

World Development Report 2020

**Trading for Development
in the Age of
Global Value Chains**

Grey Cover Draft

June 24, 2019

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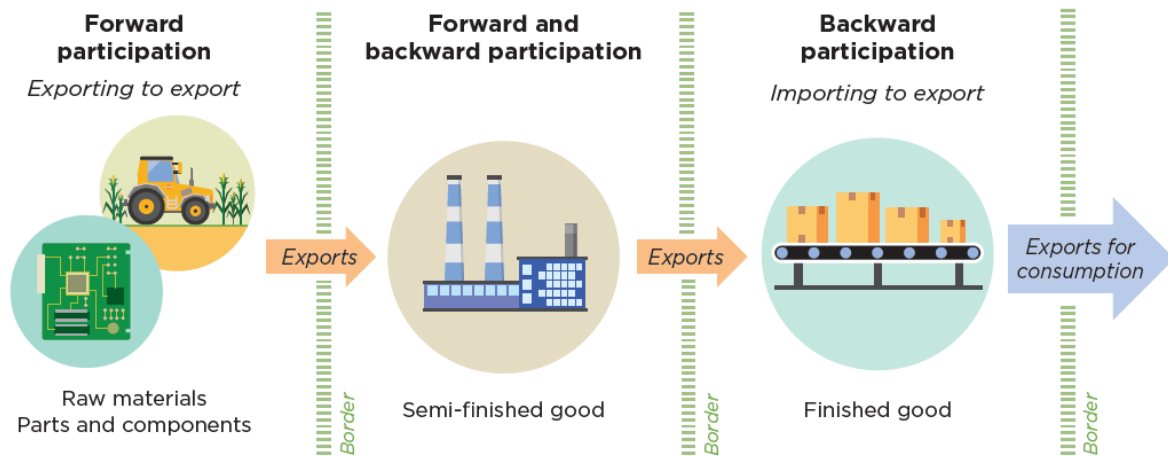
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Note: The maps in this draft are provisional. They will be reviewed and finalized by the WBG cartography team in GCS before publication.

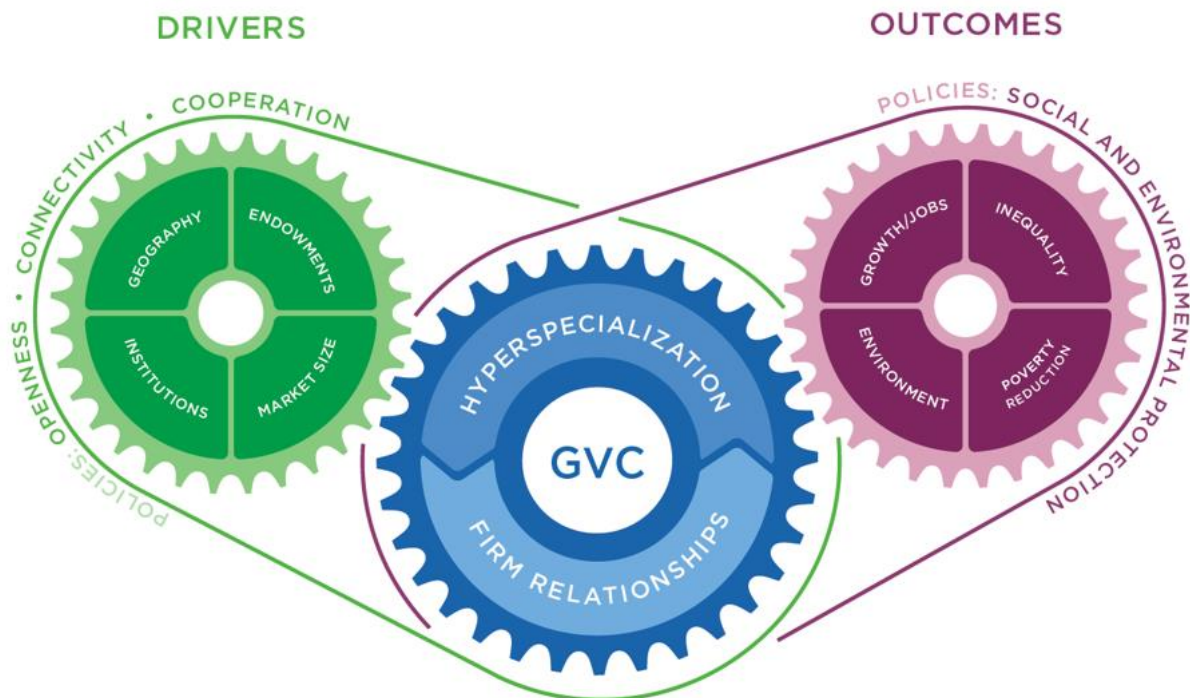
WHAT IS A GVC?

A global value chain (GVC) involves the fragmentation of production across countries. **Backward participation** is importing foreign inputs for processing and further export. **Forward participation** is exporting inputs that are incorporated in the exports of other countries.



TRADING FOR DEVELOPMENT IN THE AGE OF GVCs

GVC participation is driven by economic fundamentals but policy choices matter – both to enhance participation and to ensure benefits are shared and sustained.



Summary

1. International trade expanded rapidly after 1990, powered by the rise of global value chains (GVCs). Two features distinguish GVCs from traditional trade: countries import not only for domestic consumption, but also to export; transactions typically involve long-term, firm-to-firm relationships rather than anonymous spot market transactions.
2. The rise of trade and GVCs accelerated economic growth and reduced poverty. It enabled an unprecedented convergence: poor countries grew faster and began to catch up with richer countries. More than 1 billion people escaped poverty as a result.
3. These gains were driven by the fragmentation of production across countries and the growth of connections between firms. Parts and components began crisscrossing the globe as firms looked for efficiencies wherever they could be found. Productivity and incomes rose in countries that became integral to global value chains—China, Vietnam, and Bangladesh, among others. And the steepest declines in poverty occurred in precisely those countries.
4. However, it can no longer be taken for granted that trade will remain the force for prosperity it has been in the past. Since the Great Recession, the growth of trade has been sluggish, and the expansion of GVCs has slowed down. The last decade has seen nothing like the transformative events of the 1990s—such as the integration of China and Eastern Europe into the global economy and the conclusion of major trade agreements such as NAFTA and the Uruguay Round.
5. At the same time, potentially serious threats have emerged to the successful model of labor-intensive, trade-led growth. First, the arrival of labor-saving technologies such as automation and 3-D printing, could draw production closer to the consumer and reduce demand for labor—either at home or abroad. Second, trade conflict among large countries could lead to a retrenchment of supply chains or a segmentation of GVCs.
6. What does this mean for developing countries seeking to link in to global value chains, acquire new technologies and grow? Is there still a path to development through GVCs?
7. That is the central question of this report. It examines the degree to which GVCs have contributed to growth, jobs, and reduced poverty—and also to inequality and environmental degradation. It spells out how national policies can reignite trade growth and ensure that GVCs are a force for sustainable development rather than divergence. Finally, it identifies inadequacies in the international trade system that have fomented disagreements among nations, and provides a roadmap to resolve them through greater international cooperation.
8. The report concludes that GVCs can continue to boost growth, create better jobs and reduce poverty, provided developing countries implement deeper reforms and industrial countries pursue open, predictable policies. The evidence shows that technological change is likely to be more a boon than a curse for trade and GVCs. The benefits of GVC participation can be widely shared and sustainable if all countries enhance social and environmental protection.

GVC participation is uneven across regions, countries, and sectors, and driven by economic fundamentals and policy choices

9. GVCs have existed for centuries. But they grew swiftly after 1990 as technological advances—in transportation, information, and communication—and reduced trade barriers caused manufacturers to extend production processes beyond national borders. For most of the next two decades, GVC growth was

concentrated in machinery, electronics, transportation, and in the regions specializing in those sectors: North America, Western Europe, and East Asia.

10. In principle, breaking up complex products like cars and computers allows countries to specialize in simpler parts and tasks, making it easier for those at an early stage of development to participate in trade. But a country's ability to participate in GVCs is by no means assured. Instead, participation is shaped by its economic fundamentals and its policy choices.

11. GVC participation is determined, first and foremost, by factor endowments, geography, and institutions. But these fundamentals alone need not dictate destiny. Policies also play an important role. Attracting foreign direct investment can remedy the scarcity of capital, technology, and management skills. Liberalizing trade at home and negotiating trade liberalization abroad can overcome the constraints of a small domestic market, liberating firms and farms from the limits of domestic demand and local inputs. Improving transportation and communication infrastructure and introducing competition in these services can address the disadvantage of a remote location. And participating in deep integration agreements that spur reform as well as technical and financial assistance can improve domestic institutions.

GVCs raise productivity and incomes, create better jobs, and reduce poverty

12. Hyperspecialization in parts and tasks and long term, firm-to-firm relationships favor the diffusion of technology, and access to capital and inputs along chains. The result is increased productivity and income growth. For example, in Ethiopia, firms participating in GVCs are more than twice as productive as otherwise similar firms that participate in standard trade. Firms in other developing countries also show significant productivity gains from GVC participation. A one percent increase in GVC participation is estimated to boost per capita income growth by more than one percent, about twice as much as standard trade. The biggest growth spurt typically comes when countries transition out of exporting commodities and into importing-to-export basic manufacturing products, such as garments, as in Bangladesh, Cambodia, and Vietnam.

13. Eventually, however, these high growth rates cannot be sustained without further transition to progressively more sophisticated forms of participation. But the transitions from limited manufacturing to more advanced manufacturing and services, and then to innovative goods and services, are more demanding in terms of skills, connectivity, and regulatory institutions.

14. GVCs also deliver better jobs, but the relationship with employment is complex. Firms in GVCs tend to be more productive and capital-intensive than other (especially non-trading) firms, so their production is less job-intensive. But the increased productivity leads to an expansion in firm output and thus to increases in employment. In Ethiopia, for example, GVC firms are associated with faster growth in employment despite their higher capital intensity. The result is that GVCs are associated with structural transformation in developing countries, drawing people out of less productive activities and into manufacturing and services. Firms in GVCs are unusual in another respect: across a wide range of countries, they tend to employ more women than non-GVC firms. They contribute, therefore, to the broader development benefits that come from increased female employment.

15. By boosting income and employment growth, participation in GVCs is associated with reduced poverty. Trade in general reduces poverty primarily through growth. Because gains in economic growth from GVCs tend to be larger than from trade in final products, poverty reduction from GVCs also turns out to be greater than that from conventional trade. In Mexico and Vietnam, for example, the regions which saw more intensive GVC participation also saw faster growth in incomes.

But the gains are not equally shared and GVCs are a mixed blessing for the environment

16. But there is a twist: The gains from GVC participation are distributed unequally across and within countries. Large corporations that outsource parts and tasks to developing countries have seen higher markups and profits, suggesting that cost reductions from GVC participation are not being passed on to consumers. At the same time, markups for the producers in developing countries are declining. Such a contrast is evident, for example, in the markups of garment firms in the United States and India, respectively. Within countries, technological change and exposure to trade with lower-income countries contributes to the reallocation of value added from labor to capital. Inequality can also arise in the labor market, with a growing premium for skilled work and stagnant wages for unskilled work. GVCs may offer more women jobs but seem to have even lower glass ceilings: Women are generally found in lower value-added segments, and it is hard to find women owners and managers.

17. GVCs are, similarly, a mixed blessing for the environment. The main environmental costs of GVCs are associated with more—and more distant—trade in intermediate goods, which lead to greater CO₂ emissions from transportation than standard trade, and with excess waste (especially in electronics and plastics) from more trade and packaging of goods. GVCs also strain natural resources because of hyper-specialization, especially if accompanied by production or energy subsidies. On the more positive side, the concern that firms may choose to locate the most polluting stages of production in countries where environmental norms are laxer is not borne out by the data.

New technologies on balance promote trade and GVCs

18. The emergence of new products, new technologies of production, like automation and 3D printing, along with new technologies of distribution, like digital platforms, is creating both opportunities and risks. But the evidence so far suggests that these technologies are enhancing the contribution of GVCs to development.

19. Innovation is leading to the emergence of new traded goods and services. In 2017, 65 percent of trade was in categories that did not exist in 1992. Automation does encourage countries to use less labor-intensive methods, and reduces demand for the labor-intensive products of developing countries. However, the evidence on automation and 3D printing suggests that these technologies have contributed to higher productivity and a larger scale of production, and have therefore *increased* the demand for imports of inputs from developing countries.

20. Digital platform firms are reducing costs of trade and making it easier for small firms to break out of their local markets and sell both goods and services to the world. But there are signs that the rising market power of platform firms is affecting the distribution of the additional gains from trade.

National policies can enhance GVC participation and its benefits by liberalizing trade, improving connectivity, attracting capital, and developing skills

21. Based on the analysis of the drivers of GVC participation, we can identify the policies that can enhance participation in GVCs. We show in the report that national policies can and should be tailored to the specific circumstance of countries and to specific forms of participation in GVCs. Here we identify certain generally relevant reforms. The benefits of GVC participation come through import-led growth at least as much as export-led growth. Connecting to markets through trade liberalization and trade facilitation helps countries expand their market size and gain access to the inputs needed for production. But many developing countries still maintain high tariffs on imported inputs, and even exemptions for exporters do

not spare them transaction costs. At the same time, restrictions on competition in international air transportation and telecommunications services deepen economic isolation.

22. Attracting foreign direct investment requires openness, investor protection, stability, and a strong business climate. Countries use contrasting approaches in different sectors. Some, such as those in Southeast Asia that have benefited from foreign investment in goods, still restrict foreign investment in services. Others try to draw in investment through tax exemptions and subsidies, but they risk antagonizing their trading partners, and the net benefits may not be positive. Because GVCs thrive on the flexible formation of networks of firms, countries would do better to improve the environment for contract enforcement.

23. Improving the business and investment climate for GVCs on a national scale can be costly and take time, so many countries set up special economic zones (SEZs) to create islands of excellence. But the results so far have been mixed and suggest that SEZs are successful only when they address specific market and policy failures. For example, to reduce high transactions costs associated with land acquisition, business licensing, and customs procedures, SEZs must have authority to create a separate efficient system. SEZs can also improve infrastructure in areas like electricity generation and take steps to enhance port efficiency.

Policies to assist those left behind and to mitigate environmental damage can help ensure GVC benefits are shared and sustained

24. Beyond policies to facilitate participation in GVCs, complementary policies are needed to share the benefits and attenuate any costs. These include labor market policies to help workers who may be hurt by structural change; mechanisms to ensure compliance with labor regulations; appropriate tax policies to attract GVCs without undermining tax revenues; and environmental protection measures.

25. As GVCs expand, some workers will gain, but in some locations, sectors, and occupations, workers may lose. Adjustment assistance is needed to help workers adapt to the changing patterns of production and distribution that GVCs bring about. Adjustment policies can include facilitating labor mobility and equipping workers to find new jobs. Because unemployment resulting from structural change tends to be persistent, wage insurance can help keep workers employed in lower paying jobs without experiencing income loss, leading to better long term outcomes.

26. Labor regulations, when well designed and enforced, can help ensure the safety and health of workers. Private firms can contribute, especially when their consumers are sensitive to labor conditions in the firm's global operations. But there is also an important role for national policy supported by international cooperation, in establishing and monitoring appropriate labor standards. In Vietnam, working conditions improved when firms participated in the ILO-IFC Better Work Program and complementary government action to publicly disclose the names of firms that fail to meet key labor standards.

27. Tax policy too needs to be carefully designed to ensure socially beneficial GVC participation. Since capital and production are increasingly mobile, governments compete for FDI by lowering the burden of corporate income tax or offering specific firms or sectors tax exemptions and subsidies. While such incentives may help attract firms, being too generous compromises the revenue benefit of increased GVC activity. And in the absence of strong administration and enforcement, base erosion and profit shifting by multinationals will go unchecked, reducing taxable income.

28. Pricing environmental degradation can prevent GVCs from magnifying misallocations of resources. Prices of goods should reflect both their economic and socio-environmental costs. Appropriate pricing of environmental damage would also encourage innovation in environmentally friendly goods and production processes. Reducing distortions, such as those created by energy and production subsidies, and shifting towards taxing carbon, would reduce CO₂ emissions. In addition, environmental regulation,

especially for specific industries and pollutants, can curb damage caused by GVC-related production and transport.

International cooperation supports participation in GVCs and enables countries to reap their benefits, but the international trading system is under threat

29. The international trade system is especially valuable in a GVC world. GVCs span boundaries, and policy action or inaction in one country can affect producers and consumers in other countries. International cooperation can help address the policy spillovers and achieve better development outcomes. Because the costs of protection are magnified when goods and services cross borders multiple times, the gains from coordinated reduction of barriers to trade are even larger with GVCs than in the case of conventional trade. Because foreign investment and GVCs are inextricably linked, creating an open and secure climate for investment is vital for GVC participation, especially by capital-scarce countries.

30. Developing countries have benefited enormously from the rules-based trade system. The trade system has provided developing countries with guarantees against trade discrimination, incentives to reform, market access around the globe, and recourse in case of disputes—even against the trade heavyweights.

31. Today, however, there is tremendous pressure on the international trade system. Three decades of trade and GVC-led catch-up growth in developing countries has contributed to shifts in economic power across countries and increased income inequality within countries. The increasing symmetry in the size of countries is placing in sharp relief the persistent asymmetry in their levels of protection. The trade system has adapted to changes in the past, but it has faltered in recent years, most notably with the failure of the Doha negotiations. Regional initiatives, such as the EU and NAFTA, have also been hurt by disagreements among member countries.

32. Most seriously, trade conflict between major countries is leading to protection and policy uncertainty, and beginning to disrupt GVCs. If trade conflict worsens and causes a slump in investor confidence, effects on global growth and poverty could be significant—more than 30 million people could be pushed into poverty (measured as income levels below \$5.50 a day), and global income could fall as much as \$1.4 trillion.

33. To sustain beneficial trade openness, it is essential to “walk on two legs.” The first priority is to deepen traditional trade cooperation to address the remaining barriers to trade in goods and services, as well as other measures that distort trade, such as subsidies and the activities of state-owned enterprises. In parallel, there is a need to widen cooperation beyond trade policy to include taxes, regulation, and infrastructure.

Deepen trade cooperation to further liberalize trade in goods and services, and restrain industrial subsidies

34. Looking ahead, the first priority should be to deepen traditional trade rules and commitments. International cooperation has so far delivered uneven openness in goods and services. Trade liberalization is overdue in agriculture and services, and some industrial goods remain restricted in certain markets and by non-tariff measures. Trade agreements have reduced the goods tariffs the poorest countries face—but not the tariffs these countries impose on their imports. Special and differential treatment for developing countries has accommodated sluggish reform, ultimately inhibiting GVC participation and integration into the global economy.

35. Meanwhile, the escalation of tariffs in some of the world’s largest markets--which serve to protect higher value added production--inhibits processing activities in agroindustry and other labor-intensive areas such as apparel and leather goods in developing countries. In addition, restrictive rules of origin curtail sourcing options. Increasingly, subsidies and state-owned firms are distorting competition, and existing rules do not guarantee competitive neutrality. For services, international negotiations have delivered little liberalization beyond what has been undertaken unilaterally. Key GVC-relevant services, such as air and maritime transportation, which most need coordinated liberalization, have been excluded from negotiations because of the power of vested interests.

36. Traditional trade negotiations may deliver more meaningful outcomes if the large developing countries engage as equal partners and even leaders, instead of seeking special and differential treatment; if the large industrial countries continue to place their faith in rule-based negotiations, instead of resorting to unilateral protection; and if all countries together define a negotiating agenda that incorporates the areas mentioned above and reflects both development and business priorities.

Widen cooperation beyond trade—to capital taxation, competition policy, data flows and infrastructure

37. Taxing capital, the big winner from globalization, is increasingly difficult in a GVC world, with global firms, fragmented production, and the growth in intangible assets like intellectual property. Cooperation needs to be widened beyond trade to ensure fair access to tax revenues, which rich countries need to help displaced industrial workers and poor countries need to build infrastructure. Ultimately, a joint approach to greater use of destination-based taxation, such as the value added tax, could eliminate the incentive to shift profits and compete over taxes, but the consequences for tax revenue in small developing countries would need to be considered. Higher value added taxes coupled with low labor taxes would shift more resources to people and away from capital. Meanwhile, other measures against tax-base erosion and income-shifting, proposed by the OECD, IMF and the World Bank, could alleviate challenges around domestic resource mobilization.

38. Consumer concern is growing about data flows and the international expansion of digital firms, both of which play an important role in GVCs. The risks range from privacy abuses in data-based services to anti-competitive practices in platform-based services. Governments are resorting to data localization laws to limit the cross-border mobility of data, and strict rules on the handling of data domestically. Competition laws remain explicitly nationalist in focus, and cooperation in bilateral or regional trading agreements has been limited. The solution may be a new type of bargain: *regulatory commitments by exporters* to protect the interests of consumers abroad in return for market-access commitments by importers, as is the case for data flows.

39. But developing countries must not be left out of such arrangements, because that would undermine their productive engagement in GVCs. International support can help them both to make regulatory commitments in areas of export interest (as in data-based services) and to extract commitments from their trading partners when they open their markets (as for the enforcement of competition policy).

40. Coordination failures in infrastructure investment affect GVC investment, expansion, and upgrading especially in the poorest countries. Lessons come from the WTO Trade Facilitation Agreement, which encouraged countries to coordinate improvements in trade facilitation. Each individual country does not fully internalize the benefits to foreign traders of reductions in domestic trade costs, and gains are larger when governments on both sides of the border invest in expediting trade simultaneously. The agreement addressed this coordination problem and provides low-income countries with financial assistance for the necessary investments. A similar approach may help exploit synergies for other infrastructural investment in transport, energy, and communication.

Overview

41. International trade expanded rapidly after 1990, powered by the rise of global value chains (GVCs), speeding up economic growth, and dramatically reducing poverty. It enabled an unprecedented convergence: poor countries grew faster and began to catch up with richer countries. More than 1 billion people escaped poverty as a result.

42. These gains were driven by the fragmentation of production across countries. Parts and components began crisscrossing the globe as firms looked for efficiencies wherever they could be found. Productivity and incomes rose for countries that became integral to global value chains. The steepest declines in poverty occurred in precisely those countries—China, Vietnam, and Bangladesh, among others.

43. Today, however, it is no longer clear that trade will remain the force for prosperity it has been in the past. Since the Great Recession, the growth of trade has slowed sharply, and the expansion of GVCs has moderated. The last decade has seen nothing like the transformative events of the 1990s—such as the integration of China and Eastern Europe into the global economy and the conclusion of major trade agreements such as NAFTA and the Uruguay Round.

44. At the same time, potentially serious threats have emerged to the successful model of labor-intensive, trade-led growth. First, the arrival of labor-saving technologies such as automation and 3-D printing, could draw production closer to the consumer and reduce demand for labor – at home or abroad. Second, trade conflict among large countries could lead to a retrenchment of supply chains or a segmentation of GVCs

45. What does this mean for developing countries seeking to link in to global value chains, acquire new technologies and grow? Is there still a path to development through GVCs?

46. That is the central question in WDR 2020. The report examines how far GVCs have contributed to growth, jobs, and reduced poverty, as well as to inequality and environmental degradation. The report also studies how national policies can reignite trade growth and ensure that GVCs are a force for sustainable development rather than divergence. Finally, it considers how stresses on the trade system have led to conflict among nations, and how they can be resolved by greater international cooperation.

47. The report concludes that GVCs can continue to boost growth, create better jobs and reduce poverty, provided developing countries implement deeper reforms and industrial countries pursue open, predictable policies. The evidence shows that technological change is likely to be more a boon than a curse for trade and GVCs. The benefits of GVC participation can be widely shared and sustainable if all countries enhance social and environmental protection.

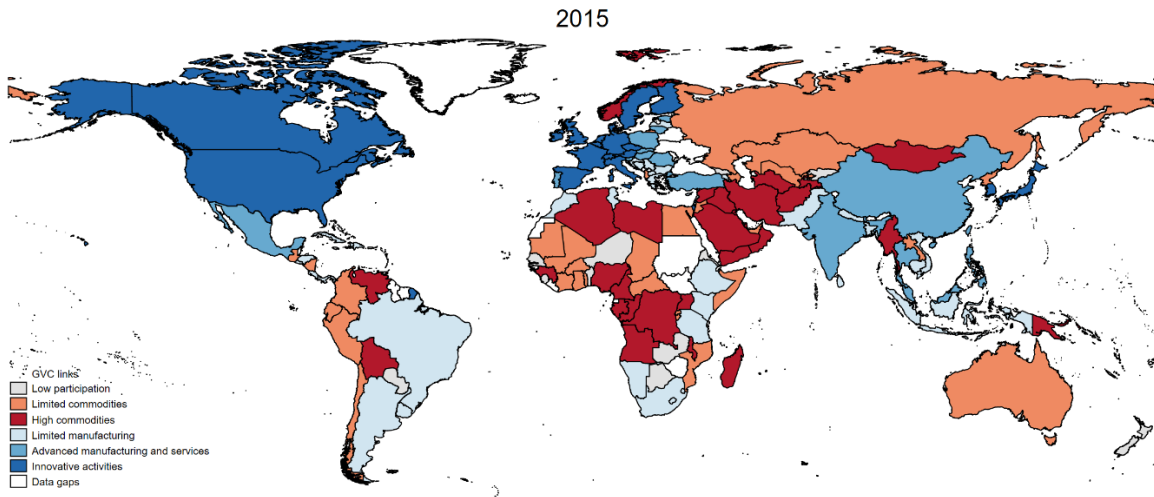
A. Evolving patterns of GVC participation

48. GVCs are not new. Assyrian merchants who settled in Kanesh (in modern-day Turkey) four thousand years ago, imported luxury fabrics and tin from Aššur (in modern-day Iraq) to make apparel and bronzes that were traded throughout the region. But remarkable improvements in transport and more recently in information and communication technology in the last three decades have accelerated the breaking up of production across borders. Not just the components of cars and computers, but a range of services have also been liberated from the confines of factories and local service firms and are being outsourced to different countries.

49. Only some countries have shared in the expansion of GVCs, however, and participation in global or even regional value chains differs across regions and sectors (figures 1 and 2). Many producers in Africa and Latin America are at the base of value chains and produce primarily agricultural goods and natural resources, like cocoa and copper. Some producers in South Asia and East Africa have broken into simple manufacturing tasks, like garments, while others in South and East Asia as well as Eastern Europe are

engaged in more advanced tasks in electronics and services. And a few in North America, Western Europe, and East Asia are generating innovation and innovative goods and services.

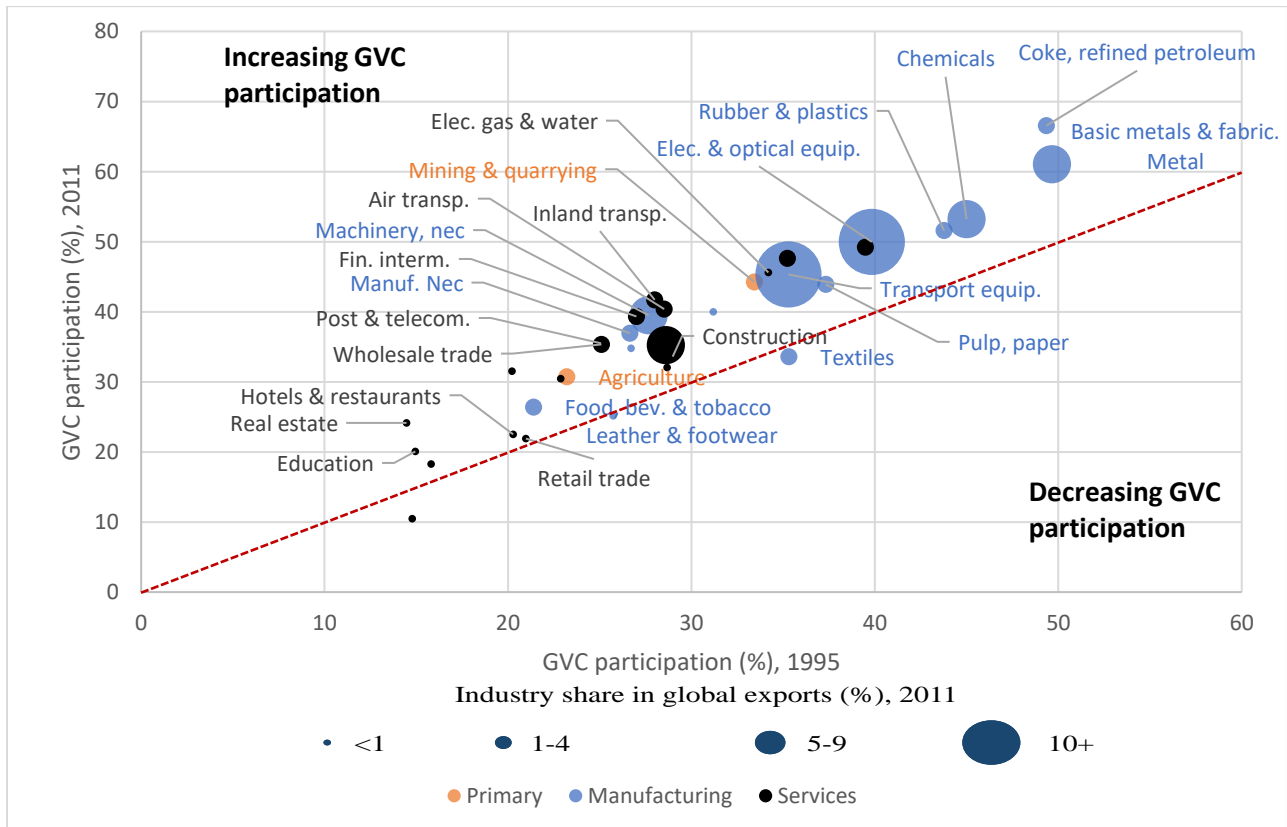
Figure 1 All countries participate in GVCs—but not in the same way



Source: WDR team calculations based on the GVC taxonomy of 1990 and 2015 (see Box 1.2).

Notes: The type of a country’s GVC links are based on: (a) the extent of its GVC participation; (b) the country’s sectoral specialization in trade. Details are provided in Chapter 1, figure 1.5.

Figure 2 GVC participation by sector, 1995 and 2011



Source: WDR team calculations using the WIOD 2013 release dataset and Borin and Mancini (2019).

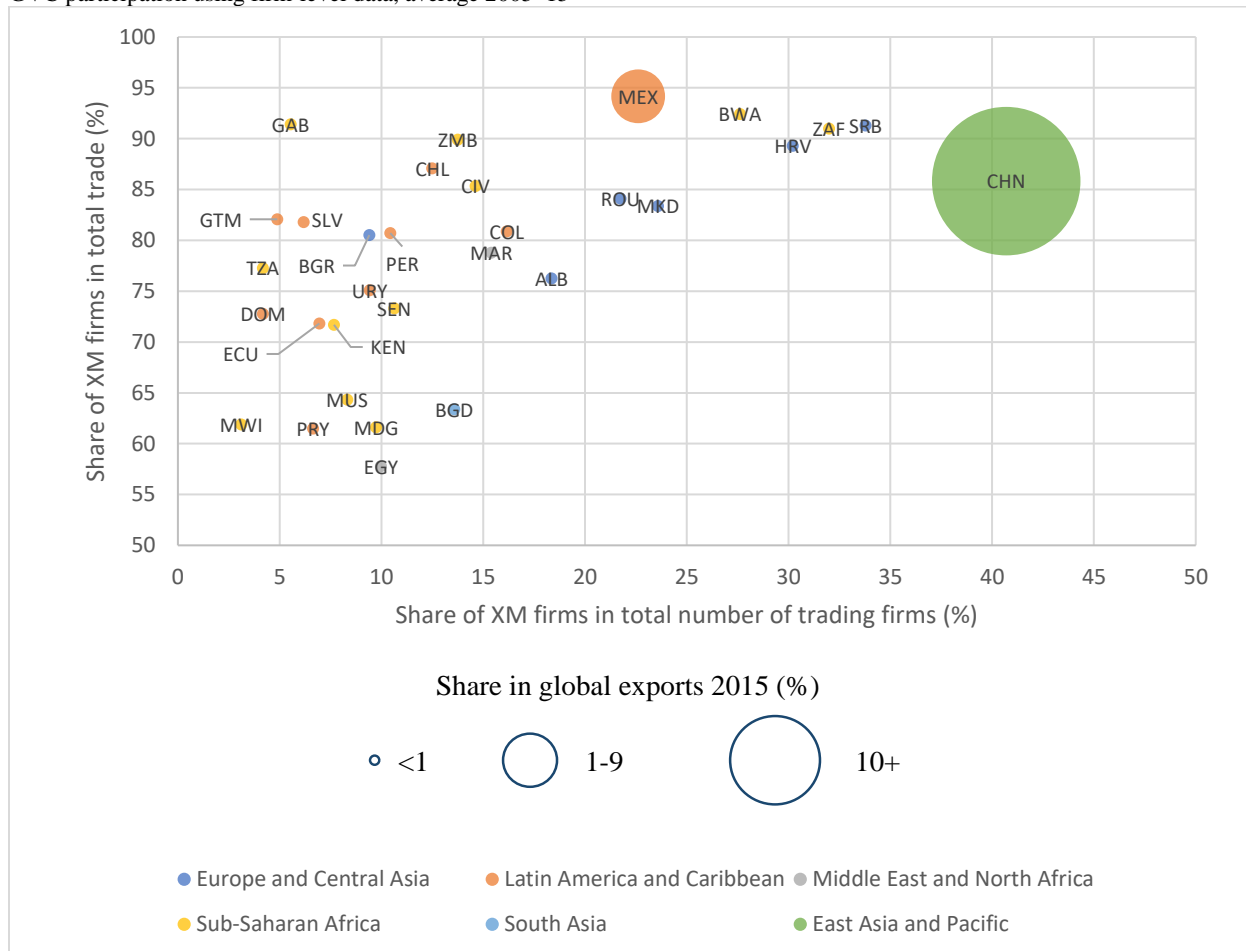
Note: The GVC participation measure reflects the share of world exports that flow through at least two borders. For each industry year, it is computed as the share of GVC exports in total international exports. GVC exports include transactions in which a

country’s exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country’s exports are not fully absorbed in the importing country and instead are embodied in the importing country’s exports to third countries (forward GVC participation). The WIOD 2013 dataset is used because it offers a finer sectoral classification than EORA26. In addition, the 2013 release is used, which covers the years 1995 to 2011 rather than the latest 2016, which covers the years 2001 to 2014, in order to compare the change in GVC participation in the 2010s relative to the 1990s.

50. The main actors in GVCs are not countries but firms. One way of illustrating GVC participation is by looking at the number and share of firms that both import and export. These “GVC” firms account for only about 15 percent of all trading firms on average in our sample of countries, yet they capture almost 80 percent of total trade (figure 3). These are the “superstar” firms, many of them multinational, that drive countries’ trade performance. Foreign investment by these firms is a key driver of GVC participation.

Figure 3 Firms that both import and export dominate GVC participation, 2005–15

GVC participation using firm-level data, average 2005–15



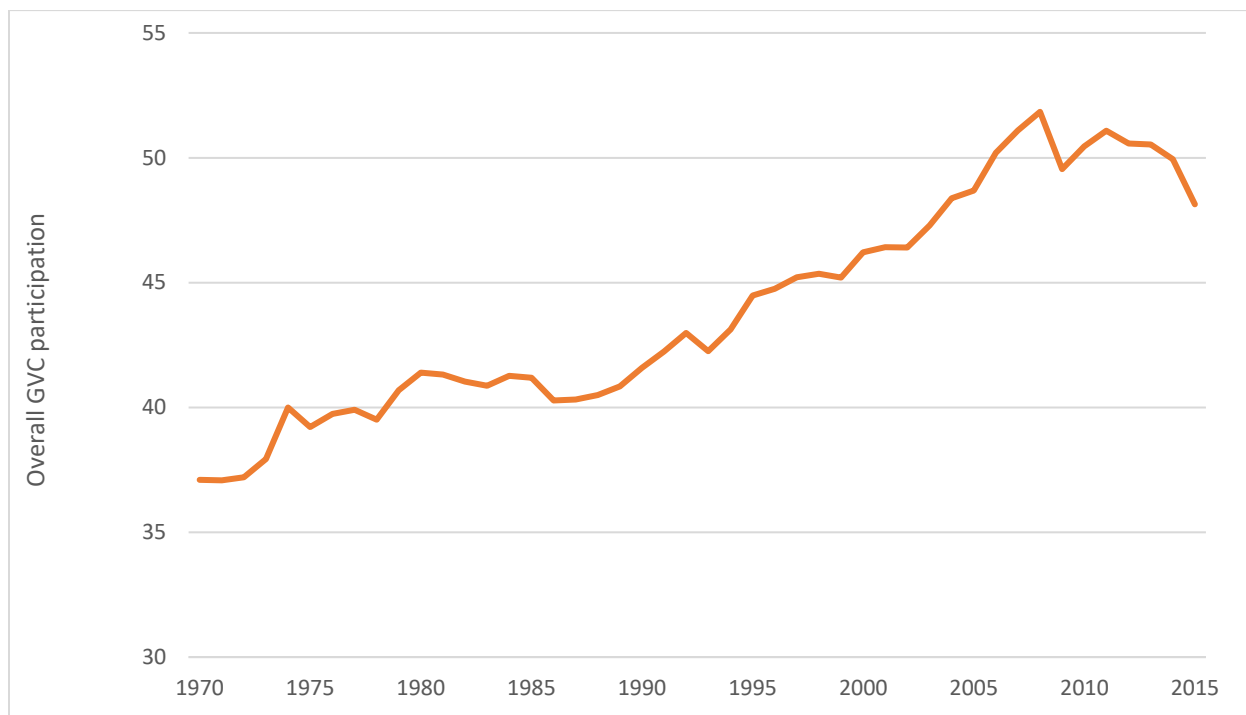
Source: WDR team calculations using firm matched export–import customs data collected for 32 countries by the Trade and Integration Unit of the World Bank Research Department, as part of efforts to build the Exporter Dynamics Database described in Fernandes, Freund, and Pierola (2016).

Note: The graph plots the share of two-way trading firms (firms that both import and export in a given year) in the total number of trading firms (firms that import, export, or do both), against their share in a country’s total trade value (imports plus exports). For each country, the average of each measure is computed over 2005–15 for the largest available sample of countries. The dashed lines mark the average across countries for each measure on the X and Y axis.

51. Notwithstanding these significant if uneven developments, this Report comes at a time when international production fragmentation might be running out of steam. Trade and GVC growth have slowed, especially since the global financial crisis (figure 4). One reason is the slowing of overall economic growth,

and especially investment. Another reason is the slowing pace and even reversal of trade reform. The last decade has seen nothing like the transformative events of the 1990s—such as the integration of China and Eastern Europe into the global economy and the conclusion of major trade agreements such as NAFTA and the Uruguay Round. Meanwhile, the fragmentation in the dynamic regions and sectors has matured. China is producing more at home: the share of intermediate imports to exports of Chinese goods dropped from about 50 percent in the 1990s to a little over 30 percent in 2015. In fact, due to its growing domestic manufacturing capacity to supply downstream production, China has defied the global trend of falling domestic value-added shares in exports. In the United States, a booming shale sector reduced oil imports by one-fourth between 2010 and 2015 and slightly reduced the incentives to outsource manufacturing production.

Figure 4 GVC trade grew fastest in the “long 1990s” but stagnated after the crisis



Source: WDR team calculations using the EORA26 database, Johnson and Noguera (2012), and Borin and Mancini (2019).

Note: The GVC participation corresponds to the share of world exports that flow through at least two borders. For 1990–2015, the GVC participation measure is computed as the ratio of the sum of foreign value added embodied in countries’ gross exports (backward linkages) and domestic value added embodied in third countries’ exports (forward linkages) to gross exports. The data used to compute the GVC participation measure is the EORA26 database. For 1970–90 the GVC participation measure is backcasted using Johnson and Noguera (2012) estimate of VAX, an older measure of value-added content of bilateral trade. While the difference between VAX and the GVC participation measure is sizable, the correlation of the change over the overlapping years (1990–2010) is 0.97. This method allows reconstructing a long series covering 1970–2015 rather than simply 1990–2015 for which the EORA26 database is available.

52. The slowdown is thus best seen as a sign not of diminished opportunities but of uneven participation. So, a key question is: What can be done to foster more productive engagement in other regions (Africa, Latin America, and South Asia) and in other sectors (services, agroprocessing)? Changes in the technologies of communication (simultaneous translation, holographic video-conferencing), production (automation and artificial intelligence) and distribution (digital platforms) add a new dimension to this question.

53. Recent rises in protection could also affect the evolution of GVCs. On the one hand, it could facilitate reshoring of existing GVCs or their shifts to new locations. On the other hand, unless policy predictability is restored, any expansion of GVCs is likely to remain on hold. When future market access is

uncertain, firms have an incentive to delay investment plans until uncertainty is resolved. Foreign direct investment inflows, a key driver of GVC participation, fell by more than 20 percent in 2017 and are estimated to have remained weak in 2018, as trade tensions escalated.

B. Drivers of GVC participation

54. Participation in GVCs is shaped by what a country is already endowed with and the policy choices it makes. GVC participation is determined, first and foremost, by fundamentals, such as factor endowments, geography, and institutions. But these fundamentals need not dictate destiny. Choosing the right policies can shape each of the fundamentals and thus also GVC participation.

55. Analysis in this Report shows that attracting FDI can remedy the scarcity of endowments such as capital, technology, and management skills. Liberalizing trade at home and negotiating trade liberalization abroad can overcome the constraints of a small domestic market, liberating firms and farms from narrow domestic demand and dependence on limited local inputs. Improving transport and communication infrastructure and introducing competition in these services addresses the disadvantage of a remote location. Participating in deep integration agreements that help spur both reform as well as technical and financial assistance can improve domestic institutions.

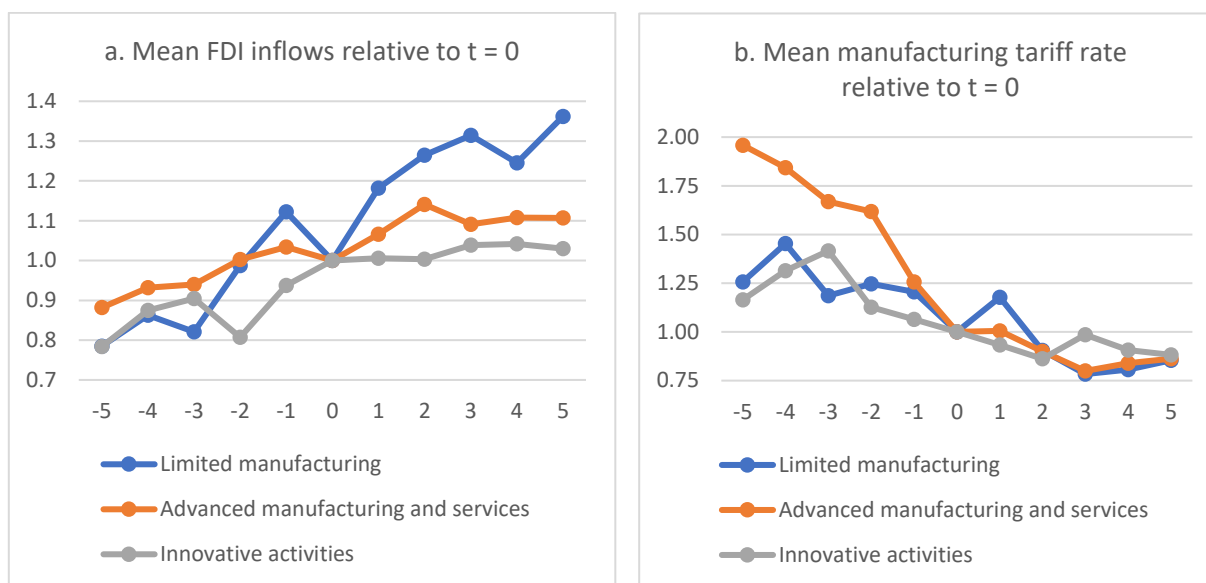
Focus 1 Vietnam

Vietnam's electronics sector expanded sharply in less than a decade, with exports relying heavily on imported components. In 2019, Vietnam is the second largest smartphone exporter, produces 40 percent of Samsung's global mobile phone products and employs 35 percent of its global staff. The success of Vietnam can be largely attributed to a combination of factors. Openness to trade, a favorable investment climate, and a large pool of low-cost labor shaped Vietnam's attractiveness as a GVC location, resulting in large foreign direct investment (FDI) inflows. An important factor in opening its own market and securing access to foreign markets, were the trade deals Vietnam signed, including a bilateral agreement with the U.S. in 2001, accession to the WTO in 2007, and most recently the Comprehensive and Progressive Agreement for Trans-Pacific Partnership in 2019. Vietnam's geographical proximity to regional suppliers of electronics parts and components like China, Japan, Republic of Korea, and Thailand helped foreign investors access quality inputs from abroad. And improvements in connectivity enabled Vietnam to import and export in a timely manner.

Factor endowments matter: Foreign capital can help

56. Consistent with traditional trade theory, factor endowments are a key determinant of specialization in GVCs and they also shape the positioning of countries in GVCs. The availability of low-skilled labor is linked to countries' stronger backward integration in GVCs. The supply of low-cost labor in lower income countries was in many cases an entry point to participation in relatively downstream, unskilled-labor intensive manufacturing segments of GVCs. But skill upgrading becomes necessary for integration into more complex GVCs. A country's higher abundance in natural resources is a crucial determinant of forward GVC integration.

57. Attracting FDI can remedy the scarcity of endowments such as capital, technology, and skills. FDI inflows are strongly and positively associated with the extent of backward GVC participation. FDI also promotes domestic upstream sectors, as seen in the experiences of the apparel sector in Bangladesh, the electronics sector in Vietnam, and the automotive sector in Morocco. Whether GVC participation is in simple manufactures, enhanced manufactures and services, or innovative and complex products, FDI increases in the years before countries upgrade their GVC participation (year zero) and continues increasing a few years after that (figure 5a).

Figure 5 FDI increases and tariffs decline before countries upgrade their GVC participation

Source: WDR team based on World Development Indicators and GVC taxonomy.

Note: The year of entry is normalized at 0 for all countries in a particular GVC group and the sample to compute the means is based on countries with at least five years of observations before and after entry to the GVC group. Averages are for absolute values of FDI inflows (in logs) and tariff rates (in percentage points). Additional analysis confirms that FDI inflows increase significantly in the 5 years before and after a switch, while tariff rates show a significant decline over that same period.

58. FDI is also important in agriculture, increasing productivity and helping countries break into and move up in GVCs. With more than 500 million small-scale farmers, agribusiness is the entry point for many developing countries into GVCs. The challenge for farmers is moving into higher value-added stages of production. Capital-intensive processing makes investment costly, while quality standards and tariffs that often escalate with the extent of processing make exporting difficult. Coffee is a prime example, with more than three-quarters of coffee imported in Europe, Japan, and the United States entering as beans for domestic roasting and processing, and often reexported. Some countries in Asia and Latin America export sizable shares of processed coffee, but African exporters remain concentrated in beans. Lead firms can foster the upgrading of farmers through long-term relationships and commitments for products that meet agreed-upon quality standards (focus 2).

Focus 2 The role of FDI in agricultural upgrading

Linking farmers into high-end global value chains often requires upgrading quality to meet standards. Quality upgrading, however, can be particularly difficult in agricultural chains in developing countries due to multiple market imperfections along the chain. Upstream, farmers face acute challenges when accessing finance and other inputs due to a lack of collateral, and extension services are often absent. In informal markets, buyers also hold significant market power in setting prices, but the lack of meaningful contract enforcement increases the risk of side-selling by farmers. There are more problems at the point of export, where perishability, limited demand, and cumbersome processing requirements combine to lower prices and lead to high postharvest losses.

Buyer-driven initiatives, often called Voluntary Sustainability Standards (VSSs), strive to overcome these challenges to guarantee the quality and sustainability of the products sourced, and often to increase productivity amongst the farmers in the value chain. VSSs have become increasingly popular in global agricultural value chains. In recent years buyer-driven initiatives have emerged in response to the

limitations of social and environmental labels and as part of a broader trend in which global buyers reorganize their supply chain to achieve greater collaboration with a more limited number of suppliers.

A recent study, covering 80,000 eligible coffee farmers and 1,000 villages across 10 years in Colombia, showcases the success of one private firm-led VSS program. Using census data on all coffee farms in Colombia, researchers could trace coffee batches from the point of sale by the farmer to the export gate. The analysis showed that participating in the program induced farmers to upgrade their farms: coffee trees were replanted, better environmental practices were adopted, the land cultivated expanded, and there was a consolidation toward more productive farmers. For the regions participating in the program, the quality of the coffee increased both at the coffee mill and the export gate.

The program also paid a price premium of about 10 percent. Participants' profits increased by 15 percent, without reducing the profits of other farms that did not join the program. Given a 20 percent price premium paid by the program's buyer at the export gate relative to standard coffee, the program increased profits in the Colombia coffee chain by about 30 percent. Around 50 percent of the additional surplus created by the program stayed with the farmers.

The analysis suggests that the demand commitment made by the international buyer played an important part in incentivizing farmers to opt into the program, notwithstanding the additional upgrading. Crucially, the buyer made a demand commitment, guaranteeing purchases for all coffee produced under the program at the stated premium. This demand commitment stands in stark contrast to most other certification schemes, in which farmers typically pay to certify all of their production, but buyers are under no obligation to purchase.

Source: Macchiavello, R., and Miquel-Florencia, J. Forthcoming. Quality Upgrading in the Colombia Coffee Chain: Evaluation of a Buyer Driven Program.

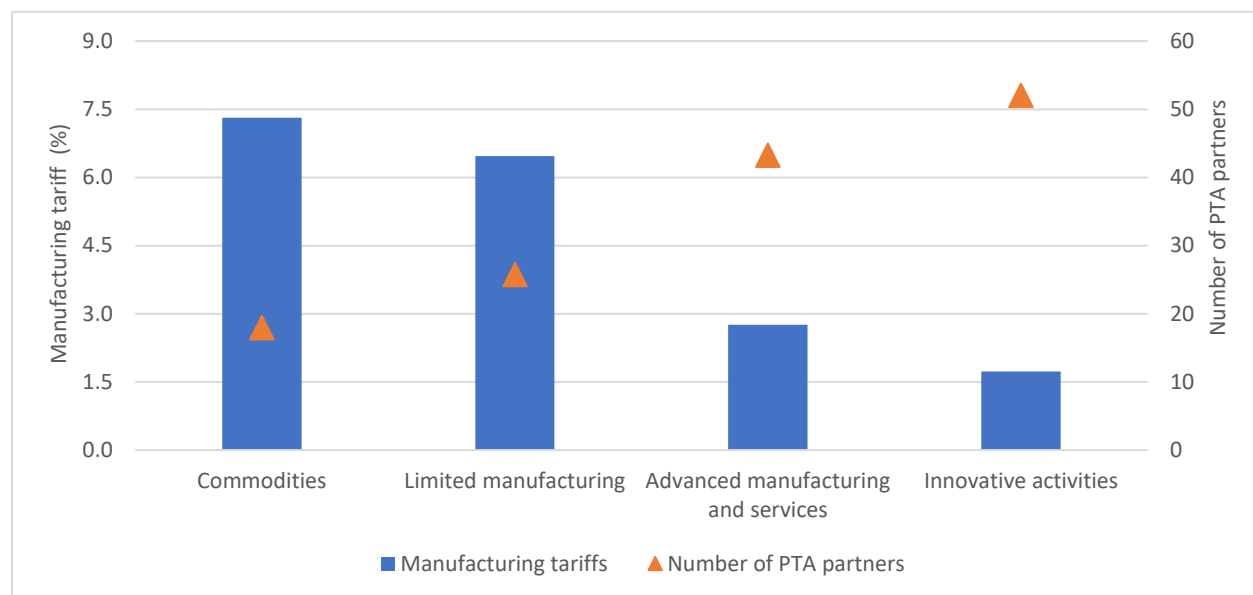
Market size matters: Trade liberalization can help

59. Countries with larger markets have a larger industrial capacity and are less likely to use imported inputs in their exports. As a result, a larger market size is associated with larger forward GVC participation and smaller backward GVC participation.

60. Smaller countries can enhance their market size through trade liberalization at home and obtaining better access to markets abroad. Lower tariffs on manufacturing goods foster countries' backward GVC participation in manufacturing. Manufacturing tariffs fall sharply in the years prior to a country transitioning from commodity-linked to limited manufacturing-linked GVCs (figure 5b). Tariffs are much lower for countries with high backward GVC participation than for resource-intensive exporters (figure 6).

61. Favorable access to other countries' markets also plays a role. Sectors facing lower tariffs in destination markets exhibit stronger levels of backward and forward GVC participation across countries. Market access, such as that provided by the European Union's Everything but Arms Initiative or the U.S. African Growth and Opportunity Act, can foster exports and GVC integration. In the long run, the effects depend on rules of origin and their impacts on developing a local supplier base.

Figure 6 Manufacturing tariffs are high and PTA partners are few in countries connected to commodity GVCs



Source: WDR team based on WDI and Deep Trade Agreements database and GVC taxonomy of 2011.

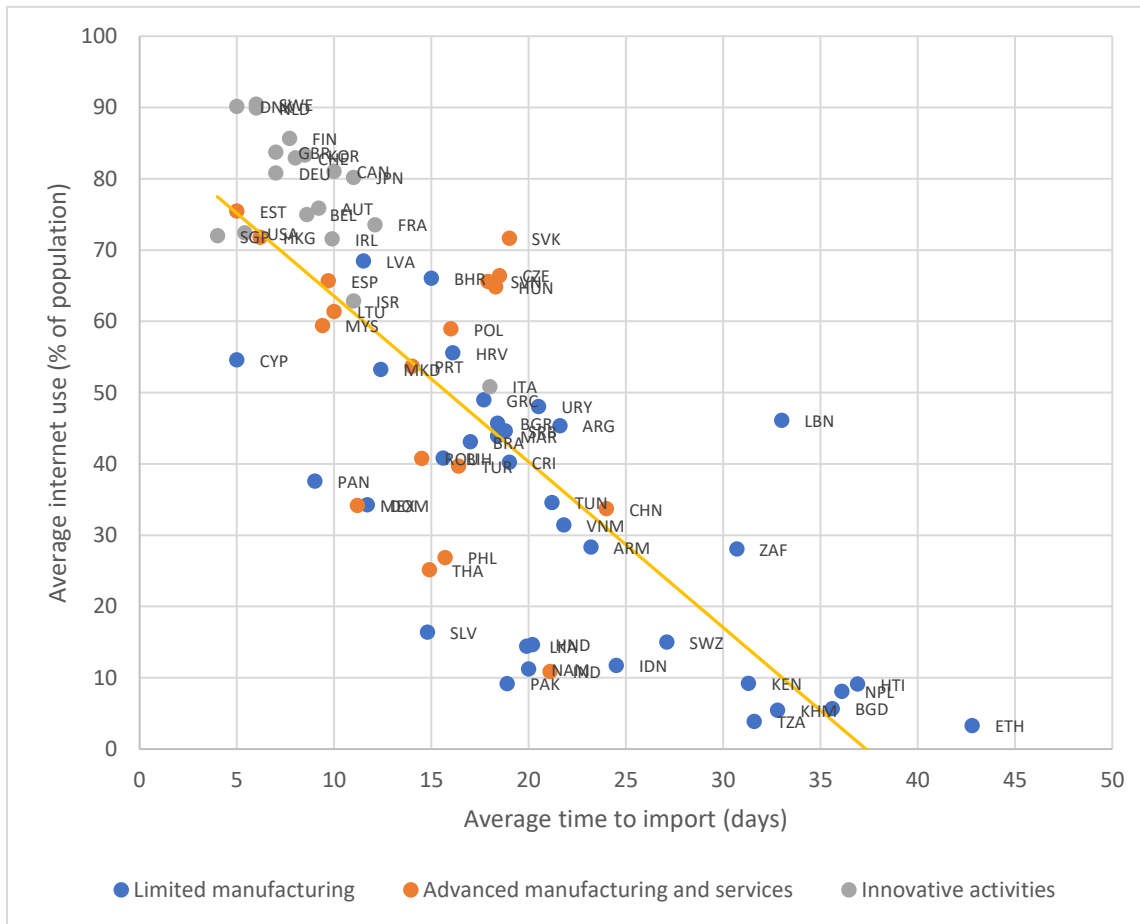
Note: The left axis shows average manufacturing import tariffs and the right axis the average number of preferential trading partners by GVC taxonomy group, with averages over 2006–15.

Geography matters: Improved connectivity can help

62. Distance and the resulting trade costs remain a big obstacle to entering, establishing, and upgrading in GVCs. Indeed, compared with standard trade, the costs have disproportionately negative effects on GVC trade. Larger geographical distances to the major GVC hubs—China, Germany, and the United States—reduce both backward and forward GVC participation in manufacturing. By contrast, larger geographical distance to the major GVC hubs increases a country’s likelihood of being specialized in commodity GVCs.

63. Inefficient, uncompetitive transport and logistics services amplify transport costs in many manufacturing GVCs, due to multiple border crossings. High transport costs can even offset the comparative advantage of low labor costs. Trade in parts and components in international production networks is particularly sensitive to logistics performance and uncertainty about international transport times. Countries with longer times to import are less likely to participate in manufacturing and services GVCs (figure 7). While imports by innovative GVC countries need only nine days to reach a warehouse, countries in enhanced manufacturing and services GVCs require one additional week and countries specializing in commodity GVCs more than one month.

64. Not confined to the physical supply chain of goods, connectivity also includes effective communication between the different participants in GVCs, which using the internet can improve. Higher internet use is linked to stronger backward GVC integration.

Figure 7 Connectivity matters for specialization in more advanced GVCs

Source: WDR team based on World Development Indicators, Doing Business Database and GVC taxonomy of 2011

Note: Excludes countries specializing in commodities. The x axis shows the average time to import (days) and the y axis the average internet use (% of population) by GVC taxonomy group, with averages over 2006–15.

Institutional quality matters: Deep trade agreements can help

65. Weak contract enforcement deters even traditional trade flows, but GVCs are particularly sensitive to the quality of institutions. Sectors relying more strongly on contract enforcement indeed see faster growth in GVC participation levels in countries with better institutional quality. Political stability also matters greatly for backward GVC integration and reduces the likelihood of specializing in commodity GVCs.

66. Institutional quality can be enhanced primarily through domestic reform, but international engagement can help. Deep preferential trade agreements can foster GVC participation through a combination of channels that go beyond simple market access and cover several aspects of legal and regulatory frameworks, harmonized customs procedures, and rules on intellectual property rights. Regional trade blocs and especially deep trade agreements like the European Union and ASEAN, strongly promote countries' backward integration in GVCs.

C. GVCs and sustainable development

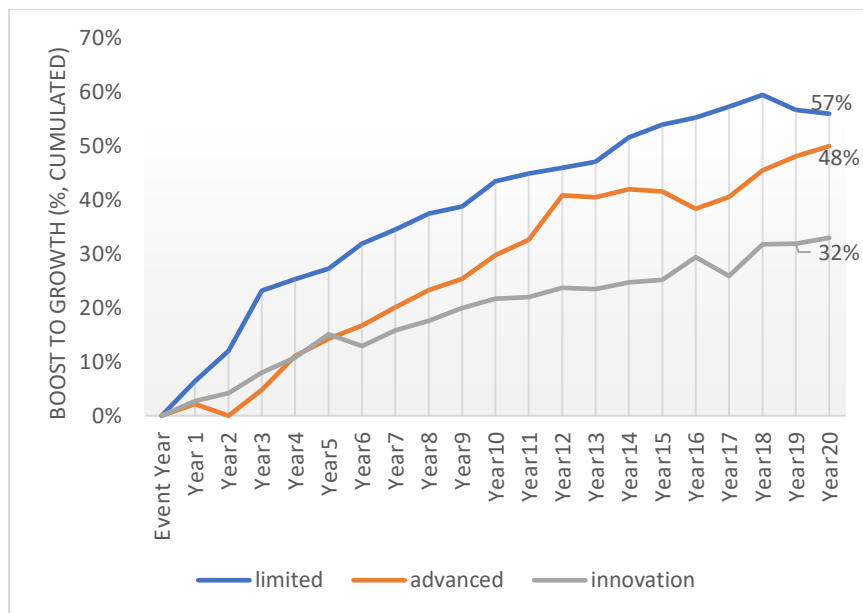
67. The hyperspecialization in parts and tasks, the diffusion of technology, and the access to capital and inputs along chains can all lead to productivity and income growth. But the same division of labor can

also generate inequality within and across countries, as some are stuck in dead-end tasks while others reap even higher returns to skills and innovation. Hence the question: How far are GVCs delivering growth and jobs and reducing poverty, and how far greater inequality?

GVCs are associated with growth

68. GVCs are indeed contributing to higher productivity and incomes in participating regions, countries, sectors, and firms. All forms of GVC participation are associated with higher growth in incomes than standard trade (figure 8). The biggest growth spurt occurs when countries like Bangladesh, Cambodia, and Vietnam break out of commodities into basic manufacturing.

Figure 8 The boost to per capita GDP growth is largest in countries after they enter simple manufacturing GVC tasks



Source: WDR Team using data from WDI and EORA.

Note: The event study quantifies cumulated boost to real income growth in the 20 years following a switch from a lower to a higher stage of GVC engagement. See box 3.3 for the methodology.

Focus 3 Bangladesh

Bangladesh is a powerful example of how participation in global value chains has supported inclusive economic growth. In 1988, Bangladesh exports of apparel and footwear were negligible, only 0.2 percent of the global total. Since then the business of exporting apparel made from imported textiles has grown on average 17.5 percent every year. Bangladesh now exports 7 percent of the world's apparel and footwear, third only to China and Vietnam. The sector accounts for 89 percent of the country's exports, 14 percent of GDP, and employs 4.2 million workers, 90 percent of them women. The economy has transformed: agriculture's share in GDP fell from 70 percent in 1988 to 38 percent in 2018, and the share of people in poverty fell from 44 percent to 15 percent in 2016.

Navigating globalization has not been easy. Low wages drive Bangladesh's export success. In the past 30 years, there has been little upgrading toward more productive and better paid tasks. Demands for higher wages in the factories recently spilled to social unrest in the streets in strikes and protests. Tragic incidents, such as the Rana Plaza collapse in 2013, have highlighted poor safety conditions in the GVC factories. Unplanned growth of the textile and apparel industry has strained scarce land resources. The sector

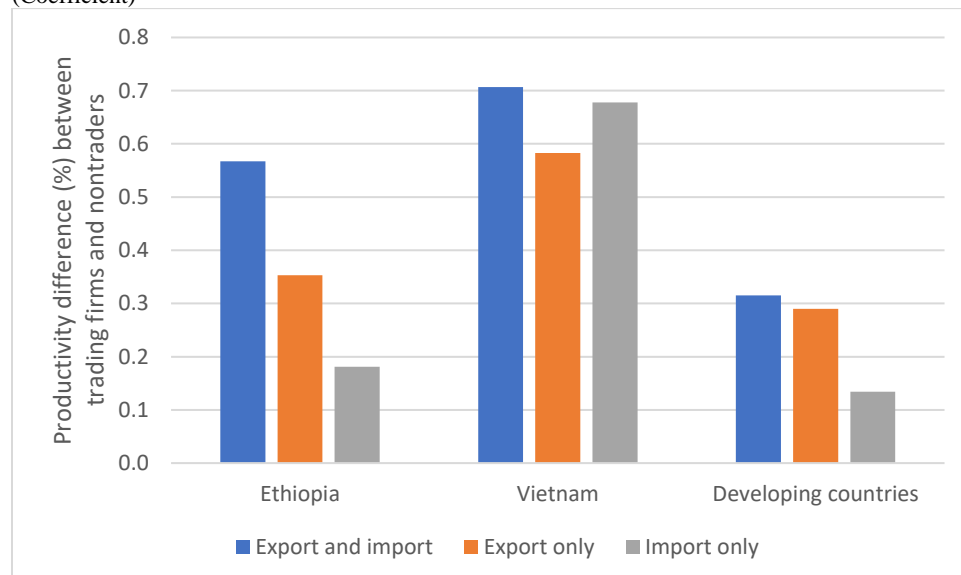
consumes nearly twice as much water as the entire population of the capital Dhaka, and ground water levels are dropping at more than 2 meters a year.

The relational nature of GVCs is, however, leading to a positive response. Industrial disputes and disruptions, arising from worker dissatisfaction with working conditions, have increased international attention to labor conditions. And the private and social costs have resulted in a series of responses from buyers and donors alike to improve working conditions and building, fire, and worker safety, and to reduce environmental harm.¹

69. The country picture is supported by firm-level evidence. In Ethiopia, and across a large sample of countries, GVC firms (that both import and export) in manufacturing have higher productivity (labor productivity controlling for capital intensity) than one-way traders or nontraders (figure 9). In Vietnam, this relationship holds for firms not just in manufacturing but in all sectors. Vertical relational GVCs, in particular, are a natural vehicle for technology transfer, due to a shared interest in the exchange of knowledge which is more likely in the context of longer-term association between firms. Furthermore, access to cheaper, better and more diverse input inputs also tends to increase productivity.

Figure 9 GVC firms that both export and import are more productive

(Coefficient)



Source: 2014 GSO Enterprise Survey (firms with >5 employees) for Vietnam. 2000–14 manufacturing census (firms with >=10 employees) for Ethiopia and Choi et al. (2019). World Bank Enterprise Surveys for a developing country sample of 81 countries.

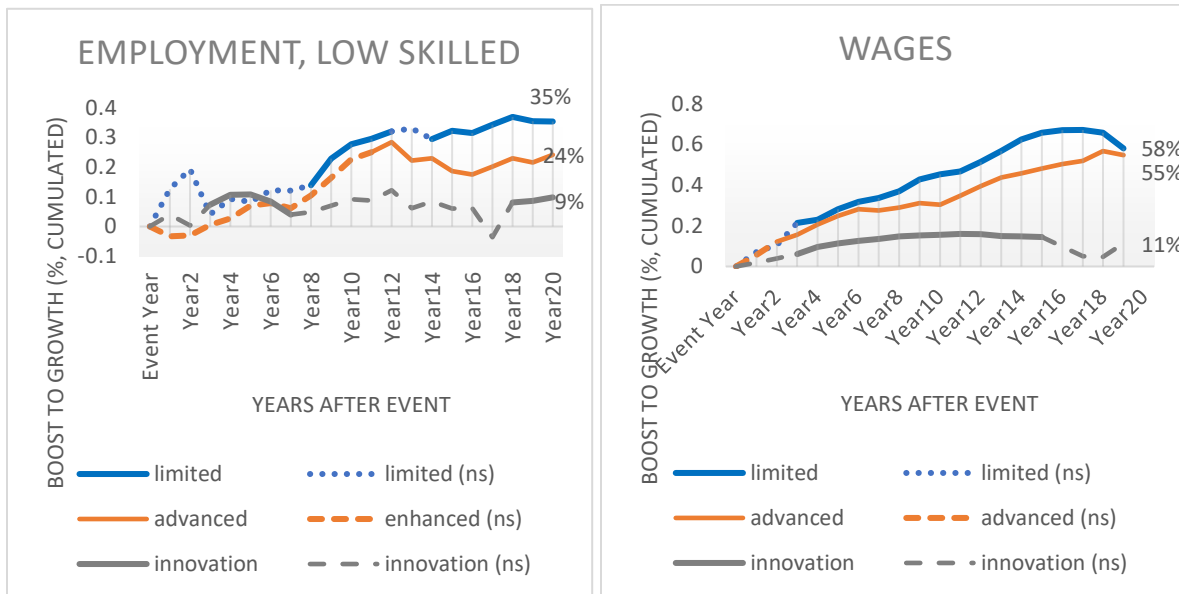
Note: The figure plots the coefficient estimates of a regression of log of labor productivity (sales per worker) on dummy variables if the firm exports and imports (GVC firm), exports only, or imports only, controlling for capital per worker. Only statistically significant coefficients reported. The global sample controls for country–sector, subnational region, and year fixed effects. The Ethiopia sample controls for sector, year, and region fixed effects as well as whether the firm is state-owned. The Vietnam sample controls for sector and region fixed effects as well as whether the firm is state- or foreign-owned.

GVCs can deliver better jobs

70. Apart from higher overall productivity, production within GVCs is also associated with high capital intensity—machines can be equipped to deliver the precision needed for inter-compatible parts. Exports are thus becoming less job intensive and, for some countries, contributing to a smaller share of total jobs. But the effect on employment has been positive because the expanding aggregate output is increasing sectoral employment through scale effects (figure 10). The result is that GVCs are associated with structural transformation in developing countries, with exports pulling people out of less productive activities and becoming more important for manufacturing jobs. This pattern is apparent in Ethiopian GVC firms, which

use more capital and have higher employment growth (figure 11) and are more productive. Importantly, GVCs support jobs not just for men but also for women: firms in GVCs tend to employ more women than non-GVC firms (figure 12).

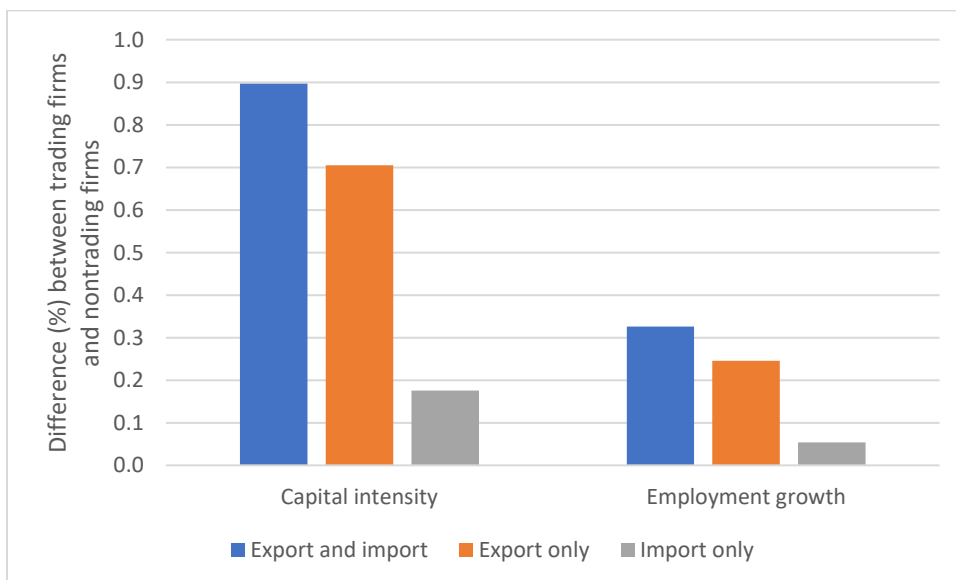
Figure 10 The boost to employment and wage growth is largest when countries first break into manufacturing



Source: Authors using data from WDI and EORA.

Note: The event study quantifies the change in cumulated employment and wage growth in the 20 years following a switch from a lower level to a higher level of GVC engagement. Dotted lines indicate statistically non-significant coefficients. Details are provided in Chapter 3.

Figure 11 In Ethiopia, GVC firms are more capital-intensive but are generating faster employment growth, 2000–14

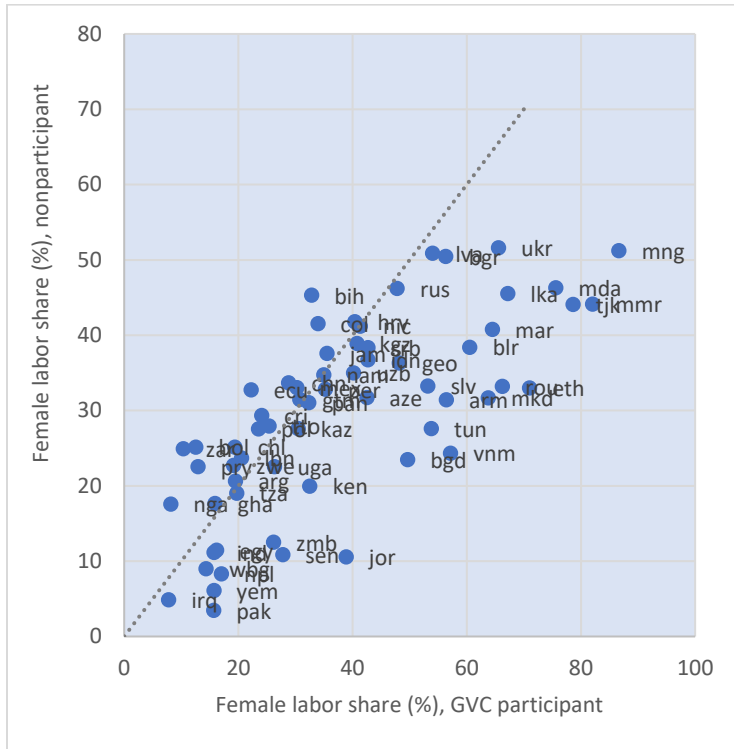


Source: 2000–14 manufacturing census (firms with >=10 employees) and Choi et al. (2019).

Notes: The figure plots the coefficient estimates of a regression of log of capital intensity (capital per worker) or employment on dummy variables if the firm exports and imports (GVC firm), exports only, or imports only. Only statistically significant

coefficients reported. The sample controls for whether the firm is state-owned as well as sector, year, and region fixed effects (capital intensity) and firm and year fixed effects (employment). For the capital intensity and employment regressions, the coefficients for export-only and GVC firms are not statistically different from each other.

Figure 12 GVC firms hire more women than non-GVC firms across the world



Source: Rocha and Winkler (2019) using data from World Bank Enterprise Surveys.

Note: Each dot represents a country-year observation. The x-axis plots the employment-weighted share of female workers in total workers within firms that both export and import (GVC participant) within each country-year. The y-axis plots the employment-weighted share of female workers in total workers within firms that do not export and import (nonparticipant).

Better jobs and higher productivity lead to lower poverty

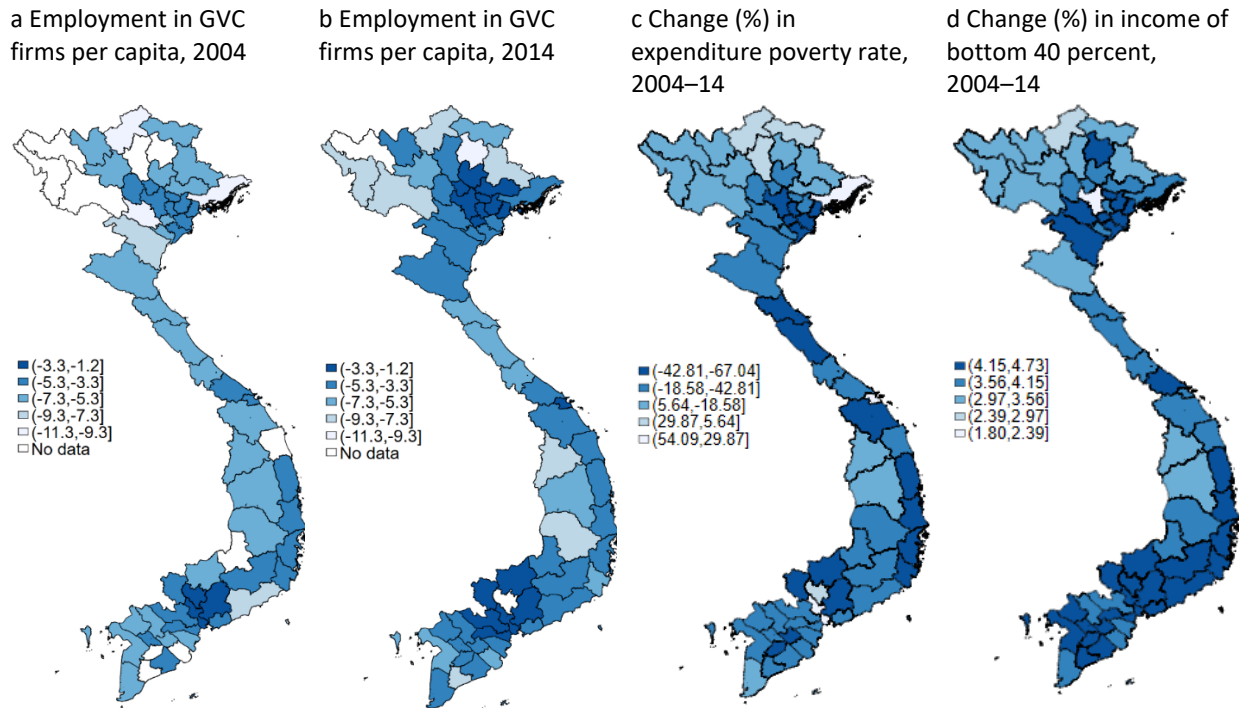
71. Trade reduces poverty through growth. Since the productivity growth associated with GVCs is greater than that associated with trade in complete products, poverty reduction from GVCs is unsurprisingly larger than from conventional trade. In Vietnam, GVC formation was associated with large declines in poverty rates, with GVC-intensive provinces experiencing especially sharp declines in poverty and improvements in shared prosperity (figure 13).

But the gains may be distributed unequally

72. Large corporations that outsource parts and tasks to developing countries have seen higher profits, suggesting that cost reductions are not passed on to consumers (figure 14). Yet the markups for producers of these inputs in developing countries are declining. So too is labor's share in income, as technological change and GVC integration contribute to the reallocation of value added from labor to capital within countries—also reflected in the increasing markups (figure 15).

73. Inequality can also arise in the labor market, with a growing wage premium for skills and stagnant wages for the unskilled. Women are generally in lower value-added segments, and women owners and managers are largely absent in GVCs (figure 16). As with trade, inequality also has a geographical dimension, with GVCs strongly associated with greater concentration in urban agglomerations (or in border regions for countries neighboring GVC partners).

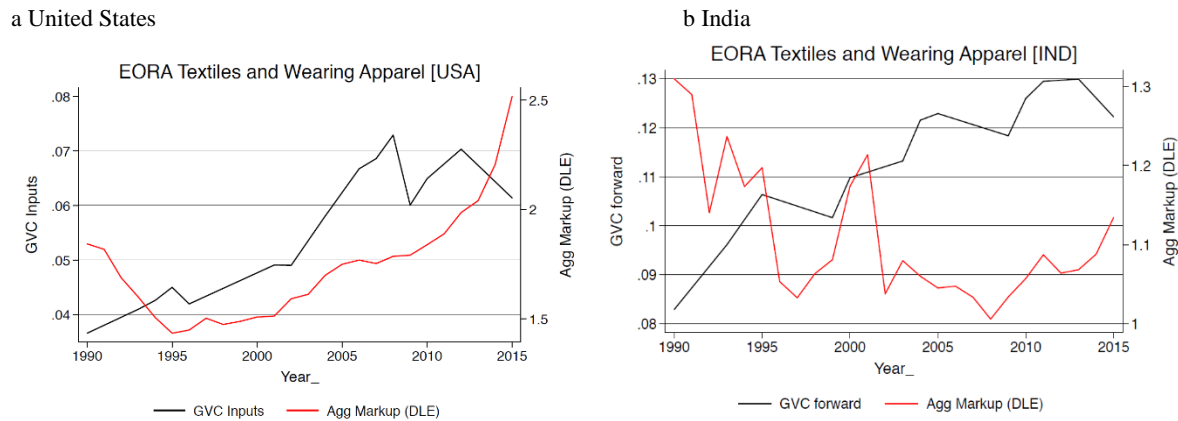
Figure 13 Poverty reduction and shared prosperity has been greater in locations with increased presence of GVC firms in Vietnam



Source: Vietnam Household Living Standards Survey and GSO Enterprise Survey.

Note: GVC firms are firms that both export and import. Employment is measured as the number of total employees reported by registered firms, summed across firms with more than five employees within each province. Employment in GVC firms per capita measured in logs. Expenditure poverty rate is measured as the poverty headcount. The presence of firms that only export had no additional relationship with poverty reduction.

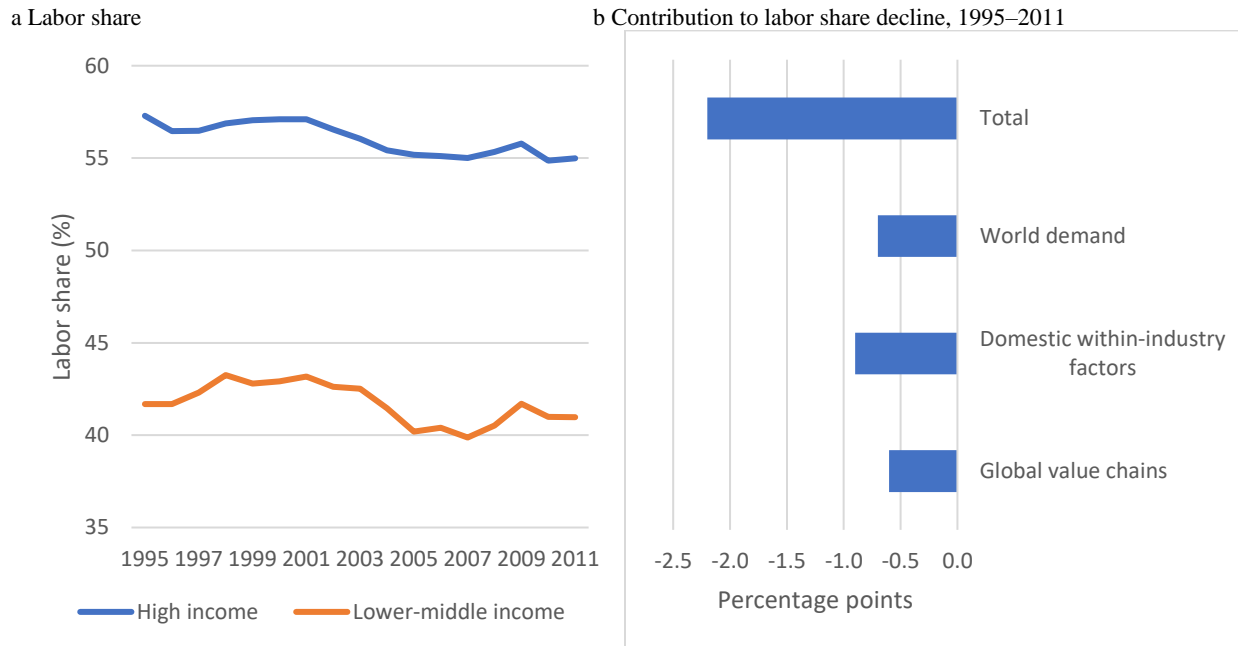
Figure 14 GVC participation is associated with higher markups in developed countries but lower markups in developing countries



Source: Worldscope and Eora.

Note: The left y-axis in figure a measures the share of foreign value added in gross exports of the textiles sector in the United States. The left y-axis in figure b measures the share of domestic value added in India embodied in importing country's exports to third countries for each year between 1990 and 2015. The right y-axis measures the share-weighted average mark-up of listed companies in the textiles sector for each year between 1990 and 2015. Markups are calculated following De Loecker and Eeckhout (2018). Similar results hold across countries and sectors.

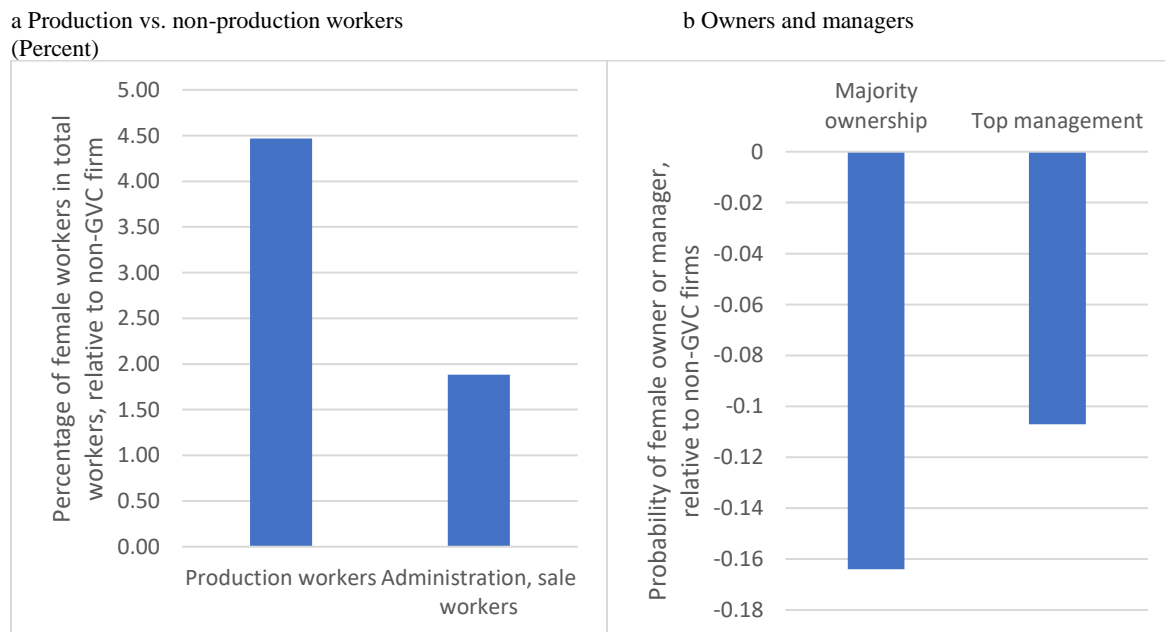
Figure 15 Technology and GVCs have contributed to the declining labor share in countries



Source: OECD–WTO TiVA Database.

Note: In figure a, the blue line plots the labor share in advanced economies, and the orange line plots the labor share in developing economies. In figure b, the decomposition explores the contribution of global demand (Y), domestic within-industry factors (V), and global value chains (B) to the total percentage point decline in the average labor share between 1995 and 2011. V is the diagonal matrix of the share of value added in gross output, B is the Leontief inverse, and Y is the diagonal matrix of final goods and services produced in a country and sold worldwide. The results are obtained from three counterfactual exercises to decompose the relative contribution of each component, by asking what the contribution to the observed overall changes in labor share would be if only domestic within-industry factors (V), GVCs (B), or world demand (Y) are allowed to change over time. The decomposition follows the methodology of Reshef and Santoni (2019).

Figure 16 Women are more likely to be production workers but less likely to own or manage GVC firms



Source: Rocha and Winkler (2019) using data from World Bank Enterprise Surveys.

Note: Exporters are firms with an export share (direct or indirect) of at least 10 percent of total sales. Importers are firms with an imported input share of at least 10 percent of total inputs. GVC participants are firms classified as both an exporter and importer. Figure a plots the coefficient of estimations of whether a firm is majority female owned or has a female top manager on a dummy variable if the firm is a GVC participant controlling for country-sector, subnational region and year fixed effects. Figure b plots the coefficient of estimations of the female labor share (production workers, non-production workers) on a dummy variable if the firm is a GVC participant controlling for capital intensity, sales, and TFP, as well as country-sector, subnational region, and year fixed effects.

D. GVCs and digital innovation

74. This tension between growth and inequality could be magnified by new technologies of production and new technologies of distribution. Automation and 3D printing may encourage countries to use less labor-intensive methods and reduce demand for labor-intensive imports from developing countries. A substantial share of low-wage developing country exports is in sectors being rapidly automated by their trade partners. These developments have evoked fears that industrialization led by labor-intensive exports may no longer be viable for emerging economies seeking to develop by joining and moving up the value chain.

75. But these technologies could also lead to higher productivity and larger scale, which increases demand for inputs from developing countries. And platform firms can make it easier for small firms to break out of their neighborhoods and sell to the world. But the market power of platforms could affect the distribution of gains. That leads to the question: Is the interplay between GVCs and technological change a boon or curse for development?

Digital innovation reduces trade costs and creates opportunities—if unevenly

76. Trade costs are likely to continue to fall because of new digital technologies, offering greater opportunities for GVC participation. Developing countries may stand the most to gain from emerging digital technologies as they face the highest trade costs and biggest distortions. Extending access to high-speed internet and expanding e-commerce will facilitate greater GVC participation. Artificial intelligence applications, such as machine translation, are further reducing trade and logistics costs, and may also help reduce red tape.

77. Technology is also affecting trade costs directly, with implications for trade patterns. New digital distribution platforms make it easier for firms to sell products in foreign markets. For example, large online retailers, like Alibaba or Amazon, allow small companies to reach consumers in new markets. Business services that were formerly little traded, such as graphic design or software programming, become tradable. These effects are expected to boost trade in the coming decade.

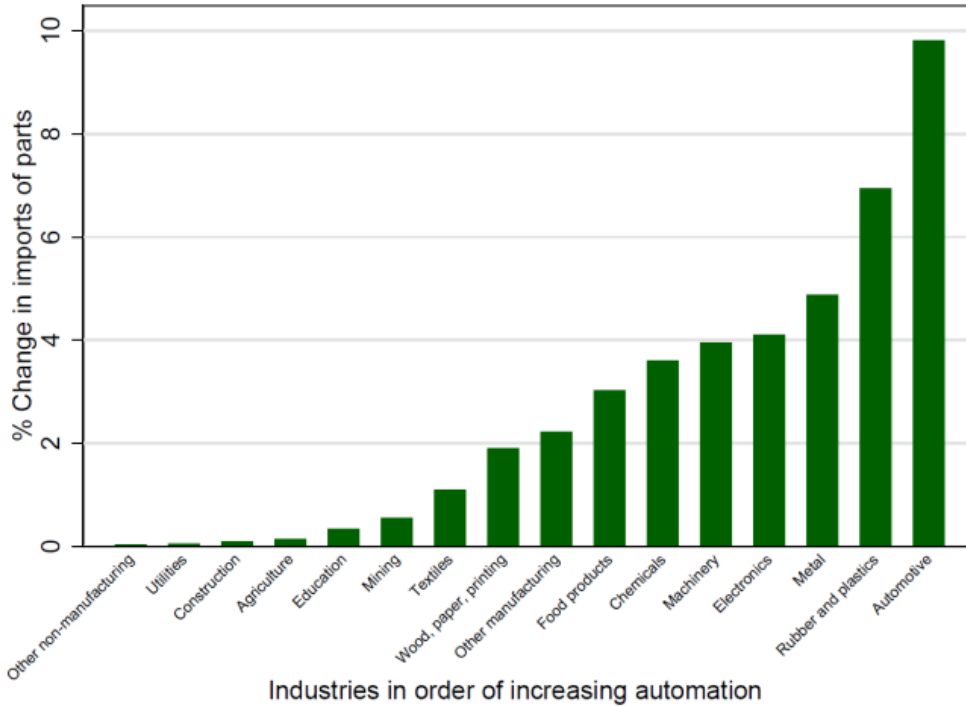
78. But the gains from e-commerce are likely to be unevenly distributed across households, and not all firms benefit equally from internet access. The reputation mechanisms platforms rely on to verify seller and buyer quality may make it more challenging for entrants to compete, since they foster concentration. Platform firms also pose new challenges for regulators. Their extensive networks are likely to make it difficult for other retailers to compete. The valuable data and information they accumulate from sales, across locations and over time, give them an advantage in predicting and meeting future demand. But the associated economies of scale may lead to concentration and market power that affects the distribution of gains.

Robot adoption promotes trade, but has distributional consequences

79. Anxiety that automation will hinder labor-intensive industrialization may not always be warranted. While robots displace workers performing repetitive tasks in automating sectors, they also stimulate labor demand because of increased productivity and input–output linkages—boosting final demand and creating

new tasks where labor has a comparative advantage (figure 17). Evidence for reshoring is limited and new production technologies such as industrial robots and 3D printing have so far promoted North–South trade.

Figure 17 Increased adoption of industrial robots in the North has promoted imports of material inputs from the South



Source: Artuc, Bastos, and Rijkers 2018.

Note: The figure depicts the automation-induced increase in imports of material imports from developing countries into developed countries by broad sector over 1995–2015. The change in imports of parts is measured in log points; a 0.10 increase in log points is roughly equivalent to a 10% increase in imports.

80. But the effects are heterogeneous across countries and sectors. Those that do not supply intermediate inputs complementary to robots but mainly compete with robot-adopting countries in output markets risk being outcompeted by foreign robots and may suffer substantial reductions in employment. Robot adoption is driving down the share of income accruing to labor and increasing the demand for skilled workers that perform tasks complementary to the ones robots perform, thus exacerbating inequality. Their adoption will likely entail substantial labor market pain, so there is an important role for policies that manage their distributional effects.

Focus 4 Mexico and technological change

Global value chains link the fate of workers living in different countries together, as technological progress in one country can impact employment in others.

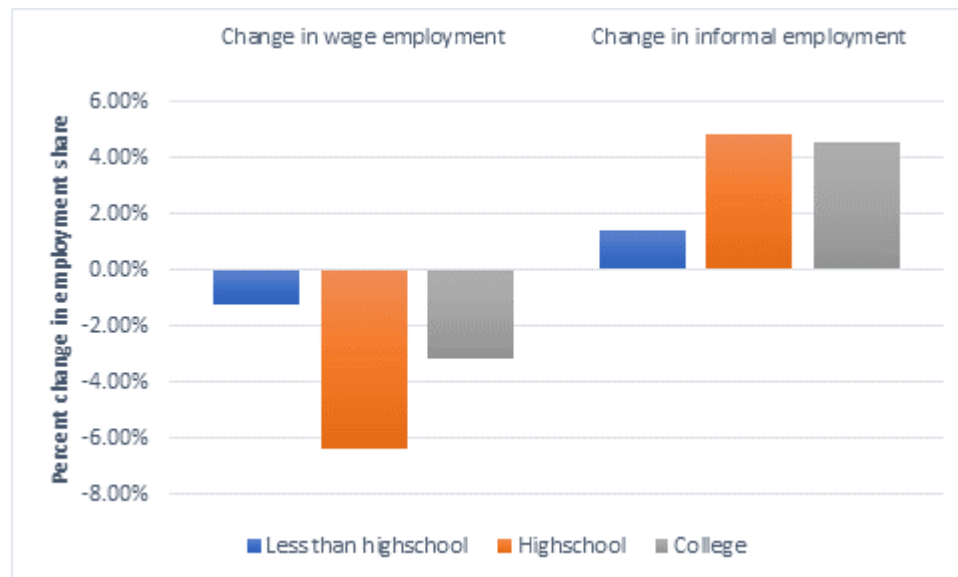
In the last two decades, car manufacturers in Detroit have gradually upgraded their technology and are using robots to automate the production of engines, replacing workers with industrial robots. Since some of the engine components are produced elsewhere within GVCs, many workers living thousands of miles away from Detroit, in foreign cities such as Chihuahua, where American companies assemble car parts, are exposed to the threat of robotization. In other words, automation in the United States can potentially cause unemployment in Mexico by bringing back jobs to... American robots.

But the story is not quite so simple: Robots also increased U.S. productivity, which led to greater demand for intermediate and consumer products from Mexico, and created new jobs for Mexicans (though not necessarily in Chihuahua). For example, roughly 70 percent of electrical wiring components of American cars are currently produced in Mexico, and their production process cannot be automated. After an automation induced a productivity spike, demand for electrical wiring produced in Mexico could be expected to increase. This productivity boost in the American car industry also increases aggregate income and enhances overall demand. So, the demand for consumer products, in addition to car parts, from Mexico expands. In the end, it is difficult to predict the size and direction of the impact of high-income country automation on developing country workers operating through international trade channels. Recent evidence shows that the overall impact of U.S. automation on Mexican workers was negligible. Does this mean that Mexican workers were immune to the negative distributional effects of robotization? No.

The use of industrial robots is not limited to high-income countries. In the last 15 years, manufacturers in Mexico also adopted new automation technologies, if less intensively than manufacturers in the United States. Production technologies in Mexico and the United States are linked by large corporations, FDI, and GVCs. The relation between domestic and foreign firms, as subsidiaries or as arms-length suppliers of parts, accelerates transfers of technology and eases access to capital in developing countries. And even when different parts are produced by different firms, using similar technologies ensures compatibility.

As producers in Mexico started using industrial robots following their counterparts in the US, Mexican workers were gradually displaced just like the American workers. Therefore, GVCs and more generally international trade have contributed to worker displacement in Mexico. However, contrary to speculation, the impact was not through reshoring, but through the diffusion of technological shocks with the global integration of production processes.

Automation reduces the wage employment of high school graduates



Source: WDR team calculations based on Artuc, Christiaensen, and Winkler (2019).

Note: Figure shows the estimated percent change in wage employment and informal employment of different skill groups between 2011 and 2016 that can be attributed to automation in Mexico. The impact is especially large for high school graduates who constitute a larger share of employment in robotized industries, such as automotive, compared with other industries.

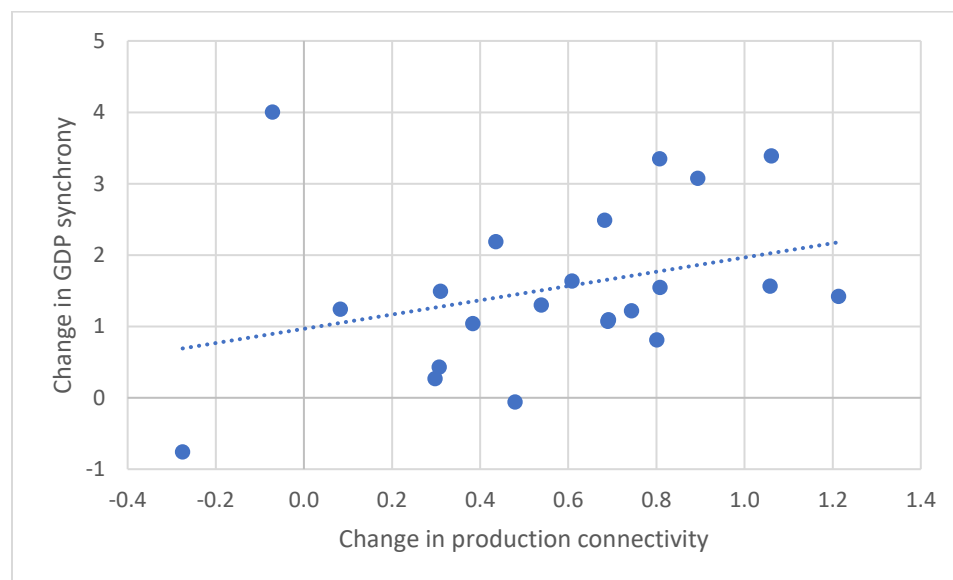
E. Macroeconomic consequences of GVC connections

81. GVCs create strong economic connections between countries. Rather than selling final goods and competing for the same customers, countries are increasingly connected through rigid production linkages

that bind them to a common fate. This international interdependence means that public policies and economic conditions in one country strongly affect and spill over to its trade partners, and propagate to the rest of the world through the complex interconnections of modern economies. As a result, the benefits from international coordination (and the costs of not connecting) are greater, creating challenges for development agencies and the international community alike.

82. First, production linkages are associated with a higher synchronization of economic activity across countries (figure 18). When production in one country relies on inputs imported from its partners, the economic conditions in other countries affect the ability of domestic activity to thrive. While international trade in finished products cannot be associated with any change in GDP co-movement, trade in intermediate inputs is an important driver of the strong increase in economic synchronization over the past decades.

Figure 18 GVCs are associated with greater synchronization of economic activity



Source: WDR 2020 team, based on World Bank’s World Development Indicators (database) and World Integrated Trade Solution (database).

Note: Each dot represents a pair of regions—for example, East Asia and Pacific and Sub-Saharan Africa, and Latin America and Caribbean and South Asia are two different observations). The horizontal axis measures the change over time in production connectivity defined as the total trade in intermediates as a share of GDP of both regions. The vertical axis measures the proportional change in GDP correlation over time.

83. Second, input-output linkages also create strong links in the formation of prices, implying that inflation in one country is more likely to “spill over” to both direct and indirect trade partners. In this sense, GVC participation will be associated with a rising synchrony of both real economic activity and inflation across countries. National central bank actions can have big consequences in other countries through production linkages.

84. Third, with complex interconnections in production, episodes of export growth are linked with a similar growth in imports. So, the consequences of a currency movement for export volumes are likely to be reduced and will become harder to predict. With a decrease in the responsiveness of exports to exchange rate movements, some governments will be deprived of an important stabilizer. Export volumes react not to the exchange rate with the direct partner, but to the exchange rate of the country of final consumption. When the relative value of its currency changes, it affects the trade flows of other countries and the effects are felt throughout the production chain.

F. GVCs and the environment

85. GVCs have mixed impacts on the environment, with the costs of hyperspecialization and the potential benefits from relational trade. GVCs, by promoting economic growth, will put pressure on the environment unless production techniques and consumer preferences adjust. By promoting trading in tasks, they cause certain types of economic activity to relocate internationally, thus transforming patterns of production and trade. Because resources are used more economically (less farming in the desert), GVCs create some global environmental gains. But they also cause hyperspecialization and can strain natural resources, especially when paired with production subsidies.

86. Differences in regulation can also lead to greater environmental damage from trade and GVCs if polluting tasks migrate to countries with lax regulations. A large body of literature does not find evidence of the so-called pollution-haven hypothesis on a macro scale. Comparative advantage is largely determined by other factors, so industry does not migrate to the least regulated countries because of the regulation per se. In addition, the most polluting activities tend to be hard to move and based on natural resources, making it even more difficult for industry to chase lax restrictions. However, it is possible that the fear of becoming a less attractive location for investment inhibits the strengthening of environmental regulation in a way that has environmental costs. In any case, there are powerful reasons for cooperation action for environmental protection.

87. On the positive side, GVCs tend to promote better production techniques. Knowledge flows among networks of firms enable more environmentally friendly techniques to be developed or applied more quickly. The relational aspect of GVCs is important in this context, as lead firms increasingly transfer environmentally friendly technologies to their suppliers and push for higher standards. Public-private partnerships and consumer attention to how goods and services are produced could encourage this trend.

G. National policy in a GVC world

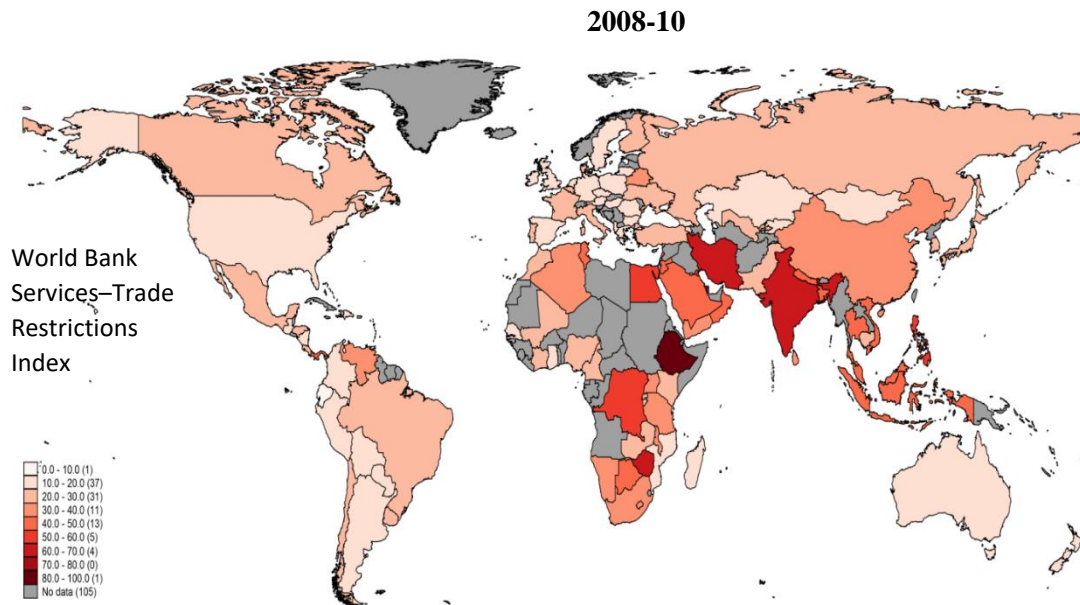
88. How can policy facilitate the fruitful participation of firms in GVCs? What needs to be done to fully reap the benefits from GVCs? And how can countries manage any negative consequences associated with GVC activity? Based on the analysis of the drivers of GVC participation, we can identify the policies that matter most at particular stages of development (Table 1).

Table 1 Different factors drive transitions between different forms of participation

	Commodities to Limited Manufacturing	Limited manufacturing to advanced manufacturing and services	Advanced manufacturing and services to innovative activities
Endowments	<ul style="list-style-type: none"> • FDI 	<ul style="list-style-type: none"> • FDI • Basic technical, management & language skills 	<ul style="list-style-type: none"> • Advanced technical, research, and managerial skills
Location	<ul style="list-style-type: none"> • Logistics & customs 	<ul style="list-style-type: none"> • Basic ICT • Liberalized transport • Improved infrastructure 	<ul style="list-style-type: none"> • High ICT connectivity • Seamless logistics
Market Size	<ul style="list-style-type: none"> • Liberalize access to key inputs • Market access 	<ul style="list-style-type: none"> • Broad-based liberalization • Trade agreements 	<ul style="list-style-type: none"> • High degree of openness • Deep trade agreements • Stronger services regulation • Intellectual property protection
Institutions	<ul style="list-style-type: none"> • Political stability • Standards and testing 	<ul style="list-style-type: none"> • Trade agreements • Contract enforcement 	

89. Because market size matters, markets need to be expanded by liberalizing trade. A country’s own liberalization of imported inputs expands its available sources of supply, as well as the possible roles it can play in the value chain. How trade restrictions can inhibit GVCs is becoming evident from the impact of the recent increases in bilateral tariffs by the United States and China (See Focus 5). Similarly, protection in other countries can limit the ability of one country’s exporters to diversify into products downstream from those already being produced. Nontariff measures (NTMs) can similarly limit the ability to access a wide variety of imported intermediate inputs. Because goods and services economies are increasingly interlinked, liberalizing services trade should be part of any strategy for promoting GVC activity (figure 19).

Figure 19 Services trade remains restricted in a number of countries



Source: Borchert, Gootiiz, and Mattoo 2014.

Note: The World Bank Services Trade Restrictions Database covers 103 countries (79 developing) and financial, basic telecommunications, transport, distribution and selected professional services. Data were collected between 2008 and 2010.

Focus 5 United States-China Tariff Increases

Tariff protection witnessed a resurgence over the last two years, fueled by tensions between the United States and China. The two countries imposed tariffs on each other in 2018 covering more than half of their bilateral trade (approximately 70 percent of U.S. exports to China and almost half of U.S. imports from China). The United States also imposed tariffs on other countries covering solar panels, washing machines, steel, and aluminum, sparking retaliation from affected trading partners. At the same time, negotiations continued over the terms and timing of the United Kingdom’s departure from the European Union.

In the age of GVCs, this new wave of protectionism is likely to have significant costs.

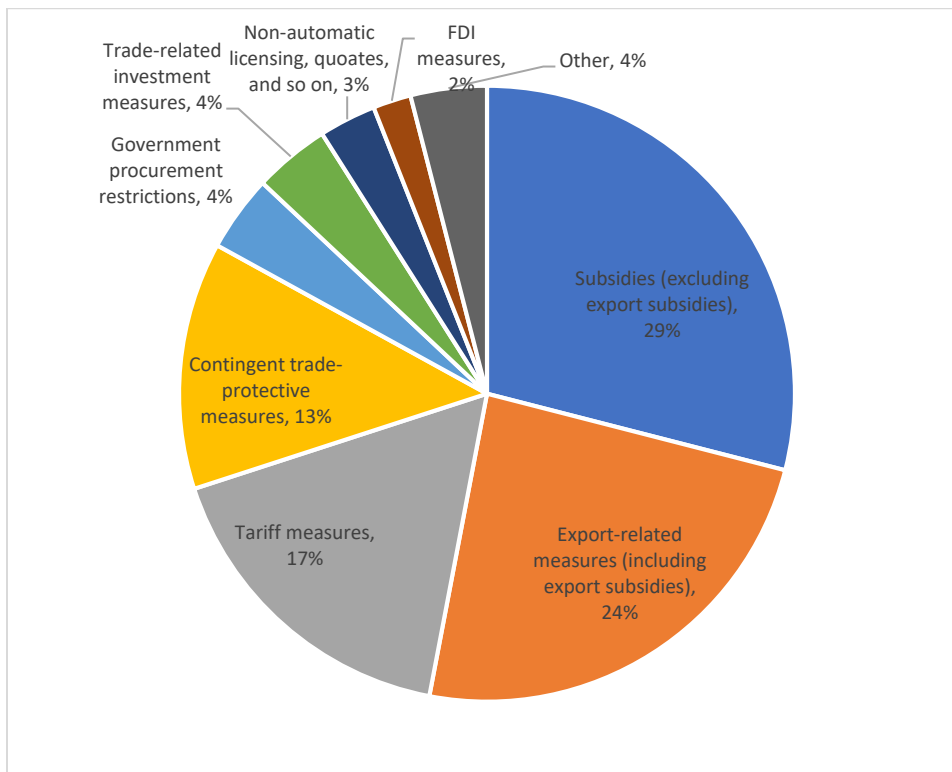
- The hyper-specialization in tasks and parts across borders means that trade costs are incurred multiple times.
- Protective measures against any country have knock on effects on all its trade partners in the value chain.

- GVCs also amplify the costs of trade policy uncertainty, as firms are more reluctant to make further investments in new or existing relationships with foreign suppliers.
- Significant tariffs on inputs can make firms incur large costs to reshape their existing supply chains—and thereby cause potentially long-lasting disruptions to global investment and production.

According to recent research for this report, US-China tariffs are already leading to a decline in GVC-related intermediate goods like parts and components. If the tariffs persist, then in the longer-term, US imports of intermediate goods from China are estimated to decline by over 40 percent, much more than the declines in consumption and investment goods. Furthermore, if the trade conflict worsens and causes a slump in investor confidence, effects on global growth and poverty could be significant—up to 30.7 million people could be pushed into poverty measured as income levels below \$5.50 a day, and global income could fall as much as \$1.4 trillion in a worst-case scenario. Developing countries other than China would bear roughly half of the global income loss.

90. Reducing policies that distort international trade can make GVCs more successful. In recent years, domestic subsidies and export-related measures, including export subsidies, have proliferated (figure 20). Some of these policies can help to remedy market failures, such as imperfections in capital markets and in information about export opportunities, but they can also be costly and foster the expansion of activities in which countries may not have a comparative advantage. Similarly, while some subsidies can encourage shifts away from environmentally-destructive technologies, others can promote unnecessary environmental damage by encouraging production in unsuitable locations and by using inappropriate technologies. In addition, when subsidies have a beggar-thy-neighbor aspect, they can become a source of conflict between trading partners.

Figure 20 Governments increasingly use distortionary subsidy policies



Source: Global Trade Alert.

Note: Data are from November 2018.

91. Not all firm-level support is distortionary. Governments can and should pursue interventions that boost firm productivity by correcting market failures. Two specific examples of such policies are encouraging firms to improve their managerial practices and build relationships with buyers. Successful supplier development programs often combine aspects of these interventions. In Mexico, for example, firms in the top decile of the managerial practices index are more than seven times more likely to participate in GVCs than firms in the bottom decile. A randomized controlled trial providing Egyptian carpets' producers access to demand from high-income foreign markets, reported that treated firms experienced a 16-26 percent increase in profits, driven by higher quality and learning-by-doing. Evidence shows that support to firms to facilitate improvements in management or find buyers is not only a cost-effective way to boost productivity, but also a useful tool to support GVC integration.

92. Because location matters, remoteness needs to be overcome by improving connectivity and lowering trade costs. Some countries are disadvantaged naturally due to being landlocked or in remote locations. Others are disadvantaged by human action, by having slow, costly and unpredictable border procedures. Since GVCs rely on fast and predictable movements of goods, reducing the time it takes goods to move, and making such movements more predictable, is key. For many goods traded in GVCs, a day's delay is equal to imposing a tariff in excess of 1 percent ad valorem. Improving customs and border procedures, promoting competition in transport services, improving port structure and governance, and opening the domestic market to global providers of third-party logistics and express delivery services, all are strategies that can help reduce trade costs related to time and uncertainty.

93. Because institution quality matters, the legal environment must be improved. Because GVCs thrive on the flexible formation of networks of firms, attention should be paid to contract enforcement, to ensure that legal arrangements within the network are stable and predictable. Better contract enforcement has been shown to support the supply of business services, which support the development of GVCs. The ability to enforce contracts relating to intellectual property is also important for more innovative and complex value chains.

94. Because endowments matter, it is important to attract foreign investment and to upgrade skills. Some types of GVC make intensive use of cheap labor, so those activities are attracted to countries with such labor. But GVCs also require capital, technology and managerial know-how. Since the lead firms in GVCs are often multinationals, attracting foreign direct investment is critical for GVC formation. The participation of domestic firms in a value chain led by a foreign lead firm can be enhanced by qualified supplier programs, which help foreign firms identify domestic firms that can offer goods and services to a GVC supply chain, and thus expand the value generated by GVCs in the national economy. These programs address a market failure: information about local firms is hard for MNCs to find or trust. In contrast, increasing value added through restrictions, such as local content requirements, is distortionary and can do more harm than good.

95. When improvements in connectivity, business climate, and policies on a broader scale are costly and will take time, can countries use special economic zones (SEZs) to achieve islands of excellence to attract investors? SEZs can be successful when they address specific market and policy failures, but there are numerous examples of SEZs that fail to attract investors or grow. Even in a restricted area, getting conditions right requires careful planning and implementation to ensure that the needed resources—such as labor, land, water, electricity, and telecommunications—are readily available; that regulatory requirements, such as customs clearance, are efficiently fulfilled; and that connectivity is seamless. Communicating with businesses in the targeted sectors ensures that the zone meets their needs. But SEZs cannot address political or macro instability: a volatile exchange rate will hurt investors inside and outside the zone.

96. These policies can help countries participate in GVCs, but complementary policies are also important to ensure the gains are widely distributed to mitigate the costs of GVC participation. These include labor market policies to help workers who may be hurt by structural change; mechanisms to ensure

compliance with labor regulations; appropriate tax policies to attract GVCs without undermining tax revenues; and environmental protection measures.

97. As GVCs expand, some workers will gain, but in some locations, sectors, and occupations, workers may lose. Adjustment assistance is needed to help workers adapt to the changing patterns of production and distribution that GVCs bring about. Adjustment policies can include facilitating labor mobility and equipping workers with resources and skills to find new jobs. Wage subsidies can also be employed to encourage employment of workers in hard hit communities or sectors. Interventions designed to stimulate new investments and transform local economies, however, should be undertaken carefully, recognizing the possibilities (and constraints) of structural endowments, and favoring targeted initiatives to address coordination failures over blunt investment subsidies.

98. Labor regulations, when well designed and enforced, can help ensure the safety and health of workers. Private firms can contribute, especially when their consumers are sensitive to labor conditions in the firm's global operations. But there is also an important role for national policy supported by international cooperation, in establishing and monitoring appropriate labor standards. In Vietnam, working conditions improved when firms participated in the ILO-IFC Better Work Program and complementary government action to publicly disclose the names of firms that fail to meet key labor standards (figure 21).

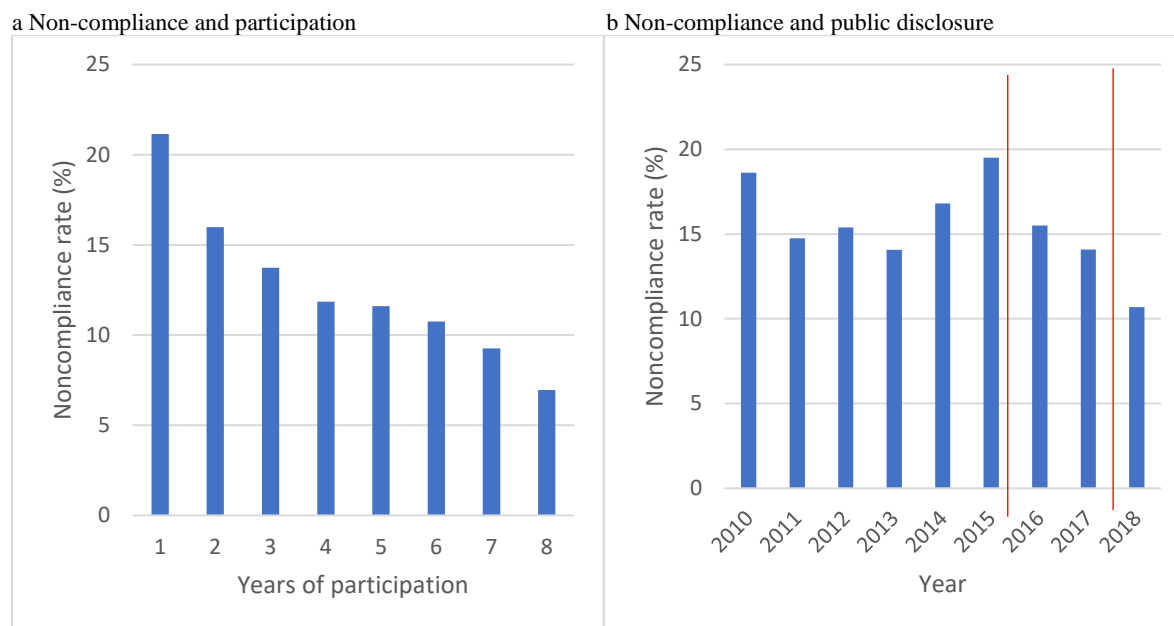
99. Tax policy too needs to be carefully designed to ensure socially beneficial GVC participation. Since capital and production are increasingly mobile, governments compete for FDI by lowering the burden of corporate income tax or offering specific firms or sectors tax exemptions and subsidies. While such incentives may help attract firms, being too generous compromises the revenue benefit of increased GVC activity. And in the absence of strong administration and enforcement, base erosion and profit shifting by multinationals will go unchecked, reducing taxable income.

100. Pricing environmental degradation can prevent GVCs from magnifying misallocations of resources. Prices of goods should reflect both their economic and socio-environmental costs. Appropriate pricing of environmental damage would also encourage innovation in environmentally friendly goods and production processes. Reducing distortions, such as those created by energy and production subsidies, and shifting towards taxing carbon, would reduce CO₂ emissions. In addition, environmental regulation, especially for specific industries and pollutants, can curb damage caused by GVC-related production and transport.

101. Some past trade agreements ignored the environment, but recent agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, have stronger provisions on the environment. Pressure is also increasing in the WTO for agreement to reduce fishery subsidies. Meanwhile, other international treaties, such as the Paris Agreement, include binding requirements on environmental protection for signatories of all income levels.

102. Also important are better metrics for measuring waste and for sustainability reporting. Without properly monitoring environmental damage by firms and countries, and the adherence to standards, it is not possible to design the appropriate policies.

Figure 21 Working conditions improve through participation in ILO-IFC Better Work Vietnam as well as public disclosure, 2010–18



Source: Hollweg and Kanz 2018; Better Work 2016.

Note: Figure a plots the average non-compliance rate of firms for each year of program participation. Figure b plots the average non-compliance rate of firms over time since the start of ILO-IFC Better Work Vietnam. The policy of public disclosure of firms that failed to meet key labor standards was announced in 2015 and implemented in 2017.

H. Cooperating for development in a GVC world

103. Three decades of trade and GVC-led catch-up growth in developing countries is contributing to shifts in economic power across countries and increasing income inequality within countries. The result is tremendous pressure on the international trading system and increasing recourse to trade-distorting measures. While the trade system has adapted to changes in the past, in recent years it has struggled to cope. The multilateral trade system was weakened by the failure of the Doha negotiations, and regional initiatives, such as the EU and NAFTA, are also being upended by disagreements among member countries.

104. The disruptions can be particularly costly for developing countries which have benefited enormously from the rules-based trade system. The trade system has provided developing countries with guarantees against trade discrimination, incentives to reform, market access around the globe, and recourse in case of disputes, even against the trade heavyweights.

The international trade system is especially valuable in a GVC world. GVCs span boundaries, and policy action or inaction in one country can affect producers and consumers in other countries. International cooperation can help address the policy spillovers and achieve better development outcomes. The priorities are to deepen traditional trade cooperation and to widen cooperation beyond trade to address spillovers in tax and regulatory policy.

Deepening traditional trade cooperation

105. Since the costs of protection are magnified when goods and services cross borders multiple times, the gains from coordinated reduction of barriers to trade are even larger for GVCs than for conventional trade. Since foreign investment and GVCs are linked, creating an open and secure climate for investment is vital for GVC participation, especially by capital-scarce countries. International cooperation has so far delivered greater, but uneven, openness.

Liberalization

106. For goods, multilateral and preferential initiatives have worked in tandem to reduce goods tariffs and greatly enhanced market access for the poorest countries. But problems remain from a GVC perspective: high tariffs in many of the poorest developing countries hurt GVC participation by increasing transaction costs of acquiring inputs even when they are notionally tariff-exempt; tariff escalation in important destination markets inhibits processing activities in agroindustry and other labor-intensive areas like apparel and leather goods; and restrictive rules of origin curtail sourcing options.

107. For services, international negotiations have not delivered much liberalization beyond that undertaken unilaterally. Key GVC-relevant services, such as air and maritime transport, in which liberalization needs to be coordinated, have typically been excluded from negotiations. For goods investment, there are no multilateral rules, and relevant policies are covered by a patchwork of preferential trade agreements (PTAs) and bilateral investment agreements (BITs), rather than by a coherent and comprehensive set of multilateral rules. For subsidies, trade rules have sought to allow space for legitimate use while preventing protectionist abuse, but recent frictions suggest that they have not succeeded.

Transparency and predictability

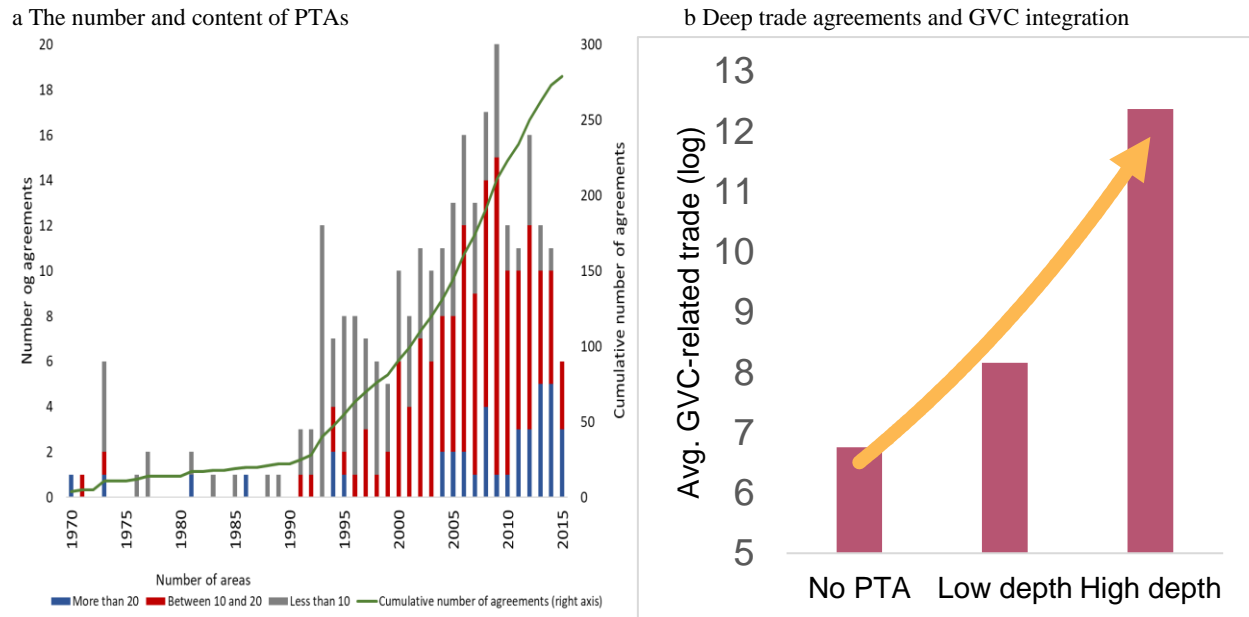
108. Regardless of the precise nature of policies, firms need information about trade and investment policies and their predictability, especially when investing in international relationships. To address this need, international trade agreements include rules to enhance the transparency of national policies and to help reduce policy uncertainty through legally binding commitments. Unfortunately, the failure to honor WTO requirements that countries provide regular notifications on subsidies and other measures that affect trade has led to policy opaqueness and caused trade tensions. Similarly, large wedges between legal bindings and applied policies in both goods and services have perpetuated policy uncertainty. For example, developing countries typically have tariff bindings set 20 percentage points above actual tariffs, meaning they can raise tariffs significantly at any time.

Nontariff measures

109. Many of the policies affecting GVCs are regulatory, including technical regulations, sanitary and phytosanitary measures, and a range of services regulations. Trade agreements and WTO commitments have made some progress in disciplining the protectionist impact of these measures but tend to view them primarily through a producer-centric, market access lens. Accordingly, countries have focused on attempts to harmonize or mutually recognize product standards and other regulations in the context of regional agreements, seeking to emulate the progress in the European Union, particularly in goods. But there has been limited progress because of the significant divergence across countries in social preferences on regulatory issues.

Deep trade agreements

110. As multilateral negotiations have languished, preferential trade agreements (PTAs) have grown in number and in content. Modern PTAs cover not only tariffs, but foreign investment, intellectual property rights, government procurement, and many other areas (figure 22). They aim to free and facilitate the flows of goods, capital, people, and ideas needed for the proper functioning of GVCs. And the evidence suggests that they are helping trade and GVCs grow without diverting trade away from other countries. In many developing countries, however, GVC integration is still constrained by traditional trade policy barriers. Regional negotiations such as the African Continental Free Trade Area should thus make eliminating traditional barriers a top priority.

Figure 22 Trade agreements are becoming deeper and are linked to GVC growth

Source: Hofmann, Osnago, and Ruta 2017; Laget, Osnago, Rocha, and Ruta 2018.

Note: The estimator is Poisson pseudo maximum likelihood. GVC-related trade is defined as trade in parts and components.

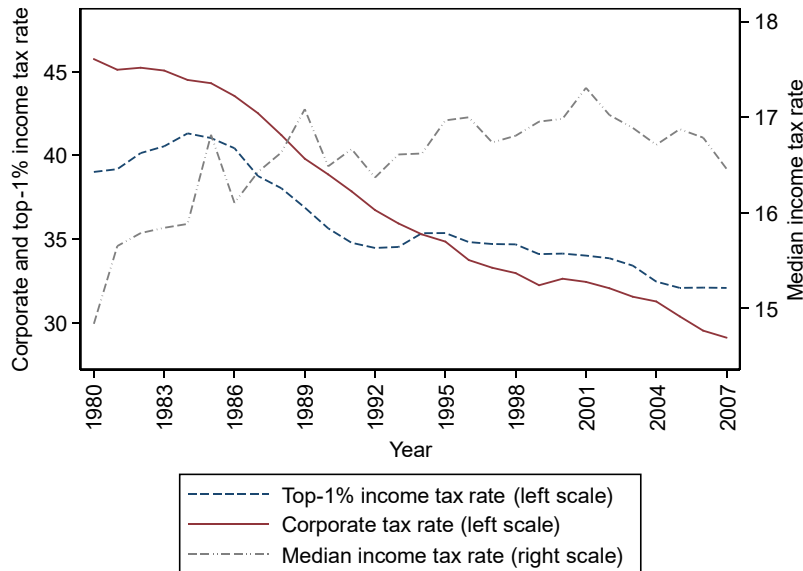
Revitalizing trade negotiations

111. But PTAs are not a substitute for coherent multilateral rules that do not discriminate between countries. The multilateral system is under stress in part because of the increasing symmetry in the size of countries and the persistent asymmetry in their levels of protection. Large developing countries were mostly inactive during earlier episodes of reciprocal liberalization but have now grown to a size where their markets and protection matter. Traditional trade negotiations may deliver more meaningful outcomes if the large developing countries engage as equal partners and even leaders, instead of seeking special and differential treatment; if the large industrial countries continue to place their faith in rule-based negotiations, instead of resorting to unilateral protection; and if all countries together define a negotiating agenda that incorporates the areas mentioned above and reflects both development and business priorities.

Widening cooperation beyond trade

112. The conventional approach to trade negotiations, relying primarily on reciprocal liberalization driven by large producer interests, needs to be complemented by broader cooperation—for four reasons. One is increasing political sensitivity to the plight of industrial workers in the face of both technological change and international competition. And since the winners from globalization, internationally mobile capital and skills, are hard to tax, workers bear not only the burden of adjustment but also a growing relative burden of taxation (figure 23). Second is diminished tolerance of the negative spillovers from restrictions and industrial assistance in developing countries whose markets and policies have begun to matter. Third is growing consumer concern about the risks of market failure in international markets where regulation remains mostly national, ranging from abuses of privacy in data-based services to anti-competitive practices in platform-based services. Fourth is disenchantment with the international trading system in developing countries that await liberalization in sectors like agriculture and apparel, after the Doha Development Agenda failed.

Figure 23 Corporate tax rates and personal labor income tax rates for the top 1 percent have fallen but for median workers are higher in 65 economies over 1980–2007



Source: Egger, Nigai, and Strecker 2016.

113. To sustain beneficial trade openness, it may be necessary to widen cooperation beyond trade policy per se to include taxes, subsidies, regulation, and infrastructure.

Tax cooperation

114. Tax competition and profit shifting may be affecting both the ability of countries to join GVCs and their benefits. International cooperation may be necessary to enable states to raise tax revenues in a GVC world and to ensure that conditions of competition are not distorted. The OECD has already taken steps to address tax base erosion and profit shifting by multinationals, including changes in the transfer prices of intermediate inputs, especially for intangibles like services and intellectual property. These problems, as well as tax competition, may ultimately be best addressed by a destination-based tax, such as a value added tax, in all countries, which would eliminate the incentive to shift profits and compete over taxes. Complemented with low labor taxes, the expansion of such taxes could shift an equal burden back to capital. Such a tax may not be immediately feasible, but transitional arrangements can begin to alleviate the resource mobilization problem.

Mutual restraint on subsidies

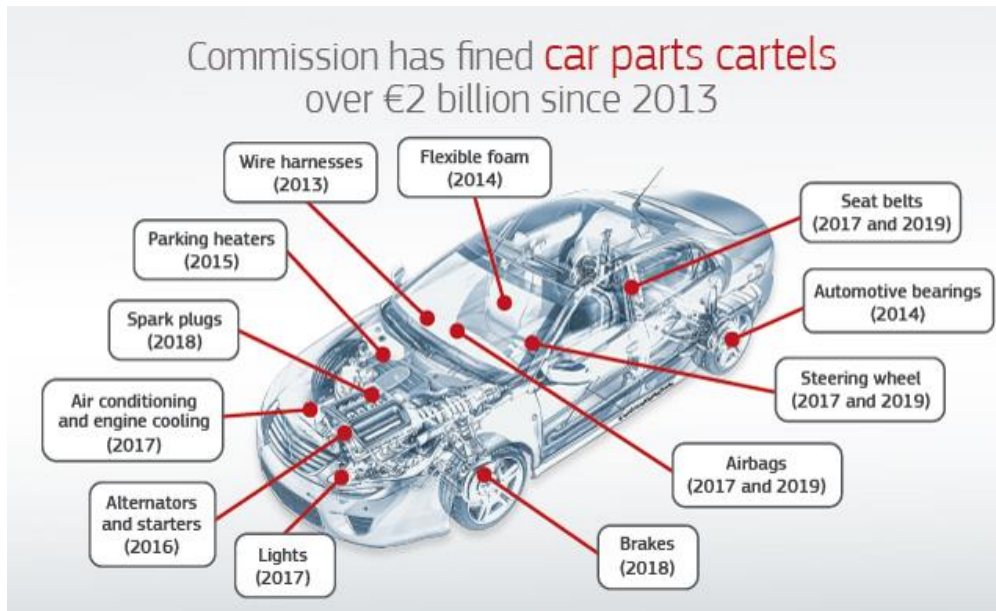
115. International trade rules and enforcement have struggled to strike a balance between the legitimate and distortionary aspects of subsidies. Cooperation to ensure transparency and allow assessments of the effects of subsidies can be good for both the subsidizing country and for the trading system. Apart from greater compliance with WTO notification requirements, new rules could build on EU experience with members states having to comply with transparency obligations for state aid allocations over €500,000. Beyond transparency, countries can consider an approach that devotes more attention to the aims and effects of subsidies—prioritizing rule-making for subsidies that are more likely to have adverse spillovers on low-income developing countries, while enabling the use of subsidy instruments to address market failures. Again, there may be lessons from the European Union, the only international integration effort that has sought to level the playing field for firms in the integrated market.

Regulatory cooperation

116. International market failures can be addressed cooperatively in several areas that matter for GVCs. Cross-border data-based services, addressing market failures efficiently is not possible without the cooperation of the regulator in the data-destination country. Also, governments may fear opening markets if the gains from liberalization are likely to be appropriated by anticompetitive practices in both goods and services, for which there is growing evidence (figure 24). The relevant international bargain could be an exchange of regulatory commitments by exporters to protect the interests of consumers abroad in return for market access commitments by importers. For example, vital data flows between the European Union and the United States not because of reciprocal liberalization or regulatory harmonization, but because of the unique EU-US Privacy Shield Agreement: the U.S. regulators (the Federal Trade Commission and the Department of Commerce) ensure that U.S. firms adhere to European Union standards of privacy in handling the personal data of EU citizens; in return the European Union allows such data flows to the US.

117. But developing countries must not be left out of such cooperation. Multilateral trade rules require that they be given an opportunity to negotiate similar agreements. International support can help them both to make regulatory commitments in areas of export interest (as in data-based services) and to extract commitments from their trading partners when they open their markets (as for the enforcement of competition policy).

Figure 24 The European Commission has imposed substantial fines on car part cartels since 2013



Source: http://europa.eu/rapid/press-release_IP-19-1512_en.htm.

Infrastructure coordination

Coordination failures in infrastructural investment affect GVC investment, expansion, and upgrading. But consider the WTO Trade Facilitation Agreement, which encourages countries to coordinate improvements in trade facilitation. Each country does not fully internalize the benefits to foreign traders of reductions in domestic trade costs, and gains are larger when governments on both sides of the border invest in expediting trade simultaneously. The agreement addresses this coordination problem and provides low-income countries with financial assistance for the necessary investments. A similar approach could exploit synergies in other infrastructure investment in transport, energy, and communication.

Chapter 1: The New Face of Trade

118. Technological, institutional, and political developments fueled the globalization of production from 1990 to 2008. The shift was especially concentrated in some regions and sectors, as firms began organizing their production in complex global value chains (GVCs). They designed products in one country, procured parts and components from several countries, and assembled the final products in yet another country. As a result, international trade and investment flows increased considerably, far outpacing the growth of economic output. But with the 2008 global financial crisis and subsequent great recession, the growth of GVCs and trade slowed, prompting speculation that the phenomenon has run its course.

119. Some aspects of this new wave of globalization are not new. Past increases in the trade-to-GDP ratio have been substantial and sustained. International trade in raw materials and intermediate inputs has been a prominent feature of world trade flows since time immemorial. For example, Assyrian merchants who settled Kanesh (in modern-day Turkey) in the 19th Century BCE imported luxury fabrics and tin from Aššur, and traded copper and wool within Anatolia.¹ And the “First Globalization” during 1870–1914 witnessed a major increase in international trade flows, largely fueled by the steamship. Similarly, the new wave was fueled by falling trade costs and policy choices, particularly the integration of China and Eastern Europe into the world economy, and the conclusion of major trade agreements like NAFTA and the Uruguay Round.

120. But there are also new features of this wave of globalization and interpreting the rise of global value chains as simply an intensification of trade across countries misses a few key dimensions. For instance, by integrating in global value chains, developing countries can take advantage of richer states’ industrial bases and advances rather than having to build up entire industries from scratch—thus accelerating their industrialization and development. And trade within GVCs intensifies the effects of standard trade integration. Fragmented production makes it possible for firms in developing countries to enter foreign markets at lower costs. They can benefit from specialization in niche tasks and gain access to larger markets for their output. Even smaller firms can benefit from higher returns to scale. And companies can also access cheaper and better inputs, productivity-enhancing technologies and improved management practices developed elsewhere, and thus, grow at a faster rate, contributing to the creation of more quality and higher paying jobs. These features of GVCs thus make them increasingly attractive to policy makers in developing countries.

121. It is of concern then that since the financial crisis, trade growth and GVC formation have stagnated. The slowdown is partly cyclical. Trade growth is lower because global output growth is lower in major trading economies, including Europe—which accounts for one-fourth of global output and one-third of world trade—and China. The slowdown is also structural. Trade growth has become less responsive to income growth over the last decade, particularly in China and the United States, both major actors in global value chains. Part of this development reflects structural changes in the two economies, as China moves up the value chain and the US energy sector expands. But it also reflects the absence of major new liberalization initiatives, such as the Uruguay Round, or any of the large emerging markets undertaking the kind of major reforms that took place in China and Eastern Europe in the 1990s.

122. This chapter analyzes the changing patterns in global trade and investment in the last 30 years and the importance of GVCs in shaping these shifts. Using new data, it characterizes the GVC phenomenon across regions, countries, and sectors. In so doing, it provides a better understanding of what is new in a world of GVCs, setting the stage for the report’s analysis of how GVCs impact economic development, inequality, and poverty alleviation.

123. The chapter has three main findings. First, countries participate in GVCs in different ways. Argentina, Ethiopia, and Indonesia are more engaged in simple manufacturing production chains, while Algeria, Chile, and Nigeria export commodities or raw materials for further processing. India and the United

States produce services that have become increasingly traded and embodied in manufactured goods. And mostly advanced countries and large emerging economies produce innovative goods and services.

124. Second, the intensification of GVC trade is concentrated in a handful of regions, sectors, and firms. GVC linkages have expanded fastest in the three trade hubs—Europe, North America, and East Asia. In part this is because these regions account for a large share of production in the sectors whose production processes have become most fragmented across countries, particularly electronics, machinery, and transport equipment. GVCs also tend to be concentrated among a small share of firms that both import and export. In each country, 10 to 15 percent of firms are the most integrated in GVCs. They account for 80 percent of total trade flows and tend to be large firms that both import and export. Related-party trade, as through multinational corporations, is especially important.

125. Third, more complex value chains tend to have especially strong regional linkages, though the expansion of GVCs has been both global and regional. Europe is the most integrated region, with four times as many regional linkages as global linkages. East Asian linkages are more regional than global, and regional linkages have intensified substantially since 1990. In contrast, GVCs in North America depend somewhat more on global partners than regional partners, and integration has been increasing on both fronts. Elsewhere, GVC integration has been mostly global and has been increasing primarily with global partners. Importantly, the differences in GVC participation across regions are far greater than the changes within regions in recent decades. The same dynamic applies to sectors.

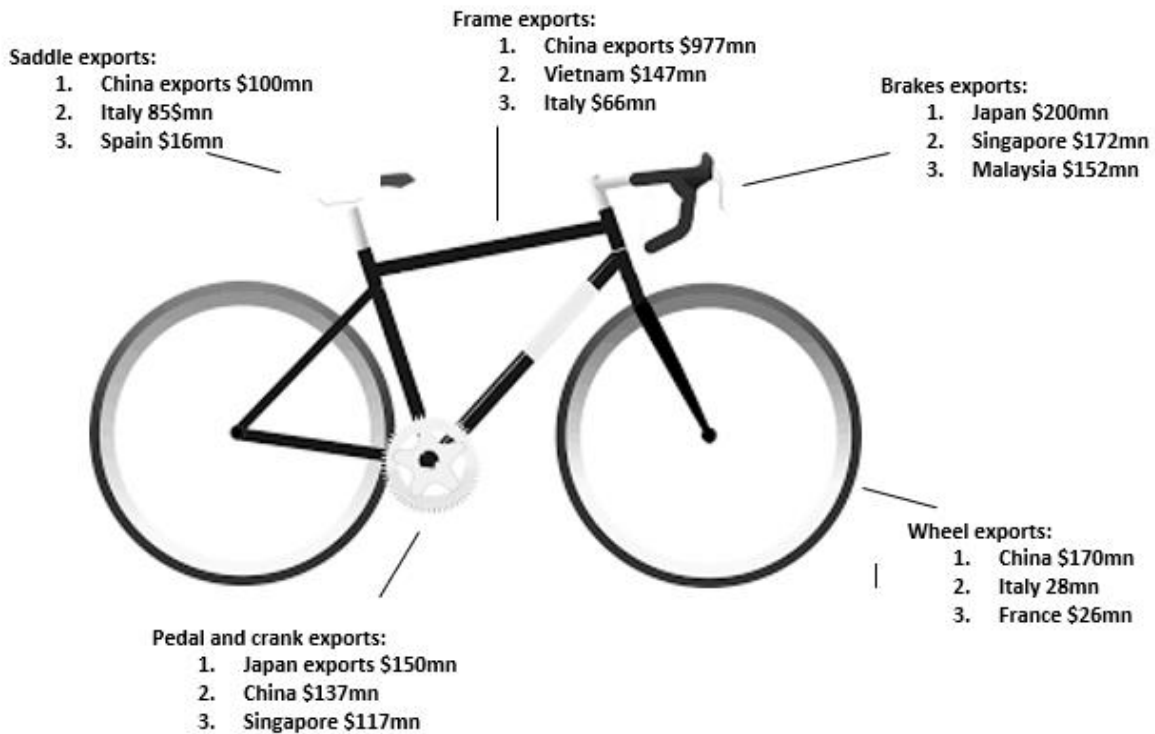
A. What is a global value chain? Consider the bicycle

126. The bicycle is the world’s most popular form of transport. Invented in Germany in the early 19th century, bicycles were mass produced by the Dutch at the end of that century, sometimes with frames imported from England. Global production later grew from about 10 million units in 1950 to more than 130 million today.

127. Bicycles are heavily traded, with 49 countries exporting more than \$1 million in bicycles in 2017. They are assembled with parts and components from all over the world, especially Asia and Europe. For example, Bianchi locates all the design, prototyping, and conception work in Italy, assembles most of its bicycles in Taiwan, China, using parts and components from China, Italy, Japan, Malaysia, and many other parts of the world. Each parts producer has niche expertise—Shimono of Japan, for example, makes brakes for Bianchi, while the handle bars come from Taiwan, China.

128. Assembling a bicycle from parts and components made around the world improves efficiency, making a cheaper and higher quality bicycle for the consumer. The bicycle frame requires steel, aluminum, or carbon fiber tubing and welding (figure 1.1). The wheel must be straightened in radial and lateral directions to ensure uniform tension. A quality saddle requires the know-how to produce high-tech gel. Because of the extensive bicycle value chain, trade in bicycle parts has outstripped trade in bicycles by 15–25 percent in recent years. In Finland, 33 percent of value added comes from outside the country, including 13 percent from the EU, 11 percent from Asia, and 5 percent from North America.² Box 1.1 defines how data are used to estimate GVC participation more broadly.

Figure 1.1 Where do bicycles come from?



Box 1.1 Defining and measuring global value chains

A global value chain (GVC) is a series of stages involved in producing a product or service that is sold to consumers, with each stage adding value, and with at least two stages produced in different countries. A bike produced in Finland with parts from Italy, Japan, and Malaysia and exported to Egypt constitutes a global value chain. According to this definition, a country, sector, or firm participates in a GVC if it produces (at least) one stage in a GVC.

Defining spiders and snakes

A GVC is a production process that embodies value added (such as labor services) from at least two countries. GVCs imply there is foreign value added in production, especially when that production is destined for exports. The definition is agnostic about the specific form for embodying foreign value added in production, though it is often associated with either international trade in raw materials (such as tin or aluminum), in intermediate inputs (such as car parts), or in tasks (such as back-office services). Similarly, the definition is consistent with various configurations of global value chains, including simple spider-like structures, with multiple parts and components converging to an assembly plant—and snake-like structures, with value created sequentially in a series of stages.³

Regardless of the shape of GVCs, the possibility of fragmenting production across borders gives rise to a finer international division of labor and greater gains from specialization. GVCs allow resources to flow to their most productive use, not only across countries and sectors, but also within sectors across stages of production. As a result, GVCs magnify the growth, employment, and distributional impacts of standard trade.

In sum, unlike traditional international trade, which focus on transactions that involve only two countries (an exporting country and an importing country), GVCs entail production processes that cross borders

multiple times. This leads to a rich set of determinants and consequences of GVC participation, as described in subsequent chapters, but it also creates challenges for measuring GVC activity in the world.

Measuring where value is added

The main challenge arises from the fact that customs data, the standard source for international trade flows, provide information on *where* the transacted good or service was produced, but not on *how* it was produced—that is, which countries contributed value to it. Similarly, customs data record *where* the transacted good is flowing to, but not *how* it will be used—whether it will be fully consumed (absorbed) in the importing country, or whether it will be re-exported after the importing country adds value to it.

With the goal of tracing value-added trade flows across countries, a body of work has combined information from customs offices with national input–output tables to construct global input–output tables. The most widely used world input–output tables are the World Input–Output Database (WIOD), a collaborative project led by researchers at the University of Groningen; the OECD Trade in Value Added (TiVA) database; and the EORA Global Supply Chain Database, constructed by a team of researchers at the University of Sydney. At a very broad level, these collaborative projects can be thought of as “scaled up” versions of product-level studies, such as the OECD bicycle study, which showed that 37 percent of value added came from foreign countries.

With these global input–output tables, it is straightforward to devise alternative measures to document how much production processes have become globalized in recent years, and how various countries and sectors participate in global value chains. A natural measure of the importance of GVC trade in total international trade, building on global input–output tables, is the share of a country’s exports that flow through at least two borders.⁴ These exports encompass two broad types of GVC trade:

1. *Backward GVC participation*—a country’s exports embody value added previously imported from abroad. In the bicycle example, if Taiwan, China’s bicycle exports use imported intermediates, then its participation is considered backward integration. This type of participation is dubbed *backward* because the intermediates used in exports are from the previous stage.
2. *Forward GVC participation*—a country’s exports are not fully absorbed in the importing country, and instead are embodied in the importing country’s exports to third countries. In the bicycle example, if India sends aluminum tubing to Taiwan, China where it is further used in the production of the bicycle later exported, then India’s participation is considered forward integration. This type of participation is dubbed *forward* because the exporter is at the early stage.

Despite their widespread use, global input–output tables have two key limitations. First, because they rely on aggregated input–output data, the resulting sectoral disaggregation of GVC flows is coarse, so they miss a lot of GVC activity occurring within the broadly defined sectors. For instance, one can compute the origin of “fabricated metal products” in the production of “motor vehicles” in the United States, but not infer where more specific components such as tires, car engines, or windshield wipers originate. Second, in constructing the tables, researchers are forced to impose strong assumptions to back out some bilateral intermediate input trade flows that cannot be readily read from either customs data or national input–output tables.⁵

A different, more granular approach to measuring the fragmentation of production processes across countries, first suggested by Yeats (2001), computes the share of trade flows accounted for by industry categories that can be safely assumed to contain only intermediate inputs (as reflected by the word “Parts of” at the beginning of the product description). Yeats found that intermediate input categories accounted for about 30 percent of OECD merchandise exports of machinery and transport equipment in 1995, and

that this share had steadily increased from 26 percent in 1978. Yeats’s classification has continued to be refined in recent years based on UNCTAD’s Broad Economic Categories (BEC) product classification.⁶

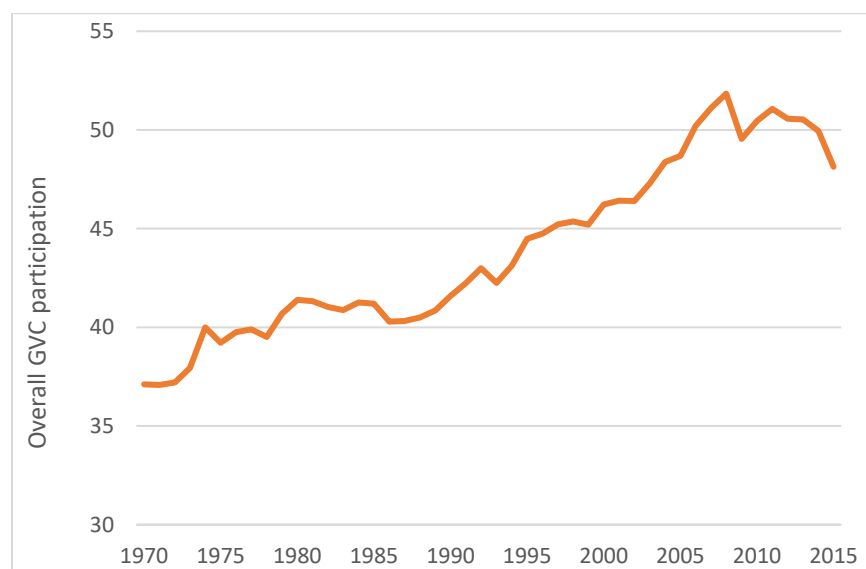
More recently, customs data at the firm level, have been used to advance measurement of GVC linkages. A key strength of these data is that transactions between firms and their foreign partner countries can be observed, rather than inferred. In addition, firm-level data capture the heterogeneity in GVC linkages across firms, which is obscured by aggregated industry-level data and thus allow a finer understanding of firms’ input sourcing decisions, how import and export participation are linked, and how multinational firms organize their production networks. However, such data do not trace the firm-to-firm transactions across countries. This would require linking customs offices and firm identifiers across the world.⁷

Thus, in the absence of such data, the best option is to keep improving the measurement of global value chain linkages at both the macro and micro-levels, across a wider range of countries, to gain a more complete empirical measurement of GVCs.

B. The evolution of GVC participation

129. The overall share of GVC trade in total world trade—encompassing both forward and backward linkages—grew significantly in the 1990s and early 2000s, but it appears to have stagnated or even decline in the last 10 years. Still, about half of world trade appears to be related to global value chains (figure 1.2).

Figure 1.2 The importance of GVC trade in world trade is rising



Source: WDR team calculations using the EORA26 database, Johnson and Noguera (2012), and Borin and Mancini (2019).

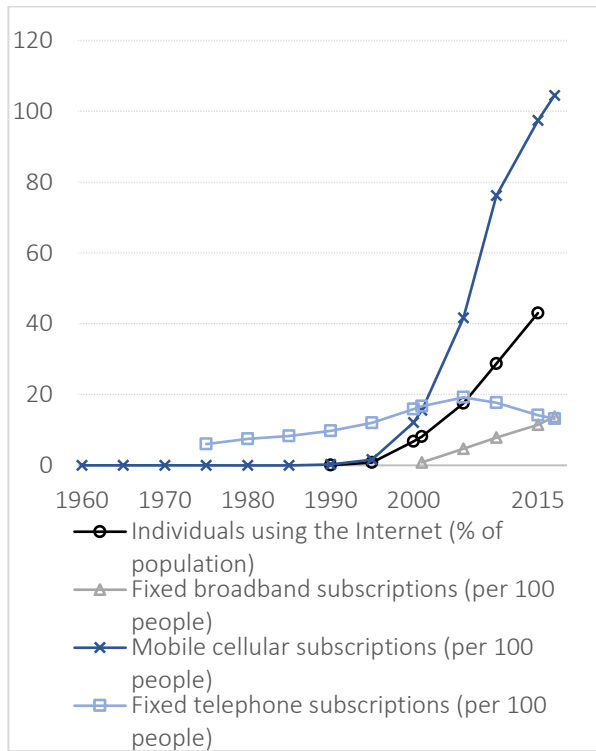
Note: The GVC participation corresponds to the share of world exports that flow through at least two borders. For 1990–2015, the GVC participation measure is computed as the ratio of the sum of foreign value added embodied in countries’ gross exports (backward linkages) and domestic value added embodied in third countries’ exports (forward linkages) to gross exports. The data used to compute the GVC participation measure is the EORA26 database. For 1970–90 the GVC participation measure is backcasted using Johnson and Noguera (2012) estimate of VAX, an older measure of value-added content of bilateral trade. While the difference between VAX and the GVC participation measure is sizable, the correlation of the change over the overlapping years (1990–2010) is 0.97. This method allows reconstructing a long series covering 1970–2015 rather than simply 1990–2015 for which the EORA26 database is available.

130. What explains the remarkable rise in GVC participation in the 1990s and 2000s? And why has this process stalled since the financial crisis?

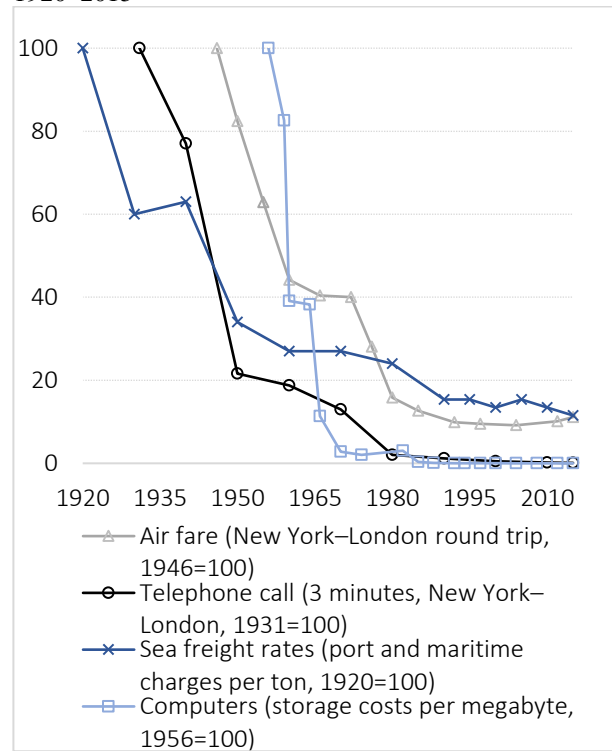
131. The wave of production’s international fragmentation of in the 1990s and 2000s was driven by a combination of several factors. The information, communication, and technology (ICT) revolution brought cheaper and more reliable telecommunications, new information management software, and increasingly powerful personal computers (figure 1.3). This made it much easier for manufacturing firms to outsource and coordinate complex activities at a distance and to ensure the quality of their various inputs. In addition, firms were able to disperse production across the world because transport costs decreased significantly. Declining air and ocean freight costs boosted trade in goods, while at the same time services benefited from cheaper communication costs.

Figure 1.3 The ICT revolution spurred the emergence of GVCs

a. Increase in ICT use, 1960–2017

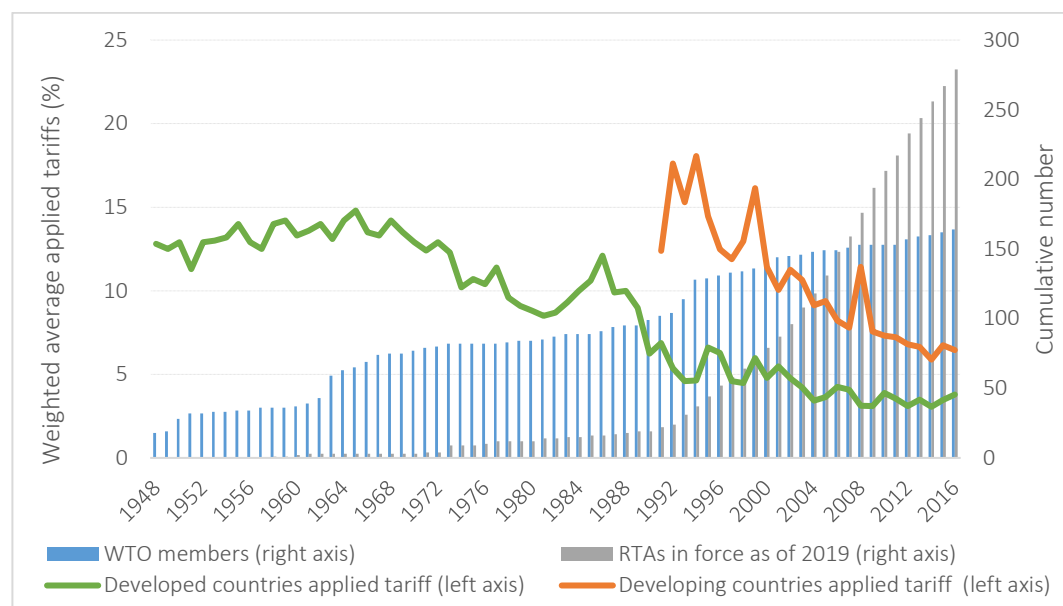


b. Decrease in transportation and communication costs, 1920–2015



Source: WDR team calculations based on Rodrigue (2017) for panel a and using the ITU database for panel b. Note: In panel a for each type the cost is reported as 100 for the first year with data.

132. Successive rounds of trade liberalization have resulted in rapidly falling barriers to trade and investment for both developed and developing countries. Tariffs have declined especially for manufactured goods, and the gradual, although still insufficient, lowering of nontariff barriers has facilitated the international trade of goods and services (figure 1.4). Finally, the creation of the European single market—together with the integration of China, India, and the Soviet Union into the global economy—created huge new product and labor markets, so firms could sell the same goods to more people and take advantage of economies of scale leading to the further deepening of GVCs. As of 2001 the integration of the ex-Soviet bloc countries and China into the global economy had increased the size of the global labor pool by 50 percent. As these countries did not bring much capital with them, the doubling of the global work force reduced the ratio of capital to labor in the world economy to two-thirds of its previous level. This new supply of cheap labor encouraged profit seeking companies to either reallocate their production facilities or find local suppliers in low wage countries.⁸

Figure 1.4 Tariffs dropped thanks to multilateral and regional trade agreements, 1948–2016

Source: WDR team computations based on Baldwin (2012). Data for RTAs and WTO members are from the RTA-IS database. Tariff data prior to 1988 are from Williamson and Clemenson (2002), then World Development Indicators using country level weighted applied tariffs for all products.

Note: The figure plots tariffs computed as simple averages for developed and developing countries. Prior to 1988, the developed countries sample covers 35 countries including 21 industrialized countries (such as France, Germany, the United Kingdom, the United States, Austria-Hungary, Denmark, Greece, Italy, Norway, Portugal, Russia, Serbia, Spain, Sweden, Argentina, Australia, Canada, Chile, Cuba, New Zealand, Uruguay) and 14 less developed countries (Brazil, Burma, Ceylon, China, Colombia, Egypt, India, Indonesia, Japan, Mexico, Peru, the Philippines, Siam, Turkey). After 1988 developed (developing) countries are defined as high income (not high income) countries based on the World Bank 2018 country classification.

133. Since the global financial crisis, the dynamics of GVC expansion have changed. Trade bounced back from its deep crisis level, but it has grown only marginally faster than output. Trade in parts and components also stalled after the financial crisis and even fell between 2011 and 2014 with a modest increase since then.

134. The trade and GVC slowdown is partly cyclical. Trade growth is lower because global output growth is lower in major trading economies including Europe—which accounts for one-fourth of global output but one-third of world trade—and China. Structural factors play a part too. Trade growth is also lower because trade has become less responsive to output. The amount of trade generated as output rises—the trade to income elasticity—has decreased, particularly in China and the United States, both major actors in global value chains. China is producing more at home, becoming less reliant on imported components for its exports. The share of intermediate imports to exports of Chinese goods dropped from about 50 percent in the 1990s to a little over 30 percent in 2015. In the United States, a booming shale sector reduced oil imports by one-fourth between 2010 and 2015.

135. The recent decade has also been absent any major liberalization initiatives that might have set off a new wave of GVC formation. The Doha Round stalled and there are no large emerging markets engaging in the types of sharp reforms that China and Eastern Europe undertook in the previous period.

136. Thus, while the high trade growth of the 1990s reflected in part the expansion of global production chains, its decline may also be attributed to slower global growth and the consolidation of major actors' positions in production networks and the absence of any major liberalization initiatives. Going forward, automation and rising protectionism could alter the future expansion of GVCs (considered in Chapters 6 and 7).

137. GVC participation intensified between 1990 and 2015, especially in Europe and East Asia, which were heavily engaged in the sectors most amenable to GVCs, such as electronics and machinery. Among advanced countries, small open economies tend to show the highest participation. Emerging economies such as China, India, and South Africa experienced rapid growth in GVC participation between 1990 and 2015 (figure 1.5). In Brazil, Morocco, and Pakistan GVC participation grew less rapidly. The high GVC participation for major commodity exporters, such as Algeria, Saudi Arabia, and Venezuela, reflects extensive forward integration, since natural resources are the most upstream sectors.

138. All countries partake in GVCs, but across the world their participation is uneven. Some countries export raw materials for further processing, other import inputs for assembly and exports, and still other produce complex goods and services. In addition, some are heavily reliant on GVCs for trade, while others export largely domestic goods for consumption. To capture these distinct features of participation, countries are classified into four main types based on the products they export and their participation in GVCs. The four types are commodities, limited manufacturing, advanced manufacturing and services, and innovative activities. The rules for classification are described in box 1.2.

Box 1.2 Types of GVC Participation

While countries participate in global value chains (GVCs) in different ways, there are regularities in the type of GVC integration and how they upgrade. In 146 countries over the period 1990 to 2015, the following **four types of GVC participation** are particularly notable:

- 1) Commodities
- 2) Limited manufacturing
- 3) Advanced manufacturing and service
- 4) Innovative activities.

Data and Measures

Countries are classified into one of the four types based on the goods and services exported, the extent of GVC participation, and measures of innovation. Specifically, the taxonomy uses information on a country's sectoral specialization of exports: the domestic value added in gross exports in primary goods, manufacturing, and business services. The taxonomy also uses information on backward GVC integration from the EORA database for the period 1990 to 2015. Higher backward integration in manufacturing (backward_mfg) is a key characteristic of countries entering or specialized in non-commodity GVCs. Finally, it employs two measures to capture a country's innovative activities: intellectual property (IP) receipts as percent of GDP and research and development (R&D) intensity, defined as expenditure of public and private R&D as percent of GDP.

Definitions of GVC Taxonomy Groups

The rules take account of country size because smaller countries naturally rely on trade to a relatively greater extent. Histograms were used to define the thresholds of variables.

The following taxonomy groups are defined **sequentially**:

Commodities:

Manufacturing share of total domestic value added in exports < 60% **and**:

- Small countries: backward_mfg < 20%
- Medium-sized countries: backward_mfg < 10%
- Large countries: backward_mfg < 7.5%

These criteria ensure that manufacturing is a small share of exports and backward linkages in manufacturing are limited.

This group is further subdivided as follows:

- a. **Low Participation:** Primary goods' share of total domestic value added in exports < 20%
- b. **Limited Commodities:** $20\% \leq$ Primary goods' share of total domestic value added in exports < 40%
- c. **High Commodities:** Primary goods' share of total domestic value added in exports $\geq 40\%$

These criteria define countries according to their export dependence on manufacturing.

Innovative Activities (based on remaining countries):

- Small countries: IP receipts as % of GDP $\geq 0.15\%$ **and** R&D intensity $\geq 1.5\%$
- Medium-sized and large countries: IP receipts as % of GDP $\geq 0.1\%$ **and** R&D intensity in GDP $\geq 1\%$

These criteria split groups into those that spend a relatively large share of GDP on research and receive a large share of GDP from intellectual property.

Advanced Manufacturing and Services (based on remaining countries):

Share of manufacturing and business services¹ in total domestic value added in exports $\geq 80\%$ **and**:

- Small countries: backward_mfg $\geq 30\%$
- Medium-sized countries: backward_mfg $\geq 20\%$
- Large countries: backward_mfg $\geq 15\%$

Limited Manufacturing: Rest of sample

Upgrading Trajectories

Based on these definitions, countries that transitioned into **limited manufacturing** GVCs over the period 1990-2015 include Argentina, Armenia, Bosnia Herzegovina, Cambodia, Costa Rica, Cyprus, Ethiopia, Indonesia, Kenya, Nepal, Serbia, Slovenia, South Africa and Tanzania.

Countries that moved into **advanced manufacturing and services from limited manufacturing** GVCs include China, Czech Republic, Estonia, India, Lithuania, Philippines, Poland, Portugal, Romania, Thailand, and Turkey.

The Czech Republic moved further up into the **innovative activities** group in the most recent four years of the period. Other countries that moved into innovative GVC activities include Austria, Canada, Finland, Ireland, Israel, Italy, Korea, Singapore and Spain.

Meanwhile, some countries **upgraded and then downgraded**. Swaziland moved from limited manufacturing to advanced manufacturing and services and then back to limited manufacturing. Seven other countries switched from commodities to limited manufacturing and then back to commodities, including Botswana, Jamaica, Jordan, Lesotho, Nicaragua, the People's Republic of Korea, and Senegal.

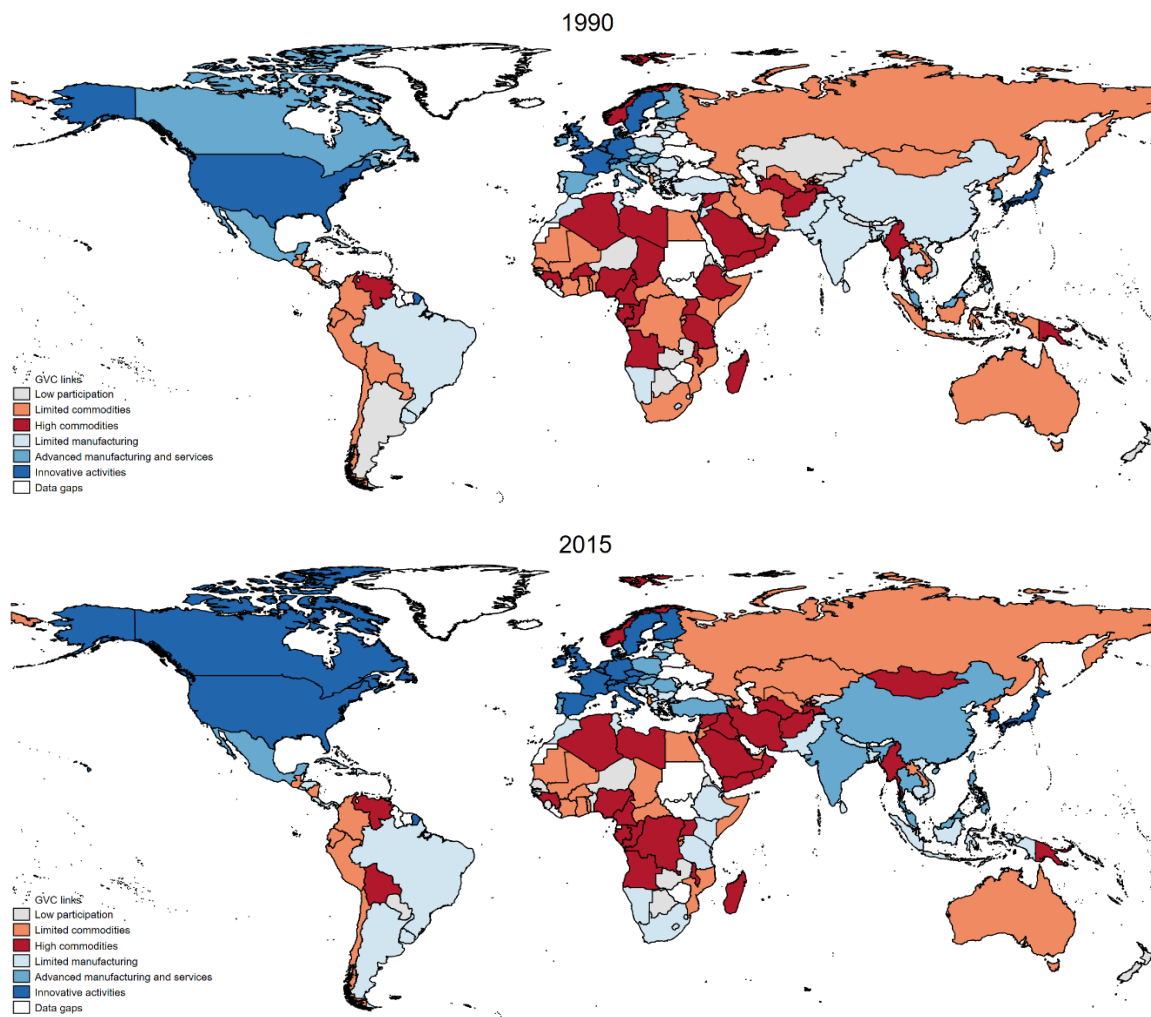
All other countries remained in the same group over the entire period covered.

Note: GDP = gross domestic product, backward_mfg = import content of exports in the manufacturing sector as percent of the country's total exports, IP = intellectual property, R&D intensity = expenditure of public and private research and development as percent of GDP.

¹ Business services include maintenance and repair; wholesale trade; retail trade; transport; post and telecommunications; and financial intermediation and business activities. Business services rather than total services were used to detect advanced countries with a developed services sector.

139. Using this taxonomy there are clear distinctions among regions. East Asia, Europe, and North America are engaged in advanced manufacturing and services GVCs and innovative GVC activities, while Africa, Central Asia, and Latin America are mostly in commodities and limited manufacturing GVCs.

Figure 1.5 GVC participation around the world, 1990 and 2015



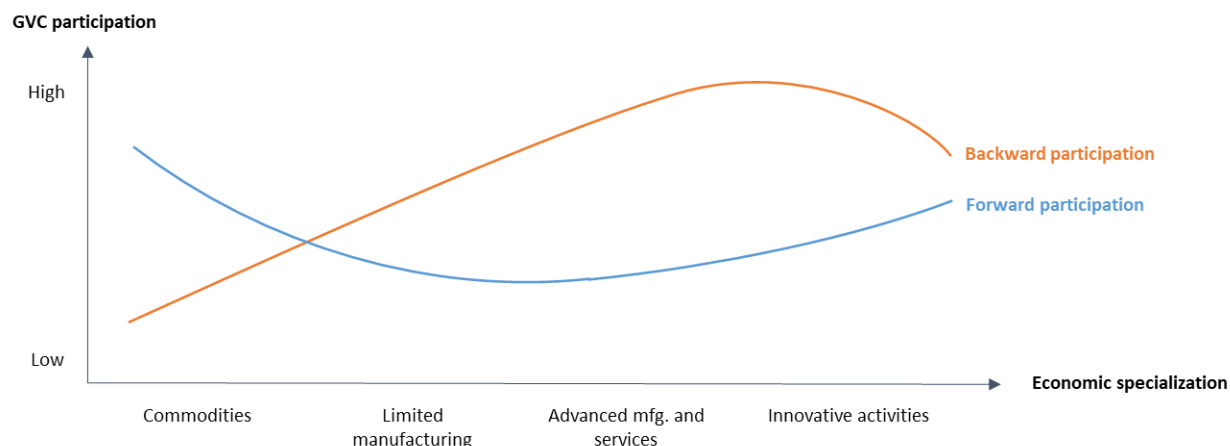
Source: WDR team calculations based on the GVC taxonomy of 1990 and 2015 (see Box 1.2).

Notes: The type of a country's GVC links are determined based on the country's extent of backward GVC participation, measured as the portion of imports that are embodied in manufacturing exports as percent of a country's total exports, combined with the country's sector specialization of domestic value added in exports. Countries in the commodities group show a small share of manufacturing exports and limited backward GVC integration. Their share of commodity exports can be low, medium or high. Countries specialized in limited manufacturing GVCs engage in some manufacturing exports, often alongside commodities exports, and show medium backward GVC integration. Countries specialized in advanced manufacturing and services GVCs show a high share of manufacturing and business services exports and high backward GVC integration. Countries specialized in innovative GVC activities spend a large share of GDP on research and development, receive a large share of GDP from intellectual property and show high backward GVC integration.

140. Countries' economic specialization shapes the extent of backward and forward participation. Figure 1.6 shows an approximate distribution of backward and forward GVC integration across the four taxonomy groups. The abundance of natural resources or agriculture in a country is linked to high forward integration,

since commodities are used in a variety of downstream production processes that typically cross several borders. Participation in limited manufacturing reduces forward integration, because commodities are less important in trade and the manufacturing output at this stage (e.g. garments) are less likely to be used as inputs in destination countries. But moving to advanced manufacturing and services GVCs and especially innovative activities increases forward participation. Backward integration is lowest for countries specialized in commodities, starts to expand for countries in the limited manufacturing group, while countries specializing in advanced manufacturing and services show high reliance on imported inputs for exports. Backward participation is slightly lower for the countries in the innovative group, because their activities are less dependent on imported inputs.

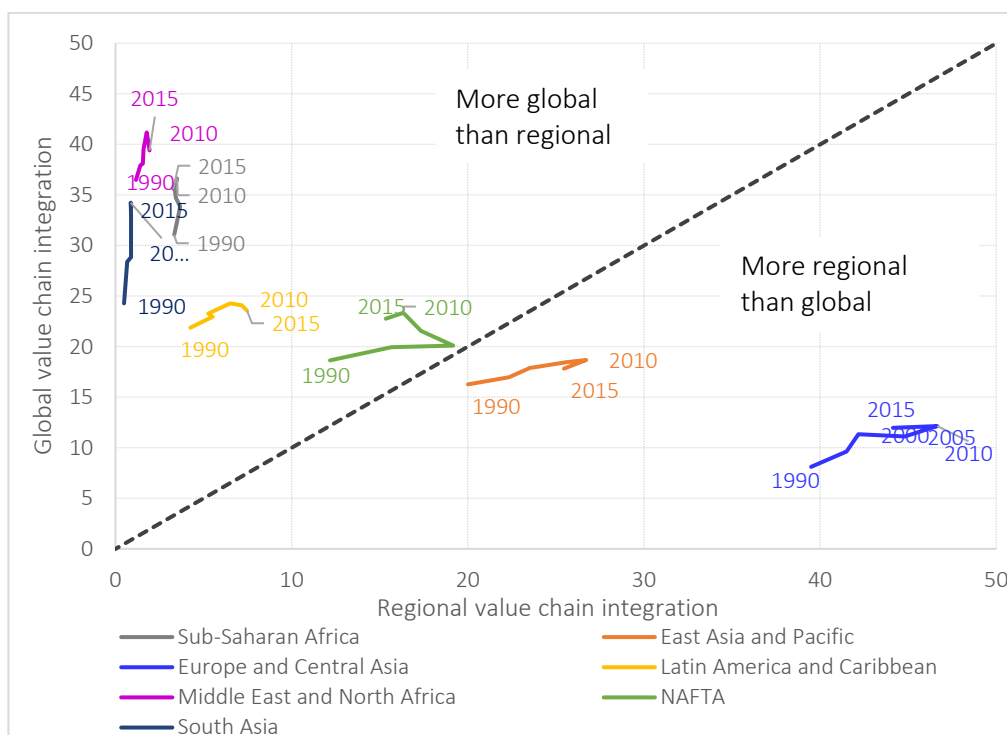
Figure 1.6 Average backward and forward GVC participation across taxonomy groups



Note: The approximate distribution is based on backward and forward GVC participation averages by taxonomy group for the period 2010-15. For the definition of taxonomy groups, see Box 1.2.

C. How are GVCs distributed across regions?

141. GVCs have increased globally and regionally, but the differences across regions remain larger than differences over time. Some regional GVCs are more focused on trade within the region while others more dependent on global integration (figure 1.7). Countries' trade into regional (or regional bloc) value chains involve only production partners in the region, while extra-regional value chain trade involves only partner countries outside the region. Importantly, the differences between regions in the depth of regional integration are stark and vastly dominate changes over time. Europe is the most regionally integrated region, with four times as many regional linkages as global linkages and South Asia and Middle East and North Africa are the least regionally integrated regions.

Figure 1.7 GVC activities have increased globally and regionally, 1990–2015

Source: WDR team calculation based on the EORA26 database and Borin and Mancini (2019).

Note: EORA26 is used as it offers the largest country coverage. The GVC participation measure reflects the share of country exports that flow through at least two borders. It is computed as the share of GVC exports in total international exports. GVC exports include transactions in which a country's exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country's exports are not fully absorbed in the importing country and instead are embodied in the importing country's exports to third countries (forward GVC participation). For each region, the graph plots the regional GVC integration involving only production partners in the same region—and global, involving only partner countries outside the region—for intervals of 5–6 years between 1990 and 2015. Regional and global GVC participation measures are computed as weighted averages over the countries in each group. The weights are the share of each country in the corresponding region total trade. The dashed line is the 45-degree line. Note that the economic size of the trading blocs and the number of potential production partners in the region are influencing these indicators.

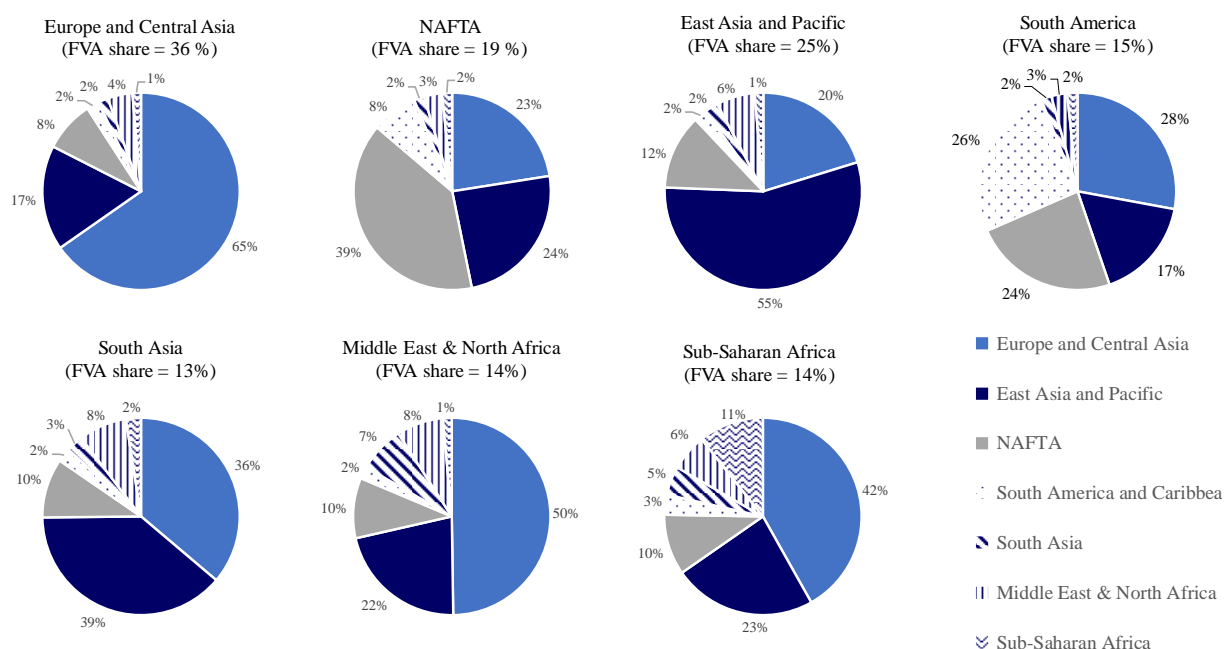
142. In all regions, the increase in GVC participation between 1990 and 2015 resulted from a combination of regional and global trends.

- In Europe, regional fragmentation of value chains increased through successive rounds of enlargement where Eastern European countries including Bulgaria, Hungary, and Poland progressively joined older members' production networks. But global fragmentation was equally important, mostly driven by larger European economies such as France, Germany, and the United Kingdom whose linkages with countries in Asia such as China or India expanded.
- In East Asia, linkages are more regional than global, and GVCs became more internationally fragmented after 1990 because of both regional and global fragmentation in the 1990s and 2000s, although regional integration dominated.
- In contrast, the NAFTA global value chains depend somewhat more on global partners than regional partners and integration has been increasing on both fronts. GVCs expanded more regionally in the 1990s reflecting the coming into force of the NAFTA trade agreement in 1994, while the 2000s saw a marked acceleration of global GVC activities in part owing to China joining the world economy.

- In Latin America, value chains are more globally linked, but have increased both regionally and globally.
- In the three remaining regions GVC integration has been mostly global and has been increasing primarily with global partners, with South Asia’s GVCs expanding almost entirely outside the region.

143. Considering backward linkages, confirms that production networks in Europe, East Asia and to a lesser extent North America, are mostly regional (figure 1.8). For an average European country, 65 percent of the imported intermediates embodied in its exports in 2018 originated from other European countries. This share is about 55 percent for an average East Asian economy, while it is almost 40 percent for a NAFTA country. The other regions are all more integrated globally than regionally. The share of imported intermediates embodied in exports originating from regional partners is 26 percent in South America but as low as 3 percent in South Asia.

Figure 1.8 Global production networks are still organized around three main regions, 2018



Source: WDR team calculations based on the EORA full database.

Note: For each region, the graph reports the share of imported intermediates embodied in exports in total exports computed as the ratio of the foreign value-added content of exports in total gross exports (FVA in parenthesis). The graph further reports the contribution of each origin partner region to this share. The geographic breakdown across source countries is only available for one index, the foreign value-added content of exports. The data used to compute this index is the EORA full database for which the latest available year is 2018.

144. In Latin America (excluding Mexico) the geographic distribution of the foreign content of exports is almost equivalent across the three regions, Europe, East Asia, and North America. South Asia is particularly integrated in production networks with East Asia and Europe, while Africa is predominantly integrated in European supply chains followed by those in East Asia. These regional patterns reflect geographic distances and trade costs, since intermediate inputs are shipped across borders multiple times. For instance, just-in-time techniques pushed firms to locate production of time-sensitive components closer to home. Trade costs also determine the optimal location for individual production stages along GVCs.⁹

145. Africa has managed to join GVCs in the apparel, food, and automotive industries and in some business services. But it remains a small actor in the global economy, accounting for just 3 percent of global

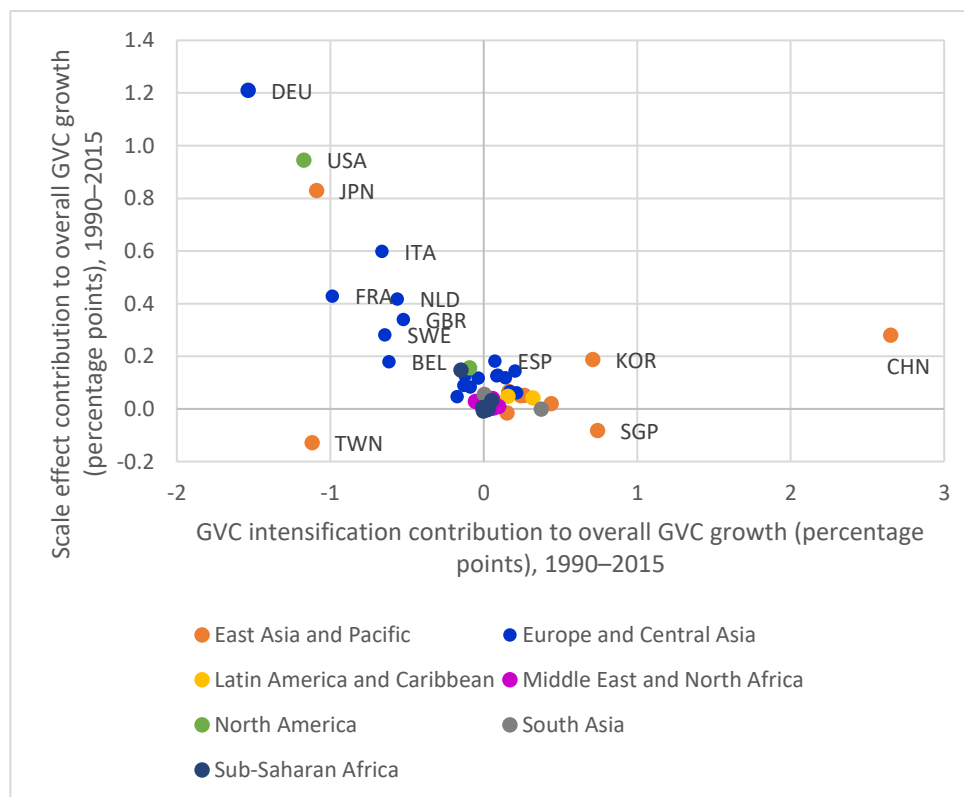
trade in intermediate goods. African countries' exports tend to enter at the very beginning of global value chains, where a high share of their exports enter as inputs for other countries' exports, reflecting the still-predominant role of agriculture and natural resources in their exports. Botswana, Democratic Republic of Congo, and Nigeria have become integrated in GVCs through exports of oil and other natural resources. But Ethiopia, Kenya, and Tanzania have seen faster GVC integration sourcing foreign inputs for their export-oriented businesses. Most of their integration occurred in agri-business and apparel, especially in Ethiopia and Kenya, in manufacturing in Tanzania, but also, though to lesser extent, in transport and tourism. Moroccan efforts to attract major manufacturers in the automotive industries over the past decade are paying off, as with the arrival of a new Peugeot facility in 2019 following in the footsteps of another French automaker Renault-Nissan. Overall, the GVC participation in some of these (Ethiopia, Kenya, South Africa, or Tanzania) countries grew by 10 percentage points or more, close to what Poland or Vietnam—now success stories—experienced over the late 1990s and 2000s.

D. Which countries accounted for most of the GVC expansion?

146. A few countries in Asia, Europe, and North America drove GVC expansion over the past 30 years. Between 1990 and 2015, world GVC participation grew by 7 percentage points. That increase could be because countries or sectors became more GVC intensive as production processes become more fragmented—an intensification effect. Or it could also be because already intensive-GVC countries and sectors boosted their share of world trade—a scale effect.

147. The top contributors to GVC intensification were Germany, the United States, Japan, Italy, and France, which began using more imported inputs in their exports (figure 1.9). In contrast, China's contribution to the expansion of GVC worldwide was predominantly through an increase in its share of world trade, though its GVC intensification remains significant.

Figure 1.9 A handful of countries have driven the GVC expansion, 1990–2015



Source: WDR team calculations using the EORA26 database and Borin and Mancini (2019).

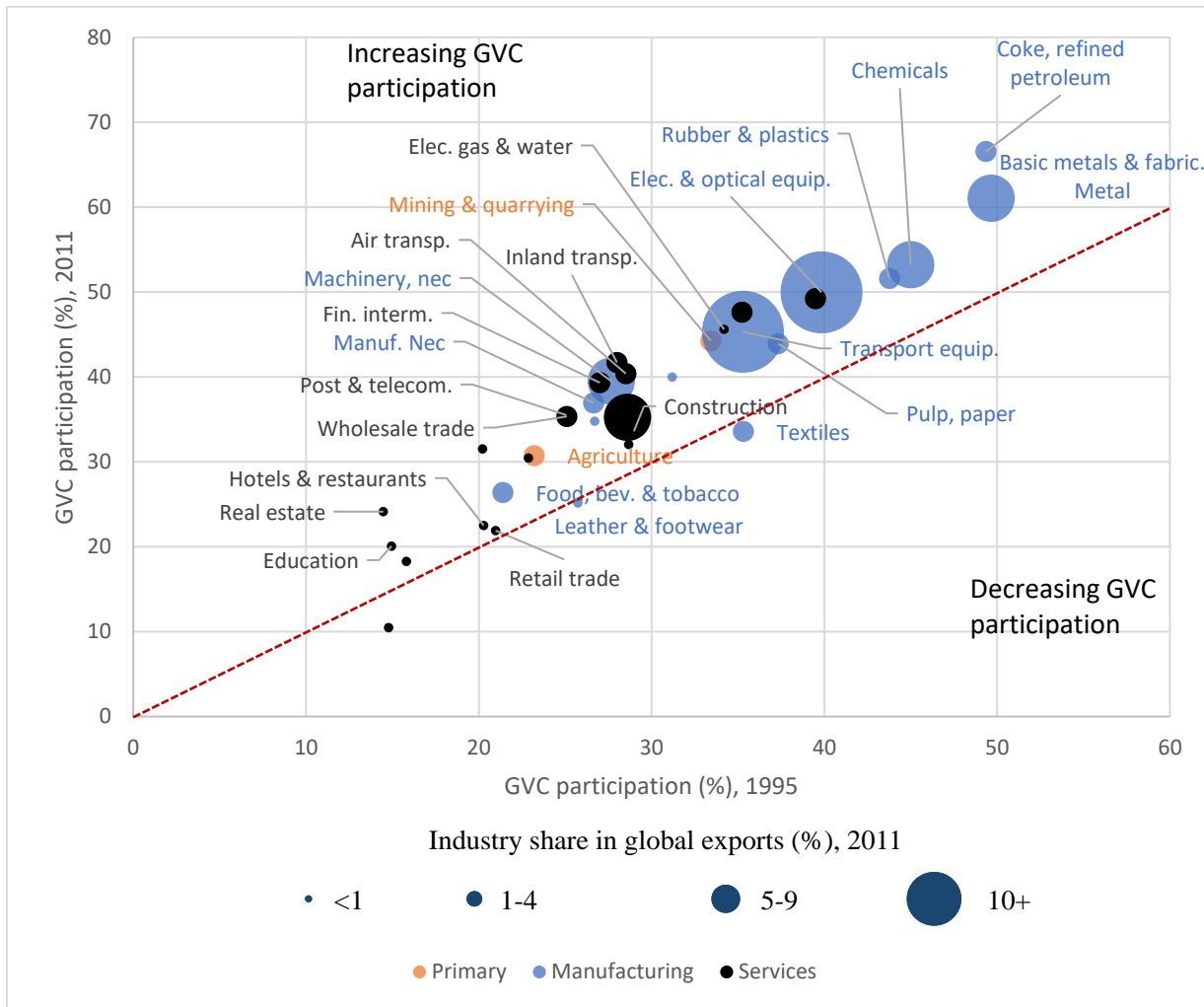
Notes: EORA26 dataset is used, as it offers the largest country coverage. The GVC participation measure reflects the share of countries' exports that flow through at least two borders. It is computed as the share of GVC exports in total international exports. GVC exports include transactions in which a country's exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country's exports are not fully absorbed in the importing country and instead are embodied in the importing country's exports to third countries (forward GVC participation).

E. How are GVCs distributed across sectors?

148. The sectoral composition of GVC flows is also quite diverse. Some countries specialize largely in agricultural GVCs (such as Madagascar) or in the natural resource segments of GVCs (such as Chile or Norway). These types of GVC are classified as commodity-linked. Less developed economies (such as Tanzania) specialize in low-tech simple manufacturing, and more developed economies (such as Mexico, Slovakia, or China) in medium-tech manufacturing. A set of countries (including India and Singapore) largely specializes in the services embodied in GVCs. And a small set of very advanced economies (Japan, Germany, and United States) provide innovative goods and services.

Most GVCs are for a handful of sectors in manufacturing and services

149. Some industries have used GVCs heavily for decades. For example, basic industries that are resource-intensive and make heavy use of imported primary inputs—chemicals, refined petroleum, basic metals, and rubber and plastics. These sectors displayed large GVC participation already in 1995, due to their high foreign value added in exports (figure 1.10). They have also intensified their use of supply chains over time.

Figure 1.10 GVC participation by sector, 1995 and 2011

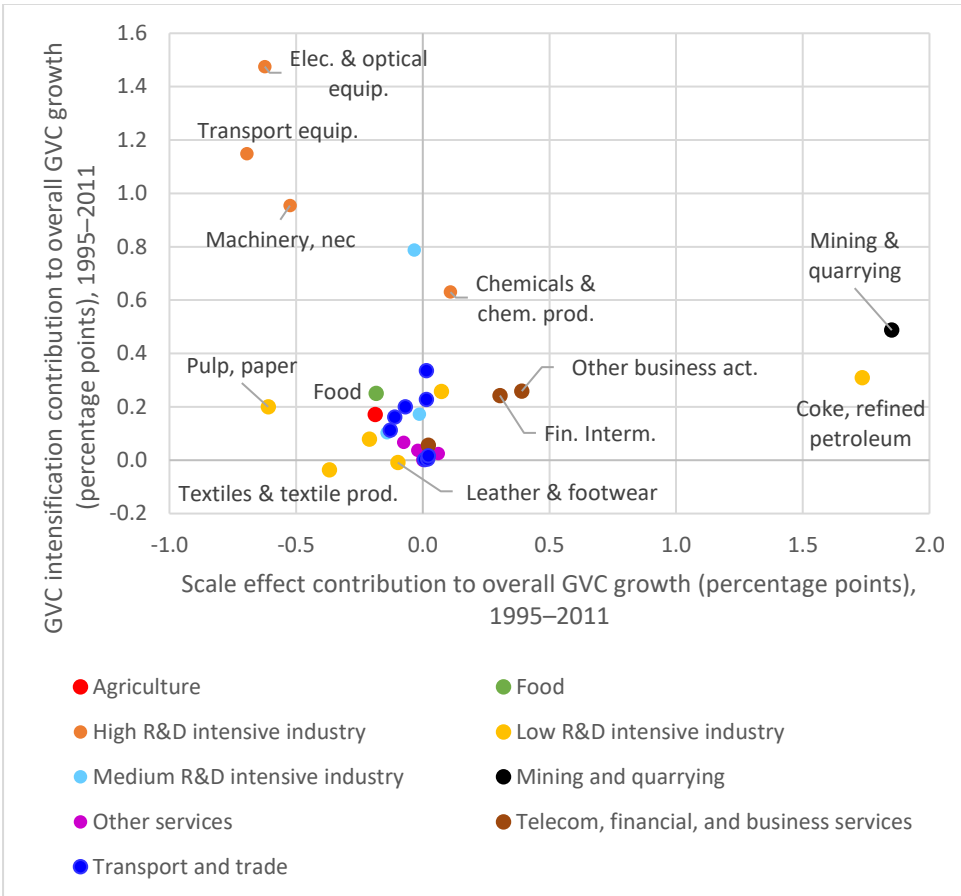
Source: WDR team calculations using the WIOD 2013 release dataset and Borin and Mancini (2019).

Notes: The GVC participation measure reflects the share of world exports that flow through at least two borders. For each industry year, it is computed as the share of GVC exports in total international exports. GVC exports include transactions in which a country's exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country's exports are not fully absorbed in the importing country and instead are embodied in the importing country's exports to third countries (forward GVC participation). The WIOD 2013 dataset is used because it offers a finer sectoral classification than EORA26. In addition, the 2013 release is used, which covers the years 1995 to 2011 rather than the latest 2016, which covers the years 2001 to 2014, in order to compare the change in GVC participation in the 2010s relative to the 1990s.

150. In contrast, the fragmentation of value chains in food products and textiles and leather has not changed over the last two decades. Most fragmentation of production in these sectors already took place in the 1970s and 1980s, hence the slower pace. The end of the MultiFibre Arrangement in 2004 further concentrated production chains in fewer countries, with China emerging as the largest producer and capturing many stages of production. For manufactured food, an important share of intermediates is sourced from local agriculture, especially for time-sensitive fresh products. In addition, trade costs, including nontariff measures, are still high for many food products, as are transport costs due to their low-value-to-weight ratio. For services, construction and transport-related activities are the most fragmented, with the latter's GVC participation increasing substantially between 1995 and 2011.

151. For sectors, most of the GVC intensification over the period was driven by high technology manufacturing industries, whose use of imported inputs increased. At the other end of the spectrum, very upstream mining and other primary industries accounted for most of the scale effect, consistent with their high share of GVC integration and increasing share in world trade following the large price surge over the period (figure 1.11).

Figure 1.11 GVC expansion was driven by a handful of sectors, 1995–2011



Source: WDR team calculations using data from the WIOD 2013 release database and Borin and Mancini (2019).

Note: The GVC participation measure reflects the share of countries' exports that flow through at least two borders. It is computed as the share of GVC exports in total international exports. GVC exports include transactions in which a country's exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country's exports are not fully absorbed in the importing country and instead are embodied in the importing country's exports to third countries (forward GVC participation). The 35 WIOD 2013 industries are classified in 9 industry groups (see GVC Development Report 2019): (1) agriculture, hunting, forestry, and fishing (ISIC rev.3 codes "01T05"); (2) food (ISIC rev.3 codes "15T16") (3) mining and quarrying (ISIC rev.3 codes "10T14"); (4) high R&D intensive industries (ISIC rev.3 codes "24, 29T34, 352,353, 359"); (4) medium R&D intensive industries (ISIC rev.3 codes "25T28, 351, 37"); (5) low R&D intensive industries (ISIC rev.3 codes "17T23, 36"), (6) trade and transportation (ISIC rev.3 codes "50T52," 55, "60T63"); (8) post and telecommunications, financial and business services (ISIC rev.3 codes "64, 65T67, 71T74"); (9) real estate activities, utility, construction, and other services (ISIC rev.3 codes "70, 75, 80, 85, 90T93, 95, 40,41, 45"). The WIOD 2013 dataset is used because it offers a finer sectoral classification than EORA26. In addition, the 2013 release is used, which covers the years 1995 to 2011 rather than the latest 2016, which covers the years 2001 to 2014, in order to compare the change in GVC participation in the 2010s relative to the 1990s.

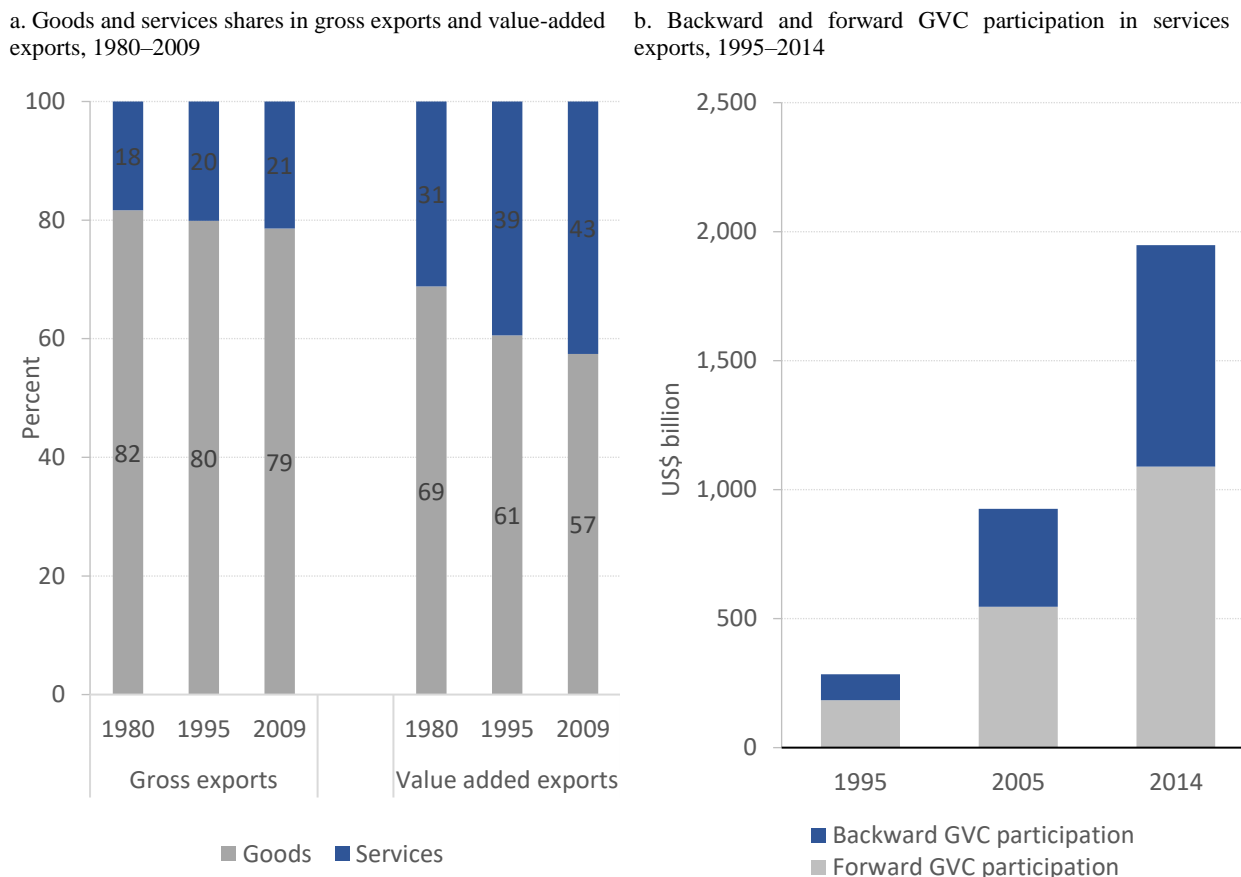
GVCs are not just in manufacturing—they have also expanded rapidly in services

152. Services are an invisible but vital part of GVCs. The fragmentation of goods production has been associated with outsourcing not just manufacturing tasks but also service tasks, with the back office of

many U.S. manufacturers now in India. In addition, transportation, telecommunications, and financial services facilitate and coordinate the geographic dispersion of production in all sectors. And service production is itself being fragmented across countries, as when preliminary architectural designs, tax returns, and magnetic resonance image readings are performed in one country and finalized and delivered to customers in another. In the United States, United Kingdom, France, Germany, and Italy, services contribute more than half the total value added embodied in exports. Kenya, India, and the Philippines and Kenya also have rapidly expanding ITC and business service sectors. Even in China, traditionally viewed as an exporter of manufactures, more than a third of the value added in its exports comes from services.

153. For gross exports of services, such as transport, tourism, or business services, the share in trade is fairly flat at around 20 percent. But goods trade increasingly involves services in production, with the share of services in valued added trade rising from 30 percent to more than 40 percent between 1980 and 2009, a result of both forward and backward use of services in production (figure 1.12).

Figure 1.12 Services play a growing role in GVCs



Source: WDR team calculations for panel a using Johnson and Noguera (2012) VAX measure, for panel b using WIOD data from the 2013 release for 1995 and from the 2016 release for 2005 and 2014 and Borin and Mancini (2019) measures.

Notes: Panel a reports the share of goods and services in gross exports and value-added exports, and panel b the GVC exports for services broken down into its backward and forward components. The GVC exports reflect exports that flow through at least two borders and indicate the extent to which sectors participate in global value chains. GVC exports include transactions in which a country’s exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country’s exports are not fully absorbed in the importing country and instead are embodied in the importing country’s exports to third countries (forward GVC participation).

GVCs in agriculture and food industries have also expanded, including those in Africa

154. While global value chains in the agricultural and food sector have expanded over the past two decades, they remain a small share of GVC trade. In 2014 agriculture exports accounted for 2 percent of world exports against 60 percent for manufactures and around 20 percent for services. When measured in value-added terms, this share rises to just about 5 percent.

155. This reflects the fact that in the agri-food sector, contrary to the manufacturing sector, domestic value chains are dominant and dynamic, with GVCs important but secondary. Asia and Latin America have seen a particularly rapid spread of supermarkets and food-sector small and medium enterprises such as chain restaurants, processors, and modern wholesale and logistics companies.¹⁰

156. This also reflects the fact that GVCs in the agri-food sector typically involve less cross-border movement of goods than capital investments through direct and portfolio investment, and business practices such as contracting, logistics expertise, etc. Taking Asia, Latin America, and Sub-Saharan Africa together, FDI inflows in the agri-food sector grew by a factor three between 2000 and 2010. But such investments are mainly into large and more developed markets within Latin America (Argentina, Brazil, Chile, and Mexico) and Asia (China, Vietnam, and Indonesia) with little flowing into Sub-Saharan Africa (Ethiopia, Ghana, Tanzania, and Uganda) and mostly concern the food industry (processing and retail) rather than agriculture.¹¹

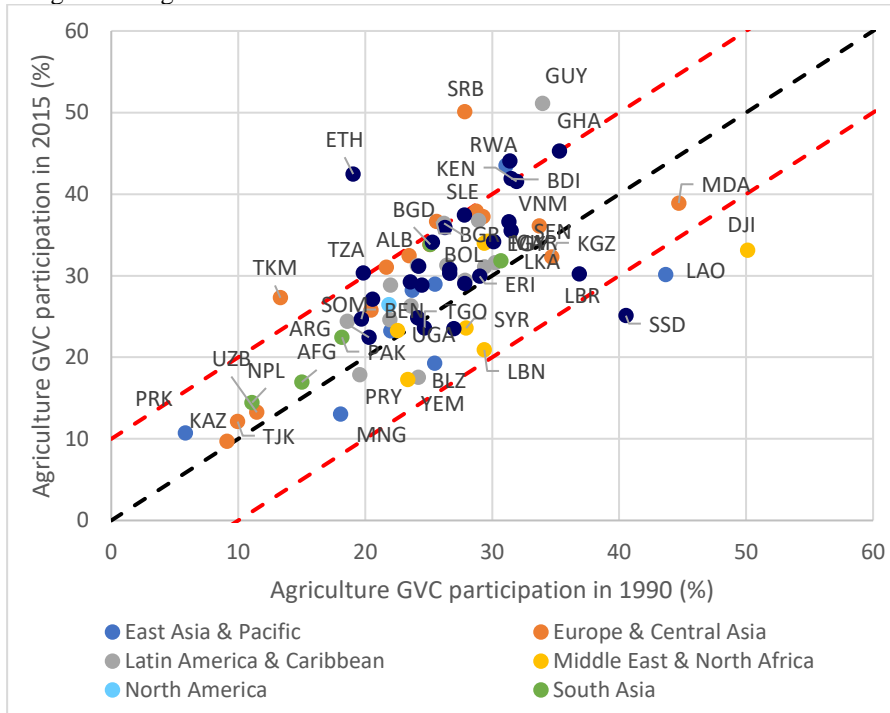
157. Considering countries' overall participation in agricultural GVCs between 1990 and 2015, countries such as Ethiopia, Ghana, Kenya, and Rwanda in Africa—and Vietnam in East Asia—stand out with increases in GVC participation close to 10 percentage points or more. In contrast, Laos, Lebanon, Madagascar, and Yemen—and resource-rich economies like Sudan—have seen their integration in agricultural value chains drop by between 5 and 30 percentage points (figure 1.13a). For food value chains, a similar picture emerges for countries in Africa including Ethiopia, Kenya, and Tanzania, suggesting that those countries have been successfully developing food processing industries (figure 1.13b). Value chains in the food industry are also important in Eastern European countries such as Bulgaria, Hungary, and Serbia.

158. Importantly, for most developing countries involved in agricultural and food GVCs, their participation is in large part forward looking, being limited to the supply of a specific product such as coffee in Ethiopia or Uganda, Cocoa in Côte d'Ivoire or Ghana, oranges in Brazil and bananas in Colombia.

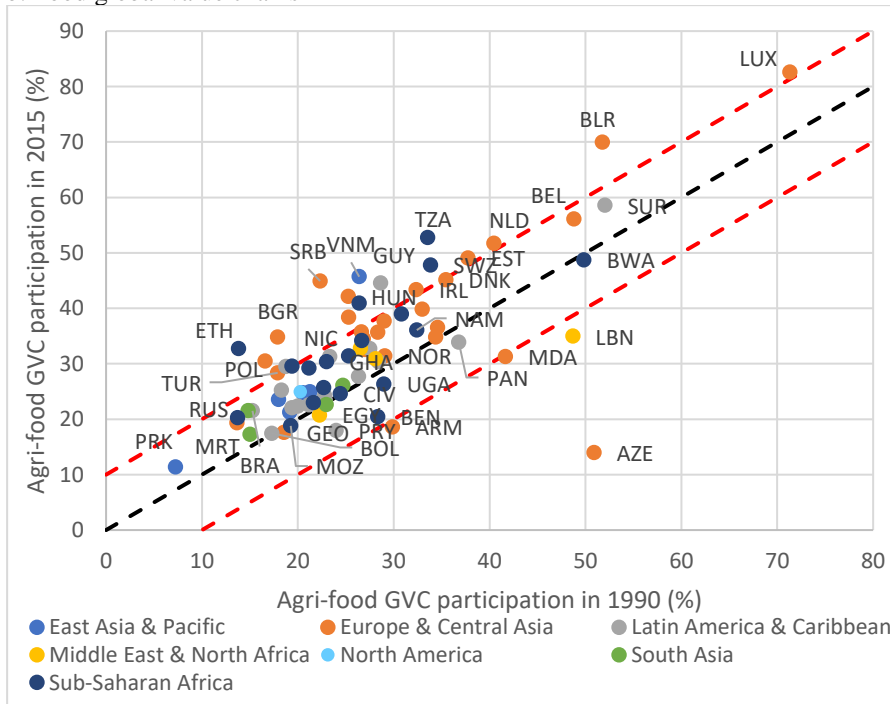
159. Agricultural value chains are also characterized by the prevalence of informality with important consequences for workers poverty and vulnerability. In developing countries over 94 percent of employment in agriculture is informal against 63 percent in manufacturing. In African countries these shares rise to 98 and 77 percent for agriculture and manufacturing respectively.¹² While firms within GVCs pay higher wages to their formal workers they also rely heavily on informal workers that do not earn the same premiums. In Peru 79 percent of all men and 84 percent of all women working on artichoke farms and processing plants have insecure jobs. Only about half of the migrant workers in the export pineapple sector in Ghana have permanent contracts.¹³ In addition hiring workers indirectly through sub-contractors or agents further contributes to vulnerability within GVCs as firms transfer their social responsibilities to a third party.

Figure 1.13 GVCs have expanded in both the agriculture and food industries, 1990 to 2015

a. Agriculture global value chains



b. Food global value chains



Source: WDR team calculations using the EORA26 data and Borin and Mancini (2019).

Note: EORA26 is used, as it offers the largest country coverage. Plots report only countries with at least 5 percent of their exports in the agriculture or food sectors. Agriculture includes forestry, hunting, and fishing. The GVC participation measure reflects the share of countries' exports that flow through at least two borders. It is computed as the share of GVC exports in total international exports. GVC exports include transactions in which a country's exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country's exports are not fully absorbed in the importing country and instead are embodied in the importing country's exports to third countries (forward

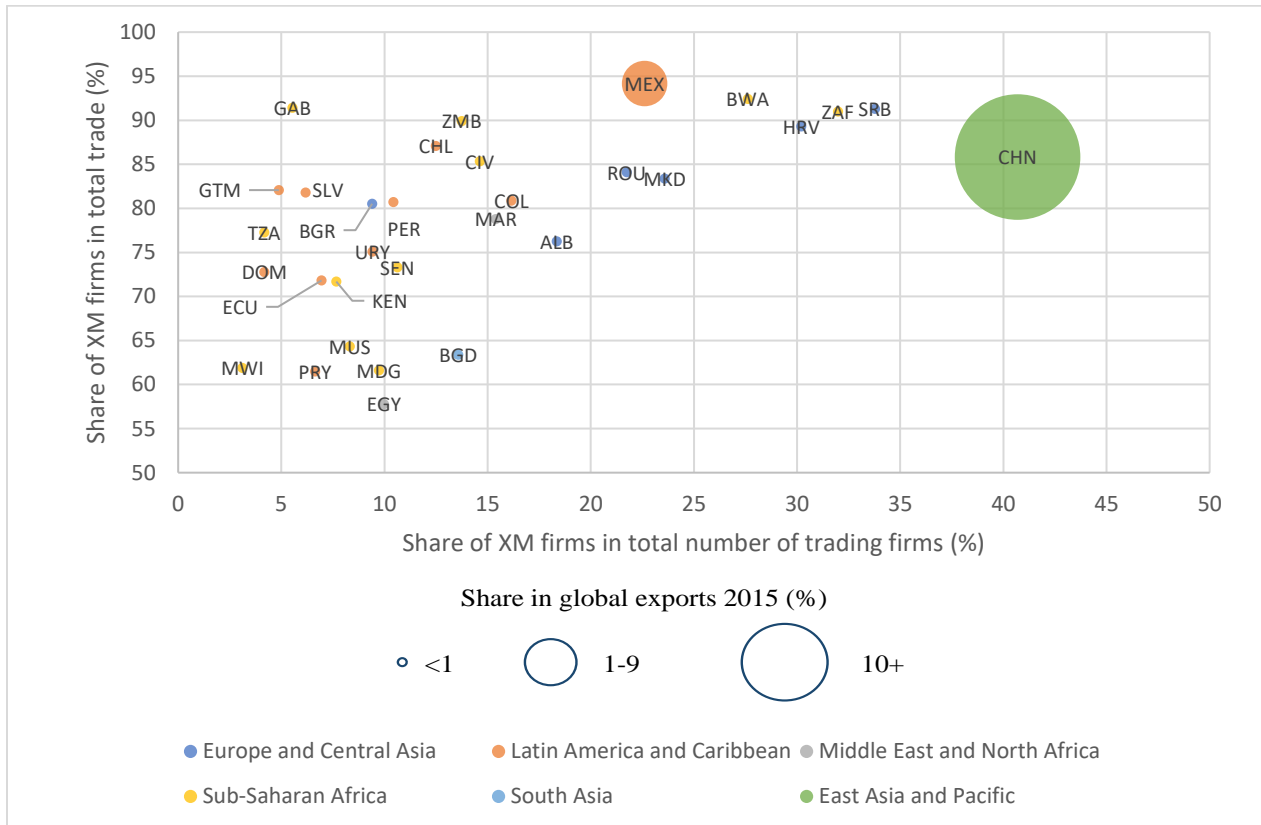
GVC participation). The black dashed line is the 45-degree line. The red dashed lines mark a 10-percentage point change in the rate of GVC participation between 1990 and 2015.

F. A few large trading firms account for most GVC trade

160. In practice, it is rather firms not countries or industries that participate in international trade (box 1.3). In line with this simple observation, economic research in international trade transformed dramatically in the last 20 years, placing firm-level international strategies at center stage. Fueling this shift was the increased availability of longitudinal plant and firm datasets that permitted researchers to unveil new facts challenging the validity of existing models. An important stylized fact from this literature is that in all countries, rich and poor, trade is highly concentrated in a small share of large firms that both import and export. Similarly, firms that both import and export dominate GVC participation (figure 1.14).

161. Because firms are the main actors of GVCs, another way to illustrate individual country GVC participation is to look at their share of firms engaged in two-way trade—that is, firms both importing and exporting (figure 1.14). Countries with large GVC participation such as China, South Africa, and Mexico have respectively 41 percent, 32 percent, and 22 percent of their trading firms both importing and exporting. Note the extreme concentration of trade by a few importing–exporting firms. Two-way traders account for about 15 percent of all trading firms on average in the sample of countries, yet they capture almost 80 percent of total trade. These “superstar” firms, many of them multinational,¹⁴ drive country trade performance.¹⁵

Figure 1.14 Firms that both import and export dominate GVC participation, 2005–15



Source: WDR team calculations using firm matched export–import customs data collected for 32 countries by the Trade and Integration Unit of the World Bank Research Department, as part of efforts to build the Exporter Dynamics Database described in Fernandes, Freund, and Pierola (2016).

Note: The graph plots the share of two-way trading firms (firms that both import and export in a given year) in the total number of trading firms (firms that import, export, or do both), against their share in a country's total trade value (imports plus exports). For each country, the average of each measure is computed over 2005–15 for the largest available sample of countries. The dashed lines mark the average across countries for each measure on the X and Y axis.

Box 1.3 The firm in GVCs

At the theoretical level, the seminal paper in the literature is that of Melitz (2003), which focuses on the exporting decisions of heterogeneous firms within an industry. In Melitz's framework, firms are assumed to produce differentiated products with technologies featuring increasing returns to scale. Product differentiation confers market power on firms, while scale economies are associated with firms facing fixed costs of production and distribution. The decision of a firm to export to a given foreign market is shaped by a comparison of the potential operating profit obtained in that foreign market with the fixed costs associated with distributing products in that market.

This firm-level approach to international trade initially involved only the exchange of final goods, but an active literature has adopted similar ideas to understand the rise of GVCs. Given the fixed costs of engaging in global sourcing (of importing parts and components), one would expect that the use of imported inputs in production will demand that importers attain a minimum efficient scale of production, excluding smaller and less productive firms in an industry from GVC participation.¹⁶

With a firm-level approach, one can also distinguish global value chains organized by a lead firm, which incurs the bulk of the fixed costs associated with setting up the network of producers for a given production process—and those more decentralized, with individual producers incurring costs to set up links upstream and downstream.¹⁷

Firm-level datasets containing information on the import and export transactions of firms can be fruitfully used to construct measures of GVC participation similar to those based on the country–industry information in global input–output tables. More specifically, transaction-level customs datasets of the type available from the World Bank's Export Dynamics Database can identify the set of firms in a country that participate in trade, further distinguishing firms that export, firms that import, and firms that both export and import. When a given firm in a given country both imports *and* exports, it is natural to conclude that this firm participates in GVCs.

To map this definition more precisely to the definition of backward GVC participation developed in country–industry studies, one would ideally also resort to product-level information to verify that the goods imported by an exporting firm are indeed intermediate inputs (rather than final goods), so that one can more comfortably conclude that this firm is indeed using foreign value added in its production destined for exports. Without linking customs data across countries, it is much harder to come up with analogous firm-level measures of forward GVC participation. Even when a firm is identified as an exporter of intermediate inputs (rather than of final goods), it is almost impossible to establish whether those inputs are fully absorbed in the importing country, or whether they are re-exported to third markets by the importing firms after having added value to them.

Note that the firm-level measures identify only the *extensive* margin of GVC participation, while industry-level measure based on global input–output tables also capture the *intensity* of GVC participation. Computing *intensive* measures of GVC participation at the firm-level data is challenging, however, particularly if complementary census information is not available. The reason is that customs data have no information on firms' domestic purchases of inputs or domestic sales of goods. So, it is difficult to infer the ratio of foreign inputs used in production, and it is even more difficult to disentangle the foreign-input content of exports from the foreign-content of overall production.¹⁸

Firm-level information on importing and exporting can also shed light on whether global input–output tables provide an accurate description of value-added trade flows across countries. Even when the entries in these tables provide an accurate account of the origin of inputs in a country's industrial production, the

standard methods used to compute bilateral value-added trade flows from these tables assume that the same combination of inputs is used in production regardless of the destination of sales of a country and industry’s output. In practice, firms selling output to different markets use very different combinations of input sources, and this has implications for the type of bilateral value-added trade flows one infers from global input–output tables. For instance, because Mexican exports to the United States embody a disproportionate amount of U.S. value added relative to Mexican exports to other countries, the share of U.S. value in U.S. imported Mexican manufactures is 30 percent, rather than the 17 percent one would infer from standard techniques applied to global input–output tables.¹⁹

Sticky buyer–seller relations

162. Modeling global production sharing as simply an increase in the extent to which foreign inputs (or foreign value added) are used in production misses distinctive characteristics of the recent rise of GVCs. That rise entails much more than the intensification of the trade in raw materials and homogeneous intermediate inputs that has existed since the Bronze Age. It is also much more than importing and exporting firms transacting with each other in world markets. The expansion of GVCs entails a finer international division of labor, but it also involves several additional features, four of them particularly important: matching buyers and sellers, making relation-specific investments, exchanging intangibles, and living with limited contractual security.

163. First, matching buyers and sellers in GVCs is not frictionless. Fixed costs of exporting and importing partly reflect the costs of finding suitable suppliers of parts and components or suitable buyers of one’s products. For this reason, these fixed costs are better understood as sunk costs, which naturally create “stickiness” among participants in a GVC.

164. Second, a source of lock-in for GVC relationships is that participants often make numerous relationship-specific investments (such as purchasing specialized equipment or customizing products), would obtain a much-depressed return if GVC links were broken. The need to customize inputs, coupled with quality sensitivity makes matching buyers and sellers particularly important. If a firm suddenly faces an increase in the demand for its goods, it cannot easily scale up by buying more foreign inputs from some centralized market. Typically, only a handful of suppliers worldwide can provide the additional customized inputs to scale up.

165. Third, GVCs are more likely to lead to technology transfer and standards upgrading. Firms in GVCs do not engage only in trade in tangible goods with other members of their value chains. GVCs often involve large flows of intangibles, such as technology, intellectual property, and credit. Lead or parent firms may also provide good managerial practices, saving resources and lifting productivity, or labor and environmental standards. The exchange of these intangibles is much more complex than that of simple goods or services.

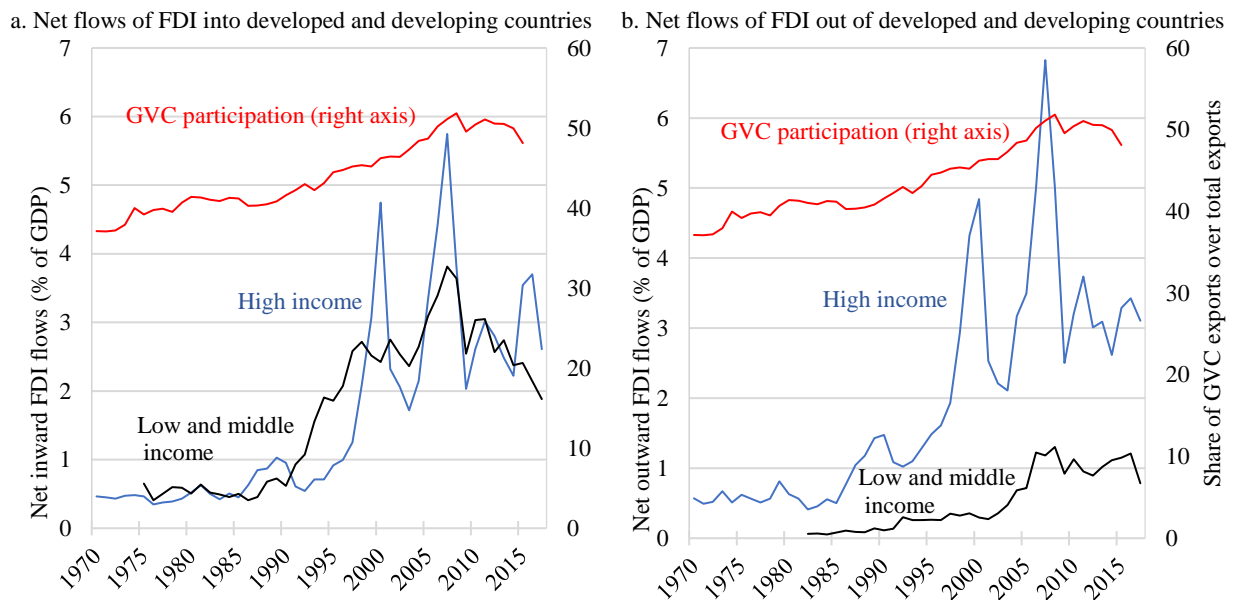
166. Fourth, the lock-in effects and flows of intangibles within GVCs are particularly relevant given the limited contractual security governing transactions within these chains. GVC often involve transactions that require a strong legal environment to bind producers together and to preclude technological leakage. And yet, GVCs are often conducted in situations lacking this strong legal environment because cross-border exchanges of goods cannot generally be governed by the same contractual safeguards that typically accompany similar exchanges occurring within borders. As a result, GVC participants have repeated interactions to provide implicit contract enforcement. As with matching frictions and relationship-specificity, this force contributes to the “stickiness” of GVC relationships.

167. In sum, these considerations lead to a novel, relational conceptualization of GVCs that shifts the focus away from the mere allocation of value added across countries through anonymous spot exchanges of goods and services. Instead, the identity of the agents participating in a GVC is crucial, and within GVCs, relationships are more likely to exhibit persistence.

Transacting within firm boundaries

168. An extreme version of relational contracting arises when parties in a GVC bypass the market mechanism altogether and transact within firm boundaries—by having the buyer vertically integrate the seller or vice versa. Indeed, many value chains are managed and controlled by multinational enterprises that organize their production across different locations. In some cases, that make goods closer to new customers while reducing trade costs (market-seeking investment). In others, it takes advantage of lower costs of factors of production (efficiency-seeking investment). Both types of investment have contributed to the international dispersion of production, the second has been especially important for GVC growth, as evident from the growth of foreign direct investment (FDI) flows and GVCs, especially since the 1990s (figure 1.15).

Figure 1.15 FDI has accompanied the fragmentation of production, 1970–2018



Source: WDR team calculations using data from the World Development Indicators.

Notes: Panel a reports the net inflows of investment in the reporting economy from foreign investors divided by GDP, and panel b reports the net outflows of investment from the reporting economy to the rest of the world divided by GDP. To avoid composition effects, the definitions of income groups are time-invariant and based on the World Bank 2018 country classification. The GVC participation measure reflects the share of countries' exports that flow through at least two borders. It is computed as the share of GVC exports in total international exports. GVC exports include transactions in which a country's exports embody value added that it has previously imported from abroad (backward GVC participation) as well as transactions in which a country's exports are not fully absorbed in the importing country and instead are embodied in the importing country's exports to third countries (forward GVC participation).

169. FDI flows into southern and northern countries (inward FDI) are positively correlated, suggesting that the expansion of foreign investments into one market did not come at the expense of the other. For foreign investment flows out of developed and developing countries (outward FDI), those from emerging countries have grown very rapidly, if from a very low base. Since the early 2000s, southern companies have sought opportunities to sell products locally, as when Kenyan supermarket chain Tusksys opened stores in Uganda. In other instances, firms have focused on taking advantage of cheaper labor, as with Chinese firms' investment in Madagascar's agricultural and textile sectors. The outward direct investment of firms in Brazil, Russia, India, China, and South Africa surged—from US\$7 billion in 2000 to US\$200 billion in 2015, almost one-third of global FDI.²⁰

170. Intrafirm trade flows in world trade flows also exemplify the relational aspects in the growth of GVCs. For instance, U.S. Census data from 2016 show that more than 40 percent of U.S. goods trade

involves related-party transactions. At the global level, intrafirm trade has been estimated at about one-third of world trade flows.

171. Note, however, that the internalization of transactions in a GVC is just one of the many organizational responses to the contractual vagaries of cross-border transactions. The range of actors in transactions has also expanded sharply because of GVCs, involving large, medium, and small firms alike. In addition to having their own affiliates abroad, multinational companies rely on independent suppliers including small firms in domestic and foreign markets.

172. The hierarchy and direction of knowledge flows between the multinational (or lead firm) and its suppliers vary across types of GVCs, depending on the complexity of products, the ability to codify transactions, and the capabilities of supplying firms.²¹ In producer-driven chains, the lead firm controls the design and most of the assembly of products by affiliates and captive suppliers prevented from sharing technology with competitors. Such chains are typical in industries relying heavily on technology and R&D, such as the electronics, automotive, aerospace, and pharmaceutical industries, where production requires the assembly of thousands of customized parts into one high-end product. Large manufacturers such as Apple, General Motors, Samsung, Sony, or Toyota are typical of producer-driven global supply chains.

173. In contrast, when production is less complex and can be modularized, or knowledge can be codified, captive relationships are less likely. In GVCs driven by the purchasing firms, so-called buyer-driven GVCs, the lead company has few factories of its own and sources its products almost entirely from a large network of independent suppliers, focusing instead on marketing and sales. This type of GVC is mostly found in the textile and apparel industries, where products like clothes, houseware or toys require relatively little capital and skills. Large retailers such as JC Penney and Walmart and big brands such as Nike are examples.

174. From this relational concept of GVCs emerges a richer analysis of GVCs, one that puts at center stage the major actors (multinational firms, lead firms in GVCs, and so on) that shape GVC activity and foreign direct investment (FDI) flows—and that underscores institutional factors in shaping the location of global production. By explicitly modeling the mechanisms for dividing the gains from specialization across firms, this relational approach also delivers novel lessons about the implications of GVC participation for inequality and for development, as future chapters review. It also provides a rich set of predictions about how an increase in automation or digital technologies might affect the landscape of the international economy and the different agents in society.

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¹ Barjamovic et al. 2018.

² OECD 2013.

³ Baldwin and Venables 2013.

⁴ Borin and Mancini 2019.

⁵ The homogeneity and proportionality assumptions are conveniently imposed to resolve the fact that available datasets have no information on which domestic industries buy which imports. However, such assumptions are not necessarily valid. Specifically, under the homogeneity assumption all firms in the same industry are assumed to have the same production function and use the same bundle of inputs. Yet, at the country-industry level, input use varies with output, since firms exporting to different countries and industries participate in different value chains and face distinct rules of origin (De Gortari, 2018).

⁶ <https://unstats.un.org/unsd/tradekb/Knowledgebase/50090/Intermediate-Goods-in-Trade-Statistics>.

⁷ Johnson 2018

⁸ Freeman 2007

⁹ Antràs and De Gortari 2018.

¹⁰ Reardon and Timmer 2012.

¹¹ Reardon and Barrett 2019.

¹² International Labor Organization 2018.

¹³ Chan 2017. Gammage et al 2009. Barrientos et al. 2009.

¹⁴ Freund and Pierola 2015.

¹⁵ Mayer and Ottaviano 2008 and Freund and Pierola 2015.

¹⁶ See Antràs and Helpman 2004; Halpern, Koren, and Szeidl 2015; Gopinath and Neiman 2014; and Antràs, Fort, and Tintelnot 2017.

¹⁷ See Bernard, Moxnes, and Ulltveit-Moe 2018.

¹⁸ See Kee and Tang, 2016, for an attempt using processing trade in China.

¹⁹ De Gortari 2018. Apart from qualifying the type of implications that one can draw from aggregated input–output tables, firm-level data can also be fruitfully used to test the validity of the “proportionality” assumptions that go into the construction of those data.

²⁰ Gómez-Mera et al. 2015; Cusolito et al. 2016.

²¹ Gereffi, Humphrey, and Sturgeon 2005.

Chapter 2: Drivers of Participation

175. Vietnam’s electronics sector expanded sharply in less than a decade. Today, Vietnam is the second largest smartphone exporter, producing 40 percent of Samsung’s global mobile phone products and employing 35 percent of its global staff. Its success can be largely attributed to a combination of factors. Trade liberalization—driven by WTO accession, an agreement with the United States, and the Trans-Pacific Partnership—a favorable investment climate, and a large pool of low-cost labor determined Vietnam’s attractiveness as GVC location, resulting in large foreign direct investment (FDI) inflows, particularly from Samsung. Vietnam’s geographical proximity to regional suppliers of electronics parts and components like China, South Korea, Japan, and Thailand helped foreign investors access quality inputs from abroad. And improved connectivity enabled Vietnam to import and export in a timely manner.

176. Vietnam shows that GVC participation is determined, first and foremost, by fundamentals, such as factor endowments, geography, and institutions (box 2.1). But these fundamentals need not dictate destiny. Choosing the right policies can shape each of the fundamentals and thus GVC participation. Attracting FDI can remedy the scarcity of capital, technology, and management skills. Liberalizing trade at home and negotiating trade liberalization abroad can overcome the constraints of a small domestic market, freeing firms and farms from dependence on limited local inputs and narrow domestic demand. Improving transport and communication infrastructure and introducing competition in these services can address the disadvantage of a remote location. Participating in deep integration agreements can improve domestic institutions by helping countries commit to domestic reform and receive technical and financial assistance.

177. Factor endowments matter. Low skilled labor and foreign capital are key for backward participation in GVCs. The abundant supply of low-cost labor in lower income countries is in many cases an entry point for participation in the labor-intensive manufacturing segments of GVCs. But upgrading skills becomes necessary for integration in more complex GVCs. A country’s higher abundance of natural resources determines forward GVC integration. Foreign capital, whether efficiency-seeking or resource-seeking, can enhance host-country integration in GVCs. It is strongly and positively correlated with backward GVC participation. It also promotes domestic upstream sectors, as for apparel in Bangladesh, electronics in Vietnam, and automotive in Morocco.

178. Market size matters. Trade liberalization can expand market size and promote GVC participation. Countries with larger markets have a larger industrial capacity and are less likely to use imported inputs in their exports. Lower tariffs on manufacturing goods foster backward GVC participation in manufacturing. Manufacturing tariffs fall sharply in the years before a country’s transition from commodity to limited manufacturing GVCs. Sectors facing lower tariffs in destination markets exhibit stronger backward and forward GVC participation. Market access for low-income countries provided by the Everything but Arms Initiative of the European Union or the African Growth and Opportunity Act by the United States can foster their exports and GVC integration. But in the long run, the effects depend on rules of origin and their impacts on developing a local supplier base.

179. Geography matters. Overcoming remoteness by improving connectivity can foster GVC participation. Longer geographical distances to the major GVC hubs—China, Germany, and the United States—have a strong negative impact on both backward and forward GVC participation in manufacturing. By contrast, longer distances increase a country’s likelihood of specializing in commodity GVCs. High transport costs impede entering, establishing, and upgrading in GVCs. Inefficient transport and logistics services and weak competition in these services amplify those costs in many manufacturing GVCs. Trade in parts and components within international production networks is highly sensitive to logistics performance and uncertainty in bilateral international transport times. Connectivity also includes effective communication among the different participants in GVCs, which can be improved by the use of the internet. Higher internet use is linked to stronger backward GVC integration.

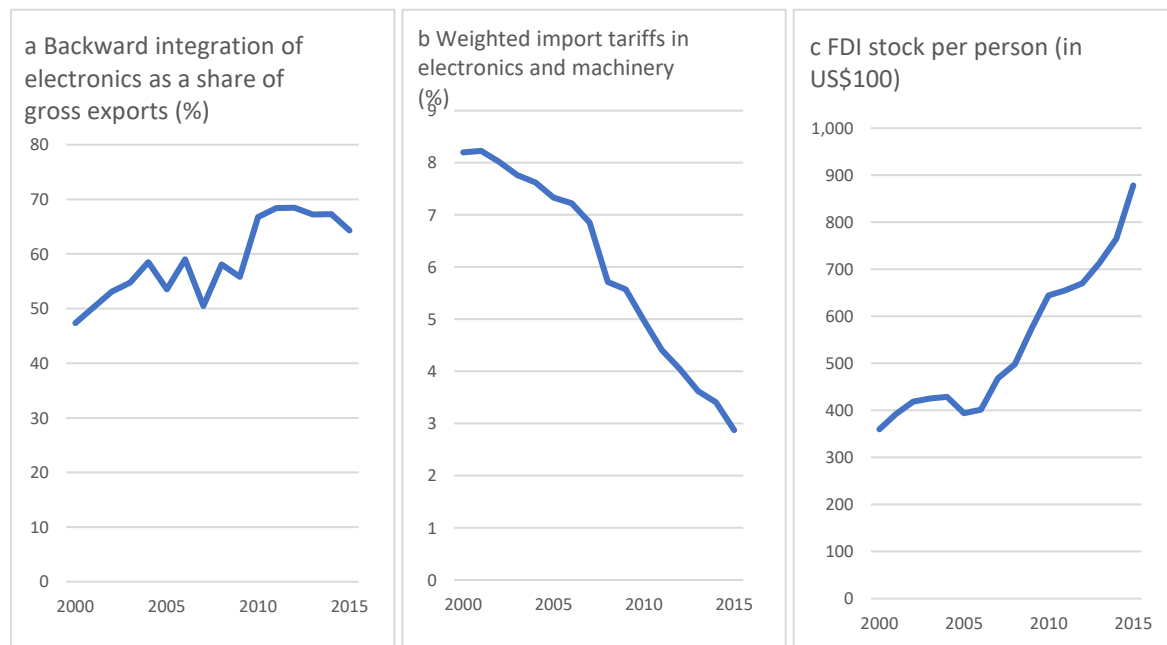
180. Institutional quality matters. Entering deep preferential trade agreements can enhance that quality and increase GVC participation. Weak contract enforcement deters traditional trade flows, and GVCs are particularly sensitive to the quality of contractual institutions. Sectors relying on contract enforcement see faster growth in GVC participation in countries with better institutional quality. Greater political stability increases the likelihood of specializing in backward GVCs. Institutional quality can also be enhanced through deep preferential trade agreements, which cover legal and regulatory frameworks, harmonize customs procedures, and set the rules on intellectual property rights.

Box 2.1 Vietnam’s integration in the electronics GVC

Today, Vietnam is the second largest smartphone exporter, producing 40 percent of Samsung’s global mobile phone products and employing 35 percent of its global staff. Vietnam’s backward participation in electronics GVCs increased from 47 percent in 2000 to 66 percent in 2010, and then declined slightly after 2012 (box figure 1a). Import tariffs in the sector dropped from about 8 percent in 2000 to less than 3 percent by 2015 (box figure 1b). Import tariffs in the sector dropped from about 8 percent in 2000 to less than 3 percent by 2015 (box figure 1b).

Vietnam has been an ASEAN member since 1995, and after entering the WTO in 2007 the country’s number of preferential trade partners increased from 10 to 16 by 2014. Most free trade agreements were between ASEAN and third countries (China, Japan, India, the Republic of Korea, Australia, and New Zealand) but some were bilateral with Chile, Japan and the European Union. The coverage in Vietnam’s trade agreements expanded substantially from 13 core provisions in 2007 to 86 in 2014.

Box figure 1 Vietnam’s backward GVC integration increased as tariffs declined and FDI expanded



Source: EORA, WITS, WDI.

Stable investment climate

Vietnam’s foreign direct investment stock picked up from around \$400 per person in the early 2000s to \$500 in 2008 and \$880 in 2015 (box figure 1b). FDI inflows to the electronics sector included mostly large investments from the Republic of Korea’s Samsung Group, which started Samsung Electronics Vietnam in 2008. Samsung’s presence in Vietnam now includes the world’s largest smartphone production facility, a smartphone and tablet display assembly facility, an electromechanical assembly operation for camera modules, and the Samsung Vietnam Mobile Research and Development Center.

Samsung has around 160,000 workers in Vietnam, and lead firm LG, Canon, Panasonic, contract manufacturers Foxconn and Jabil Circuit, and platform leaders Intel and Microsoft also operate there. FDI benefited from generous incentives including tax concessions provided by the Vietnamese government.

Abundant low-skilled low-cost labor

Vietnam's large pool of low-skilled low-cost labor was a key determinant of its attractiveness as a GVC location. Vietnam has a population of more than 95 million, with over half of the workforce estimated to be low-skilled in 2006. But the quality of education in Vietnam is a significant barrier, and extensive training is still necessary. Samsung's software engineers are trained at Samsung Vietnam's Mobile Research and Development Center, with 90 percent of them attaining Samsung's global standards. Improved technological skills of the Vietnamese workforce may have actually contributed to the declining share of low-skilled workers to less than 40 percent by 2015.

Proximity

Most imported electronic inputs come from China, Hong Kong SAR, China, Japan, Republic of Korea, Singapore, Taiwan China, and Thailand. And while the import content of electronics exports reached two-thirds of gross exports (box figure 1a), recent years showed a slight decline in the reliance on imported inputs as the role of local suppliers increased. Samsung's local suppliers include not only foreign-owned suppliers that co-located with Samsung in Vietnam, but also 29 domestic suppliers (as in display making and plastic molding) in 2016, up from just 4 in 2014, all trained by Samsung to meet quality standards.

Connectivity

Vietnam reduced the average time to import by two days to roughly three weeks over the period, though this is still one week longer than in the Philippines or Thailand, which have been in manufacturing GVCs for much longer. But Vietnam's internet usage shot up from 17 percent of the population in 2006 to 43 percent by 2015, higher than 27 percent in the Philippines and 25 percent in Thailand, reflecting an effort to dominate the information and communications technology GVC, not only in hardware but also in business services.

Source: Sturgeon and Zylberberg 2016; <https://asia.nikkei.com/Business/Business-trends/Samsung-suppliers-in-Vietnam-branch-out-to-new-frontiers>; <http://vietnamnews.vn/economy/279340/samsung-r-d-centre-hitting-stride.html#z18J2mJzilCJPLem.97>.

A. Factor endowments matter: Low-skilled labor and foreign capital are key

181. GVCs entail a finer international division of labor than standard trade, with countries specializing in segments of GVCs rather than in industries (chapter 1). Traditional trade theory postulates that factor endowments are a key determinant of specialization in GVCs, and they also shape the positioning of countries in GVCs. For example, an abundance of natural resources in a country is naturally linked to high forward GVC integration, since agricultural products and commodities are used in a variety of downstream production processes that typically cross several borders. Vietnam's electronics GVC shows that the low-skilled labor in lower income countries is often an entry point to downstream assembly-type stages of production associated with high content of imported inputs in a country's exports (high backward GVC participation) and exports of final goods (low forward GVC participation).¹ But advancing to more skill-intensive tasks in the value chain increases forward GVC participation.

A large pool of low-skilled workers matters for joining manufacturing GVCs, but higher skills matter for upgrading

182. When Samsung decided to invest in Vietnam and eventually propelled the country into the world’s second largest smartphone exporter, it was attracted to the young, cheap, and abundant workforce.² On average, Vietnamese workers were half the cost of their Chinese counterparts and seven years younger. The cheap labor lowers costs in Samsung’s factories, giving the smartphone maker an edge over Apple in less expensive handsets. Likewise, Bangladesh’s success in apparel exports after the end of the Multi-Fibre Arrangement’s quota regime in 2004 is linked to its large pool of low-skill low-cost workers. At less than \$200 a month, the average wage of an apparel sector worker in Bangladesh is lower than that in China (\$270), India (\$255), and Vietnam (\$248).³

183. The abundance of low-skilled labor in countries is positively linked to their extent of backward integration in GVCs, based on evidence for a large sample of countries in the EORA database (box 2.2).⁴ This pattern is driven by backward GVC participation in the manufacturing and services sectors. Countries with larger endowments of low-skilled labor in the 2000s are also more likely to be among the group of countries specialized in either limited manufacturing or advanced manufacturing and services in 2011. Among limited manufacturing countries, Vietnam had by far the highest average percentage of low-skilled workers in its labor force (over 42 percent) during 2006–15, followed by Ethiopia (37 percent) and El Salvador (31 percent). Using labor costs as an alternative measure of low-skilled labor endowments for the same large sample of countries in the EORA database confirms the positive link with backward integration. Evidence for 87 countries shows that lower wages facilitate participation in final assembly stages of GVCs, mostly in the apparel sector.⁵

184. But labor costs could rise with a country’s continuing involvement and upgrading in GVCs, as China suggests. Improved technological skills contributed to a declining share of low-skilled workers in Vietnam (see box 2.1). Exporting firms pay higher wages, reinforcing the notion that low labor costs themselves are not sufficient to sustain long-term GVC participation. Upgrading workforce skills becomes necessary in order to export more advanced manufacturing goods and services. This could explain the negative link between forward GVC participation and a country’s relative endowment with low-skilled labor based on the EORA database (see box 2.2).⁶ Firm-level analysis for Bangladesh confirms that higher skill intensity of the workforce and higher wages (relative to other firms in the country) are positively associated with the likelihood of being a GVC firm.⁷

185. Different types of engagement in GVCs require different types of workers (figure 2.1). Average annual labor costs for countries with limited manufacturing GVCs (such as Costa Rica, Morocco, South Africa, and Sri Lanka) averaged around \$11,000 over 2006–15. Labor costs reached \$16,500 for countries specialized in advanced manufacturing and services GVCs (such as Mexico, Poland, Thailand, and Turkey). In countries focusing on innovative GVC activities—such as Germany, Japan, the United Kingdom, and the United States—employees cost around \$55,000 a year on average, reflecting their higher skill-intensity and productivity.

Box 2.2 Modeling results on the drivers of GVC participation

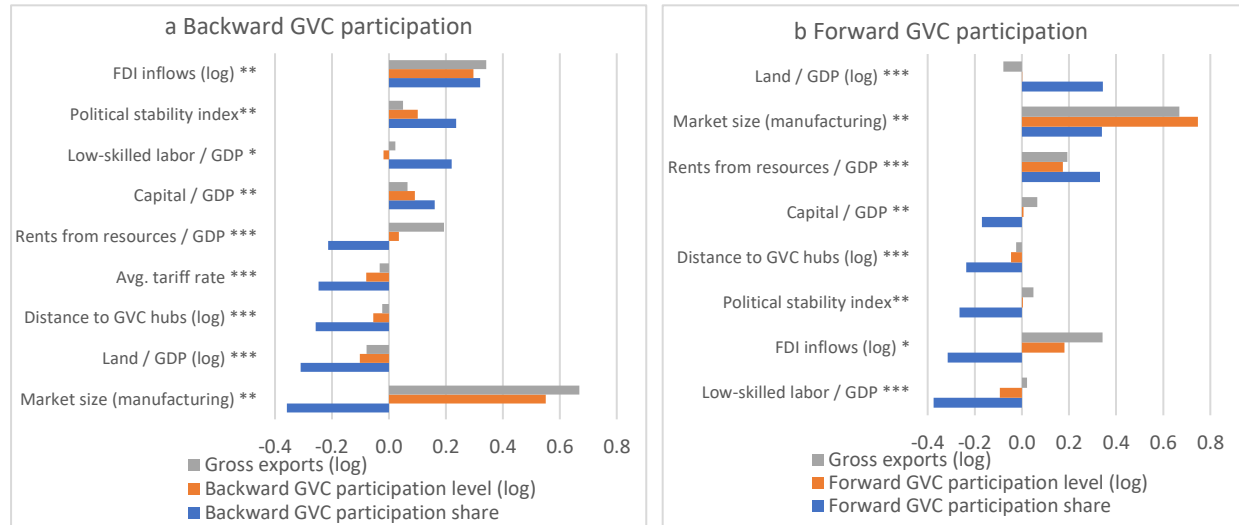
From imports of pistons used as intermediates in car manufacturing in Morocco (foreign content of exports/backward participation) to Chilean exports of copper used in refrigerators produced by firms in China and Mexico (domestic value added in exports used by partner countries for export production/forward participation), GVC participation is multifaceted and diverse across countries.

To assess the drivers of GVC participation across countries, we rely on GVC participation measures from the EORA database, which covers 189 countries and draws on a combination of international input–output tables, domestic production, and trade data. Our econometric model includes comparative advantage factors such as country endowments (labor, land, capital, and natural resources), contracting

institutions, foreign direct investment, trade policy and connectivity, using averages of those factors in the 1990s and 2000s to explain differences in countries’ average GVC participation in the 2000s and 2010s. Many factors have complex relationships with one another, and by entering them jointly in the model, their coefficients capture marginal impacts on GVC participation, controlling for all other factors. Three types of dependent variables are used: (i) gross exports (logs); (ii) backward or forward GVC participation levels (logs); and (iii) the share of backward or forward GVC participation in gross exports, which captures the intensity of GVC trade relative to traditional trade. In a model for variables (iii), a statistically significant positive [negative] coefficient indicates the factor has a stronger [weaker] impact on GVC trade than on traditional trade and an insignificant coefficient implies the factor does not have a differential impact on GVC trade relative to traditional trade. The results should be interpreted as confirming a set of robust drivers even if such relationships may not be strictly causal. The estimated impacts of the different drivers in the baseline model are in box figure 1 (those drivers explain more than half the variation in GVC participation shares).

- Controlling for factor endowments, liberal trade policy, higher FDI presence, and better institutional quality are important in determining backward GVC participation.
- Domestic market size provides a larger pool of local input suppliers, which increases forward GVC participation.
- Low-skilled labor fosters backward GVC participation, while endowments of natural resources and land foster forward GVC integration.

Box figure 1 What explains backward and forward GVC participation?



Source: WDR team based on Fernandes, Kee, and Winkler (2019).

Note: The figures show standardized beta coefficients for each variable on the y-axis from a between effects regression of either average exports, backward or forward GVC participation levels, or shares in a decade on averages in the previous decade of manufacturing tariff rates, FDI inward inflows, distance to major GVC hubs (China, Germany, and the United States), manufacturing value added, political stability index, ratio of low-skilled labor to GDP, ratio of resource rents to GDP, ratio of land to GDP, ratio of capital stock to GDP, nominal appreciation, and decade fixed effects. An ***, **, or * indicates significance at the 1, 5, or 10 percent confidence levels, respectively. Significance is based on the GVC participation share regressions. Only determinants with statistically significant coefficients are shown.

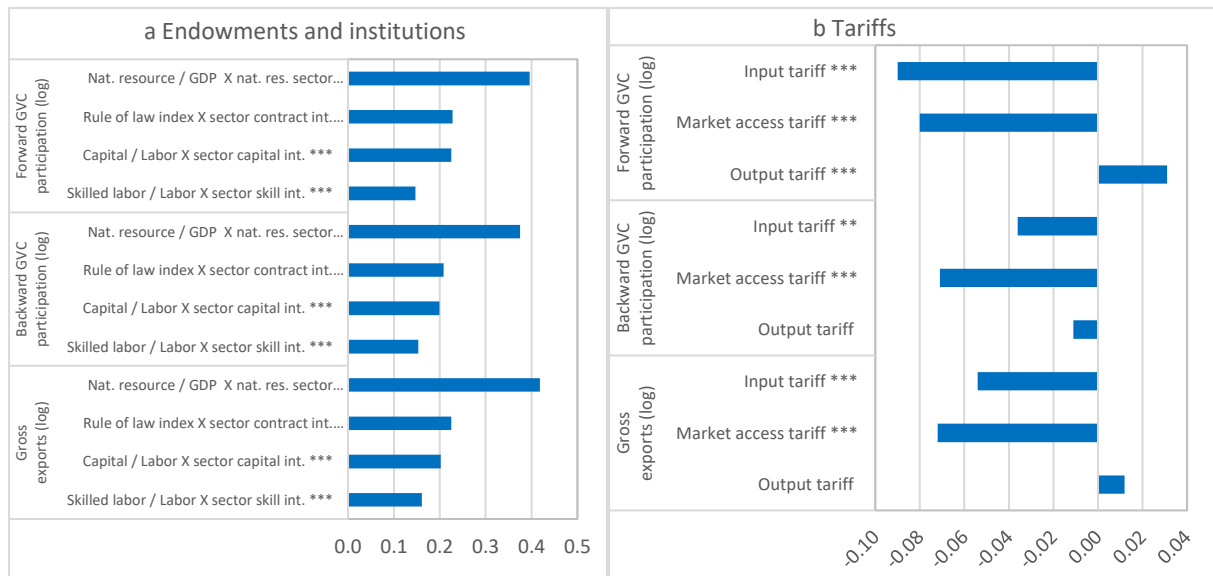
Further empirical evidence suggests that most drivers of backward GVC participation in box figure 1 are driven by countries’ GVC integration of their manufacturing sector only. The role of other drivers of GVC participation shares is also tested. Membership in preferential trade agreements and the depth of those agreements increases backward GVC participation. Time to clear imports weakly reduces backward GVC participation while a better score in the logistics performance index is linked to stronger backward GVC participation. Female labor market participation increases backward GVC participation.

The share of population speaking English as a second language weakly increases both forward and backward GVC participation.

To better understand what determines how countries participate in GVCs, measures of backward and forward GVC participation at the country-sector level are used in another econometric model that combines country endowments (capital, skilled labor, and natural resources), institutional quality, and input, output, and market access tariffs.⁸ The model allows sectors to differ (largely for technological reasons) in their intensity of using endowments and contracts—and allows results to be given a causal interpretation (box figure 2).

- Sectors using high-skilled labor or capital more intensively exhibit faster growth in GVC participation levels and in gross exports in countries relatively more endowed with skilled labor or capital.
- Countries with better institutional quality exhibit stronger growth in GVC participation and exports in their more contractually intensive sectors.
- Input tariffs and market access tariffs reduce GVC participation and gross exports.
- In a separate additional test, sectors using the internet more intensively exhibit faster growth in GVC participation and gross exports in countries with a higher number of internet users, controlling for all other determinants.

Box figure 2 What explains country-sector’s GVC participation levels and gross exports?

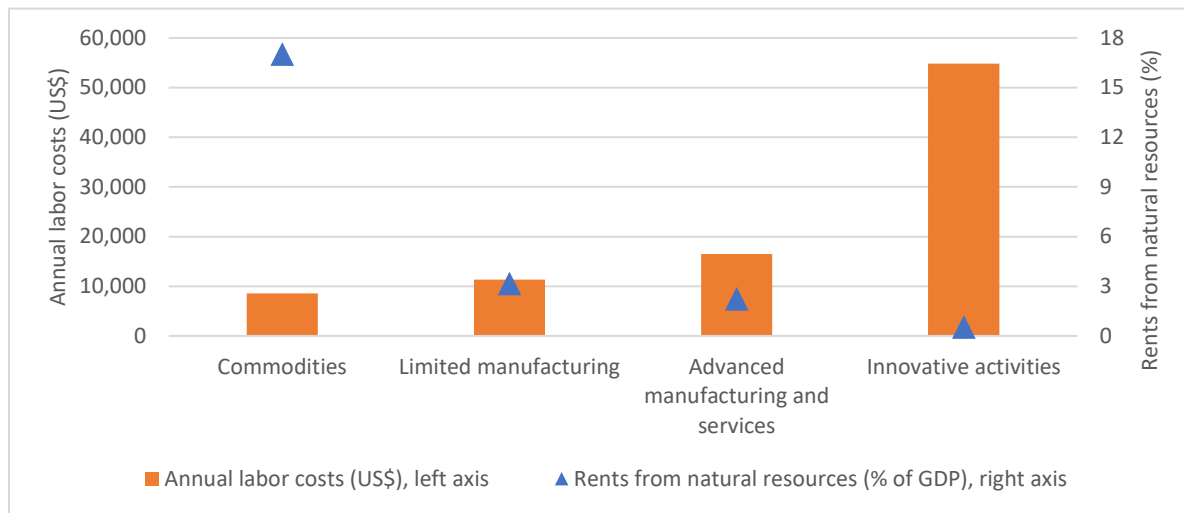


Source: WDR team based on Fernandes, Kee, and Winkler (2019).

Note: The figures show standardized beta coefficients for each variable on the y-axis from each of three separate regressions of backward GVC participation, forward GVC participation or gross exports on a three-year lag of each of the variables shown in panels a and b and country-year fixed effects and sector fixed effects. An ***, **, or * indicates significance at the 1, 5, or 10 percent confidence levels, respectively.

Figure 2.1 Countries specialized in limited manufacturing rely on low labor costs while countries specialized in commodities derive almost a fifth of GDP from natural resources

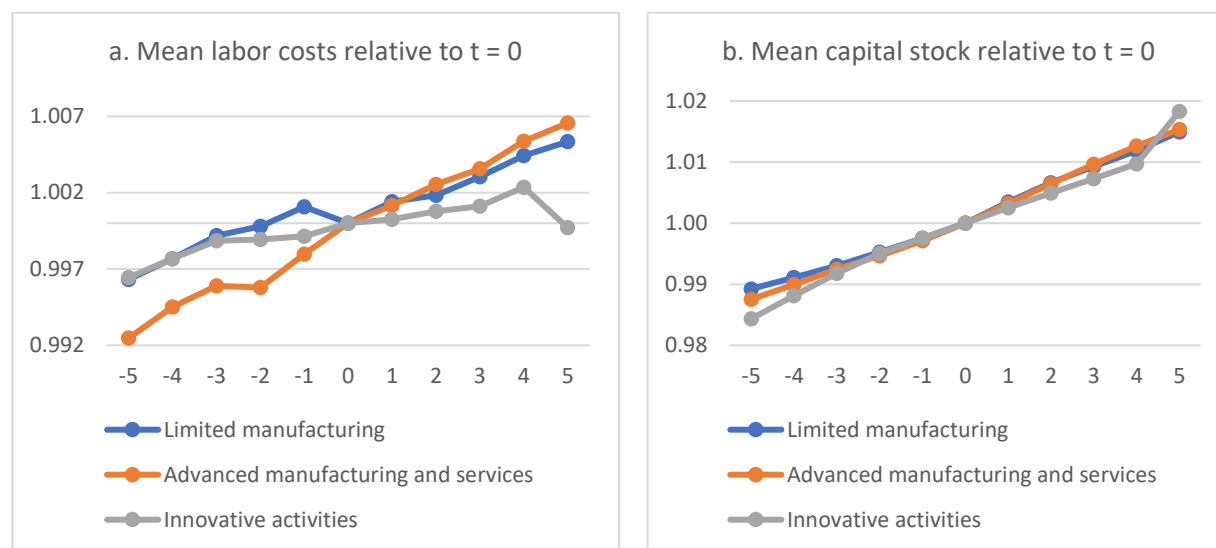
Source: WDR team based on Penn World Tables, World Development Indicators and GVC taxonomy of 2011.



Note: The left axis shows average annual labor costs and the right axis the average rents from natural resources as a share of GDP by GVC taxonomy group, with averages over 2006–15. Labor costs were obtained by multiplying a country's (deflated) GDP by its labor share and dividing by the number of employees. The average of labor costs for countries specialized in commodities includes several high-income countries (such as Australia, Norway, and Saudi Arabia).

186. Cross-country evidence supports the positive correlation between skills and integration in innovative GVCs. A relatively low endowment of low-skilled labor in the 2000s increases the probability of a country being specialized in innovative activities in 2011. Countries that entered the group of advanced manufacturing and services GVCs at some point over 1990–2015 (such as China, Czech Republic, Poland, and Turkey) saw their labor costs increase sharply. Even countries with limited manufacturing GVCs (such as Cambodia, Indonesia, Nicaragua, and South Africa) show strong increases in their labor costs in the five years before transitioning (figure 2.2, left panel). Sectors using skilled labor more intensively see faster growth in GVC participation (and in gross exports) in countries relatively more endowed with skilled labor (see box 2.2). The estimated impacts are large: if Ghana increased its skilled labor share (7.5 percent) to the cross-country median (20 percent), its backward GVC participation and its gross exports would grow by an estimated 42 percent, and its forward GVC participation would grow by 39 percent. Further evidence for Sub-Saharan Africa shows that skilled labor and higher values of the World Bank's human capital index are positively associated with GVC participation in the region.⁹

Figure 2.2 Labor costs and capital stock increase prior to countries' entry into limited manufacturing GVCs



Source: WDR team based on EORA, World Development Indicators and GVC taxonomy.

Note: The year of entry is normalized to 0 for all countries in a particular GVC group, and the sample used to compute the means shown is based on countries with at least five years of observations before and after entry to the GVC group. Labor costs and capital stock are measured relative to the year of entry. Additional analysis confirms that labor costs and capital stock increase significantly in the 5 years before and after a switch.

187. Female labor market participation is linked to higher backward GVC participation (see box 2.2). Evidence from manufacturing firms across 64 developing countries confirms that the female share of total employment is higher for firms participating in GVCs (defined as those that both import intermediate inputs and export).¹⁰ Verified in all sectors, this pattern is especially strong in apparel and electronics. A causal link is not warranted though, as female labor market participation and GVC integration can mutually reinforce each other. But the link between firm GVC participation and female corporate leadership is negative. Majority female-owned and female-managed firms are less likely to participate in GVCs. Chapter 3 discusses further the relationship between GVC participation and female employment, ownership, and management.

188. Automation, robotics, and 3D printing could pose a challenge to countries' GVC participation whose comparative advantage lies predominantly in abundant low-cost workers—because they require higher skills and enable customized production close to the end-markets, such as the 3D printing of shoes. Producers in lower income countries typically rely more on low-skilled manual labor relative to higher income countries. But this could become more difficult in the context of new technologies in GVCs, as the latter are associated with higher quality standards and high-skilled labor.¹¹ (Chapter 6 discusses the potential impacts of new technologies on countries' prospects for GVC participation).

Natural resources are a driving force for forward GVC participation

189. Higher relative endowments of land or natural resources are both strongly positively correlated with forward GVC participation (see box 2.2). In other words, countries with abundant extractive resources, such as copper, iron ore, and other minerals, exhibit higher shares of domestic value added embodied in their partner countries' exports downstream. Sub-Saharan countries rich in non-oil natural resources exhibit greater forward linkages to manufacturing GVCs than other countries.¹² Almost a fifth of GDP originates from natural resources in countries specializing in commodities, compared with 3 percent or less for countries operating limited manufacturing GVCs (see figure 2.1).

190. The positive role of natural resources for forward GVC integration is driven by forward GVC integration of the mining sector only. Countries with a higher relative endowment with natural resources in the 2000s were more likely to be among the group of countries specialized in commodities in 2011. At the same time, land and rents from natural resources exhibit a strong negative correlation with backward GVC integration, driven by GVC integration of the manufacturing sector (see box 2.2).

FDI acts as a catalyst for GVC integration, providing foreign capital and technical know-how

191. Higher capital endowments foster GVC integration and upgrading—and FDI offers a solution for countries with scarce capital. Cross-country cross-sector evidence from the EORA database shows that relative scarcity of capital deters stronger GVC participation in capital-intensive sectors (see box 2.2). Countries moving from commodities to limited manufacturing GVCs show a strong increase in capital stock in the five years before the transition (figure 2.2, right panel). Countries can attract FDI to overcome relative capital scarcity and thus integrate into GVCs. This is why GVC activity and FDI inflows go hand in hand. When tight control over foreign production processes is necessary (perhaps because of weak contractual enforcement or weak protection of intellectual property), lead firms might prefer vertical integration of suppliers over an arm’s length relationship, resulting in intrafirm trade and FDI flows (see chapter 1).

192. It is hard to imagine a GVC that does not involve a multinational firm at some stage of the production chain. Vietnam’s success in becoming the second largest exporter of smartphones in the world, after China, was the result of Samsung investing in Vietnam to set up Samsung Electronics Vietnam (SEV) in 2008 and Samsung Electronics Vietnam-Thai Nguyen (SEVT) in 2013 (see box 2.1). Likewise, the Moroccan automotive industry is led by investments by French Renault-Nissan Alliance and PSA Group car companies. Singaporean Olam, one of the world’s largest suppliers of cocoa beans, contributed to Ghana’s cocoa exports reaching over 23,000 customers worldwide.¹³ And recall historical success stories such as Intel in Costa Rica (until recently) or Volkswagen in South Africa.¹⁴ Additionally, investors from Taiwan, China in the 1990s and South African investors in the 2000s were instrumental in developing and expanding the apparel value chain in Lesotho, while Mauritian investors played a similar role for apparel in Madagascar.¹⁵ In all these cases, foreign-owned firms were instrumental in jumpstarting the domestic economy and integrating production into GVCs. But the reliance on FDI inflows also bears risks: Costa Rica lost many manufacturing jobs to Vietnam in 2014 after Intel abruptly shifted.

193. While many of these success stories (particularly in East Asia) are linked to FDI in manufacturing GVCs, much of the growth in FDI over the past two decades has come through natural resource-based sectors. Such investment differs considerably from traditional manufacturing FDI. For example, investors tend to be resource-seeking rather than efficiency-seeking or market-seeking. Investment is also likely to be dispersed across a wider set of countries and to emerge from a widening set of investors (including large investors from the global South).¹⁶

194. FDI inflows play a strong role in the extent of backward GVC participation shares and levels (see box 2.2), driven by GVC integration of the manufacturing sector.¹⁷ The lack of foreign-owned firms in manufacturing is a key reason for low backward GVC participation in Sub-Saharan Africa.¹⁸ By contrast, FDI is linked to lower forward GVC participation shares, driven by GVC integration of agriculture and services. Countries attracting FDI in manufacturing may reduce their exports of raw agricultural goods and intermediate services (such as transportation) embodied in exports of resource-intensive goods, lowering their forward GVC participation.¹⁹

195. Foreign-owned firms may also promote domestic upstream sectors. They increase the demand for local intermediate inputs and cultivate local suppliers that may subsequently supply other downstream domestic firms and even export. In particular, FDI can ease entry of domestic firms into GVCs in several ways, for example by conferring technical know-how and transmitting managerial practices. According to the Moroccan industry minister Moulay Hafid El Alami, when Renault-Nissan set up plants in the north of

Morocco’s small city of Melloussa, it aimed to build an “industry ecosystem,” which later attracted many other companies specializing in auto-parts production to co-locate to supply Renault-Nissan. There remains scope to deepen the backward linkages in Morocco and the government is looking at ways to enhance them. FDI in the apparel sector in Bangladesh led to an expansion of local input suppliers producing zippers, buttons, and fabrics, which also benefited domestic apparel firms and ensured the country’s competitiveness in global apparel exports (box 2.3).²⁰ Samsung Vietnam is cultivating a large group of local suppliers to support its operations in Vietnam, suppliers that subsequently enter export markets themselves (see box 2.1). Such linkages of sectors and firms through FDI can further deepen countries’ participation in GVCs.²¹ Indeed, China has defied the global trend of domestic value added’s falling share in exports due to its large domestic manufacturing capacity in supplying the downstream GVC parties, through favorable FDI and trade policies (box 2.4).²²

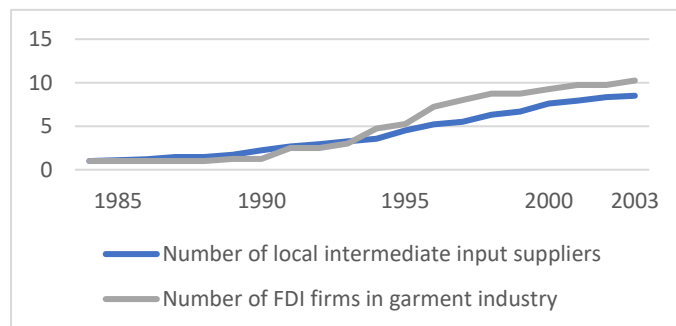
Box 2.3 Sharing suppliers—how foreign firms benefit domestic firms

In the development of Bangladesh’s apparel sector, working with more demanding foreign firms created incentives for local suppliers to improve their quality and productivity. Domestic firms that shared local suppliers with foreign firms gained access to newer and better local inputs. The spillover effects of shared suppliers helped explain a quarter of the expanded product scope and a third of the productivity gains of Bangladesh’s domestic firms in the apparel sector over 1999–2003.

The benefit from sharing suppliers with foreign firms was echoed in a 2010 interview with the managing director of LSI Industries Ltd., a local zipper firm in Bangladesh: “Serving FDI garment firms was an important reason for us to set up our plant in Dhaka, EPZ. At the beginning, the share of FDI garment firms in our total sales was about 20 percent. Now it is 35–40 percent.... To comply [with] the standard of FDI garment firms [we were required] to upgrade and expand our product range, capacity, efficiency, and to reduce our costs and lead time. Moreover, [we share] market intelligence...from our FDI garment clients regarding the latest product requirements and fashion trends with our other clients. Thus, the domestic garment firms that buy from us can further improve themselves based on the information.”

In Bangladesh, foreign apparel firms also fostered the local market supplying intermediate inputs (box figure 1).

Box figure 1 Local suppliers grow with FDI growth



Source: Kee 2014.

But the reverse is true when foreign firms leave. In Malaysia, a local supplier sold a special plastic resin to Panasonic for its fax machines—and to local manufacturers of box cutters. When Panasonic closed the plant, manufacturers of box cutters suffered too, as indicated by the General Manager of SJD Industries Malaysia in 2011: “When Panasonic closed down the fax machine plant, the local supplier also stopped selling the plastic resin, due to insufficient demand. As a result, our cutter knife production suffered. Now we are looking to import the material from Taiwan, China at a higher cost and have to face exchange rate and shipping uncertainties.”

Source: Kee 2014.

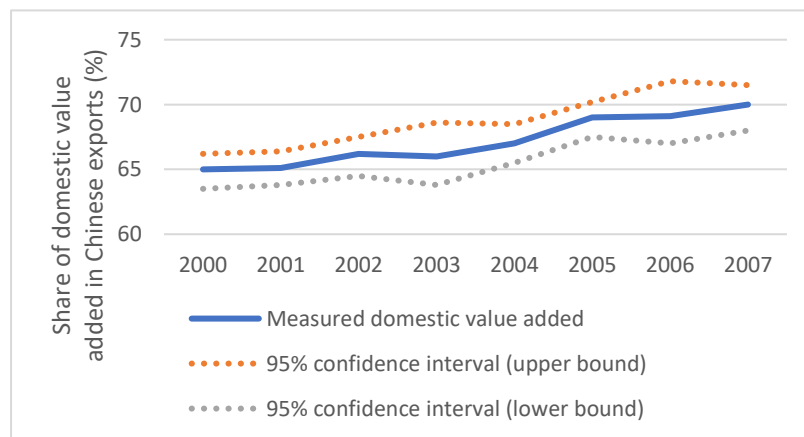
196. The link between FDI and GVC participation makes it difficult to disentangle their determinants. Executives at multinational corporations responding to the World Bank’s Global Investment Competitiveness survey involved in efficiency-seeking FDI, view country endowments as crucial for their investment decisions—such as the available talent and skill of labor, the low cost of labor and inputs (including ease of access to imported inputs), and the capacity and skills of local suppliers.²³ Favorable exchange rates, good physical infrastructure, and low tax rates are also important, as are preferential trade agreements, bilateral investment treaties, and investment incentives. (Some of these policy-amenable factors are discussed throughout the chapter as key drivers of GVC participation and other factors will be covered in chapter 7.)

Box 2.4 How liberalizing trade and FDI helped China move up in GVCs

Global production fragmentation has allowed firms to rely less on domestic inputs for production, evident in growing backward GVC participation and declining value-added-to-gross-export ratios across the world. China is an intriguing exception. How did it defy the global decline in domestic content in exports, despite its deep engagement in global value chains?

Firm-level customs transaction data and manufacturing firm survey data are used to measure China’s domestic content in exports (its ratio of domestic value added in exports to gross exports).¹ Relative to measuring industry and aggregate domestic value added in exports relying on input–output tables, the firm-level approach is novel, as it takes firm heterogeneity into account to minimize aggregate bias. The share of domestic content in Chinese exports rose, from 65 percent in 2000 to 70 percent in 2007 (box figure 1). This upward trend is mainly driven by China’s processing exporters substituting domestic for imported intermediate inputs, both in volumes and varieties. After 2000, China’s structural transformation was fueled by trade and FDI liberalization that encouraged intermediate input producers in China to expand their product varieties. Exporters in China started to buy more domestic intermediate inputs and to rely less on imported inputs. Other factors—such as rising wages, firm entry and exit, and changing composition of Chinese exports toward industries with high-domestic value added or in nonprocessing sectors—cannot explain the upward trend.

Box figure 1 Domestic value added in exports for China (2000–07)

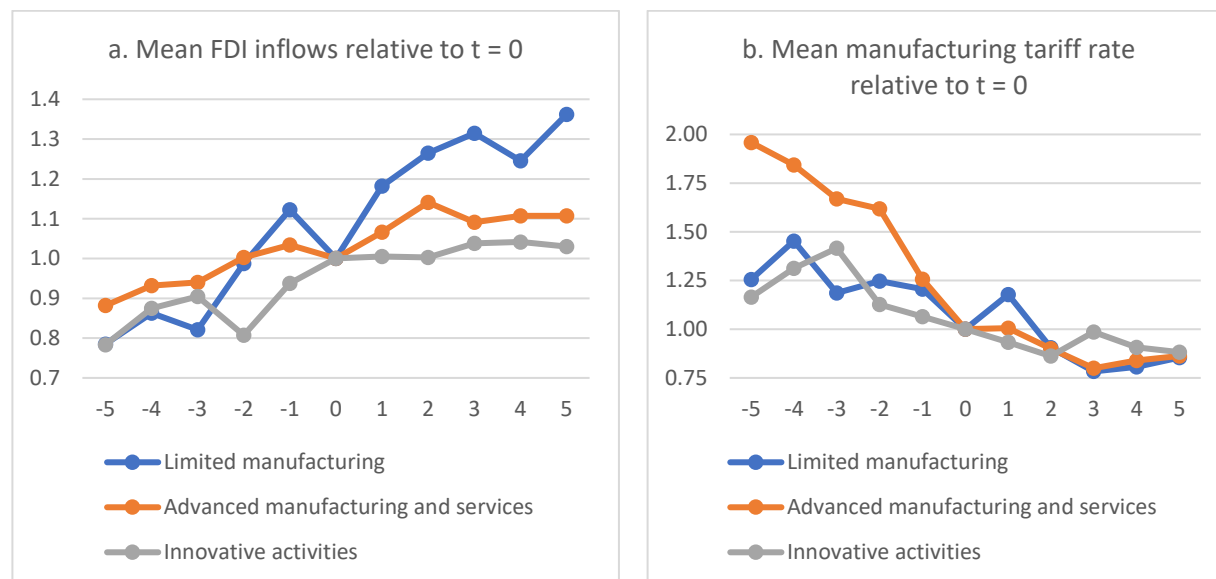


Source: Kee and Tang 2016.

197. FDI is critical, particularly for countries upgrading their type of participation in GVCs (figure 2.3a). Net FDI inflows picked up substantially in the years before transitioning into a new GVC group during 1990–2015 for all countries. The growth of FDI inflows continues after countries transition into limited manufacturing GVCs (as for Argentina, Cambodia, Indonesia, and South Africa) and to less extent for

countries transitioning into advanced manufacturing and services GVCs (as for China, Czech Republic, Romania, and Turkey) or into innovative GVC activities (as for Austria, Italy, Republic of Korea, and Singapore).

Figure 2.3 FDI increases while tariffs decline before countries upgrade their GVC participation



Source: WDR team based on World Development Indicators and GVC taxonomy.

Note: The year of entry is normalized at 0 for all countries in a particular GVC group and the sample to compute the means is based on countries with at least five years of observations before and after entry to the GVC group. Averages are for absolute values of FDI inflows (in logs) and tariff rates (in percentage points). Additional analysis confirms that FDI inflows increase significantly in the 5 years before and after a switch, while tariff rates show a significant decline over that same period.

198. Lower income countries that face substantial infrastructure and regulatory gaps can establish competitive spaces (such as special economic zones or export processing zones) with different rules of business and lower costs of production than in the rest of the country, as a way to attract FDI. This was key to successfully entering the apparel GVC in Bangladesh, Cambodia, Lesotho and recently Ethiopia. Such sites can be built rapidly and usually have excellent infrastructure; streamlined customs, regulatory, and administrative procedures; and favorable tax conditions (such as tariff drawbacks on imports of intermediates and reduced value added taxes). They account for a large share of exports and employment in GVCs, but linkages to the local economy tend to be small.²⁴ (Chapter 7 dives deeper into special economic zones and their role for GVCs.)

B. Market size matters: Trade liberalization can expand market size

199. Backward GVC participation in manufacturing as a percent of total exports is lower in large economies, including China, Japan, and the United States. To minimize cross-hauling of semiprocessed goods in GVCs, countries often specialize in contiguous stages of production. Because larger countries have a larger industrial capacity, they tend to attract a larger set of contiguous stages and reduce the use of imported inputs relative to domestically sourced inputs in their exports (lower backward GVC integration).

200. By their sheer size, large countries are likely to be geographically close to world demand for final goods, so their more “central” location should make them more prone to specialize in downstream stages of production embodying more foreign value added.²⁵ And a large domestic supplier base reduces search frictions and facilitates the replacement of domestic suppliers if there are production disruptions.

Market size and the role of domestic suppliers

201. A story from Poland highlights the relationship between market size and GVCs, and how industry linkages through the role of domestic suppliers can affect outcomes. In 1992, General Motors, one of the world's largest automakers, set up General Motors Poland to import the Opel cars for the large Polish domestic market. Two years later, production activities of GM Poland started, and today, Poland has become one of the world's major auto exporting countries. Through intensive cooperation with Polish auto part suppliers, GM Poland has contributed to a significant growth in their number and fostered their sales also to other GM units around the world.

202. The effect of market size on GVC participation is crucially mediated by links to domestic industries. Markets with larger manufacturing sectors are characterized by larger forward GVC participation and smaller backward GVC participation, highlighting the importance of domestic suppliers for GVC participation (see box 2.2). A larger manufacturing sector in the 2000s also increased the likelihood of countries participating in advanced manufacturing and services GVCs or in innovative GVC activities in 2011.

Enhancing market size by liberalizing trade policies

203. The constraints of a small market and limited local inputs can be overcome by liberalizing trade at home and negotiating liberalization abroad, to liberate firms and farms from dependence on local inputs and narrow domestic demand. Regulatory barriers on both imports and exports such as tariffs or quotas increase trade costs, with consequences for countries' GVC participation and positioning. Trade barriers increase the cost of imported intermediate inputs and thus can reduce backward GVC participation. They also translate into higher costs for a country's exports, lowering forward GVC participation. Tariffs imposed by partner countries increase the costs of exports. So, reducing tariff barriers can have an amplified benefit for internationally fragmented production.

Costly imported intermediates are a barrier to GVC integration

204. Successive rounds of trade negotiations and unilateral trade liberalization efforts have been a driving force for GVC integration over the last three decades. China's accession to the World Trade Organization (WTO) in 2001 and its requirement to reduce more than 7,000 tariffs ushered in a new era of globalization fostering GVC participation for its home firms but also those in partner countries in East Asia and beyond. Accession to the world's largest customs union—the European Union—was critical in bringing the Czech Republic, Hungary, Poland, and the Slovak Republic and later Bulgaria and Romania into GVCs.²⁶

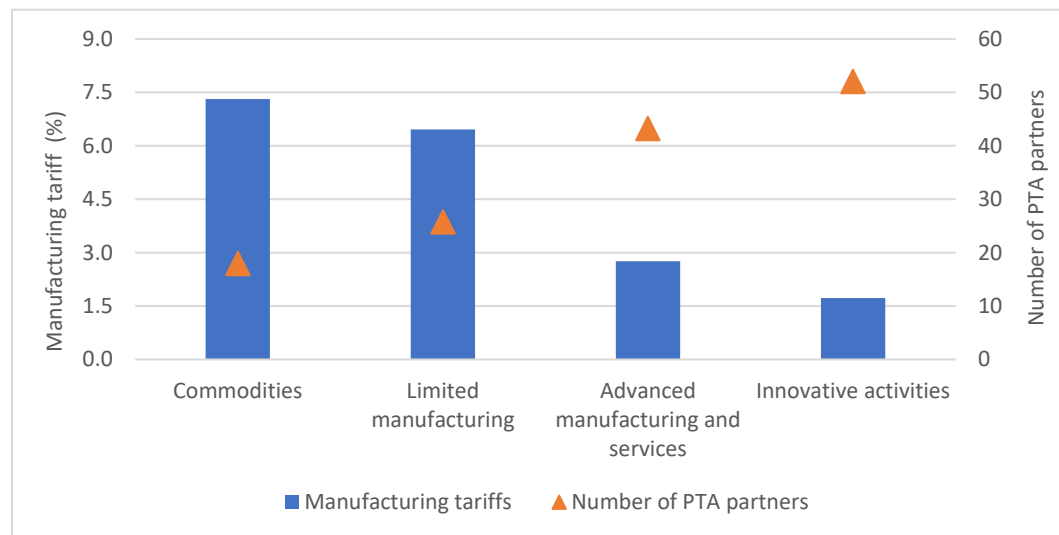
205. Lower tariffs on manufacturing goods foster countries' backward GVC participation (see box 2.2). A one standard deviation decrease in a country's average manufacturing tariffs—8 percentage points—is associated with an increase in the country's backward GVC participation share in gross exports of about 0.2 standard deviations. In Sub-Saharan Africa, the negative impact of tariffs on GVC participation is especially acute.²⁷ In particular, higher import tariffs on manufacturing in the 2000s reduce the propensity of being in the group of countries specialized in advanced manufacturing and services GVCs in 2011. Tariffs on intermediate inputs have a strong negative impact on both GVC participation and gross exports (see box 2.2).

206. Tariffs on imported intermediates shape countries' export bundles, often preventing them to upgrade into more sophisticated or more profitable products. One example from South Asia makes this point most clearly. Nepal exports tea almost entirely in bulk to India at about one-tenth of the price when sold packaged to Germany or the United Kingdom. To scale up the exports of branded, packaged tea, Nepalese entrepreneurs need intermediate inputs such as filter bags. But those are subject to a tariff of 30 percent, plus a 5 percent excise duty, increasing the world price of filter bags for Nepalese exporters by 36.5 percent and hampering their competitiveness.²⁸

207. Exporters can often circumvent high tariffs on imported intermediates using duty suspension mechanisms, but these often do not function efficiently. Examples from South Asia illustrate this point. Pakistan’s tariffs on intermediates average 8 percent—four times the average in East Asia—and regulatory and additional duties (para-tariffs) are high. So, Pakistani exporters of textiles and apparel—the country’s major export sector—rely mostly on domestic cotton rather than on imported manmade fibers such as polyester (the leading input to fast-growing global imports of apparel).²⁹ In principle, Pakistani exporters have access to duty suspension schemes for their imported intermediates, such as the Duty and Tax Remission on Exports. In practice, approvals for remission takes on average 60 days—twice the time specified by law—and clearing customs after approval takes an extra 5 to 10 days. That is why a mere 3 percent of textile and apparel exporters use the scheme. In Bangladesh, by contrast, obtaining approval for duty suspension on intermediates takes on average 24 hours, and about 90 percent of textile and apparel firms use the scheme.³⁰

208. Despite a gradual decline in tariffs over the last decades, especially for manufactured goods, there are still important differences in the restrictiveness of trade policies across countries. Countries specializing in commodities imposed manufacturing tariffs averaging 7.5 percent over 2006–15, and those with limited manufacturing GVCs impose tariffs averaging 6.5 percent (figure 2.4). Tariffs drop sharply to less than 3 percent for countries with advanced manufacturing and services GVCs and to less than 2 percent for those with innovative GVC activities.

Figure 2.4 Manufacturing tariffs are high and preferential trading partners few in countries connected to commodity GVCs



Source: WDR team based on WDI and Deep Trade Agreements database and GVC taxonomy of 2011.

Note: The left axis shows average manufacturing import tariffs and the right axis the average number of preferential trading partners by GVC taxonomy group, with averages over 2006–15.

209. For countries upgrading their participation in GVCs, manufacturing tariffs fall substantially in the years prior to such transitions (see figure 2.3b). For countries establishing limited manufacturing GVCs at some point during 1990–2015—such as Argentina, Cambodia, Indonesia, and South Africa—average manufacturing tariff rates were on average 25 percent higher five years before the transition compared to the year of the transition. Countries joining the group of advanced manufacturing and services GVCs—such as China, Czech Republic, Romania, and Turkey—see their tariffs drop into half from five years before the transition to the time of upgrading and a continued decline in the five years after upgrading.

210. Low tariffs are necessary but insufficient for high backward GVC participation, because nontariff measures and other barriers at the border also matter. In South Asia, nontariff barriers—including para-

tariffs and other regulatory constraints—increase firms’ production costs and alter their input mix thus affecting their long-term export competitiveness. This hurts the already low trade and GVC participation in South Asia.³¹ The overall trade restrictiveness index for South Asian countries—capturing the trade policy distortions that each country imposes on its import bundle—shows greater protection for imports from South Asia than from the rest of the world (table 2.1).³²

Table 2.1 Overall trade restrictiveness index, selected countries in South Asia, 2011

Importing country	Origin of imports	
	South Asia	Rest of world
Afghanistan	3.84	4.65
India	4.59	0.50
Sri Lanka	1.01	0.33
Nepal	10.59	6.87
Pakistan	3.00	0.51

Source: Updated estimates by Kee and Nicita in 2017 based on methodology in Kee and Nicita (2017).

Note: The overall trade restrictiveness indexes are computed using applied tariffs that take into account bilateral preferences.

211. Brazil’s large automotive sector—employing more than 500,000 workers in 2016—developed under the shelter of high tariffs and high nontariff measures. But these policies have also been behind the sector’s poor integration into GVCs, reflected in the lack of export orientation of its major auto producers and its domestic suppliers.³³ High local content requirements in the country’s industrial policy toward the auto sector—the Inovar-Auto policy (2011–17), prevented the sector from participating in GVCs.

Market access can jumpstart GVC participation

212. Market access, captured by the tariffs in destination markets, also plays a role. Sectors facing on average lower tariffs in destination markets exhibit stronger backward and forward GVC participation (see box 2.2). A one standard deviation decline in the average tariff facing a sector in destination markets—4 percentage points—is associated with an increase in the country-sector’s backward [*forward*] GVC participation levels by 0.06 [0.07] standard deviations.

213. Special and differential treatment (sometimes thought of as trade as aid) is a central feature of the GATT/WTO system, and its objective has been to foster export-led growth in developing countries through preferential access to advanced country markets. But there is disagreement whether preferential access can help developing countries’ exports, with skeptics arguing that trade preferences dilute the case for policy reform at home and lure beneficiaries into sectors where they lack a comparative advantage.³⁴ Preferential access to foreign markets as that provided by the Everything But Arms (EBA) Initiative by the European Union or the African Growth and Opportunity Act (AGOA) by the United States can help developing countries’ exports in the short run.³⁵ But in the long run, the effects are more nuanced, depending on the prevalent rules of origin and their impacts on the development of domestic suppliers (see box 2.5). There is great heterogeneity across African countries in the response to AGOA market access preferences. Evidence suggests that for export success, preferential access per se is not sufficient but needs to be complemented by specific domestic policies: lower tariffs, reduced regulatory burden and enhanced connectivity.³⁶ In some cases, as in Ethiopia, trade preferences are a fundamental element to offset the country’s cost disadvantages due to lower labor productivity and higher logistics costs (relative to countries like Vietnam) and lead to the attraction of FDI.³⁷

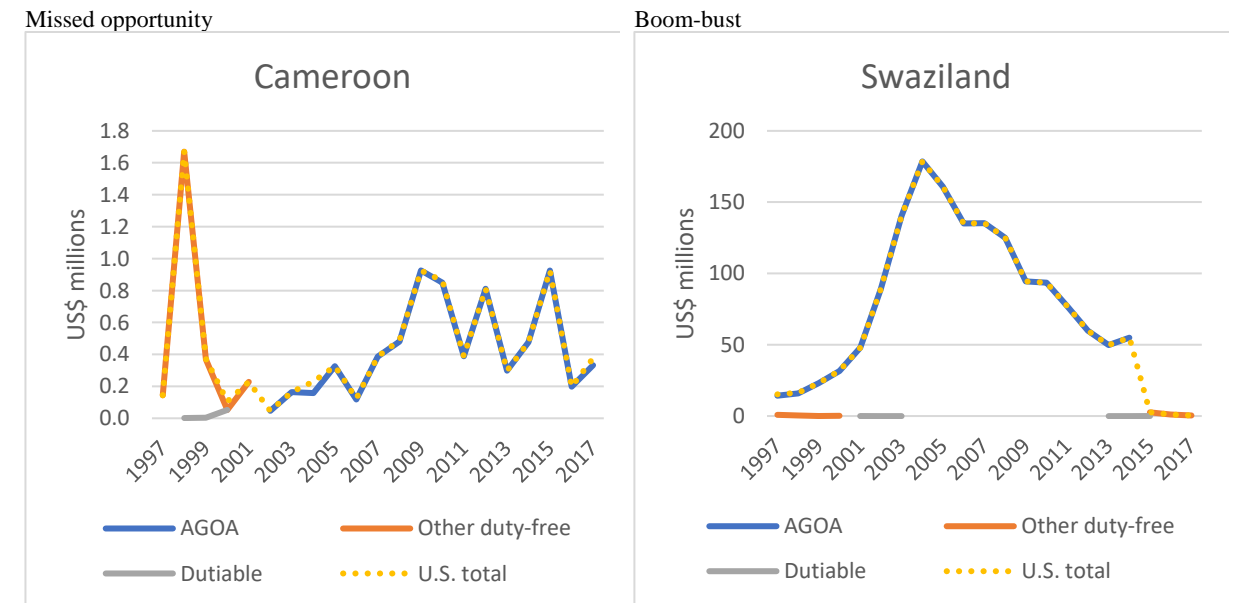
Box 2.5 Trade preferences as catalytic aid?

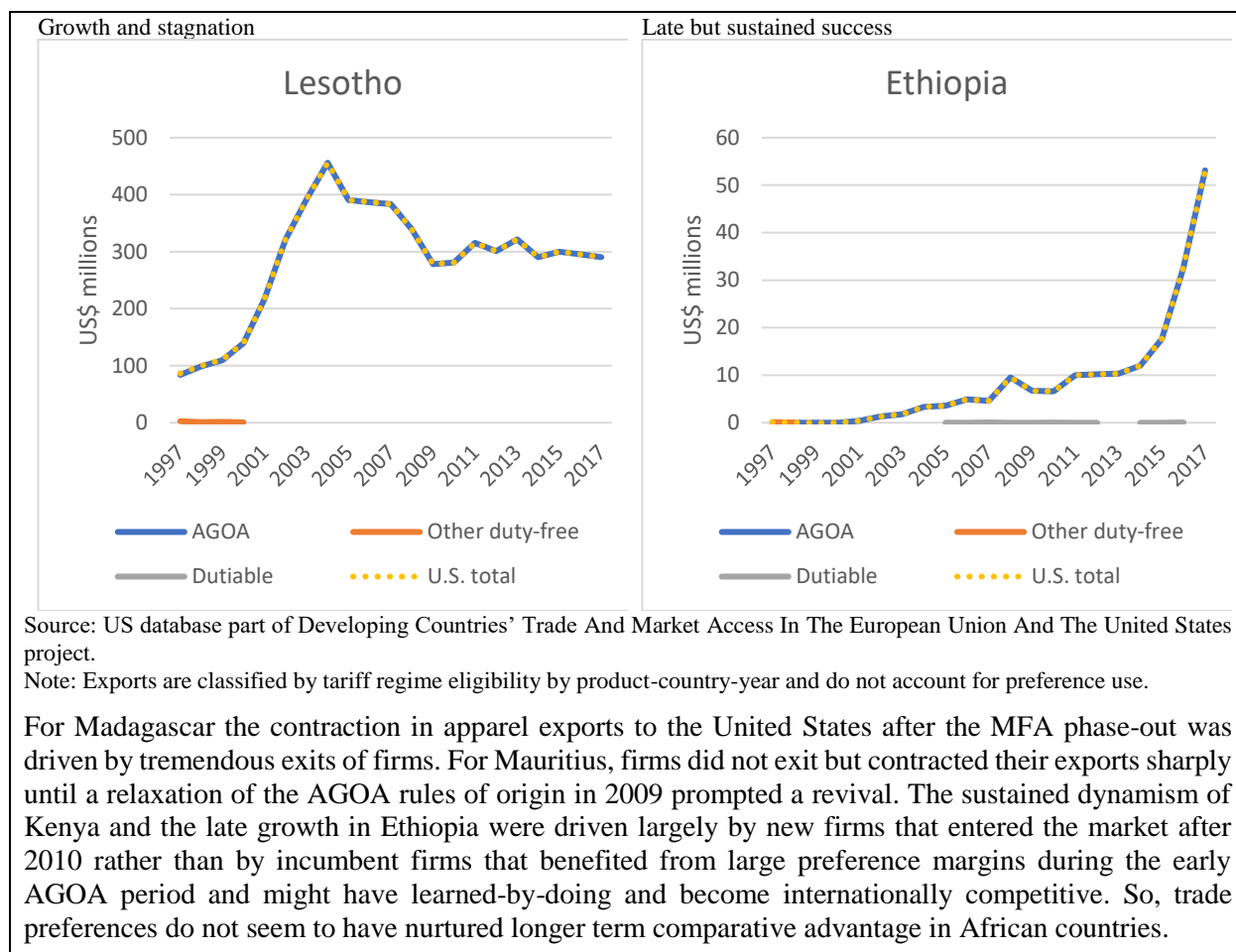
Immediately after the EU granted duty free–quota free access to Bangladesh under the Everything But Arms initiative in 2001, knitwear exports from Bangladesh to the EU more than doubled, from \$1.3 billion in 2000 to \$3 billion in 2004. During the same period, knitwear exports from Bangladesh to the United States also increased by \$30 million. Much to the surprise of many, such generous trade preferences resulted not in trade diversion from the rest of the world to the preference-granting markets, but in trade creation to the rest of the world. What could explain this finding?

Trade preferences can result in a long-term win-win scenario for all parties concerned.³⁸ The EU gained from giving trade preferences to Bangladesh under EBA as its lost tariff revenues were outweighed by gains from lower prices resulting from higher entry into exporting in Bangladesh. Preferences raised the profits of potential exporters in Bangladesh, inducing greater firm entry exports to the EU. But as firms overcame the fixed costs of production and exporting, some started exporting to other markets, and exports from Bangladesh rose to all markets. Bangladesh solidified its position as a major apparel exporter to the EU, even after the end of the Multi-Fiber Arrangement (MFA) quota regime in 2004. The strict rules of origin requirements of EU’s EBA and its potential encouragement of greater local value added through nurturing stronger domestic suppliers may have helped explain these durable benefits.

In contrast, the long-term impacts of the African Growth and Opportunity Act (AGOA) on apparel export performance by African countries were more nuanced. Aggregate African apparel exports to the United States first boomed after AGOA was enacted, then declined after the end of the MFA quotas in 2004 and the ensuing preference erosion (with competition from Asian giants) and stagnated in recent years. But the aggregate picture is based on four different country-level stories: countries mostly in Central and West Africa never took meaningful advantage of AGOA; countries mostly in Southern Africa experienced a boom right after AGOA followed by a bust; countries like Lesotho and Mauritius experienced growth and then stagnation; and countries in East Africa saw fairly sustained success, albeit starting late in some cases (box figure 1).³⁹

Box figure 1 Four stories of AGOA apparel exports





C. Geography matters: Overcoming remoteness by improving connectivity

214. Proximity to the hubs in the global trade network—China, Germany, Japan, and the United States—matters for GVC participation. Many value chains are not global but regional. Vietnam's proximity to its regional suppliers of electronic inputs—such as China, Republic of Korea, Japan, and Singapore—clearly helped its GVC participation in the electronics sector (see box 2.1). Has remoteness prevented countries in Latin America and Sub-Saharan Africa from participating in GVCs? The total distance from Argentina or Chile to the GVC hubs reaches almost 40,000 kilometers and that from Malawi or Mozambique exceeds 30,000 kilometers. This contrasts sharply with countries specialized in advanced manufacturing and services GVCs and innovative GVC activities, whose total average distance to the GVC hubs is 18,700 and 17,000 kilometers, respectively.

215. The automotive sector relies strongly on fairly short regional value chains for at least three reasons. Automotive components like car seats or engines can be heavy, bulky, and easily damaged, increasing transportation costs. Just-in-time production and high product variety often require the assembly of subcomponents to be close to final assembly. And final assembly often happens in large end-markets with local content requirements in return for market access, as in Brazil, China, India, and South Africa.⁴⁰ Morocco has taken advantage of its geographical proximity to the EU market and become Africa's largest producer of passenger vehicles in 2017, surpassing South Africa.⁴¹

216. Inefficient infrastructure and delays in clearing customs are important sources of trade costs. First, the performance of a GVC is often severely impaired by its weakest link, as with customs delays. Supply

chain disruptions are especially costly when firms cannot easily resort to alternative suppliers. Trade delays associated with inefficient connectivity can be a large deterrent for relational GVCs requiring coordination and in-time delivery. Weak contract enforcement and the need for stronger cooperation and repeated interactions among the several agents participating in the chain may be severely curtailed by remoteness or inadequate air connectivity.

217. Trade costs can also shape a country’s positioning in GVCs. In sequential (or snake-like) GVCs, trade costs compound along the value chain and have a higher incidence on downstream stages than on upstream stages. This may incentivize remote countries to specialize in upstream stages and more central countries to specialize in downstream stages.⁴² Inefficient transport and logistics services and weak competition in these services amplify trade costs in many manufacturing GVCs with multiple border crossings and can offset other competitive advantages like low labor costs.⁴³

218. Strong evidence of a negative role of larger geographical distance for GVC participation, both backward and forward is found using the EORA database, mainly driven by manufacturing sector GVCs (see box 2.2).⁴⁴ Larger geographical distance to the GVC hubs China, Germany, and the United States increases a country’s likelihood of specializing in commodities, while countries closer to the GVC hubs are more likely to be in limited manufacturing GVCs. Geographical proximity also matters more for trade in GVCs than for trade in final goods.⁴⁵

Enhanced connectivity can overcome geographical barriers and promote GVC participation

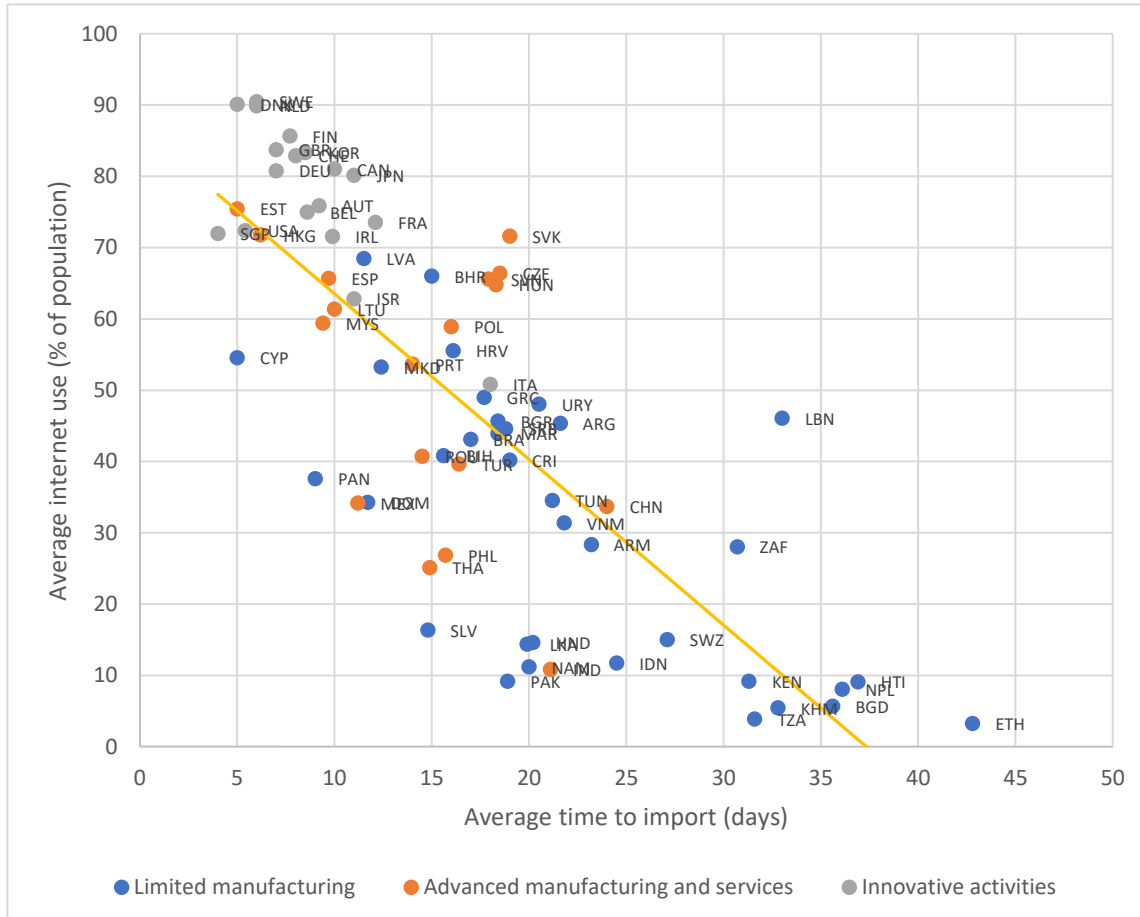
219. The disadvantage of a remote location can be addressed by improving transport and communication infrastructure as well as the regulatory framework—especially competition—governing these services. The most remote countries—such as those landlocked—have policies in key “linking” services like transport and telecommunications that are perversely restrictive.⁴⁶ Better connectivity would influence predictability, reliability, and timeliness in GVCs.⁴⁷

220. Transport costs remain, according to developing country suppliers, the main obstacle to entering, establishing, or upgrading in GVCs.⁴⁸ The geographic centrality of a country can attract downstream production stages in GVCs. But geographic centrality is more related to centrality in the transport network than to distance. Perhaps what is more important for GVC participation is not geographic distance but rather economic distance. Countries in Central Asia, while central in the distance to neighbors, are isolated due to poor quality transport networks, the lack of affordable transport services for containers, and the missing links along main infrastructure corridors.⁴⁹ These impair their participation in downstream stages of GVCs. Similarly, slow and unpredictable land transport keeps most Sub-Saharan African countries out of the electronics value chain.⁵⁰ Estimates suggest that improving trade facilitation halfway to global best practices would stimulate trade in the Sub-Saharan Africa region to a far greater extent than eliminating all import tariffs.⁵¹ And while air transport could help bridge slow land transport or long geographical distances, its high cost limits low income country exports to very high unit-value goods (such as gold and silver), time-sensitive goods (fast-fashion clothing), and perishable goods (cut flowers).⁵² A day of delay in transit due to different transport mode choice has a tariff equivalent of 0.6 to 2.1 percent, and the most sensitive trade flows are those involving parts and components.⁵³ The private provision of cold storage logistics infrastructure has enabled the development of the Ethiopian floriculture value chain, while its absence is limiting the upgrading potential in Bangladesh’s aquaculture value chain.⁵⁴

221. High logistics costs inhibit landlocked countries from participating in GVCs for electronics and fruits and vegetables.⁵⁵ The average number of days from a warehouse in the origin economy to a warehouse in the destination country in 2006–15 varies greatly for different types of GVC participation (figure 2.5). Imports by countries specialized in innovative GVC activities need less than nine days on average to reach a warehouse, but one additional week for countries specialized in advanced manufacturing and services GVCs, such as the Philippines, Portugal, and Thailand. By contrast, the average time to import exceeds one month in countries specializing in commodities: it takes 42 days to import in Ghana and 92 days to import

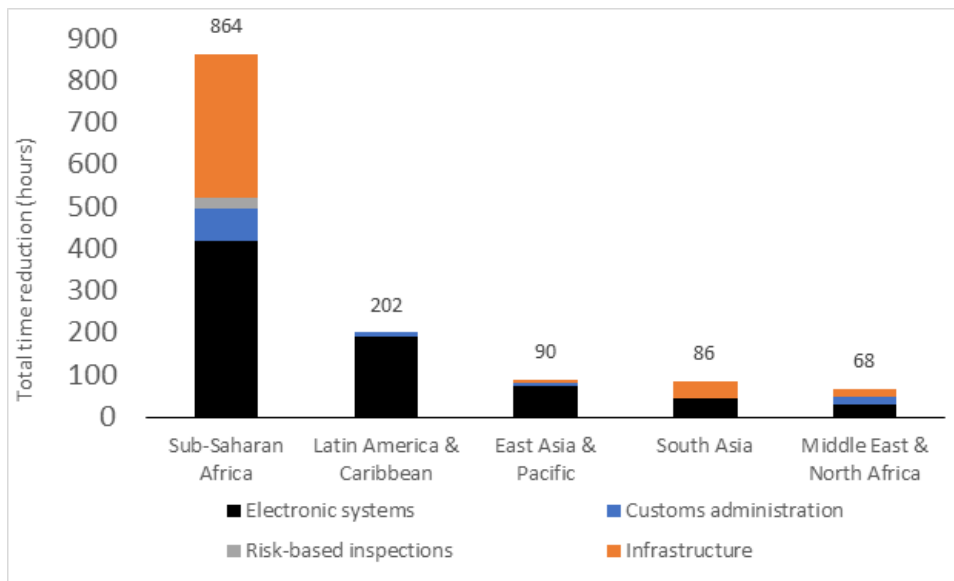
in Iraq. Infrastructure gaps are partly responsible for longer delays in Africa, while the lack of electronic systems and to a lesser extent customs administration and inspections account for more than half of the total delays according to the Doing Business Data (see Figure 2.6). A large portion of long transport times in Sub-Saharan Africa is attributed to cargo dwell times at the port.⁵⁶ Despite an already favorable location, Vietnam reduced its average time to import over the period when the electronics GVC sector expanded but its connectivity remains worse than that of regional competitors like Thailand (see box 2.1).

Figure 2.5 Connectivity matters for specialization in more advanced GVCs



Source: WDR team based on World Development Indicators, Doing Business Database and GVC taxonomy of 2011
 Note: Excludes countries specializing in commodities. The x axis shows the average time to import (days) and the y axis the average internet use (% of population) by GVC taxonomy group, with averages over 2006–15.

222. The inability to meet requirements for timely production and delivery hurts GVC participation. Trade in parts and components in international production networks is more sensitive to logistics performance than trade in final goods and to suffer in the face of higher uncertainty in bilateral international transport times.⁵⁷ Evidence from the EORA database shows that better scores in the logistics performance index are linked to stronger backward GVC participation (see box 2.2). Unpredictability in border clearance times for imports lowers survival rates for manufacturing exporters in 48 developing countries.⁵⁸ And the quality of the national road infrastructure matters for timely delivery to global markets. For Indonesian manufacturing firms, a higher road density in a firm’s province and in neighboring provinces’ increases the probability of exporting.⁵⁹

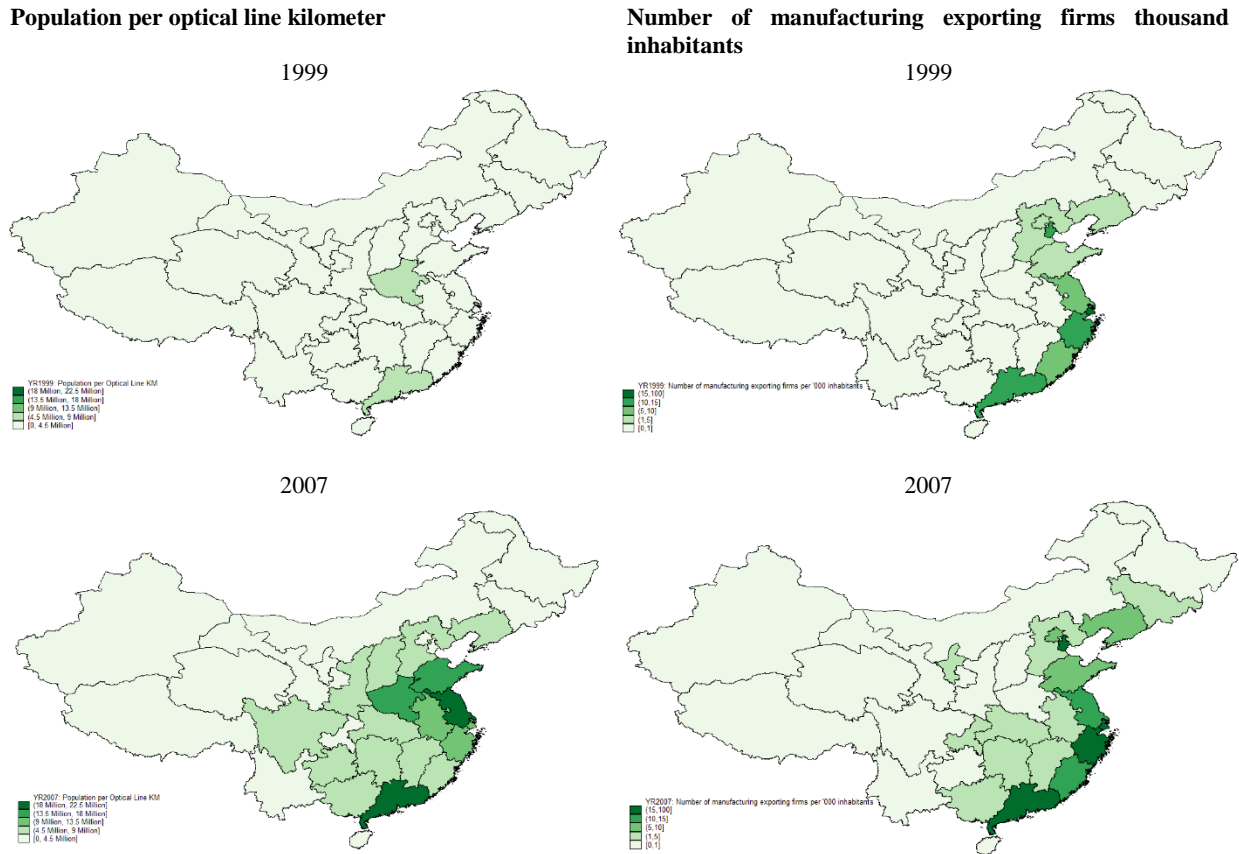
Figure 2.6 Improving customs is as important as infrastructure for African trade

Source: Doing Business Database.

223. Not confined to the physical supply chain of goods, connectivity also includes effective communication between the different participants in GVCs. Two ways that improve effective communication are the use of the internet and the use of the English language.

224. Stronger internet usage could be linked to stronger GVC integration for at least two reasons. First, a large percentage of inputs embodied in exports—about 30 percent—are services, such as logistics, ICT, and other business services, which rely on the internet. Second, firms in GVCs need to communicate with both their suppliers and their customers through ICTs.

225. Countries with a higher average share of the population using the internet exhibit stronger backward GVC integration (see box 2.2). In China, expanding internet access from coastal provinces to hinterland provinces increased in the density of manufacturing exporters in hinterland provinces (figure 2.7).⁶⁰

Figure 2.7 Growth in internet density and exporter firm density across provinces in China

Source: Fernandes, Mattoo, Nguyen, and Schiffbauer 2019.

226. But many countries still have very low internet coverage, particularly those specialized in commodities. Over 2006–15, only 21 percent of the population used the internet in these countries, and coverage was even lower than 5 percent in Burkina Faso, Burundi, and Mali. This contrasts sharply with countries participating in advanced manufacturing and services GVCs, with half the population using the internet on average. This share exceeds over three quarters in countries focusing on innovative GVC activities, with coverage exceeding 85 percent in Denmark, Finland, and Sweden (see figure 2.5).

227. English skills have helped India and the Philippines become attractive offshore destinations for business services, including call centers but also increasingly complex services such as IT and finance serving the United States and United Kingdom. Morocco and Tunisia have become destinations for French firms.

228. A higher portion of people speaking English in a country is positively correlated with forward GVC participation (see box 2.2) and proximity is shown to be more relevant for GVC trade than for trade in final goods.⁶¹ Language frictions also inhibit knowledge spillovers in GVCs, as in Myanmar, where large communication barriers between domestic managers and Chinese, Japanese, and Korean managers limit the productivity spillovers from FDI.⁶²

D. Institutional quality matters: Deep preferential trade agreements can enhance quality

229. Among the top 25 most politically unstable countries over 2006–15, only the Philippines and Thailand participated in advanced manufacturing and services GVCs and only Israel in innovative GVC

activities. How important is the quality of institutions, all else being equal, for countries' participation in GVCs?

230. Weak contract enforcement is a significant deterrent of traditional trade flows, but GVCs are particularly sensitive to the quality of contractual institutions. Because the performance of a GVC depends on the strength of its weakest link, production delays driven by weak contract enforcement might be particularly harmful in GVCs. The presence of relationship-specific investments (e.g., customization of products) and the exchange of large flows of intangibles (such as technology, intellectual property and credit) reinforces the potential role of institutional quality as a significant determinant of relational GVC participation.⁶³ On the other hand, GVCs links relying intensively on institutional quality also tend to be particularly “sticky,” which fosters the need for reputational mechanisms of cooperation that partly substitute for the absence of formal contracting. Under some circumstances, vertical integration through FDI may serve as a direct (albeit imperfect) substitute for strong contract enforcement in the host countries.

231. Evidence based on the EORA database shows that political stability matters strongly for backward GVC integration (see box 2.2). Sectors that rely more on contract enforcement see faster growth in GVC participation levels (and in gross exports) in countries with better institutional quality, after controlling for endowments, geography, tariffs, and macroeconomic cycles (see box 2.2). If Mozambique increased its rule of law index to the cross-country median, its backward GVC participation level would increase by 29 percent while its forward GVC participation level and its exports would grow by 32 percent at the sample mean of sectoral contractual intensity (all else constant). By contrast, countries characterized by lower political stability show higher forward GVC participation (see box 2.2). This is driven by GVC participation of the mining sector. Indeed, higher average political stability in the 2000s reduces the likelihood of countries specializing in commodities in 2011. Poor institutional quality linked to land and property rights in Cote d'Ivoire and Ghana has hampered growth in their agroprocessing GVCs (pineapples and cocoa).⁶⁴

232. Preferential trade agreements (PTAs), especially those with “deep” provisions, can improve domestic institutions—since they help import both reform and technical and financial assistance—and result in stronger GVC participation.

233. Most tariff liberalization in the last decades has been through the negotiation of bilateral and regional PTAs by developing and developed countries. Tariff reductions (and certainty about those reductions) are a key benefit of PTAs, but more countries are signing bilateral and regional PTAs that go beyond simple market access. The depth of trade agreements is associated with the international fragmentation of production as behind-the-border policies need to be disciplined in trade agreements for GVCs to operate efficiently.

234. Participation in more advanced GVCs goes hand in hand with countries' engagement with more PTA partners (see figure 2.4). A supportive role for regional trade blocs and deep trade agreements in promoting countries' backward integration in GVCs is found based on the EORA database. Specific trade agreements, such as the EU and ASEAN, are linked to substantially higher backward GVC integration for its members and a positive if weak effect is also found for NAFTA (see box 2.2).⁶⁵ The depth of trade agreements is particularly relevant, with countries having signed more deep trade agreements exhibiting higher backward GVC participation (chapter 8 discusses deep trade agreements in more detail). The channels for preferential trade agreements to foster GVC participation include lower tariffs, larger FDI inflows, shorter distances to GVC hubs, and stronger regulatory frameworks increasing political stability.

235. But not all preferential trade agreements have been conducive to GVC participation. MERCOSUR has, if anything, impeded its members' backward GVC participation (see box 2.2). Argentina exhibits low backward integration into GVCs resulting from its restrictive trade policies, but high forward GVC integration due to its rich natural resources. If MERCOSUR were to add deep provisions, such as commitments on investment and reforms to remove entry barriers and tackle anticompetitive business practices, Argentina's GVC integration would gain substantially.⁶⁶ Argentina now has only three PTA

partners covering 57 enforceable deep provisions, compared with 18 PTA partners for Colombia and 19 for Peru (covering 250 and 263 deep provisions, respectively). With a Mercosur agreement as deep as the agreement among the EU, Colombia, and Peru—in terms of the number of enforceable provisions—Argentina could increase its exports of parts and components to MERCOSUR members by 1 to 9 percent. Large potential gains for GVC participation from deepening existing preferential trade agreements (and from engaging in new deep PTAs) are also found for the other MERCOSUR giant, Brazil.⁶⁷ But the impacts of preferential trade agreements on GVC participation can be subtle, because the rules of origin under PTAs can influence how GVCs form and expand (box 2.6).

Box 2.6 PTAs and GVCs—the role of rules of origin

Rules of origin, a key element in the functioning of PTAs, indicate that for the final good to be eligible for preferential tariff treatment, the production or sourcing of some of its inputs must take place within the PTA area. PTAs can affect firm-level intermediate-input sourcing decisions, and thus their GVC linkages, through two channels:

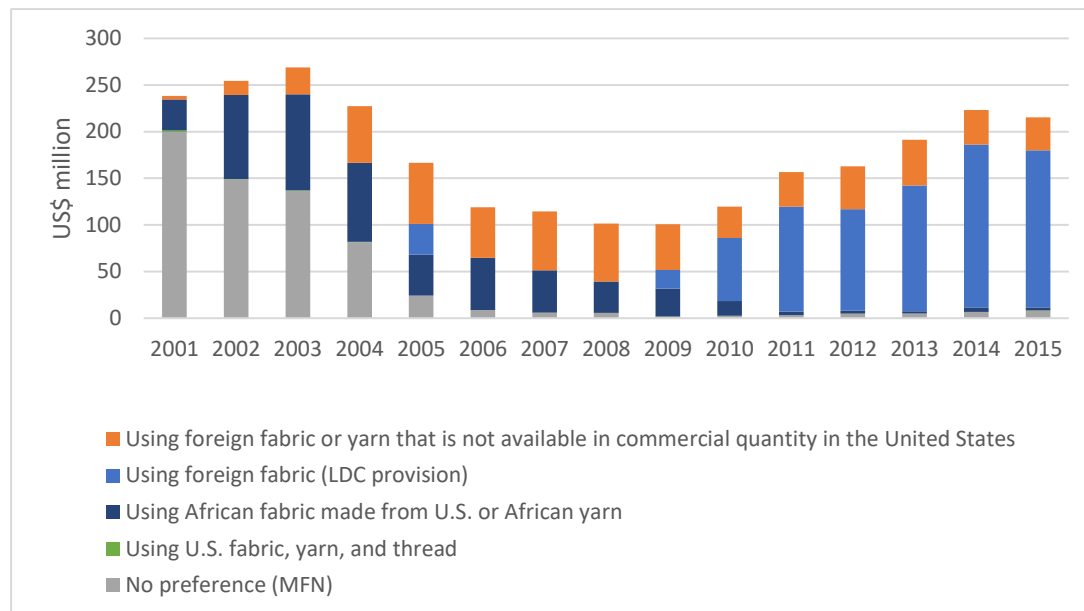
Preferential tariffs, as inputs imported from PTA members face lower (often zero) tariffs than inputs sourced from nonmembers.

Rules of origin that distinguish goods originating from PTA members from goods originating from nonmembers with the objective of ensuring that goods imported by one PTA member from another benefiting from lower PTA tariffs truly originate from the PTA area and are not simply assembled from components originating in nonmembers.

Rules of origin can constrain PTA members by not allowing them to select the globally most efficient intermediate input suppliers. In recent surveys, manufacturing firms in developing countries repeatedly point to rules of origin as a crucial nontariff barrier.¹ Rules of origin are difficult to measure due to their legal complexity, but recent progress in measurement has been for the world’s largest PTA, NAFTA.

A novel mapping of all input–output linkages embedded in NAFTA’s rules of origin is constructed for each final good, identifying all intermediate inputs required for its production subject to rules of origin, and for each intermediate good, identifying all final goods that impose rule of origin restrictions on its sourcing.² Regression evidence on the impact of these sourcing restrictions shows that NAFTA’s rules of origin significantly reduced the growth rate of Mexican imports of intermediate goods from nonmembers relative to the growth rate of imports of intermediate goods from members. On average, NAFTA’s rules of origin reduced the growth rate of imports of affected goods from nonmembers relative to NAFTA members by 30 percentage points. These findings reveal an effective strengthening of the regional GVC, Factory North America.³ But they also point to the trade diversion of PTAs through the deterrence of imports of intermediate goods from nonmembers.

Exemplifying the dramatic changes in sourcing decisions—and thus changes in patterns of GVC participation from changes in rules of origin under a PTA—is the Mauritius apparel sector since 2000. Mauritius has been eligible to U.S. nonreciprocal trade preferences under AGOA since 2001, but it experienced a swing between liberal rules of origin (2001–05), stringent rules of origin (2005–09), and again liberal rules of origin (2010–15) in its exports of apparel to the U.S. market. A shift across sources of fabric imports followed closely the swings in rules of origin, with fabric originating in African countries or the United States until 2009 and switching almost entirely to outside Africa and United States (mostly to Asian countries) from 2010 onward.⁴

Box figure 1 Mauritius exports of apparel to the US by origin of fabric

Source: Office of Textiles and Apparel (OTEXA), International Trade Administration, U.S. Department of Commerce.

¹ ITC 2015.

² Conconi et al. 2018.

³ The term was coined by Baldwin (2013).

⁴ Fernandes et al. 2019a.

E. Transitioning up the GVC typology

236. Over 1990–2015, many countries upgraded their GVC categories. The Czech Republic moved from limited manufacturing GVCs in the 1990s to advanced manufacturing and services GVCs in the 2000s and to innovative GVC activities after 2010.

237. Several determinants identified here as conducive to stronger GVC integration help to explain the Czech Republic’s transitions. After the fall of the Iron Curtain, its geographical proximity to neighboring Germany and Austria and its supply of skilled labor at lower labor costs made the country an attractive location for FDI. In the 1990s, its shares of high-skilled workers (35 percent) and medium-skilled workers (57 percent) were almost identical to Germany’s, while the average labor costs of a Czech worker were around \$13,800, or less than a third of Germany’s \$49,000. This led to strong FDI inflows, particularly in automotive and business services, also fostered by political stability.

238. While average manufacturing import tariffs were already low in the Czech Republic in the early 1990s at around 5 percent, they declined to less than 2 percent by 2000. The Czech Republic’s accession to the EU in 2004 opened the doors for PTAs—the EU being one of the deepest PTAs—and the number of PTA partners jumped from 0 to 45. The 2000s also started a new era where the country emphasized skill building and innovation. Internet use rose from 35 percent of the Czech population in 2005 to 75 percent in 2015. The share of high-skilled workers further climbed up reaching 40 percent by 2007, while R&D expenditure as percent of GDP grew from 1.1 percent in 2000 to 1.9 percent in 2015, ranking the Czech Republic among the countries with the highest innovation potential in the world.⁶⁸ The productivity of the workforce and the availability of high-quality suppliers are major reasons for the country’s continuing attractiveness to German and other multinationals.

239. The relative importance of different determinants for GVC participation depends on the type of GVC engagement and on the characteristics of countries. Bottlenecks specific to different regions and groups of countries hamper their backward GVC participation (Box 2.7). For transitioning across groups,

all determinants and policy areas need to be improved, including tariffs, FDI, political stability, customs and logistics. For countries in different regions, the relative importance of these determinants differ. For example, for Sub-Saharan Africa, low FDI inflows is the most important deterrent for backward GVC participation, while for countries in MENA and Fragile and Conflict Situations, low political stability is the most severe obstacle. Countries in South Asia, LAC, MENA and Pacific Islands stand to benefit most from tariff liberalization.

Box 2.7 Most important determinants for GVC participation by taxonomy groups and regions

The determinants of backward GVC participation differ importantly across countries depending on their type of GVC participation (Box table 1).

- An average country in the **commodities** group is characterized by low political stability (-0.6), low FDI inflows, high manufacturing import tariffs (6.6%), low customs efficiency (35 days to import), and low scores in the logistics performance index (LPI) (2.6).
- Countries in the **limited manufacturing** group see on average improved political stability, 60% higher FDI inflows, 1 percentage point lower average tariffs (5.6%), improved customs efficiency (20 days to import), as well as improved LPI scores (2.8), relative to the commodities group.
- Countries in the **advanced manufacturing and services** group exhibit on average further improved political stability, substantially – 150 percent – higher FDI inflows on average, substantially lower average tariffs by 3.1 percentage points (2.5%), better customs efficiency (13 days to import), as well as a higher LPI (3.3), compared to the limited manufacturing group.
- Countries part of the **innovative activities** group show on average improved political stability, 90 percent higher FDI inflows, lower tariffs by 0.8 percentage points (1.7%), higher customs efficiency (8.9 days to import), and a better LPI (3.8), relative to the advanced manufacturing and services group.

Overall it is clear that to transition across different types of GVC participation, several policy areas need to see substantial improvements. The color-coded averages shown in Box table 1 suggest that the time to import improves substantially between the commodities and the limited manufacturing groups, while tariff rates fall drastically between the limited manufacturing and the advanced manufacturing and services groups. The relative importance of lower tariffs coincides with backward integration being much higher for countries specialized in advanced manufacturing and services than for countries in limited manufacturing (39.8% versus 24.1%). The innovative activities group sees improvements on all fronts, most notably in political stability and in logistics performance.

Box table 1. Average of backward GVC participation and determinants by taxonomy group

Taxonomy groups	Average backward GVC participation share	Average political stability index	Average FDI inflows (log)	Average tariff rate	Average days to import	Logistics Performance Index
Commodities	13.9%	-0.6	6.7	6.6	35.4	2.6
Limited manufacturing	24.1%	-0.3	7.3	5.6	19.9	2.8
Advanced manufacturing and services	39.8%	0.1	8.9	2.5	13.0	3.3
Innovative activities	37.4%	0.8	9.7	1.7	8.7	3.8

Note: Averages shown cover the period 2010-2015.

Based on the evidence from the cross-country regressions (see box 2.2), the most important bottlenecks hampering backward GVC participation shares of each World Bank region or group of countries are summarized below, along with the hypothetical impacts of their improvements:

- **Backward GVC integration in Africa, South Asia, fragile and conflict situations, and Caribbean and Pacific Islands would increase most from attraction of FDI.** Africa and South Asia rank lowest among all regions in terms of FDI inflows. If Africa and South Asia improved their average FDI levels to those of the best-performer ECA, backward GVC participation is estimated to increase by 16% and 16%, respectively.¹ If fragile and conflict situations improved FDI levels to those of ECA, backward GVC participation could increase by 34% on average. For Caribbean Islands, GVC participation is estimated to grow by 19% under that scenario, while for Pacific islands the increase would be a dramatic 40%.
- **Backward GVC participation in South Asia, MENA, and Pacific Islands would increase most from import tariff liberalization.** South Asia imposes the highest average manufacturing import tariff rates across all regions (11%). If South Asia decreased its tariff rates to those of the best-performer ECA (3%), backward GVC participation could increase by 20%. Under the same scenario, MENA and Pacific Islands are estimated to experience backward GVC participation rates growing by 14 to 16%.
- **Backward GVC integration in MENA, South Asia, and fragile and conflict situations would increase most from improved institutional quality.** MENA and South Asia rank lowest among all regions in terms of political stability. If MENA and South Asia improved their political stability to that of the best-performer EAP, backward GVC participation in MENA would be estimated to increase by 28% and in South Asia and fragile and conflict situations by 20-36%.
- **For LAC, lower tariffs could have a high payoff for GVC integration.** If LAC decreased its tariff rates from their average of 6.3% to the rates of the best-performer ECA (3%), backward GVC participation would be estimated to increase by 7%.

Box Table 2. Average of backward GVC participation and determinants by region and group of country

	Average backward GVC participation share	Average political stability index	Average FDI inflows (log)	Average tariff rate
Europe & Central Asia	28.9%	-0.2	7.4	3.0
East Asia & Pacific	20.0%	-0.2	7.3	5.6
Latin America & Caribbean	18.1%	-0.2	7.2	6.3
Middle East & North Africa	14.7%	-1.3	7.3	8.8
South Asia	16.1%	-1.1	6.1	11.0
Sub-Saharan Africa	17.3%	-0.5	6.0	8.6
Fragile and conflict situations	11.6%	-1.3	5.4	9.0
Caribbean Islands	17.5%	0.1	5.7	9.5
Pacific Islands	15.3%	0.1	4.2	8.4

Note: averages shown cover the period 2010-2015. In each region or group of countries averages are computed based only on World Bank client countries. These groups only include countries that are eligible for lending and are part of the EORA database.

¹ For any given determinant, the magnitudes reported are obtained as a ratio between: (i) the product between the difference in the determinant in the best-performer region and the determinant in the considered region/group and the estimated coefficient on the determinant in cross-country regressions and (ii) the average backward GVC participation share in the considered region/group. Estimated coefficients are shown in Fernandes et al. (2019).

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¹ In this chapter the definition of low-skilled worker or low-skilled labor is based on International Standard Classification of Occupation (ISCO) categories and it covers ‘elementary occupations’, called skill level 1 by the ILO. See <https://www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm>.

² <https://www.economist.com/asia/2018/04/12/why-samsung-of-south-korea-is-the-biggest-firm-in-vietnam>.

³ “What Makes Bangladesh—A Hub Of Garment Manufacturing?” *Stitchdiary* 2018, <https://medium.com/@stitchdiary/what-makes-bangladesh-a-hub-of-garment-manufacturing-ce83aa37edfc>.

⁴ These results appear to contrast with McKinsey Global Institute (2019), who argue that labor-cost arbitrage is small share of GVC activity and has declined between 2007 and 2017. The difference in interpretations is because of differences in definitions and methodology. They define labor-cost arbitrage as exports from countries whose GDP per capita is one-fifth or less than that of the importing country, so convergence between developing and advanced countries will reduce labor-cost arbitrage. Importantly, they find that the overall share of labor-cost arbitrage in goods value chains has remained roughly constant at 18-19 percent from 2007 to 2017, it is only labor-intensive goods, such as textiles and apparel, where they note a significant decline in labor-cost arbitrage, albeit from high levels. Consistent with the analysis presented in this report, they also observe a sharp increase in labor-cost arbitrage from 1995 to 2007 and find labor-cost arbitrage is high and rising even in the most recent decade in some sectors, such as autos, and some countries, such the United States.

⁵ See Pathikonda and Farole (2017) who extend the traditional theory of factor-content of trade to construct measures capturing the capabilities most relevant in trade of GVC products (defined by Athukorala (2010) and Sturgeon and Memedovic (2011)).

⁶ Evidence from the EORA database shows a U-shaped relationship between GDP per capita and forward GVC integration across countries.

⁷ Engman, Farole, and Winkler 2018.

⁸ This analysis focuses only on differences across countries in the seven sub-sectors within the overall manufacturing sector in the EORA database.

⁹ See Yameogo and Jammeh (2019) based on EORA cross-country data for 23 African countries and its comparison to global evidence for 115 countries.

¹⁰ See Rocha and Winkler (2019) for a study using data from the World Bank Enterprise Surveys.

¹¹ Rodrik 2018.

¹² See the evidence in Abreha et al. (2019) based on the EORA database contrasting GVCs of Africa’s manufacturers to GVCs of other developing regions (including in South Asia and East Asia).

¹³ <http://olamgroup.com/investor-relations/annual-report-2016/>.

¹⁴ See Freund and Moran (2017) on how governments were successful in using FDI to increase the countries’ GVC participation in Costa Rica and Morocco.

¹⁵ See Staritz and Morris 2014 and Godfrey 2015.

¹⁶ Farole and Winkler 2014.

¹⁷ This positive association is driven by GVC participation in the manufacturing sector only, while there is no association between FDI inflows and countries’ GVC integration of their agriculture, commodities, or services sectors. This could point to a more favorable role of efficiency-seeking or market-seeking FDI that looks for internationally cost-competitive destinations and potential export platforms. See Buelens and Tirpak (2017) for further evidence that bilateral FDI stocks are positively associated with the bilateral backward GVC participation as well as with bilateral gross trade.

¹⁸ Liu and Steenbergen (2019) use World Bank’s Enterprise Survey data for 139 countries from 2006 to 2018 to show lower foreign ownership presence is linked to lower backward GVC participation, measured by exporting and importing at the firm level. Based on the same source of data, World Bank (2018a) shows evidence of a strong link between foreign participation and integration into global production chains via exporting and importing for firms in the ECA region.

¹⁹ However, FDI inflows are important for forward GVC participation levels according to the EORA cross-country evidence (see box 2.2). The negative impact of FDI on forward GVC participation shares may also reflect the fact that some of the natural-resource abundant countries that exhibit very high values of those shares have low institutional quality (as shown later in the chapter) and attract relatively less FDI.

²⁰ Kee 2014.

²¹ Alfaro-Urena, Maneliciz, and Vasquez (2019) also highlight similar positive improvement for local suppliers from joining multinational supply chains in Costa Rica.

²² Kee and Tang 2016.

²³ World Bank 2018b.

²⁴ Taglioni and Winkler 2016.

²⁵ Antràs and de Gortari 2017.

²⁶ World Bank 2018a.

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- ²⁷ See Abudu and Nguimkeu (2019) focusing on EORA data for African countries and exploiting variation in countries' tariff policies over time.
- ²⁸ Narain and Varela 2017.
- ²⁹ Rocha and Varela 2018.
- ³⁰ The importance of lower tariffs on intermediate inputs to foster the use of imported inputs and improve export performance at the firm level is true both in countries poorly integrated into GVCs as the Nepal and Pakistan, as well as Peru (see Pierola, Fernandes, and Farole 2018) but also in countries highly integrated into GVCs like China (Bas and Strauss-Kahn 2015).
- ³¹ Kathuria 2018.
- ³² The overall trade restrictiveness index measures the uniform tariff equivalent of the country's tariff and nontariff barriers that would generate the same level of import value for the country in a given year. See Kee and Nicita (2017) for details on the methodology.
- ³³ World Bank 2019.
- ³⁴ Hoekman and Özden 2005; Ornelas 2016.
- ³⁵ An example of the loss of that market access illustrates its importance. The suspension of AGOA market access benefits by Madagascar due to its domestic political unrest in 2009 led to an outflow of Asian FDI and a reduction in apparel exports of apparel to the US by 156 million USD or 75 percent within a year.
- ³⁶ See Fernandes et al. 2019a.
- ³⁷ Interviews with enterprises in Ethiopia and testimonies of foreign investors discussed in Fernandes et al. (2019a) indicate that lead apparel companies in GVCs would not have set up their production plants in Ethiopia if AGOA trade preferences were not in place.
- ³⁸ Cherkashin et al. 2015.
- ³⁹ Fernandes et al. 2019a.
- ⁴⁰ Sturgeon and Thun 2018.
- ⁴¹ <https://www.morocoworldnews.com/2018/10/254381/morocco-africa-automotive-industry/>.
- ⁴² Antràs and de Gortari 2017.
- ⁴³ APEC and World Bank 2018.
- ⁴⁴ An important role of geographical distance from GVC hubs is identified in the study by Kowalski et al. (2015) based on OECD TIVA data for GVC participation.
- ⁴⁵ Johnson and Noguera (2017) find distance to be a friction for bilateral value added in exports (as well as for bilateral gross exports) while Buelens and Tirpak (2017) identify a stronger role of distance for GVC trade relative to trade in final goods.
- ⁴⁶ Arvis, Raballand, and Marteau (2010) emphasize the crucial role of uncompetitive market structure in the transport sector in explaining the high logistic costs in landlocked countries. Borchert et al. (2017) show that landlocked countries have more restrictive policies in transport and communication sectors than coastal countries using the World Bank Services Trade Restrictiveness Database.
- ⁴⁷ WEF 2013.
- ⁴⁸ OECD and WTO 2013.
- ⁴⁹ The evidence is provided by Briceno-Garmendia, Lebrand, and Abate (2018) using a novel measure of country connectivity that captures the cost, time and reliability of the transport network that enables users to reach relevant economic destinations including global GVC hubs.
- ⁵⁰ Christ and Ferrantino 2011.
- ⁵¹ World Economic Forum (2013), *Enabling Trade: Valuing Growth Opportunities*, Online Appendix.
- ⁵² Arvis et al. 2011.
- ⁵³ The estimates are obtained by Hummels and Schaur (2013) based on transport mode choices by US importers. Similar magnitudes for the cost of a one-day delay in inland transit are found based on a different methodology and data on the time to export from the *Doing Business* database by Djankov, Freund, and Pham (2010).
- ⁵⁴ See Ponte et al. 2014.
- ⁵⁵ Arvis, Raballand, and Marteau 2010.
- ⁵⁶ Raballand et al. 2012.
- ⁵⁷ A gravity model of trade is used by to relate bilateral trade in parts and components or in final goods to the Logistics Performance index by Saslavsky and Shepherd (2014) and to transit times measured from database of parcel deliveries by the Universal Postal Union by Ansón et al. (2017).
- ⁵⁸ Vijil, Wagner, and Woldemichael 2019.
- ⁵⁹ Rodríguez-Pose et al. 2013.
- ⁶⁰ See Fernandes et al. (2019b) who also provide econometric results for a causal impact of internet access on firm export participation in China.
- ⁶¹ Buelens and Tirpak 2017.
- ⁶² Khandelwal et al. 2018.

⁶³ Levchenko 2007; Nunn 2007.

⁶⁴ See Amanor 2012 and Gebreeyesus and Sonobe 2012.

⁶⁵ Johnson and Noguera (2017) also show an important role of the EU and other preferential trade agreements, especially deep agreements, in decreasing the ratio of bilateral value added to gross exports, a sign of growth in global production fragmentation.

⁶⁶ This is one of the trade liberalization scenarios for Argentina whose impacts are obtained from a dynamic computable general equilibrium model as discussed by Licetti et al. (2018).

⁶⁷ This finding is shown by Hollweg and Rocha (2018) based on the impact of deep PTAs in a gravity model of trade for bilateral trade in parts and components.

⁶⁸ <http://www.oecd.org/innovation/czech-republic-fourth-industrial-revolution.htm>.

Chapter 3: Consequences for Development

240. Bangladesh is a powerful example of how participation in global value chains has supported economic growth and structural change. In 1988, Bangladesh exports of apparel and footwear were negligible and only 0.2 percent of the global total. Since then the business of exporting apparel made from imported textiles has grown on average 17.5 percent every year. Bangladesh now exports 7 percent of the world's apparel and footwear, third only to China—which increasingly sources from Bangladesh—and Vietnam.¹ The sector accounts for 89 percent of the country's exports, 14 percent of GDP, and employs 4.2 million workers, 90 percent of them women. Diversification is also under way. The plastics sector has benefited from complementarities with the readymade garment sector, since garments are folded in plastic packaging. And leather goods and leather and nonleather footwear are growing rapidly (second largest export category). Many garment factories have been investing in parallel factories to build this capacity—transforming the country. Agriculture's share in GDP fell from 70 percent in 1988 to 38 percent in 2018, and the share of people in extreme poverty from 44 percent to 15 percent in 2016.²

241. Navigating globalization has been challenging. Low wages drive Bangladesh's export success, and in the past 30 years, there has been little upgrading to better paid tasks. Demands for higher wages in the factories recently spilled into social unrest in the streets in the form of strikes and protests.³ Tragic incidents, such as one at the Rana Plaza in 2013, have highlighted poor safety conditions in some parts of the value chain, particularly the more peripheral but numerous contractor factories that employ most Bangladeshi workers. Unplanned growth has strained scarce land resources. The sector consumes nearly twice as much water as the entire population of the capital Dhaka, and ground water levels are dropping at more than two meters a year.

242. The relational nature of GVCs is attenuating some of the negative aspects of GVC integration and is also generating some remedial actions. As emphasized in chapter 1, GVCs are far from anonymous markets, and the relevance of the identity of the agents participating in them facilitates their monitoring. Big formal exporters tend to pay better and offer much safer conditions than their suppliers, particularly less-visible subcontractors further up the value chain. But as those suppliers are more associated with global brands, the industrial disputes and disruptions arising from the poor working conditions they offer, safety and environmental concerns of their factories, and workers' dissatisfaction have caught the attention of consumers and civil society. Buyers have mobilized. With the support of donors and in coordination with local public institutions, they have increased monitoring on indirect suppliers and undertaken a series of initiative to improve the governance of the value chain, and social and environmental practices. Among others, they have started enforcing better fire, building, and worker safety—and taking steps to reduce water waste and environmental damage.⁴ As a result of exposure to international best practice, Bangladeshi producers are increasingly recognizing the need not only to make improvements in their practices, but also for these improvements to be independently verifiable by third parties.

243. Is Bangladesh an isolated experience? This chapter examines whether GVC participation promotes development, beyond what countries can achieve through standard trade, or makes the development path harder. It considers cross-country evidence but also focuses on a few countries to show the different facets and complexities of GVC participation, especially Ethiopia, Mexico, and Vietnam. The evidence shows that the challenges, opportunities, successes, and failures of Bangladesh reflect how countries are forging their development path in a GVC world. These experiences can be relevant for other low- or middle-income countries, but the outcomes are also shaped by policies, institutions and other country-specific factors.

244. GVCs support productivity gains and income growth, especially through international capital inflows, better access to foreign inputs and markets, product diversification, and firm-to-firm relationships. In cross-country studies, a 10 percent increase in the level of GVC participation is estimated to increase average productivity by close to 1.6 percent. The increase in per-capita GDP from a 10 percent increase in the level of GVC participation ranges between 11 percent and 14 percent—much larger than the 2 percent income gain from increasing trade in products fully produced in one country by a comparable amount.

245. GVCs lead to hyper-specialization in specific tasks, learning of new capabilities, and to flows of technology along the value chain. Domestic firms become interdependent with foreign firms and share know-how and technology with their buyers and suppliers. These are the two key reasons why firms in developing countries that participate in GVCs tend to be more productive, and all forms of GVC participation are associated with higher income growth than standard trade. The biggest growth spurt, however, comes when countries like Bangladesh, Cambodia, and Vietnam break out of commodities or agriculture into basic manufacturing. Empirical evidence suggests that within three years after joining a manufacturing GVC, a country is more than 20 percent richer on a per capita basis.

246. Alongside the productivity gains, GVCs can deliver better jobs. In addition to higher overall productivity, production within GVCs is also associated with higher capital intensity perhaps because machines can deliver the precision for compatible parts. That makes exports relatively less job intensive. But the overall effects on employment in developing countries can be positive because of increased exports. In Ethiopia, for example, firms that both import and export utilize 0.9 percent more capital per worker than nontrading firms. Yet two-way traders also grew their labor force 0.3 percent faster than nontrading firms. The new activities that GVCs bring to countries move workers across economic sectors, with exports pulling people out of less productive work and into more productive manufacturing jobs. GVCs also create jobs for women: GVC firms tend to employ more women than other firms, improving their livelihoods and those of their families.

247. By boosting income and employment growth, GVC participation reduces poverty. Trade reduces poverty first and foremost through growth. Where economic growth and employment gains from GVCs are larger than from conventional trade, poverty reduction from GVCs can also be expected to be larger. Hence poverty reduction in countries that break into simple manufacturing GVCs that deliver better jobs can be expected to be large.

248. But the gains from GVC participation may be distributed unequally within and across countries. Large corporations that outsource parts and tasks to developing countries have seen an increase in markups, suggesting that cost-reductions are not being passed on to consumers. At the same time, markups for the producers of these inputs in developing countries are declining. So too is labor's share of income in both developed and developing countries. Technological change and higher markups reallocate value added from labor to capital within countries. In some countries and sectors, firms could also be stuck in dead-end tasks with few opportunities to innovate, upgrade, and diversify after new GVC business ties are created. Inequality can also arise in the labor market, with growing premiums for skills, but this is largely a rich-country phenomenon. Women are generally in lower value-added segments, and women owners and managers are largely missing in GVCs. As in the case of trade, inequality also has a geographic dimension, with GVCs concentrated in urban agglomerations (and in border regions for countries neighboring GVC partners).

249. Finally, raising taxes is a challenge. GVCs are not the cause of tax avoidance and tax competition, but their evolution has magnified the challenges facing the international tax system. The growth of intangibles in global business and the digital delivery of services are further exacerbating the problem. Moreover, in GVCs that involve affiliates of the same firm, fragmentation of production also leads to greater intrafirm trade and greater opportunities for tax avoidance by manipulating where profits are recognized for tax purposes. The revenue losses from profit shifting are substantial, and particularly large for non-OECD countries. In 2013, non-OECD countries missed out on \$200 billion in revenues as a result of this practice.

250. Policy intervention is important to attenuate the costs and share the benefits of GVC participation. While GVCs have been able to drive pro-poor growth, continued efforts are needed to pull the remaining two billion people out of poverty without exceeding environmental limits. The policy chapters of the report discuss in detail these considerations.

A. GVCs and economic growth

251. Trade openness and GVC integration have coincided with better macroeconomic performance (figure 3.1). But the rise of GVCs has generated even greater income gains for countries' trade than a commensurate expansion of traditional trade. Quantitative methods that trace the internationally fragmented nature of trade and production through global input–output links⁵ typically predict larger gains from trade than models without those international links.

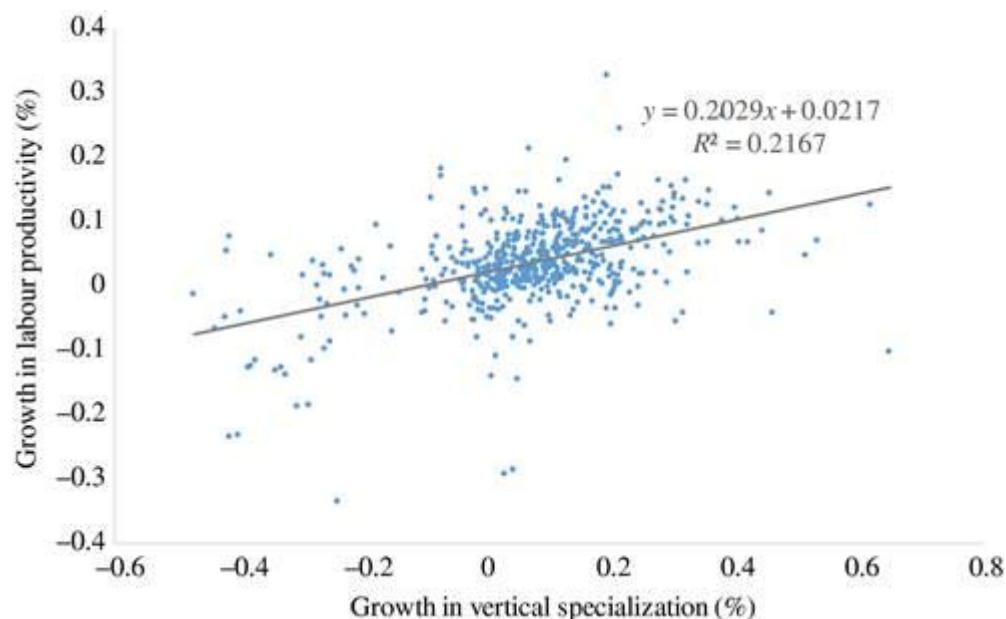
Figure 3.1 GVC participation is associated with growth in exports and incomes, 1990–2015



Source: World Bank n.d.a.

Note: Each dot is a country–year observation. The x-axis is the average annual growth in foreign value added in exports between 1990 and 2015. In panel a, the y-axis is the average annual growth in total exports between 1990 and 2014. Total export growth includes exports of goods and services. In panel b, the y-axis is the average annual growth in per capita GDP in purchasing power parity terms between 1990 and 2014. The R-squared is 0.73 for total export growth and 0.25 for GDP per capita growth.

252. The intricate network of trade relations gives rise to these enhanced positive implications of opening borders to trade. There is a positive association between growth in manufacturing productivity and growth in GVC participation (figure 3.2). Backward participation in GVCs emerges as particularly important, where an increase by 10 percent in the level of GVC participation increased average productivity by close to 1.6 percent.⁶ Intuitively, there are two complementary explanations for higher growth and productivity.

Figure 3.2 GVC participation is associated with growth in productivity, 1995-2009

Source: Constantinescu, Mattoo, and Ruta (2019).

Note: GVC participation is measured as the sum of the foreign value-added embodied in a country's gross exports (backward linkages) and the country's domestic value-added embodied in other countries' gross exports (forward linkages). Labor productivity is computed as the real value-added divided by the number of persons employed in manufacturing (excluding petrochemicals). Each dot represents a country-year combination.

253. First, GVCs allow countries to benefit from the efficiency gained from a much finer international division of labor. GVCs exploit the fact that countries have different comparative advantages not only in different sectors, but also in different stages of production within sectors. By breaking up complex products, GVCs allow countries to specialize in specific parts or tasks, escaping domestic supply (backward) and demand (forward) constraints. China's "Button Town," where hundreds of factories produce more than 60 percent of all buttons on earth, is an extreme example.⁷

254. Second, growth and productivity gains stem from better access to a greater variety of higher quality or less costly intermediate inputs.⁸ In traditional trade, where products cross borders only as finished products, greater openness to imports entails greater competition for domestic producers. In GVC trade, openness also increases imports of intermediate inputs, and domestic firms using those products observe positive effects on firms' productivity. Because of these mechanisms, export growth can be expected to raise domestic income and employment even when exports have lower domestic content (discussed below).⁹ Reinforcing this enhancement is the fact that exporting to the global market allows for greater economies of scale.¹⁰

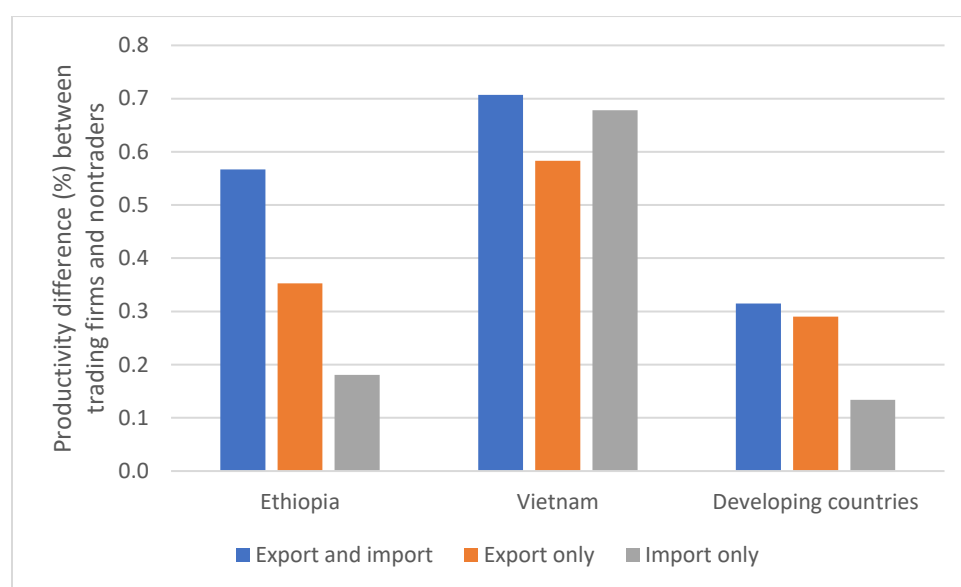
255. This is consistent with empirical results in recent economic research. Increasing direct and indirect exports and imports of goods, services, parts, and components produced through GVCs has been associated with much larger per capita income growth than trading products fully produced in one country (box 3.1).

256. Since GVCs are a firm-level phenomenon, the greater income gains are partly due to firms becoming more productive through GVC participation. In the cashew value chain in Mozambique, for example, processors were more likely to adopt a mix of manual and mechanical technologies to achieve better balance between the need to create employment, increase capacity, and reduce costs. They replaced part of the old labor-intensive technology with new semi-automatic equipment, reducing cost, and increasing productivity.¹¹ In Kenya, Uganda and South Africa, upgrading through improved processes in horticulture allowed diversification and higher yields of fresh fruit and vegetables exports in global and

regional value chains, including into the production network of supermarkets.¹² In Kenya, the adoption of standards of lead firms by contract farmers and support by lead firms for improved traceability of the product similarly resulted in increased incomes.¹³

257. Also firm-level empirical evidence supports the association of GVC participation with higher productivity. Firm-level data can identify the set of firms in a country that participate in trade, further distinguishing firms that export, firms that import, and firms that both export and import. When a given firm in a given country both imports *and* exports, it is natural to conclude that this firm participates in GVCs. In Ethiopia and across a large sample of countries, GVC firms in manufacturing also show higher productivity (labor productivity controlling for capital intensity) than one-way traders or nontraders (figure 3.3). Firms that both import and export are 0.6 percent more productive than nontrading firms, compared to 0.4 percent difference for export-only firms and 0.2 percent for import-only firms.¹⁴ In Vietnam, this relationship holds across firms in all sectors, manufacturing, services, and agricultural alike.

Figure 3.3 Firms that both export and import are more productive



Source: 2014 GSO Enterprise Survey (firms with >5 employees) for Vietnam. 2000–14 manufacturing census (firms with >=10 employees) for Ethiopia and Choi et al. (2019). World Bank Enterprise Surveys for a developing country sample of 81 countries. Note: The figure plots the coefficient estimates of a regression of log of labor productivity (sales per worker) on dummy variables if the firm exports and imports (GVC firm), exports only, or imports only, controlling for capital per worker. Only statistically significant coefficients reported. The global sample controls for country–sector, subnational region, and year fixed effects. The Ethiopia sample controls for sector, year, and region fixed effects as well as whether the firm is state-owned. The Vietnam sample controls for sector and region fixed effects as well as whether the firm is state- or foreign-owned.

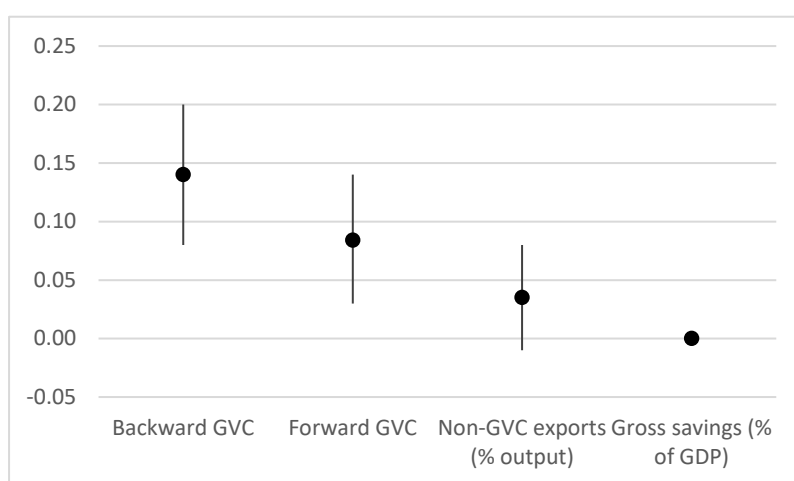
Box 3.1 GMM growth estimations

Growth regressions are estimated on a panel of 100 countries across income groups for the period 1990–2015. A Solow growth model is augmented with measures of GVC participation, where log of GDP per capita is regressed on lagged log of GDP per capita, a vector of the determinants of growth including a proxy of human capital and savings/investment (human capital index and gross capital formation as a share of GDP), GVC participation measures, and time and country fixed effects. As a robustness check, other standard determinants of growth are included (fertility rate, life expectancy, government consumption as a share of GDP). The equation is estimated using system GMM that addresses the dynamic panel dimension of the model.

The resulting increases in per capita income for a 10 percent increase in the value of each variable of interest are as follows: (i) foreign inputs used in a country’s domestic exports (backward GVC integration) = 13.6 percent; (ii) domestic inputs used by foreign producers in their own exports (forward GVC integration) = 10.5 percent; (iii) non-GVC exports relative to output = 1.9 percent. The estimation is robust to various statistical tests, including fixed effects and pooled regression, reverse causality, diagnostic tests for weak instruments, and tests for the strength of the chosen instruments.

The difference in coefficients for backward and forward GVC integration suggests that the development impact for a commodity producer only integrated in GVCs through forward linkages is much lower than for a country producing intermediate inputs, which benefits from both forward and backward linkages.

Box figure 1 Increasing exports and imports of GVC goods, services, parts, and components is associated with larger per capita income growth than is trade in products fully produced in one country



Source: World Bank n.d.a.

Note: The y-axis reports the estimated increase in per capita GDP for each 1 percent increase in the variables on the x-axis. The dots represent point estimates, and the vertical lines show the estimation interval.

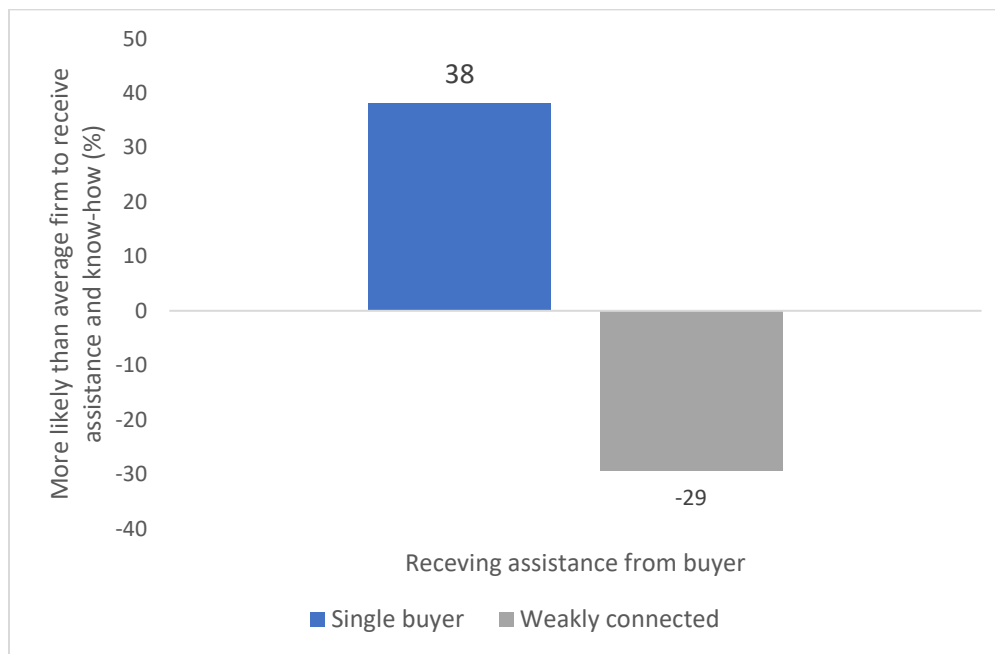
Relational GVCs are a vehicle for technology transfer

258. Relational GVCs are a particularly powerful vehicle of technology transfer along the value chain, adding to the role of GVCs as vehicles of growth and productivity gains. It is well understood that real income grows when episodes of trade liberalization boost the diffusion of new technology.¹⁵ But the positive effects can be multiplied in relational GVC trade. Interdependent firms may share know-how and technology with suppliers because this boosts their own productivity and sales, leading to faster catch-up growth across countries. The reason for this is that unlike in formulations of traditional trade, in which firms of different countries compete with each other, GVCs constitute networks of firms with common goals. Common goals include minimizing costs of production or maximizing profits for the entire production chain of which they are part. The incentives of agents (firms) in GVCs are not always aligned. Although the division of the gains generated by GVCs may be unequal, downstream firms typically benefit when their suppliers become more productive, and vice-versa. A direct implication of this simple observation is that firms from advanced countries importing or exporting goods to less developed economies might find it beneficial to share process and product innovations with their GVC co-participants. Furthermore, the stickiness of relational GVCs makes firms particularly prone to benefit from learning-by-importing and learning-by-exporting through repeated interactions with highly productive firms at the global frontier of knowledge.

259. The technology and knowledge transfer of GVCs happens both in inter- and intra-firm formation. In the coffee value chain in Costa Rica, transactions within integrated firms (intra-firm) and those in long term relationships between firms (inter-firm) are similar to one another, and starkly different from trade between anonymous firms. External international sourcing implies that trade between firms engaging in GVCs has characteristics very similar to intra-firm trade. This is because GVCs require high levels of coordination, intense bilateral information flows, and the harmonization and integration of many business services.¹⁶

260. Additional empirical evidence supports the hypothesis that firms in GVCs work toward common goals. A 2018 survey on 1,476 apparel, textiles, and ICT firms from Ethiopia and Vietnam found that the probability of a buyer providing some form of assistance to its suppliers is greater in strongly relational GVCs: firms selling exclusively to a single buyer are 38 percent more likely to receive assistance than firms with a diversified client base. Firms without strong relationships are 29 percent less likely to receive assistance from a client (figure 3.4). Lead firms may be more willing to share knowledge and knowhow that benefit the supplier firm if they believe those benefits will not be passed on to other buyers. The survey also shows that suppliers' main support from their foreign partner is in capacity building, which may help firms overcome skills constraints. GVC firms can play a role in on-the-job learning, and employer-sponsored training within GVCs can be an effective mechanism for skills development. A case study of the impact of the Japanese Multinational Company on skilled labor in Malaysia shows that the integration of the subsidiary's production network into its GVC spurred increasing needs for skill development, particularly in management and engineering services.¹⁷

Figure 3.4 Firms with relationships get more assistance



Source: World Bank n.d.a.

Note: Survey question: “What type of assistance is provided by the largest client, if any? [multiple responses are possible].” Options: (a) raw materials or intermediate inputs; (b) machinery or equipment through lending, renting, or leasing; (c) provides or assists with introduction of technologies; (d) provides financial assistance such as loans and advanced payments; (e) requires to achieve certain quality, labor, environmental or other regulatory standards; (f) helps improving human resources practices, including exchange of personnel; (g) helps in improving other management practices, including exchange of personnel; (h) assists in meeting logistics requirements; (x) other, please specify. The figure plots the coefficient of probit regressions of whether a firm receives assistance by the largest client, receives know-how by the largest client on firm characteristics. Single buyers are firms with total sales to the largest single client of 100 percent. Dominant buyers are firms with a percent of total sales to the largest single client larger than 50 percent. A non-connected firm is one where one or more these conditions do not apply. The regressions control for country, sector, and size fixed effects. Only statistically significant coefficients are plotted.

261. Buyer support takes other sometimes surprising forms. For example, Samsung, which in 2018 employed 160,000 people in Vietnam to produce its Galaxy smartphones, is trying to build a stronger local supplier base—not only through its own initiative, but also by pushing its suppliers from other countries to help in the effort and instructing them to train local firms in customizing production to Samsung needs. Sometimes, lead firm involvement benefits the wider educational system of the host country. For example, Synopsys, one of the world’s leading companies in chip design and testing, established a presence in Armenia. Today, Synopsis is one of the largest IT employers in the country, with 800 employees—mostly engineers—in Yerevan. With the goal of preparing qualified microelectronics specialists, it initiated bachelor, master, and PhD programs at both its own educational centers and at five Armenian universities.

262. In the agri-food sector, long-term relational contracts can also be very beneficial, by helping improve connectivity, provide better access to technology and capital inputs that increase quality and yield for local producers, achieve higher and stable prices to farmers, gain new managerial practices, and achieve better reputation. Alfaro-Urena, Manelici, and Vasquez (2019) investigate the effects of becoming a supplier to multinational corporations (MNCs) using administrative data tracking for all firm-to-firm transactions in Costa Rica.¹⁸ Event-study estimates reveal that after starting to supply MNCs, domestic firms experience strong and persistent improvements in performance, including gains in total factor productivity of 6 to 9 percent four years after. Moreover, the sales of domestic firms to buyers other than the first MNC buyer grow by 20 percent, both through a larger number of buyers and larger sales per buyer.

263. The relational nature of GVCs does not automatically result in technology transfer, however. Lead firms can use relational dependence to prevent technologies from spilling over from their supplier network to potential competitors. As a result, new capabilities may be especially difficult to learn when lead firms in GVCs tightly control their technology.

264. In the car industry, where production is complex, lead firms maintain control over the supply chain, and the technology is not easily diffused. Brands systematically coordinate production from start to finish, and incentives for suppliers to innovate, upgrade, and diversify into new market opportunities are relatively weak.

265. Recent research from the mining industry has similarly shown that the hierarchical form of governance typically prevailing in the sector has often represented an obstacle to learning and innovation.¹⁹ Mining is a risky and long-term business: halting mine exploitation even for a short time can be very costly, and investments have an economic cycle of at least 15 or 20 years. So, mining companies usually are very risk-averse. Rarely do they forge long-term formal links with local suppliers or collaborate with them on innovation projects. When new technological challenges arise, which open new technological opportunities for the mining industry in developing countries, they rely on solutions from their headquarters abroad or international suppliers, to the disadvantage of new local suppliers (box 3.2).

266. The extent to which a GVC relation allows for the growth potential of GVC participants from developing countries is likely to be determined by a multitude of factors, however. The sensitivity and value of the intellectual property embedded in a lead firm’s relationship with his suppliers, the technical dependence, the codification of transactions, the complexity, and the competence of these suppliers all converge to determine their upgrading opportunities.²⁰

Box 3.2 Mining GVCs—New opportunities and old obstacles for local suppliers from developing countries

Mining activities are no longer organized always as huge vertically-integrated (multinational) corporations. The tendency to focus on core activities, while outsourcing and subcontracting many others, is surfacing also in this sector. Mining companies face the need to contain costs, and their activities have become more knowledge-intensive. They increasingly search for *local* innovative

solutions from *local* firms to problems like falling ore grades and productivity, rising production costs, labor and environmental disputes from local firms, and the challenges of extreme geographical conditions in Bolivia, Chile, and Peru—where mines are operated at high altitudes, in narrow veins, and in very dry climates. Moreover, mining companies rely on local suppliers not only for intermediate products, but they are increasingly demanding services, and notably knowledge-intensive ones.

According to recent research, scientific advances and new forms of innovation have opened new technological opportunities for the mining industry in developing countries.²¹ These include revolutionary advances in ICT, computer vision systems, satellites and other remote sensing applications, advances in molecular and synthetic biology for bioleaching (extracting heavy metals from minerals with living organisms), and bioremediation of pollutants for copper and gold. These advances open opportunities for new suppliers to access and add value to mining value chains.²²

However, as discussed in the text, the organization and governance of the value chain does not appear to favor learning and innovation by mining suppliers, as sometimes happens in other sectors. The hierarchical form of governance typically prevailing in the mining sector has often presented a true obstacle.²³ Information is highly asymmetric, power between lead mining companies or buyers and their (local) suppliers is unbalanced, and many other market imperfections and failures affect transactions along the value chain. As a result, the demand for locally and sometimes even internationally provided suppliers is not easily fulfilled.

Can public policies help? The World Class Suppliers Development Program in Chile attempts to do so by matchmaking demand and supply with an open-innovation approach, but it has had mixed results thus far.²⁴ Public intervention can help address other obstacles, particularly when these require long term commitment or do not happen because of coordination failures. An example of a long-term endeavor is developing the skills required and demanded by the industry. An example of the second type is supporting the coordination of the many different stakeholders. In the mining industry this is an important obstacle since there are many actors beyond the mining industry that need to concur to create the enabling environment for firms to thrive. These range from local communities in the mining regions, to water and energy, to education and training, and to the regulatory institutions—notably on the environment.²⁵

Most important, time is of essence in public policies for this sector. Technology is hardly modifiable once in use, and the opportunities for local firms to meet mining firms' demands and become suppliers can be generated only in the very early stages of extraction process design and implementation. Once exploitation is under way, opportunities for developing country producers turn very slim.

Source: Prepared by Carlo Pietrobelli, University Roma Tre and UNU-MERIT, drawing from Pietrobelli and Olivari (2018).

How countries participate in GVCs matters

267. Because of the forces described above, how countries participate in GVCs matters. Backward participation and forward participation drive the positive association between GVC participation and growth in per capita GDP.²⁶ Inputs that are high in services content, which is a proxy for knowledge-intensive products, as well as exports that are high in domestic manufacturing content, have the strongest associations with per capita GDP growth. Meanwhile trade in unprocessed agricultural goods and commodities has no systematic and statistically significant relation with growth in per capita GDP.

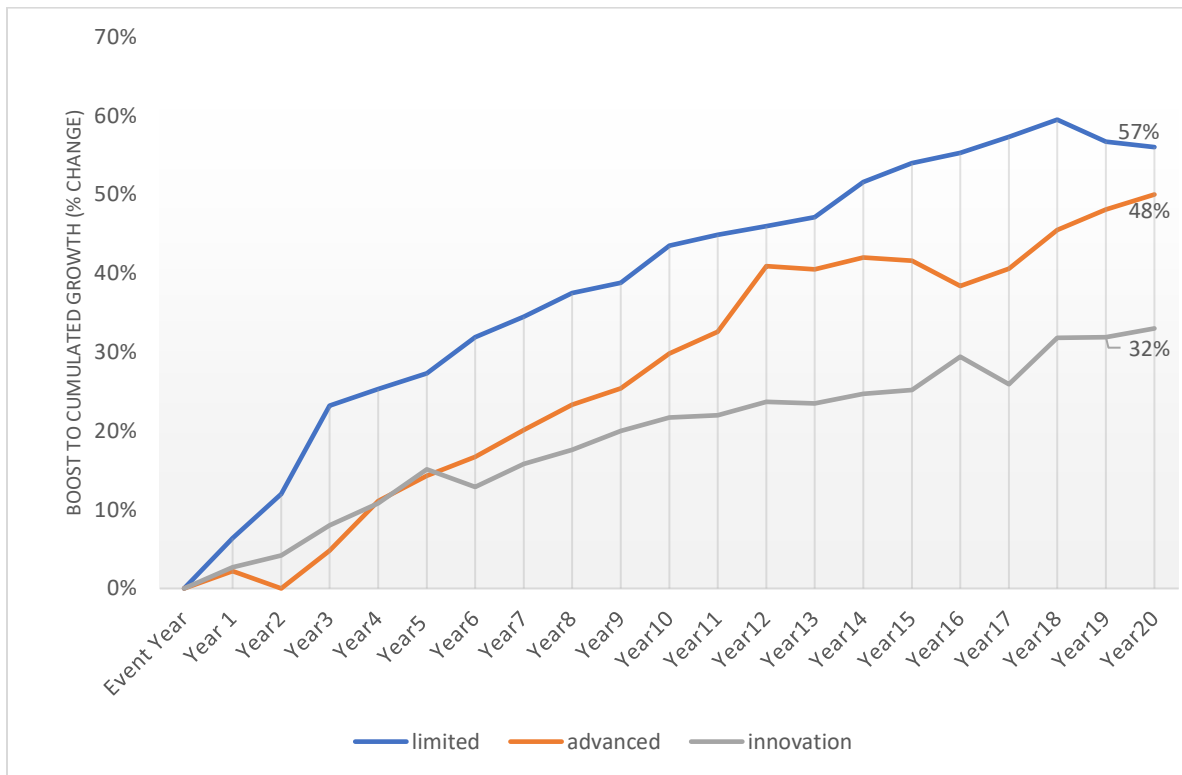
268. Countries like Bangladesh, Cambodia and Vietnam leveraged GVCs to move out of commodities into basic manufacturing activities and experienced the biggest growth spurt during this transition. Firms in GVCs contribute to their country's economic transformation by becoming suppliers of materials and components to a global buyer. Previously marginally and intermittently involved in export or import

activity, these firms now start sourcing foreign goods and services to process and re-export as part of a global buyer's value chain. During this initial phase of manufacturing engagement, domestic per capita income grows steeply, reflecting firms' learning of new processes and capabilities, access to large-scale international demand, and inflow of know-how and technology from GVC partners.²⁷

269. Productive firms drive the transition from limited to advanced GVC participation in manufacturing and services by growing in sophistication and size. They adopt a more complex production structure and improve managerial practices. They hire more workers in non-production functions, including in supply chain management, product development, ICT, and professional services. They become more capital and data intensive, and also tend to increase middle-management functions to handle the bigger scale of operations and the growing complexity. In this enhanced phase, relation-specific feedback loops with GVC partners start becoming more relevant, and firms and countries have to step-up their efforts to keep up with a more demanding environment and facilitate further learning and upgrading. Success requires continued access to markets, capital and opportunities, but also and importantly learning technologies, skills, and processes that are newer, more advanced, and increasingly close to the global technology frontier.²⁸

270. Consistent with all this, growth regressions show that from 1990 to 2015, cumulative per capita GDP growth has been largest for countries after they move away from being commodity or agriculture suppliers and relatively closed to foreign inputs and start building international linkages in simple manufacturing GVC tasks ("limited" manufacturing GVCs in figure 3.5, box 3.3). In the first year after entering limited manufacturing GVCs, GDP is 6 percent higher than it was in the year of entry. In the first year after entering advanced manufacturing and services GVC tasks it was 2 percent higher, and in the first year after entering innovation tasks it was 3 percent higher. However, there are diminishing—and even negative—returns in staying indefinitely in this phase of development. Higher rates of growth can be sustained by transitioning into advanced manufacturing and services, and then into innovation activities. The Czech Republic, which upgraded from limited to advanced manufacturing and services in 2000 and then to innovation in 2012 (see chapter 2) is now the most productive economy in Eastern Europe and the OECD country with the lowest share of population having a disposable income below the poverty line (measured as 60% of median household income). The economy is thriving. Growth is balanced. Internal demand and household consumption are strong, supported by both per capita income growth and private investment. The unemployment rate has steadily decreased since EU accession in 2004, and it is now at below 3%, one of the lowest rates in the OECD.

Figure 3.5 The boost to per capita GDP growth is largest in countries after they enter limited manufacturing-linked GVC tasks



Source: WDR Team using data from WDI and EORA.

Note: The event study quantifies the cumulated boost to real income growth in the 20 years following a switch from a lower to a higher stage of GVC engagement. See box 3.3 for the methodology.

Box 3.3 Assessing outcomes of GVC participation through event studies

The event studies used in chapter 3 and 5 quantify the changes in outcomes (i.e. cumulated real income growth; employment, aggregate and by skill level; inequality as measured by the Gini coefficient, 5.50 USD/day poverty share; and CO₂ emissions) in the 20 years following a switch from a lower to a higher stage of GVC engagement. GVC engagement stages are defined in Box 1.2 in Chapter 1.

The event study involves computing average within-country deviations in a given outcome in each year measured from the year of switch onwards, for all countries that stay at least four years in a particular GVC engagement stage and had one transition in their export status toward a more advanced GVC engagement stage, but no transitions back to a lower stage. Coefficients are estimated in a time fixed effects specification and the charts report the log levels of those coefficients for the number of years since entry into the group. The log levels of coefficients approximate percentage changes.

Data and Measures

Data are available for 146 countries over the period 1990 to 2015, and allow us to differentiate countries between the four generic types of GVC participation already discussed in Chapter 1 and 2:

- 1) Commodities
- 2) Limited Manufacturing
- 3) Advanced Manufacturing and Services, and

4) Innovative Activities.

Econometric specification

$$\ln(\text{Outcome Variable}_{it}) = a_0 + \sum_{n=1}^{20} (\delta_{t+n}^{\text{switch}}) + \delta_t + \delta_i + e_{it}$$

Outcome variables:

- Per capita GDP, total exports, manufacturing exports
- Employment by skill level (high, mid, low skills)
- Poverty share 5.50/day; Gini,
- CO₂ emission (2011 ppp)

Explanatory variables:

- $(\delta_{t+n})^{\text{switch}}$ is a dummy measuring the number of years after a switch
- δ_t and δ_i are the time and country fixed effects, which allow to control for conditions in different calendar years and in different countries
- E_{it} is the error term

In the dataset, switches are observed between limited manufacturing GVC participation (“limited”); advanced manufacturing and services GVC participation (“advanced”); and innovation GVC participation (“innovation”).

271. What does this all mean for countries’ industrialization options? It is well understood that GVCs can facilitate industrialization by reducing the range of required “capabilities” to produce and export industrial goods. For example, in the auto industry, countries can participate through GVCs even when they might not have any domestic car makers or any domestic provider of car engines.

272. But more sophisticated tasks in value chains require skills and capabilities that many developing countries lack. As a general rule, learning to handle simple products and production process is likely to be easier to acquire than capabilities to transition from simple production tasks to specializing in intangible capital and learn to break into new industries. The wrong skill mix could end up providing few opportunities to innovate, upgrade, and diversify after new GVC ties with international partners are created. Suppliers may find it difficult to upgrade beyond a certain task complexity, as doing so may require the ability to handle growing firm size and more sophisticated management, sourcing, and learning strategies.²⁹ As discussed above, in some cases, the organization and governance of the value chain, the nature of technology, and the large bargaining power imbalances may trap suppliers from developing countries in dead-end tasks rather than favor the processes of learning and innovation typical of relational GVCs.

273. As a result, the rise of GVCs might lead countries engaged in highly hierarchical or captive GVCs, or those that lag behind in skills and human capital, connectivity, and institutional quality (chapter 2) to become locked in in relatively low-value added segments of production with little scope for upgrading. Both Bangladesh’s and Cambodia’s experiences in the apparel sector show the difficulties for firms from developing countries to upgrade out of basic assembly functions into more sophisticated segments of the value chain through functional upgrading, which require a very different skill set (box 3.4). In sum, it may be simpler to “industrialize” in the age of GVCs, but the returns to doing it by replicating the strategies of earlier developers might not be as high as they were in the past. And the gradual increase in automation may compound these effects (chapter 5).

274. China’s experience suggests, however, that industrialization may still be possible, but it requires new approaches to development. Chinese firms that upgraded in the smartphone market used two key strategies: strong connectivity to international technology ecosystems, and investments in design and marketing capabilities. This allowed firms to develop new products compatible with global markets by using cutting-edge technologies to offer innovative and cost-efficient products, and capabilities in marketing and design to respond rapidly to changes in market demand and consumer taste. A few successful companies started developing their own R&D capabilities and high-technology expertise, but they did so as part of the global ecosystem of technology, not through completely indigenous innovation. Developing professional services and business functions like design and marketing while countries are still building industrial capacity, requires a new approach to development, since these capabilities are different from production skills, as are the institutions that support them.

275. Because of deepening global integration, Whittaker et al. (2010) suggest that the viable growth path for developing countries is now “compressed development”—or leveraging globally engaged production systems rather than nationally integrated production systems. GVCs introduce international interdependencies that are different from those faced by earlier developers. Accordingly, the efficacy of industrialization and development strategies will depend on how well policy makers understand these new conditions, learn, seize opportunities, adapt, and develop innovative solutions in concert with a wide range of actors, domestic and foreign. These issues are discussed further in the chapters on policies.

276. Integration in agricultural GVCs can also support economic transformation in the sector, where lead firms can foster the upgrading of farmers through long-term relationships. Formal or informal contractual arrangements that regulate the provision of inputs to production, such as fertilizer, technology, extension services, and market information, are found to positively affect upgrading of farmers in Ghana, Kenya and Zambia growing maize, cassava or sorghum. Having a contract is significantly and positively associated with upgrading to higher-value intermediate processes and moving to higher value-added products. Farmers under contract seem to have better access to inputs and technologies, through the out-grower company or other external sources. In a random sample of 1,200 farmers, the majority of surveyed contract farmers (over 50 percent) reported using fertilizer for growing their crop as a result of their contractual arrangement. Extension services, seeds and pesticides and tractors were other cited forms of support. Moreover, the majority of the farmers under contract perceived a positive to very positive impact from the scheme on their production and income. For example, many farmers reported an increase of half or more in their income and output as a result of contractual arrangements.³⁰

Box 3.4 Skills and upgrading in Cambodia’s apparel value chain

Cambodia has attracted FDI in the apparel sector, which for the past two decades has been important for jobs and growth. Foreign investors set up manufacturing locations in Cambodia 20 years ago to take advantage of lower production costs (due to a mix of lower minimum wages and trade preferences). They are multinational manufacturing firms with a head office in Hong Kong SAR, China, Taiwan, China or Korea and manufacturing facilities in a few Asian countries. But Cambodia has not moved up the apparel global value chain and is still performing the same assembly activities largely carried out by the same original foreign investors. More than 95 percent of its apparel exporters are branch plants of foreign-owned firms.

All the activities associated with functional upgrading take place at the headquarters location, leaving little or no room for branch manufacturing sites to take on more activities. These activities include: textile sourcing and sales/buyer acquisition, and technical product development.

This experience is not unique to Cambodia, as it is difficult for countries to upgrade in this industry due to relationships between global lead firms, multinational apparel manufacturers, and their foreign branch plant locations.

Opportunities for functional upgrading of these MNCs is even limited because the apparel industry is buyer-driven. This means that the consumer facing company or brand responsible for setting the final price and selling the product is not the same company that owns manufacturing facilities. Apparel manufacturers (whether at the headquarters or branch locations) do not control retail, marketing, branding, or creative new product development, which are the most lucrative and knowledge-intensive activities. So, branch plants of foreign operations have little opportunity for functional upgrading.

But there still are opportunities for upgrading—in three areas. First is in pre-production and production stages currently performed in Cambodia by foreigners. Second is in the sourcing, logistics, and client management (full package or OEM production) currently carried out abroad at the headquarters of foreign MNCs with manufacturing locations in Cambodia, but that could be transferred to Cambodia. Third is in creative design, branding, and top management, which require the development of private domestic firms.

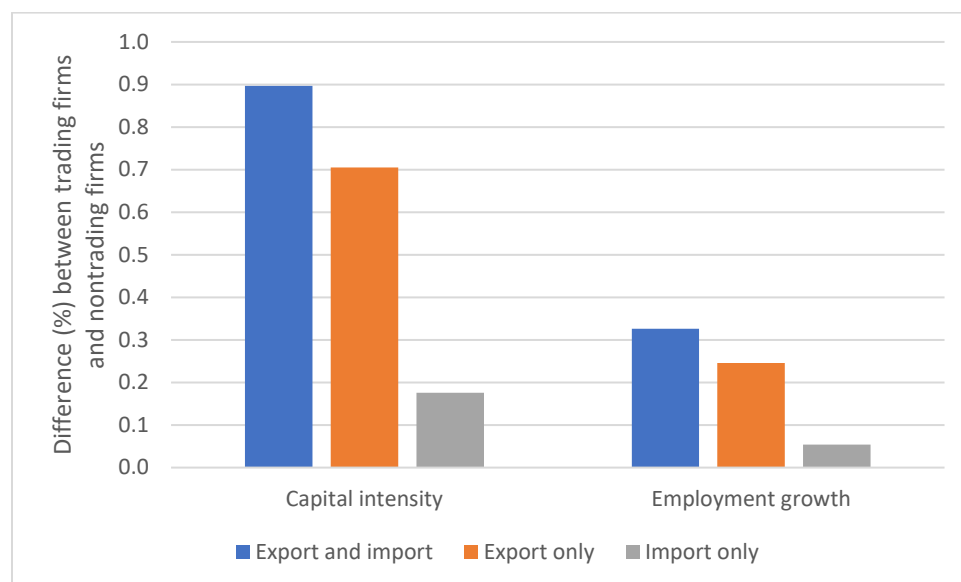
B. GVCs and employment

277. Apart from higher overall productivity, firms in developing countries that participate in GVCs tend to be more capital intensive. Machines can be equipped to deliver the precision needed for inter-compatibility of parts. They can also deliver the higher quality output demanded by foreign consumers, and help firms achieve higher productivity and greater scale. It may therefore make sense for firms to produce with more capital-intensive methods, even in poor countries with relatively large labor forces. In addition, the costs of accessing capital may be lower for GVC firms, because they have easier access to finance, foreign machinery, and training to operate the machinery due to the relational dimension of participation. In Vietnam, firms that both import and export use more capital inputs per worker than firms that export only or firms that sell exclusively to the domestic market.³¹ Firms in Ethiopia that export and import are also more capital intensive than one-way traders or nontraders (figure 3.6). This observation holds across a sample of developing countries.³²

278. Can GVCs deliver higher productivity and greater capital intensity, as well as more and better-paying jobs? Or is economic growth through GVCs at the expense of job growth? GVCs are becoming more important for exports (chapter 1), but at the same time exports are becoming less job intensive.^{33,34} For some countries, exports also contribute a smaller share of total jobs.³⁵ This has led some to conclude that the employment consequences of GVCs have been disappointing.³⁶ Rather than contributing to more and better-paying jobs in developing countries, the capital-intensive production by GVC firms may lead to stagnant or lower overall employment, and the path to development by moving workers from agriculture to manufacturing may be suppressed.

279. Because GVCs boost exports, the overall effects of GVCs on employment in developing countries have been positive. Even though production is becoming more capital intensive and less job intensive, the positive productivity effects at the firm-level is (unexpectedly) good for scale and employment. Through scale effects, the higher productivity is expanding aggregate output and thus aggregate employment. GVC firms tend to employ more workers than other firms.³⁷ When the higher productivity of these firms leads to sufficient scale—through more competition and market restructuring, demonstration effects, demand effects, technology spillovers, and investment in infrastructure—the overall effect on jobs is positive. In Ethiopia, firms that both export and import are more capital intensive *and* increased their labor force faster than other firms between 2000 and 2014 (figure 3.6). In Ethiopia, for example, firms that both import and export utilize 0.9 percent more capital per worker than nontrading firms, compared to 0.7 percent difference for export-only firms and 0.2 percent for import-only firms. Yet two-way traders also grew their labor force 0.3 percent faster than nontrading firms, compared to 0.2 percent for export-only firms and less than 0.1 percent for import-only firms. Employment in manufacturing expanded, and GVC firms accounted for an increasing share of manufacturing employment.³⁸ Despite adopting more mechanical technologies in the cashew value chain in Mozambique as discussed above, employment also increased alongside output in the sector.³⁹

Figure 3.6 In Ethiopia, GVC firms are more capital-intensive but are generating faster employment growth, 2000–14



Source: 2000–14 manufacturing census (firms with ≥ 10 employees) and Choi et al. (2019).

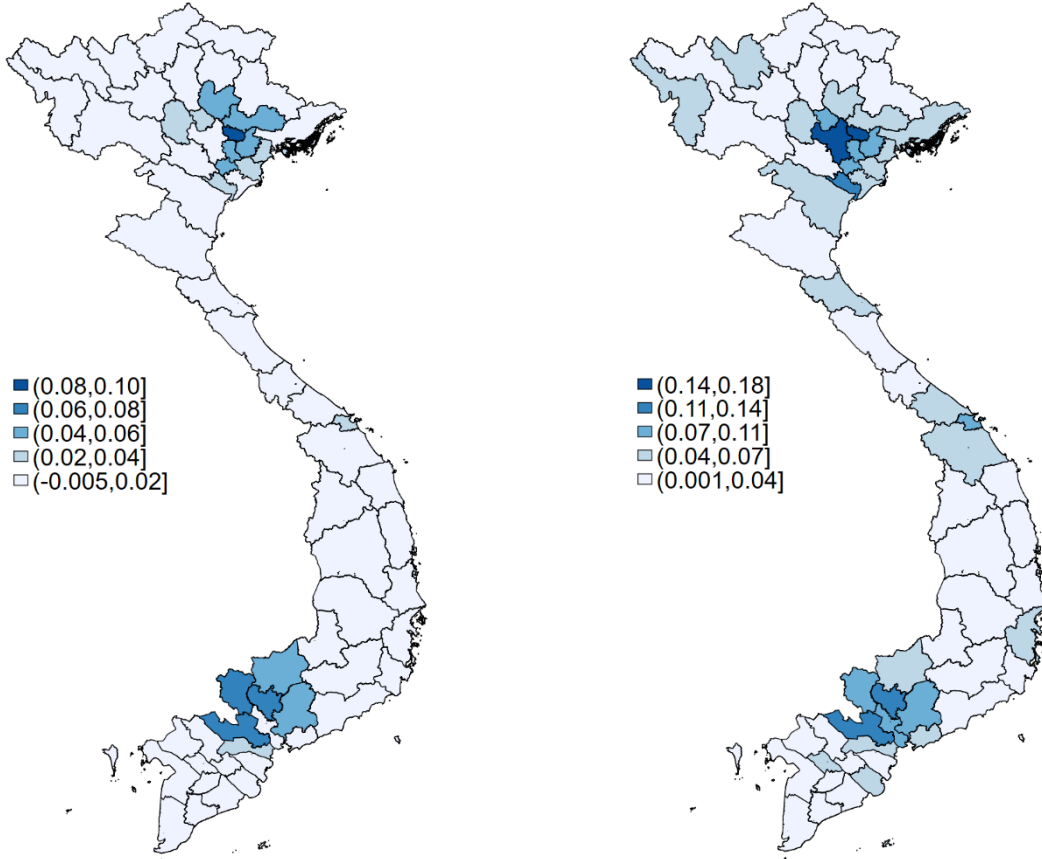
Notes: The figure plots the coefficient estimates of a regression of log of capital intensity (capital per worker) or employment on dummy variables if the firm exports and imports (GVC firm), exports only, or imports only. Only statistically significant coefficients reported. The sample controls for whether the firm is state-owned as well as sector, year, and region fixed effects (capital intensity) and firm and year fixed effects (employment). For the capital intensity and employment regressions, the coefficients for export-only and GVC firms are not statistically different from each other.

280. Vietnam is another powerful example: employment there is growing faster in GVC-intensive firms, sectors, and provinces. Total jobs in firms that both import and export expanded faster than firms that import only or export only between 2004 and 2014.⁴⁰ As a result, GVC firms increased their share in total employment, albeit slightly.⁴¹ Employment has also grown faster in provinces and sectors where GVC participation has grown faster, though the relationship with employment growth is not always different from that for other trading firms. These experiences would likely extend to other low-income countries that have been able to integrate into basic manufacturing, such as textiles or agribusiness, as has Ethiopia and Vietnam.

281. Millions of new jobs were created in Vietnam as the country became more integrated in GVCs between 2004 and 2014—many more than were destroyed—and net job creation reached more than 12 million. Employment grew faster than the labor force, and the share of employment in the population (15+) increased from 70 percent to 76 percent.⁴² In fact, the provinces that became more GVC intensive also experienced faster growth in the employment share of the population (figure 3.7). No province experienced net job losses.

Figure 3.7 Employment expansion is linked to GVC growth in Vietnam, 2004–14

a Change in employment in GVC firms per capita b Change in employment to population ratio

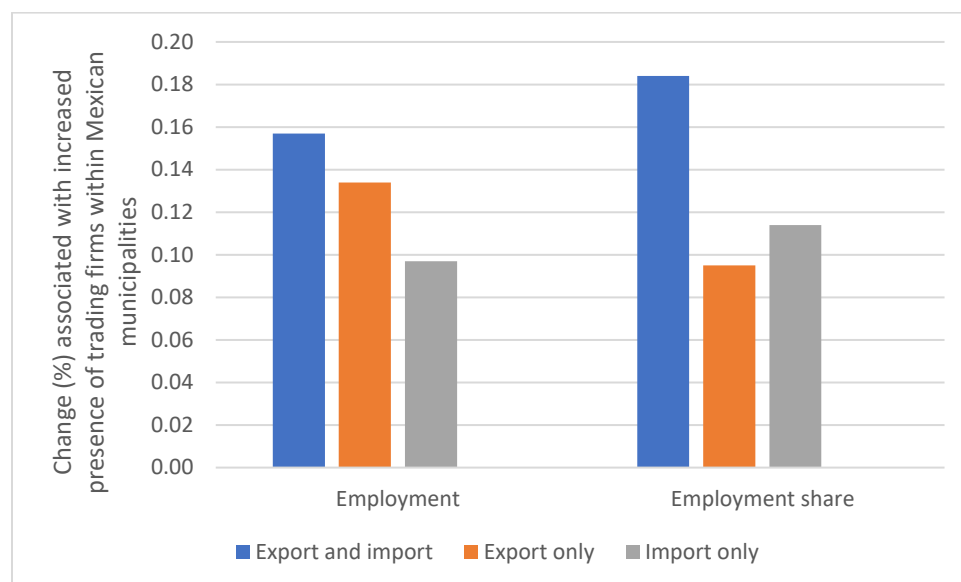


Source: Vietnam Household Living Standards Survey and GSO Enterprise Survey.

Note: GVC firms are firms that both export and import. Employment is measured as the number of total employees reported by registered firms, summed across firms with more than five employees within each province. The employment to population ratio is measured as employment in the province relative to the population in the province. The change is the difference between 2004 and 2014.

282. In Mexico, employment expansion is more strongly linked to GVCs than one-way trade (figure 3.8). Between 1993 and 2013, municipalities in Mexico with more manufacturing firms that both export and import per capita experienced stronger growth in total employment and in their share of employment.

Figure 3.8 Employment expansion is more strongly linked to GVC expansion than one-way trade in Mexico, 1993–2013



Source: INEGI Economic census; CONEVAL and World Bank 2013.

Note: Beta coefficient estimates reported from a regression of log of employment and employment relative to the population on the number of manufacturing firms per capita that export and import, only export and only import controlling for total population of the municipality, distance of municipality to the US border, and state and year fixed effects. All coefficient estimates are statistically significant.

283. The new activities that GVCs bring to countries can also induce shifts in the type of employment. In Vietnam, the number of self-employed, waged / salary workers, as well as employers all increased between 2004 and 2014. But the share of waged / salary workers in total employment increased 11 percentage points, from 25 percent to 36 percent, nearly doubling the number of waged / salary workers. Formal employment (jobs covered by social security) in the manufacturing sector also grew as GVC firms became more important for formal manufacturing employment in Vietnam.⁴³ However, as discussed below, informal/noncontract work can also be important in agriculture and manufacturing value chains.

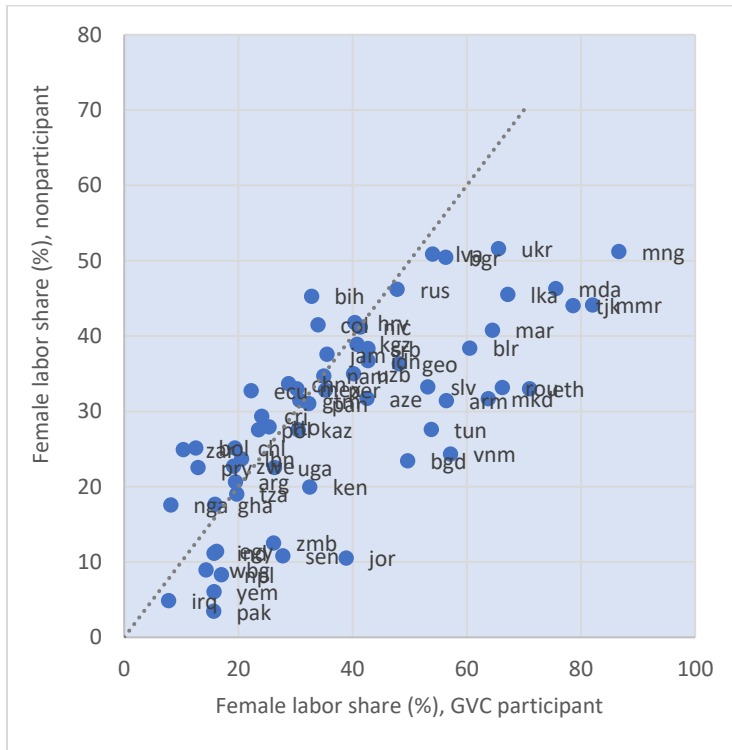
284. The result is that GVCs are associated with structural transformation, with exports pulling people out of less productive activities and into more productive manufacturing jobs. In Vietnam, manufacturing absorbed nearly 2.5 million workers between 2005 and 2014, increasing its share in employment from 12 to 14 percent.^{44,45} This is not unique to Vietnam. The 2016 World Bank book *Stitches to Riches* shows, based on data on the apparel sector in South Asia between 2000 and 2010, that when a country experienced a 1 percent increase in apparel output (a proxy for apparel exports), there was a 0.3–0.4 percent increase in employment. This increased overall welfare as workers moved out of agriculture or the informal sector toward these better paying, higher value-added jobs.⁴⁶ Similarly, Lesotho's integration in the global apparel sector employed 10 percent of the country's workforce and half of manufacturing employment in 2009, helping transform an agrarian economy.^{47,48} In Haiti, the apparel sector employed 37,000 workers in 2014.⁴⁹

285. GVCs support employment not just of men, but also of women. Female employment grew faster than male employment in Vietnamese provinces where GVC participation expanded the most.⁵⁰ Notably in the apparel and electronics sector, where assembly of many small parts needs to be done manually, firms report preferences for female employees due to high levels of dexterity. In Vietnam, firms that only export had no additional relationship with female (or male) employment growth.⁵¹ In Ethiopia, women constitute 75 percent of the workforce in the apparel sector,⁵² 65 percent in Haiti,⁵³ and 77 percent in Sri Lanka.⁵⁴

286. Across the world, firms that both export and import tend to employ more women than firms that do not participate in GVCs (figure 3.9). Foreign-owned firms as well as firms that export or import also

have higher female labor shares on average than firms that do not, but the relationship is stronger for GVC participants. These jobs have positive effects on other aspects of women’s livelihoods. In Bangladesh, for example, young women in villages exposed to the garment sector delay marriage and childbirth,⁵⁵ and young girls gain an additional 1.5 years of schooling (box 3.5).⁵⁶ The gender dimension of GVCs though is not without challenges (discussed below).

Figure 3.9 GVC firms hire more women than non-GVC firms across the world



Source: Rocha and Winkler (2019) using data from World Bank Enterprise Surveys.

Note: Each dot represents a country-year observation. The x-axis plots the employment-weighted share of female workers in total workers within firms that both export and import (GVC participant) within each country-year. The y-axis plots the employment-weighted share of female workers in total workers within firms that do not export and import (nonparticipant).

Box 3.5 GVC participation can lead to indirect welfare improvements for women

How does getting a job change your life, beyond the income itself? Bangladesh is an interesting case study, as the country’s readymade garment industry employs around 4 million people, about 80 percent of them women. The country has seen remarkable progress in health and education. How might these factors be related? One study used an innovative approach, looking at 1,395 households in 60 villages to identify how the arrival of readymade garment jobs might have impacted various welfare-related indicators.⁵⁷ Exposure to the sector was associated with a drop in both marriage and childbirth for girls aged 12 to 18. This is important, as there are long-term negative effects of early marriage and childbirth. Girls in villages close to garment factories on average had significantly higher educational attainment—they appeared more likely to stay in school than those with no factory nearby. This effect was particularly strong for younger girls, aged 5 to 9.

The most plausible explanation appears to be that the chances of getting a job increase the returns to staying in school and improving literacy and numeracy. But in addition, parents, through increased income from these jobs, can better afford to send their children to school. The study compared these demand-led welfare effects with a more supply-side one, in the form of a large-scale conditional cash transfer to encourage girls’ school enrolment. The former had a much larger effect. In other words,

expanding light manufacturing provides benefits not only in the form of jobs but also, more indirectly, for education, health, and the workers' children.

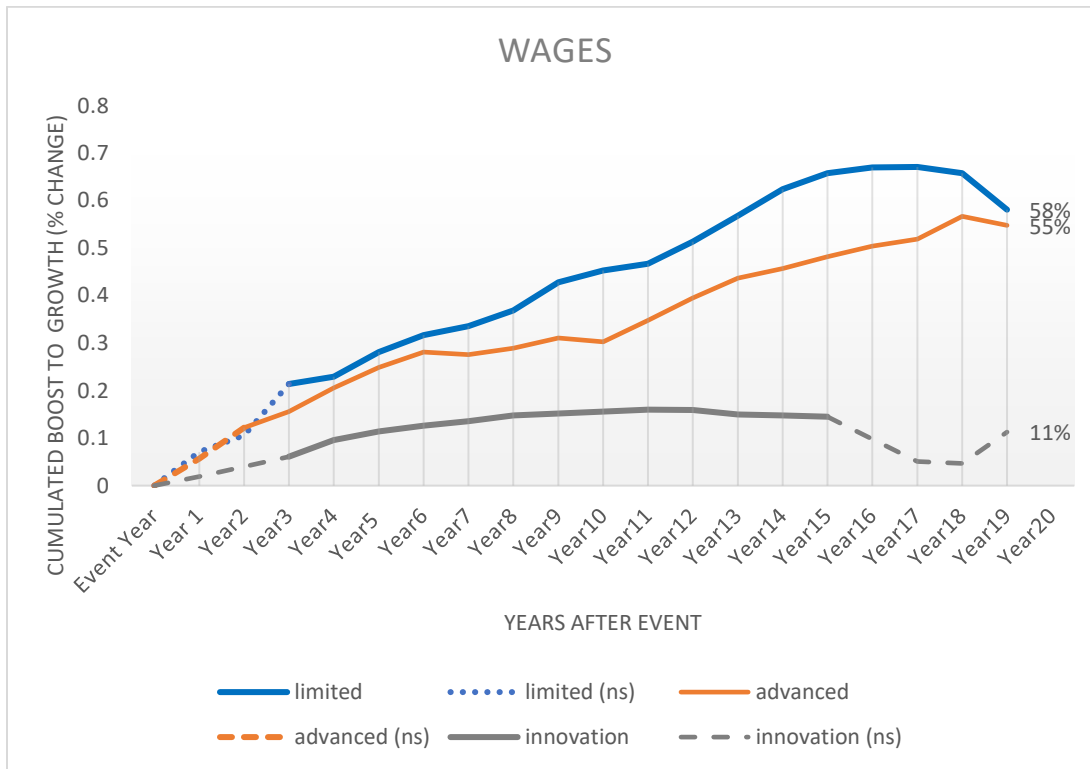
But there was also a small negative effect on school enrollment for girls aged 17–18, for whom the opportunity cost of schooling, and getting a garment factory job, might outweigh the returns to staying in school. This is consistent with research on Mexico, finding that expanding export-oriented manufacturing contributed to reduced school enrollment for children aged 16 and up.⁵⁸ Together, these results suggest that the type of job matters, and that as countries move into more value-added and skill-intensive activities, the returns to education will improve and dropout rates are likely to fall. Evidence from India seems to confirm this point. An investigation into the more skill-intensive business processing outsourcing (BPO) industry in the country showed that women in villages linked to the industry showed higher aspirations and investments in computer or English courses than those in other villages. There were also indirect positive effects from BPO employment on girls' school enrollment, nutrition, health, delayed marriage, and childbirth.⁵⁹

More generally, evidence on improved welfare for women in GVCs can be found elsewhere. One study looked at the subjective well-being of women employed in Senegal's export-oriented horticulture industry.⁶⁰ Employment improved subjective well-being for the poorest women, through generally improved living standards, but not to the same extent for women whose incomes were well above the poverty threshold. For low-income women employed in Ethiopia's cut flower industry, savings in relation to their incomes are higher than for those employed in other sectors, and subjective valuation of their jobs is also higher.⁶¹

Finally, by analyzing workers' experiences in the Kenyan cut flower industry through interviews, one article found a clear link between employment and women's empowerment—such as greater independence, new opportunities and decision-making within the household.⁶² But the strength of the effect depends on the quality of the job.

287. Not only do GVC firms employ more, but they also pay better. In Ethiopia, manufacturing firms that both import and export paid significantly higher wages in 2000–14 than did those that export only or import only, controlling for sector, location, and year fixed effects. In Mexico, wages are also significantly higher in firms that both import and export than in firms that do not. Firms with relationships with buyers or suppliers also pay higher wages than firms without relationships.⁶³ In China, GVC engagement improved firms' wages, more in capital-intensive and foreign-invested firms, both by improving productivity within firms and by reallocating labor to more productive firms.^{64,65} Again, across a sample of developing countries, firms that both export and import pay higher wages than import-only, export-only and nontraders.⁶⁶

288. How countries participate in GVCs matters also for wage growth. From 1990 to 2015, wage growth has been largest for countries that broke out of commodities or agriculture into basic manufacturing (“limited engagement” in figure 3.10).

Figure 3.10 The boost to wage growth is largest in countries after they first enter GVCs

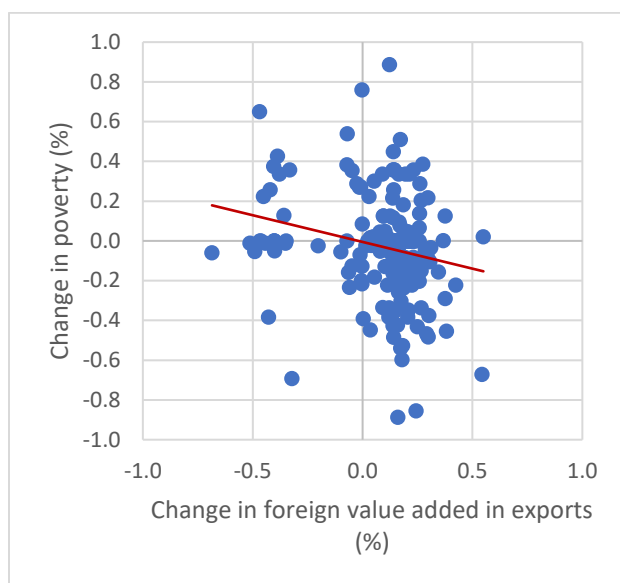
Source: Authors using data from WDI and EORA.

Note: The event study quantifies the cumulated increase in wage growth in the 20 years following a switch from a lower to a higher stage of GVC engagement. Dotted lines indicate statistically non-significant coefficients. See box 3.3 for the methodology.

C. GVCs, poverty, and shared prosperity

289. By supporting employment and income growth, GVCs also support poverty reduction and shared prosperity. The classical trade literature suggest that trade creates growth, better jobs, and higher incomes, which reduces poverty. The features of GVCs may have additional channels through which trade impacts poverty. If there is labor-saving productivity growth through hyper-specialization of GVCs, then this may directly displace jobs. However, adoption of techniques and technologies that save on labor can spur job creation through a few indirect channels that are more challenging to conceptualize and measure. First, productivity gains in supplier industries can yield steep increases in labor demand because of input–output linkages. Second, productivity growth can boost final demand. Third, it may lead to compositional shifts in the structure of the economy and could support jobs by spurring the growth of sectors with high labor shares.

290. In a cross-section of countries, growth in GVC participation is indeed associated with a fall in the number of people living on less than \$5.50 a day (in 2011 international prices) (figure 3.11). Openness impacts poverty primarily through growth, the main driver of the remarkable reduction in global poverty since 1990.^{67,68} Where economic growth gains from GVCs are larger than from conventional trade, poverty reduction from GVCs can also be expected to be larger.

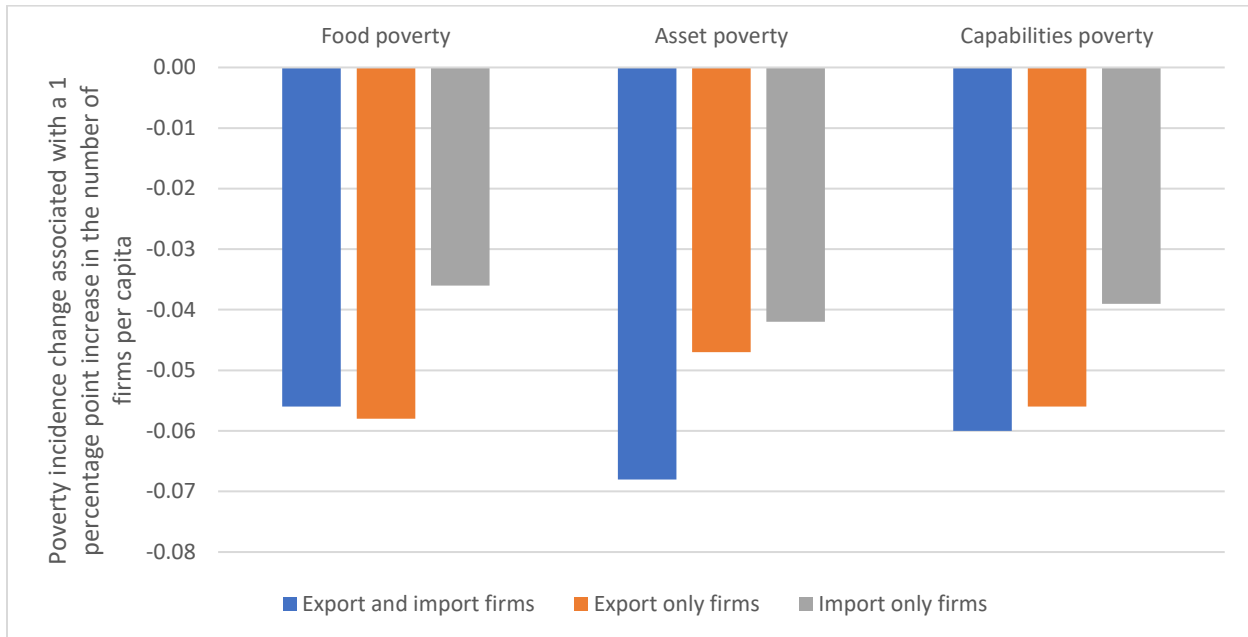
Figure 3.11 GVC participation is associated with poverty reduction, 1990–2015

Source: World Bank n.d.a and Eora.

Note: Each dot is a country–year observation. The x-axis is the average annual growth in foreign value added in exports between 1990 and 2015. The y-axis is the average annual growth in the poverty rate between 1990 and 2015. The poverty rate is measured as percentage of the population living on less than \$5.50 a day in 2011 international prices.

291. In Mexico, municipalities with more internationalized firms experienced greater reductions in poverty between 1993 and 2013, for the poorest as well as vulnerable households. Greater presence of importing and exporting firms is positively associated with the poorest household’s ability to obtain a basic food basket. Municipalities with greater GVC participation also experienced lower incidence of capabilities poverty and asset poverty, or access to wealth resources sufficient to provide for other needs including health, education, and transport.⁶⁹ They also experienced a decline in the marginalization index, which captures the deprivation and inaccessibility to basic goods and services for welfare. The relationship between poverty, marginalization and international integration is stronger for firms that export and import than for those that export only or import only (figure 3.12). Although GVCs can create opportunities for poor households, they have also been found to create risks for the accumulation of human capital throughout the life cycle, for example in Mexico (box 3.6).

Figure 3.12 Increased presence of GVC firms is more strongly associated with poverty reduction in municipalities in Mexico than firms that export only or import only, 1993–2013



Source: INEGI Economic census and CONEVAL and World Bank 2013.

Notes: Beta coefficient estimates reported from a regression of the incidence poverty rate at the municipal level on the number of manufacturing firms per capita that export and import, only export and only import controlling for total population of the municipality, distance of municipality to the US border, and state and year fixed effects. All coefficient estimates are statistically significant.

Box 3.6 Does GVC participation lead to human capital accumulation?

By boosting productivity and enabling structural transformation, participation in GVCs has been associated with rising incomes and reduced poverty. But the extent to which countries reap long-term development gains from GVC participation hinges critically on its consequences for the human capital of workers and their children.

Many developing countries have prioritized raising human capital formation while deepening GVC participation and pursuing export-led industrialization. The experience of East Asia — e.g. South Korea in the 1980s and 1990s and more recently China and Vietnam — suggests that these two goals are compatible and may reinforce each other. GVC participation fosters industrialization and urbanization, boosting parental income and productivity. This also raises tax collection and creates room for increased private and public investments in education. Human capital formation further supports GVC participation and industrial development.

But the rates of human capital formation differ significantly among countries that increased participation in GVCs. Although Mexico experienced an increase openness in the post-NAFTA period, income growth and human capital formation remained disappointing, despite rising public spending in education.

What explains these different experiences? Recent empirical evidence suggests that the skill-intensity of newly created manufacturing jobs may play a critical role. Sub-national evidence from Mexico reveals that school drop-out increased with local expansions in export-manufacturing industries: for every 25 jobs created, one student dropped out of school at grade 9 rather than continuing through to grade 12.⁷⁰ These effects are driven by less-skilled export-manufacturing jobs which raised the opportunity cost of schooling for students at the margin. Sub-national evidence from China reveals that high-skill export

shocks raise both high school and college enrollments, while low-skill export shocks depress both (Li, 2018). The amplified differences in skill abundance across regions reinforce the initial industry specialization patterns. Broader cross-country evidence for 102 countries over 45 years points in the same direction: growth in less skill-intensive exports depresses average educational attainment while growth in skill-intensive exports raises schooling (Blanchard and Olney, 2017). At the same time, increased imports of capital goods raised demand for skill and led to increases in education attainment in China (Li 2019).

These findings point to a mutually reinforcing relationship between the skill intensity of tasks and skill acquisition. On balance, participation in GVCs may still support human capital formation via income growth and reduced financial constraints of parents and governments. But these positive effects may be offset by reduced skill formation in areas where participation in GVCs leads to an expansion of low-skill intensive sectors and tedious tasks.

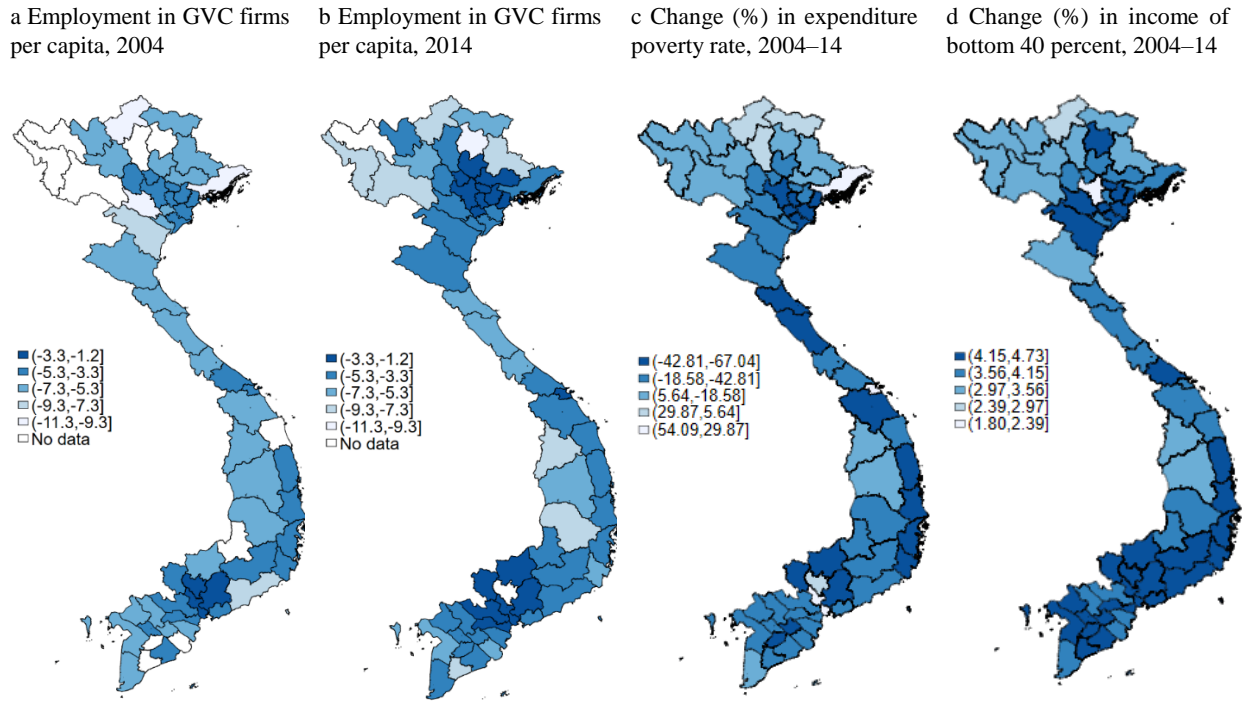
292. In Vietnam, provinces with more internationalized firms also experienced greater reductions in poverty between 2004 and 2014 (figure 3.13). This decline likely worked through the employment and ultimately the income channels, as discussed above; provinces with more internationalized firms similarly experienced higher growth in the incomes of the bottom 40 percent between 2004 and 2014. The impacts were not restricted to those provinces with more GVC participation, and poverty also fell in neighboring provinces in Vietnam.⁷¹

293. The positive effects of GVC participation on income growth are likely to extend to everyone in society—if the welfare state works. GVC integration in certain regions of a country can incentivize internal migration within countries, which can be a powerful mechanism to reduce poverty. The rise of incomes will also generate more demand for a greater and increasing variety of goods and services, imported and domestic. This will foster diversification of the economy, which will increase opportunities for a broader and more diverse set of agents. GVCs are also likely to make more affordable a larger variety of goods, such as cell phones, that allow the poor to participate more in society.

294. Agriculture value chains can be particularly powerful for poverty reduction by integrating rural households and smallholder farmers into supply chains. In Madagascar and Senegal, increased high-value exports and the modernization of export supply chains of green beans and tomatoes brought about important positive welfare effects. Most notably was increased income for these farmers, particularly in the lower quartile of the income distribution, which resulted in a reduction of absolute poverty levels.⁷²

295. There is no apparent relationship with growth in income inequality in Vietnam or Mexico, measured by the Gini coefficient using household data at the province or municipal level.⁷³ Despite this, there can be important distributional implications of GVC participation across and within countries.

Figure 3.13 Poverty reduction and shared prosperity has been greater in locations with increased presence of GVC firms in Vietnam, 2004–14

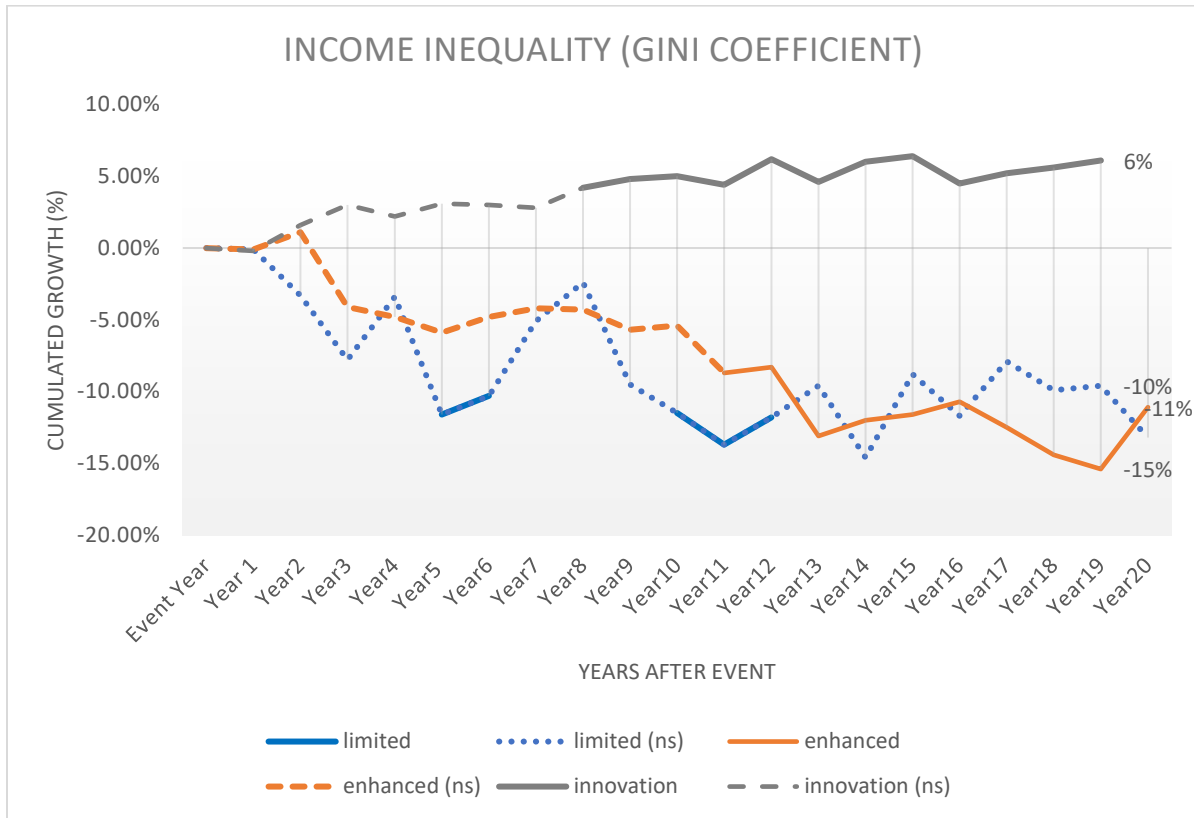


Source: Vietnam Household Living Standards Survey and GSO Enterprise Survey.

Note: GVC firms are firms that both export and import. Employment is measured as the number of total employees reported by registered firms, summed across firms with more than five employees within each province. Employment in GVC firms per capita measured in logs. Expenditure poverty rate is measured as the poverty headcount. The presence of firms that only export had no additional relationship with poverty reduction.

296. The lack of a systematic relationship between GVC participation and growth in income inequality for developing countries is at first sight confirmed by the cross-country event study. Greater income inequality within countries, measured by the Gini coefficient, is only observed in the group of countries that switch to the innovation stage of GVC engagement and it becomes statistically significant only after about a decade (figure 3.14).

Figure 3.14 Rising inequality is a greater problem for countries breaking into innovation stages of GVC engagement, 1990-2015



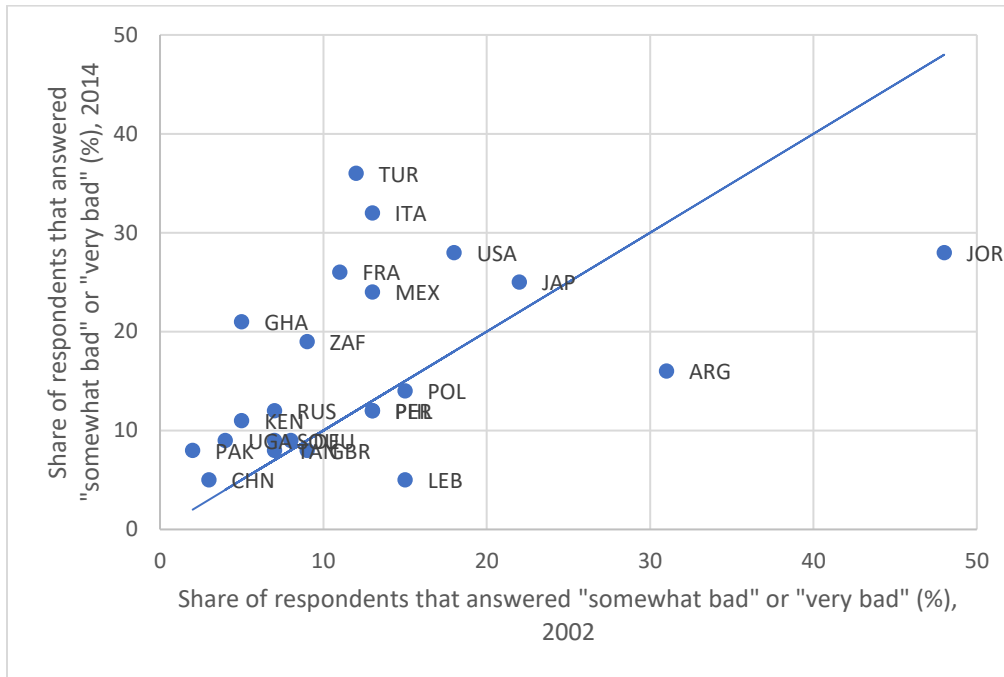
Source: Authors using data from WDI and EORA.

Note: The event study quantifies cumulated change in Gini coefficient in the 20 years following a switch from a lower to a higher stage of GVC engagement. Dotted lines indicate statistically non-significant coefficients. See box 3.3 for the methodology.

D. GVCs and the distribution of gains

297. Paralleling the gains that GVCs have delivered for countries, a large majority of people in both high income and lower income countries view key elements of GVCs positively, notably free trade and international business ties. But the number of skeptics grew between 2002 and 2018 (figure 3.15). While the discontent is greater in high-income countries, the number of those perceiving themselves as losers from global integration is non-negligible in developing countries also.

Figure 3.15 The majority views trade and international business ties positively, but skepticism is growing, 2002 vs. 2014



Source: Pew Research, Topline Questionnaire.

Note: Each dot is a country-year observation. Share of respondents that answered ‘somewhat bad’ or ‘very bad’ to the question, “What do you think about the growing trade and business ties between (survey country) and other countries—do you think it is a very good thing, somewhat good, somewhat bad, or a very bad thing for our country?” in 2002 and 2014.

298. GVCs may have fueled some of this public discontent. Rather than being distributed equally across and within countries, the gains have been concentrated, accruing to specific firms, workers, and locations. People can feel left out, even if they are not worse off.

Markups and firms

299. This public sentiment captures the fact that since the 1980s, there has been a widespread rise in profits, measured as the difference between firms’ prices and costs, and markups, measured as the amount added to the cost price of goods to cover overhead and profit. In 134 countries, the average global markup went from close to 1.1 in 1980 to around 1.6 in 2016—most for the largest firms in Europe and North America, and across a broad range of economic sectors.⁷⁴

300. The growth of GVC activity appears to be a likely contributor to the rise in markups. First, GVCs lower the costs of inputs for companies, through importing, and increase their productivity, through the scale of expansion afforded by exporting.

301. Second, in the presence of economies of scale, GVCs disproportionately favor large firms that can afford the fixed costs of exporting and importing. This may be because firms that import and export are not constrained by domestic inputs and domestic demand, which helps them grow and realize economies of scale. This is especially important in mass-production manufacturing that is predominant in the limited manufacturing-linked GVC group. The size distribution of firms is likely to be significantly more skewed in a world of GVCs than in a world without them, consistent with evidence that firms participating in GVCs tend to be larger than other firms.

302. Third, markups increase only if these cost reductions are not fully passed on to consumers through lower prices.⁷⁵ Participating in GVCs justifies some markup increase to cover the greater fixed costs of

more complex sourcing or exporting. But the markup growth in GVC intensive sectors is also likely to have increased the profit rate of these companies. It is well established empirically that large firms pass through a smaller share of a price shocks to consumers. Consistent with this, these large firms are also likely to pass lower costs due to offshoring on to consumer prices only partially. The California company Everlane, which commits to transparent pricing, reports the cost breakdown of all its products as well as the average price of its items in the market. A pair of jeans that customarily sells for USD 170, according to the website of the company, is produced for USD 34, inclusive of cost, insurance, and freight.

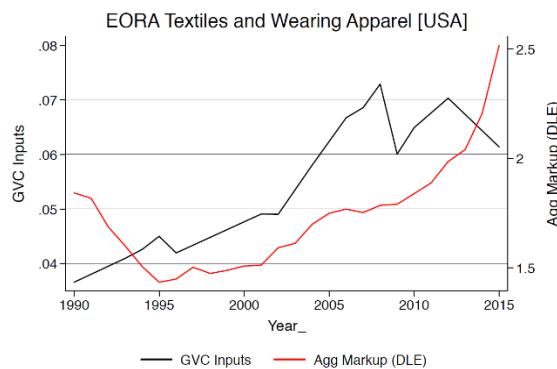
303. Indeed, in the United States, industries increasingly have a small number of productive firms with very large shares of the market and very large profits.⁷⁶ This rise of ‘superstar’ firms in the United States and other advanced economies might be partly associated with the rise of GVC and partly with technological change and innovations. In other words, GVCs have boosted ‘superstar’ firms that earn ‘superstar’ profits and may dominate the market. In Ethiopia, for instance, measures of markups are also highly correlated with industry concentration in manufacturing.⁷⁷

304. There is evidence that firms in developed countries that outsource parts and tasks to suppliers in developing countries have seen higher profits. In the textile sector, for example, mark-ups have increased in line with backward GVC participation since 1990 for firms from Japan (figure 3.16a). This positive association holds for other developed countries and other sectors that have also massively transferred part of their production to developing countries.⁷⁸

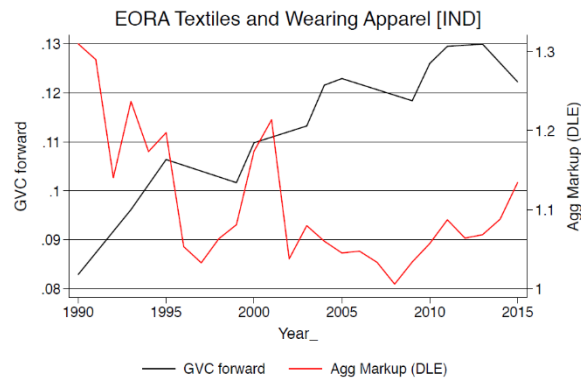
305. Within developing countries, there is also evidence of incomplete passthroughs of cost reductions to consumer through lower prices, resulting in higher profits. After India’s trade liberalization in the 1990s, when input tariffs on intermediate inputs fell, both costs and prices dropped but markups went up by about 13 percent when the economy opened to trade.⁷⁹ Consumers still benefited through lower prices (as well as higher quality and greater variety) but were worse off than if firms had fully passed on those cost reductions.

Figure 3.16 GVC participation is associated with higher markups in developed countries but lower markups in developing countries, 1990–2015

a United States



b India



Source: Worldscope and Eora.

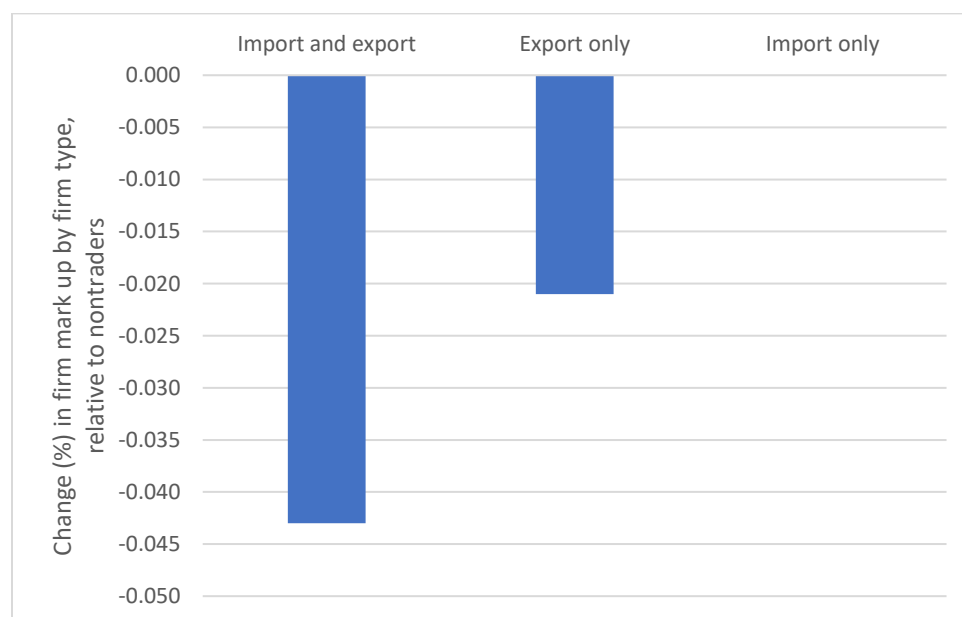
Note: The left y-axis in figure a measures the share of foreign value added in gross exports of the textiles sector in the United States. The left y-axis in figure b measures the share of domestic value added in India embodied in importing country’s exports to third countries for each year between 1990 and 2015. The right y-axis measures the share-weighted average mark-up of listed companies in the textiles sector for each year between 1990 and 2015. Markups are calculated following De Loecker and Eeckhout (2018). Similar results hold across countries and sectors.

306. GVC activity, and the relational nature of GVCs in particular, similarly appears to be a likely contributor to the international dispersion of the markups GVCs generate.⁸⁰ The implications of GVCs for the emergence of superstar firms with huge scale, high market power and large profit rates are exacerbated by the disproportionate bargaining power that these large lead firms might have over their suppliers.

307. While buying firms in developed countries are seeing higher profits, supplying firms from developing countries are getting squeezed. Across 10 developing countries, the relationship between markups and forward participation is negative for developing countries in the textile and apparel sector (figure 3.16b), though some developing countries also show a positive correlation including China.⁸¹ This is consistent with lead firms being from emerging economies.

308. Other country-level evidence suggests markups have increased mostly among advanced economies but not in emerging markets.⁸² In Ethiopia, firms that buy inputs abroad to sell on the external market have lower markups than other types of firms (one-way traders or nontraders).⁸³ And the more intensely a firm is integrated into a GVC (measured as the share of export value added and imported inputs in total sales), the lower its markup. As firms become integrated into GVCs, they also experienced reductions in their markups in Ethiopia—strongest for two-way traders (figure 3.17). In Poland, increased GVC participation—including the use of imported components in production as well as rising presence of domestic firms on foreign markets—is associated with the observed decline in markups between 2002 to 2016.⁸⁴ In South Africa, markups charged by manufacturing exporters are on average significantly lower than those charged by non-exporters. Firms with a relatively small proportion of exports (up to 10 percent) charge markups that are around 1.2 percent lower than non-exporters, while firms with a medium (11-25 percent) and large (above 25 percent) share of exports charge markups that are 1.8 percent and 2.3 percent lower than those of non-exporters, respectively.⁸⁵ The risk that firms from developing countries experience limited profits after becoming suppliers for global products/firms mirrors the rise in profits in developed countries.

Figure 3.17 GVC firms experience greater declines in markups in Ethiopia



Source: 2000–14 manufacturing census (firms with ≥ 10 employees) and Choi, Fukase, and Zeufack (2019).

Notes: Beta coefficient estimates reported from a regression of the log of mark-up at the firm level on dummy variables for firm type (export only, import only, export and import) controlling for state-ownership, labor, capital, firm fixed effects, and year fixed effects. Only statistically significant coefficient estimates reported.

309. In short, GVCs reward primarily large international firms, by reducing their costs of production. These gains are only partly passed through to consumers or shared with suppliers. With suppliers predominant in developing countries, this may distribute gains unequally even across countries in the value chain.

310. People may feel left out of today’s globalization also because of the declining labor share in income since the 1990s, and the bias in GVC-led job creation for skilled workers.

Markups and the labor share

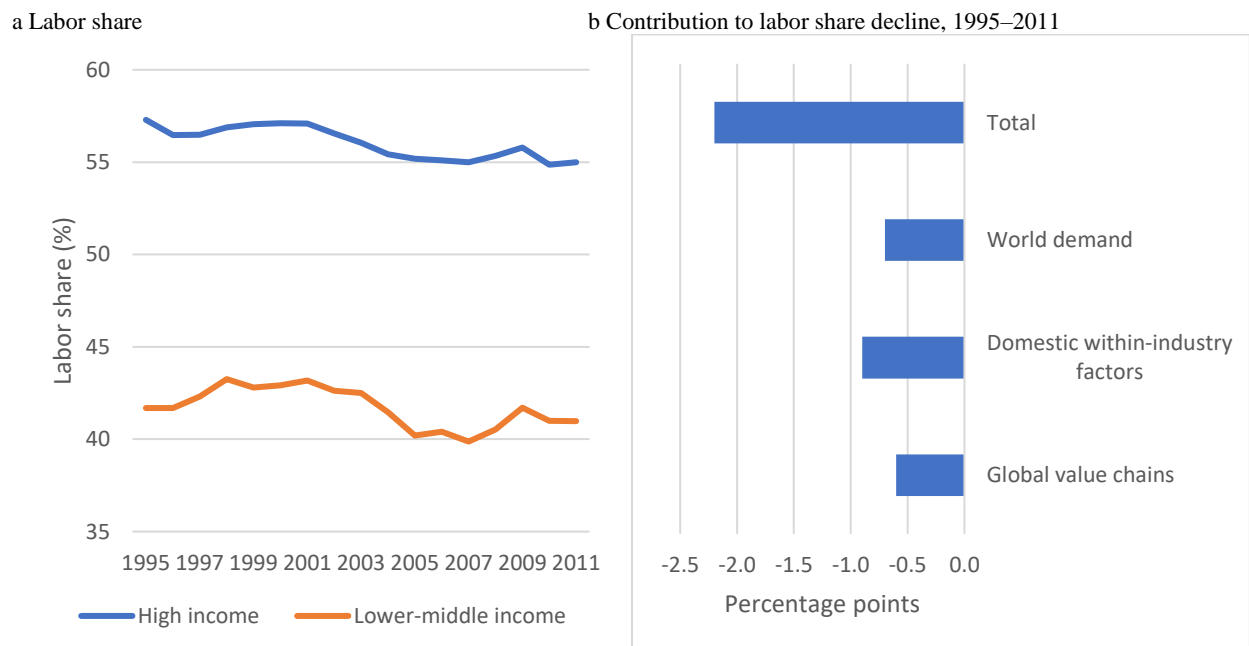
311. The rise in market power of firms is contributing to the changing distribution between capital and labor within countries. The share of income accruing to workers—or how much of a country’s GDP accrues to labor through wages as opposed to physical capital and profits—is the other side of the markup phenomenon: profits are rising, and the labor share is falling (figure 3.18a).

312. There are of course many possible explanations for the observed global decline in the labor share,⁸⁶ but the rise in GVC activity appears to be a likely contributor. By increasing the profit rate of companies, GVCs also generate a force toward a lower share of an economy’s income being paid to labor. In the United States, superstar firms that are more productive and earn higher profits also have lower labor shares, and their increasing concentration has contributed to the declining labor share within industries.⁸⁷ It may be that producers are not passing on their cost savings to workers, as well as to the consumers.

313. Similarly, the offshoring of relatively labor-intensive tasks from developed to developing countries could also explain why the composition of production becomes more capital intensive with GVC participation in developed countries.⁸⁸ In developing countries, this could also reduce labor’s share, insofar as it accompanies production that is relatively more capital intensive than before.

314. In 63 developed and developing economies, GVC integration as well as other domestic within-industry forces, such as technology or markups, contributed significantly to the reallocation of value added from labor to capital within countries between 1995 and 2011. The labor share declined by 2.2 percentage points, with global value chains contributing 0.6 percentage points (figure 3.18b). Similarly, global integration, particularly the expansion of GVCs, has been identified as the primary trigger of the rise of overall capital intensity in production in emerging markets and developing economies.⁸⁹ Alongside globalization, explanations have also focused on economies of scale, innovation and new technologies.⁹⁰

Figure 3.18 GVCs have contributed to the declining labor share within countries



Source: OECD–WTO TiVA Database.

Note: In figure a, the blue line plots the labor share in advanced economies, and the orange line plots the labor share in developing economies. In figure b, the decomposition explores the contribution of global demand (Y), domestic within-industry factors (V),

and global value chains (B) to the total percentage point decline in the average labor share between 1995 and 2011. V is the diagonal matrix of the share of value added in gross output, B is the Leontief inverse, and Y is the diagonal matrix of final goods and services produced in a country and sold worldwide. The results are obtained from three counterfactual exercises to decompose the relative contribution of each component, by asking what the contribution to the observed overall changes in labor share would be if only domestic within-industry factors (V), GVCs (B), or world demand (Y) are allowed to change over time. The decomposition follows the methodology of Reshef and Santoni (2019).

Skills and wage inequality

315. Inequality can also arise within the labor market, with a growing wage premium for the skilled, despite delivering more jobs and higher wages. The Stolper-Samuelson theorem, one of the key tenets of the canonical conceptualization of traditional international trade, indicates that increased trade integration is likely to increase wage inequality (the relative wage of skilled versus unskilled workers) in relatively advanced, skilled-labor-abundant countries. But it is expected to reduce wage inequality in less developed, skilled-labor-scarce countries. In a world of fragmentation, however, the theorem’s validity is undermined. And indeed, it is widely accepted both theoretically and empirically that increased production fragmentation increases wage inequality in both advanced and less developed countries for at least three reasons.⁹¹

316. First, when production is offshored to less developed economies, the workers of those economies find themselves employed in new production processes and tasks. These might be perceived to be low-skilled and labor intensive in advanced countries, but are instead skilled-labor intensive in less developed countries relative to the outside opportunities of workers.⁹² So, offshoring increases the relative demand for skilled workers in less developed economies and puts upward pressure on wage inequality.

317. A second force toward increased wage inequality in less developed economies stems from the fact that GVCs are often more skill sensitive than traditional trade flows, partly because they often produce goods destined for quality-sensitive consumers in rich countries,⁹³ and partly because of high complementarities among the various stages of production carried out in different countries.⁹⁴

318. The disproportionate importance of the matching between buyers and sellers in GVCs may also drive up wage inequality. Because the identity of these producers matters, especially when sensitivity to quality is high, relational GVCs may set off “a war for talent,” with the price of particularly attractive producers, or the wage of particularly skilled individuals, disproportionately bid up relative to a world without relational GVCs.

319. A third force toward increase wage inequality in skilled-labor-scarce countries is related to the fact that firms in GVCs tend to adopt more capital-intensive techniques than comparable domestic firms.⁹⁵ Physical capital deepening and upgrading contributes to the increase in the relative demand for skilled workers due to capital–skill complementarity—that physical capital (and capital equipment particularly) is less substitutable with skilled labor than with unskilled labor.⁹⁶ Consistent with this, in countries participating in GVCs, and in the more capital-intensive parts of the value chain, firms demand more skilled workers.^{97,98} The result: As workers tend to move toward less routine and more interactive tasks, GVCs lead to more employment for skilled workers.^{99,100}

320. Firm-level analysis confirms a positive and significant relationship between GVCs and skilled employment—between the number of skilled workers and firms with international linkages (that export or are foreign owned).¹⁰¹ In 27 transition economies, importing inputs increases the relative demand for skilled labor.¹⁰² Global sourcing explains more than a quarter of the unconditional difference between importers and non-importers in the employment share of high skill workers. In Madagascar, upgrading by diaspora- and Mauritian-owned firms in the apparel sector corresponded with in-firm training and skills upgrading.¹⁰³ In Africa more broadly, with Chinese import penetration, firms increase their share of skilled workers by almost 4 percent, associated with a shift in production from low-skill to high-skill-intensive products.¹⁰⁴

Geographical disparities

321. Inequality arising through GVCs also has a geographical dimension. GVC integration is strongly associated with greater concentration in cities,¹⁰⁵ as well as border regions for countries neighboring GVC partners. This is consistent with evidence showing that economic integration across national borders is associated with greater spatial concentration within national borders.

322. Because some regions grow faster, regional inequalities in developing countries can increase when labor is not perfectly mobile. In Vietnam, the only areas with double-digit job growth were concentrated around Hanoi and Ho Chi Minh City (figure 3.7a). In developed countries, some regions are instead being hollowed out by GVCs. In the United States, the outsourcing of manufacturing tasks and the exposure of industries to foreign competition have led to the emergence of the rust belt.¹⁰⁶ This can result in localized and persistent income losses for people in negatively affected regions or sectors for years when people cannot move easily.¹⁰⁷ Both experiences highlight the internal mobility of labor for distributing the gains from trade. Place-based policies that can potentially reduce the negative consequences of economic forces that disproportionately benefit some areas are discussed in the final chapters of the report.

Unequal work conditions

323. Small-scale farmers and homebased workers form the base of many value chains, often on unequal terms. A review of 49 studies related to the commodities and horticulture value chains concluded that “informality is the norm rather than the exception: informal workers make up the majority of the workforce, even in formal enterprises.”¹⁰⁸ In a random sample of 1,200 farmers in Ghana, Kenya and Zambia growing maize, cassava or sorghum, between 82 (Zambia) and 97 (Kenya) percent of farmers had no contract. For those with a contract, informal contracts dominate the landscape. In Kenya, 86 percent of contract were informal.¹⁰⁹

324. Subcontracted home-based workers (referred to as homeworkers) represent significant shares of employment in other supply chains, including weaving textiles, packaging products, processing rice, and making food products. It is estimated that more than 5 million homeworkers are part of India’s garment and textile supply chains alone. Most homeworkers are informally employed without employer contributions to their social protection, and the vast majority are women. Average earnings are not only lower than factory workers but also erratic, and subcontracted homeworkers also pay for many of the non-wage costs of production, such as workplace, equipment, utilities, and transport. Integrating homeworkers into supply chains on fairer terms will require better regulation from above and better integration from below (box 3.7).

325. There is literature on how GVC participation can increase casual employment. A case study in Ghana and Cote d’Ivoire on participation in the pineapple and cocoa value chains found that, although participation lead to improved growing processes, higher yields, and increased incomes to successful commercial farmers, it was also associated with an increase in casual labor hiring as well as displacement of farmers from land due to low bargaining positions and knowledge on rights to land ownership.¹¹⁰ Kritzinger et al. (2004) and Dolan and Sutherland (2003) document the growing use of casual and seasonal contract labor, both among farms and in pack-houses in South African fruit exports and Kenyan fresh vegetable exports.

Box 3.7 Home-based work in global value chains

Organizing in collectives is the key pathway for homeworkers to link to global supply chains in efficient ways and on fair terms. To do this, collective enterprises of homeworkers—cooperatives or other collective forms—need the following types of support:

- Management and business training, including how to forecast market demand and how to manage businesses.

- Professional managers and knowledge of how to recruit and retain managers.
- Professional advice and assistance—on how to link to global supply chains, how to upgrade products and production systems; how to reduce dependence on middlemen.
- Capital—physical and social networks.
- More appropriate and enabling laws and regulations regarding cooperatives and commercial transactions—as existing laws in most countries are not appropriate for cooperatives and commercial transactions of those at the base of the economic pyramid.

Additional spillovers from forming collective enterprises include: increased bargaining power in market transactions, enhanced ability to challenge social norms that constrain women’s time, mobility, and access to resources (such as social norms governing inheritance and property rights), and economic policies that ignore or undervalue their economic activities and contributions.

326. GVCs may also be associated with poor worker conditions. Work practices can repeatedly be found to come short of international standards in supplier countries, ranging from violations of core labor standards to unsafe working conditions, low wages, excessive working hours, and precarious contracts.¹¹¹ This is particularly relevant for labor-intensive GVCs, where outsourcing to developing country locations is often motivated by low-wage labor.¹¹² This has led many to question the social value of the GVC business model, pointing to incidents in contract manufacturers such as the 2013 collapse of the Rana Plaza garment factory in Bangladesh. In the copper-cobalt belt of the Democratic Republic of Congo, for example, children often work in the mining sector.¹¹³ Yet stopping sourcing from these artisanal mines as a way to counter child labor could have unintended negative effects for household income, where poverty followed by social norms are the main reasons for children working in mining. Instead, targeted outreach may be a better option to reduce child labor without negatively impacting families.

327. There are signs that GVCs can transmit sensitivities about working conditions in host countries and induce remedial actions. In Indonesia, for example, anti-sweatshop campaigns in the 1990s brought to light poor working conditions in the textile, footwear, and apparel (TFA) sector.¹¹⁴ As a result of activist pressure, MNEs signed codes of conduct pledging to raise wages and improve working conditions in factories producing their products. This resulted in large real wage increases for targeted enterprises, by as much as 30 percent in large foreign-owned and exporting TFA plants relative to other TFA plants. Importantly, wages were no worse in MNEs to begin with; within the TFA sector, real annual wages for domestic plants were lower than for foreign-owned or exporting plants.

328. Relationships can also catalyze training and knowledge sharing within value chains. The CocoaAction promoted by nine main global producers of chocolate and cocoa was set up to regenerate the cocoa plantations in West Africa and to help smallholder cocoa farmers who often subsist on incomes below the poverty line, and who face deficits in literacy, low school attendance rates, child labor, and gender inequality. In launching CocoaAction strategy, the leading chocolate and cocoa companies recognized that their individual commitments could not solve the complex and systemic challenges and that more sustainable production of cocoa would also be good for their profits. Similar results come from Ethiopia, Vietnam, and Mexico. In Ethiopia and Vietnam, firms that exported and had strong connections to the industry leader had a larger share of workers receiving training, for both professionals as well as general workers. Connectedness with industry leaders also has a strong effect on general assistance—and a stronger effect on knowhow assistance.

329. Overall, private firms play an important role in meeting sustainability practices. For example, there is growing private sector interest in ESG practices and in the SDG framework launched by the United Nations on January 2016. The growing private sector demand to contribute to the SDGs cover in particular the following SDG goals, according to the July 2017 report of the Multi-Stakeholder Advisory Committee (MAC) of the Action Platform Reporting on the SDGs, led by the UN Global Compact and Global

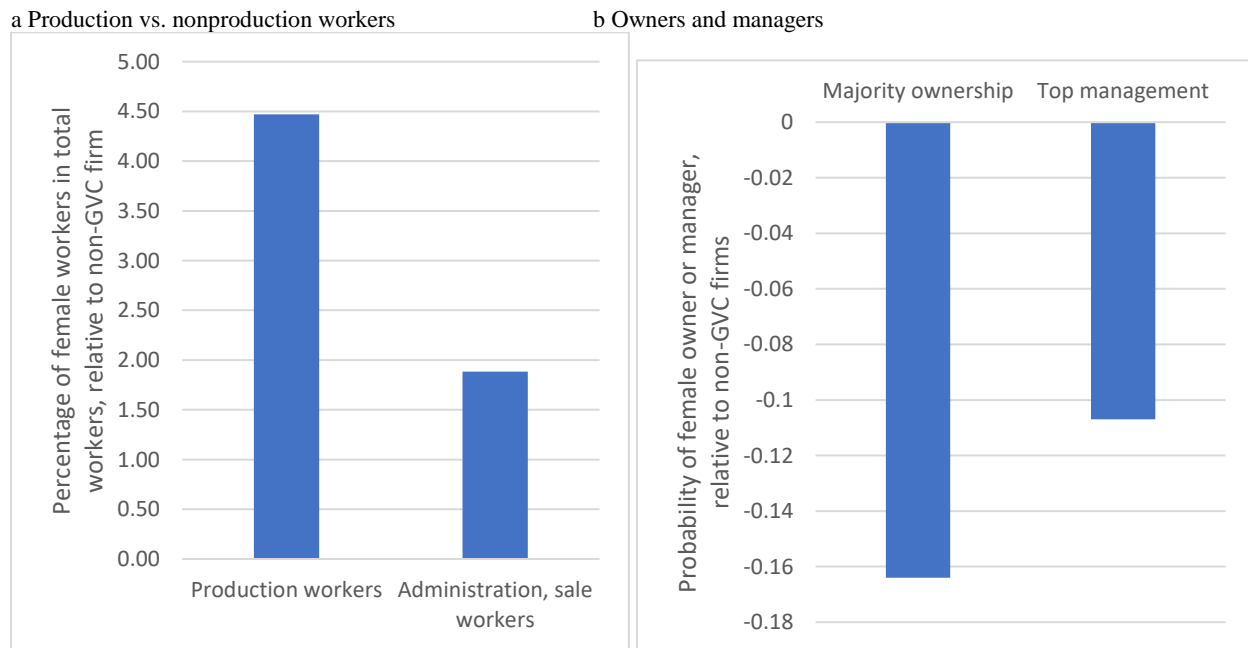
Reporting Initiative (GRI):no poverty (SDG1);good health & well-being (SDG3);gender equality (SDG5);clean water and sanitation (SDG6);decent work & economic growth (SDG8);industry, infrastructure & innovation (SDG9);responsible production and consumption (SDG12); andand climate action (SDG13).

330. However, this may not be enough. Private firms play an important role, but there is similarly a clear role for policy action supported by international cooperation to determine what are appropriate standards as well as ensure their enforcement. These policies are addressed in the final chapters of the report.

E. GVCs and the gender gap

331. Although firms in GVCs tend to employ more women than other firms, many countries have few women-owned or women-run GVC firms. Firms that import and export are significantly less likely to be majority female-owned than other firms and are significantly less likely to have a top female manager. So GVCs may be making the glass ceiling worse (figure 3.19a). Women are generally in lower value-added segments, mostly in labor-intensive production jobs and in occupations that require lower skills and pay less.¹¹⁵ The positive relationship between GVC participation and the female labor share is much higher for production workers than for administrators or sales workers in manufacturing firms (figure 3.19b).

Figure 3.19 Women are more likely to be production workers but less likely to own or manage GVC firms



Source: Rocha and Winkler (2019) using data from World Bank Enterprise Surveys.

Note: Exporters are firms with an export share (direct or indirect) of at least 10 percent of total sales. Importers are firms with an imported input share of at least 10 percent of total inputs. GVC participants are firms classified as both an exporter and importer. Figure a plots the coefficient of estimations of whether a firm is majority female owned or has a female top manager on a dummy variable if the firms is a GVC participant controlling for country-sector, subnational region and year fixed effects. Figure b plots the coefficient of estimations of the female labor share (production workers, non-production workers) on a dummy variable if the firms is a GVC participant controlling for capital intensity, sales, and TFP, as well as country-sector, subnational region, and year fixed effects.

332. The asymmetry between production and management and ownership is particularly visible in agriculture, but it plays out in other sectors too (table 3.1). In Southern Africa’s fish-aquaculture sector, women contribute most to primary production and make up 90 percent of the processing workforce but are poorly represented in enterprise management. The trends are similar in aquaculture in Vietnam and

Nigeria,¹¹⁶ cocoa and coffee in Papua New Guinea,¹¹⁷ and horticulture in Azerbaijan¹¹⁸ and Afghanistan.¹¹⁹ In the cashew value chain in Mozambique, lack of gender equality limits women farmers' access to agriculture inputs, credit services, and markets. Despite more than half of the industry's workforce comprising women, there is almost no registration of women on leadership positions within factories.¹²⁰ In call centers in Egypt, women make up the majority of call agents, while men dominate jobs in higher-value segments and management.¹²¹ In Kenya, women are overrepresented in the accommodation and excursion segments of tourism, though they tend to work as low- to mid-skill employees, unless engaged as entrepreneurs.¹²²

Table 3.1 Sample of results from case studies on gender in specific GVCs

Authors and year	Sector and country	Results
Veliu et al. 2009	Aquaculture, Northeast Vietnam and Nigeria	Women represent significant proportion of employment, especially in processing and packaging, but are poorly represented in enterprise management. ¹²³
World Bank 2014	Cocoa, coffee and fresh produce value chains, Papua New Guinea	Women provide substantial labor in both coffee and cocoa cultivation and predominate in the fresh produce sectors. This is especially true in tasks relevant for the quality of exports, e.g. post-harvesting. ¹²⁴
World Bank 2018b	Horticulture, Azerbaijan	There is a higher share of women employed in horticulture than in other sectors. For products which depend on manual harvesting, women constitute more than 50 percent of harvesters. ¹²⁵
World Bank 2011	Horticulture, Afghanistan	Women provide the majority of labor in the lower levels of the value chains, namely harvesting and post-harvesting, although this is often unpaid household work. ¹²⁶
Ahmed 2013	Call centers, Egypt	Women make up the majority of call agents, while men dominate jobs in higher-value segments and management. ¹²⁷
Christian 2013	Tourism, Kenya	Women are overrepresented in the accommodation and excursion segments of the tourism sector, though they tend to work as low- to mid-skill employees, unless they are engaged as entrepreneurs. ¹²⁸
Barrientos 2014	Apparel, globally	On average, 60–80 percent of production workers in the top 27 apparel exporting countries were women. ¹²⁹

333. Why are so few GVCs women-owned or women-run firms? Women's placement in value chains is in part due to the same reasons that hold back women in the non-GVC economy. These include disadvantages in endowments, such as assets, education, skills, experience, networks, and social capital, as well as gender-biased regulations or discriminatory social norms. According to the World Bank's Women, Business, and the Law dataset, 20 countries still do not grant men and married women equal ownership rights to property, and 41 countries do not grant sons and daughters equal rights to inherit assets from their parents. Even when the legal system does not discriminate against female ownership of assets, social norms inhibiting land ownership by women is a recurring theme across middle- and low-income countries. In Afghanistan's rural areas, social and cultural norms severely limit women's access to services, including credit, training, extension, inputs, and trading and marketing networks. In Honduras, female entrepreneurs' efforts to enter value chains and upgrade into higher-value activities appear to be complicated by limited access to key inputs, such as land, finance, and market information. In call centers in Egypt, limited access to education, training, promotion and networks made it difficult for women to take advantage of the rising demand for higher technical skills generated by product upgrading.¹³⁰ These gender-intensified constraints

can restrict a country’s ability to remain competitive and upgrade to higher-value segments of the chain – a topic discussed in the forthcoming World Bank-WTO Trade and Gender Report.

334. Removing legal restrictions that make it harder for women to start businesses and access productive resources can be an effective first step. The larger the number of legal restrictions women face, the lower is the payoff from work experience (figure 3.20). Simply mandating a nondiscrimination clause in hiring increases women’s employment in formal firms by 8.6 percent.¹³¹

Figure 3.20 Gender equality in business regulations ensures that women are more fairly rewarded



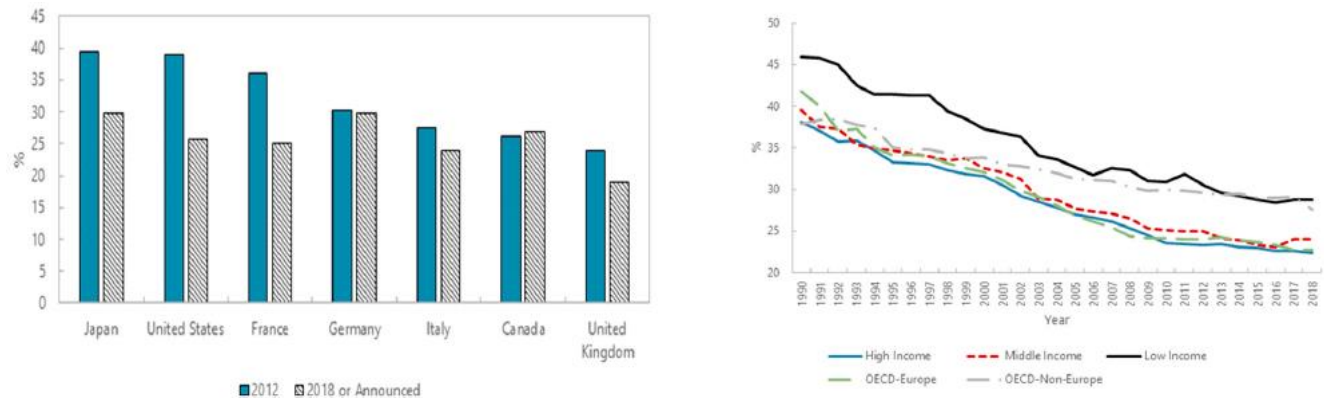
Source: World Bank 2019.

Note: Women Business and the Law (2008) documents the gender legal disparities for 189 economies.

F. GVCs and taxation

335. Raising tax revenues is a challenge in today’s globalized economy. GVCs are not the cause of tax avoidance and tax competition, but their evolution has magnified the challenges facing the international tax system. The current system of international taxation relies principally on identifying the physical place where value is created by firms. The mobility of certain factors of production, combined with the fragmentation of production processes across countries, makes firms even more sensitive to tax differences. In GVCs that involve affiliates of the same firm, fragmentation of production also leads to greater intrafirm trade and greater opportunities for tax avoidance by manipulating where value is recognized for tax purposes. Exacerbating the problems are the growth of intangibles in global business and the digital delivery of services.¹³²

336. Countries are under pressure to engage in tax competition by lowering the burden of corporate income tax to retain domestic and attract foreign investment. The decline of the cost of communication and transport facilitates the relocation of firms and the fragmentation of production across countries. Firms can locate production chains and procurement across the globe, choosing countries that make the most sense from a business perspective. That includes taking advantage of differences between national tax systems to shift production to lower-tax jurisdictions. Countries compete by lowering corporate income tax rates and granting tax incentives such as tax holidays and preferential tax zones. In a race to the bottom, corporate income tax rates have declined by almost half since 1990 (figure 3.21).¹³³

Figure 3.21 Corporate income tax rates have declined by almost 50 percent since 1990

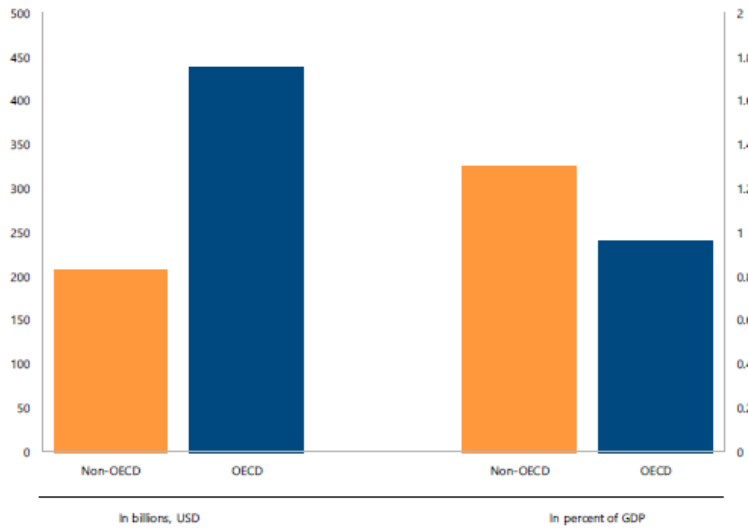
Source: IMF 2019.

Note: Including average subnational rates.

337. Revenues from corporate income taxes are further eroded by international tax avoidance, which takes advantage of loopholes and weaknesses in the international tax architecture. In GVCs that involve affiliates of the same common corporate structure, firms can locate activities that generate high profits with relatively little input, or “substance,” in jurisdictions where those profits are taxed at low rates. Such practices are legal, but they run counter to the principle of taxing activities where value is created. Firms can also manipulate transfer prices between their affiliates to shift profits to lower tax jurisdictions.

338. In principle, transactions between affiliates of a multinational corporation (MNC) are “priced” according to the arm’s length principle, which means in line with comparable transactions between unrelated enterprises under comparable circumstances. And the rules for affiliated-party transactions are intended to ensure that profits of MNCs are registered in countries where value is created. In practice, however, these rules are hard to apply, leaving scope for manipulating transfer prices to shift profits, but not substantial activities, to lowly taxed entities without violating the transfer pricing rules.¹³⁴ Other avenues for international tax avoidance include debt transactions between affiliated parties in low-tax jurisdictions (lender) and high-tax jurisdictions (borrower), locating intangible assets in low-tax jurisdictions, and treaty shopping.¹³⁵

339. The revenue losses from profit shifting are substantial: an estimated that 30 percent of global cross-border corporate investment stocks are routed through off-shore hubs, and the associated tax losses for developing countries amount to about \$100 billion.¹³⁶ In 2013, non-OECD countries missed out on \$200 billion in revenues as a result of profit shifting, a relatively larger loss than in OECD countries (figure 3.22).¹³⁷

Figure 3.22 As a proportion of GDP, non-OECD countries lose the most from profit shifting

Source: Crivelli, de Mooij, and Keen 2016.

340. The growth of intangibles in global business and the digital delivery of services pose special challenges. Intangible assets, such as data, patents, and trademarks, are inherently more mobile than traditional physical factors of production. Such assets are also harder to value in the digital economy. In the United States, the share of intangible assets in the nonresidential capital stock doubled between 1966 and 2016.¹³⁸ Firms can choose to move only certain parts of the production process abroad, thus minimizing any associated risk and maximizing the potential gains.¹³⁹ So, small changes in tax policy can prompt large locational shifts by GVC firms, increasing pressure on countries to compete for economic activity through their national tax systems.

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¹ HS 61, 62, 64 using mirror data for 2017.

² World Bank n.d.b.

³ Guardian 2019.

⁴ International buyers have joined together to work in a coordinated way through the Fire and Building Safety Accord (mostly European companies, and unions) and through the Alliance for Bangladesh Worker Safety (a group of mostly North American buyers). These groups have committed to inspect their supplier factories and develop plans for training and remediation. In March 2013, the government, business organizations and trade unions signed the National Action Plan on Fire Safety which calls for action to improve legislation, expand labor inspection capacity and implement systematic inspections of all factories. The Alliance, the Accord and the National Action Plan have agreed to use a common standard for certification to ensure that building structural integrity and fire safety are adequate. The World Bank Group has also been working with the private sector on improving water usage through the Partnership for Clean Textiles as well as labor standards through ILO-IFC Better Work. After five years anniversary of the Rana-Plaza disaster, in April 2018, a crowdsourcing effort of mapping of all garment factors in Bangladesh and make it publicly available was initiated by the private sector (collaboration between SourceMap, C&A Foundation, and BRAC University).

⁵ Caliendo and Parro 2013; Antras and de Gortari 2018.

⁶ Constantinescu, Mattoo and Ruta 2019.

⁷ CBS Evening News 2015.

⁸ Amiti and Konings 2007; Goldberg et al. 2010; de Loecker et al. 2016.

⁹ For instance, Antràs, Fort, and Tintelnot (2017) show that U.S. firms that started importing from China after this country’s accession to the WTO also increased their sourcing from domestic suppliers in the United States.

¹⁰ Amiti and Konings 2007; Halpern, Koren, and Szeidl 2015; Goldberg et al. 2010; Taglioni and Winkler 2014; Constantinescu et al. 2017.

¹¹ Costa 2018.

¹² Barrientos et al. 2016.

¹³ Krishnan 2017.

¹⁴ Output per worker controlling for capital as well as foreign ownership status, sector, and regional differences.

¹⁵ Sampson 2015.

¹⁶ Gereffi, Humphrey and Sturgeon 2005

¹⁷ Iberahim 2013.

¹⁸ Alfaro-Urena, Manelici, and Vasquez 2019.

¹⁹ Pietrobelli, Marin, and Olivari 2018.

²⁰ Gereffi et al. 2005.

²¹ Pietrobelli, Marin, and Olivari 2018.

²² For example, in Chile, the company Micomo has developed highly innovative monitoring technologies that assist the extraction process through fiber optics. Power Train has entered the market with new remote-control systems for trucks operating at high temperatures, and wireless monitoring systems that predict where key equipment will wear and need to be replaced—thus preventing stoppages. In Brazil, Geoambiente has developed sophisticated geological maps, sensors and radar images that help in the exploration phases, predicting the contents of minerals or areas prone to erosion in order to monitor environmental impacts.

This company is now Google’s largest partner in Brazil. The use of new materials is also revolutionizing the industry. For example, Verti in Brazil has developed dust suppressors that run on excess glycerin from biodiesel plants. Meanwhile, Innovaxion in Chile has applied new approaches to mechanical, robotic, and electrical engineering to substantially reduce waste generated in copper mining.

²³ Pietrobelli, Marin, and Olivari 2018.

²⁴ Navarro 2018.

²⁵ Katz and Pietrobelli 2018.

²⁶ Mancini and Taglioni, unprocessed.

²⁷ De Loecker 2013; De Loecker 2007; Iacovone and Crespi 2010.

²⁸ Kugler and Verhoogen 2012.

²⁹ More abundant capital and skills use is important for upgrading (Bustos 2011). Handling greater product complexity requires reinforcing intermediate management layers relative to plant workers (Caliendo et al. 2015). Sourcing strategies are also key for upgrading. As part of this process, the organization of procurement practices and sourcing becomes an integral part of a firm’s strategy and an increasingly important part of their competitive advantage (Antràs et al. 2017). It not only matters the international linkages a firm creates, but also which domestic supplier links it creates (Fieler et al. 2015). Connection to demanding and refined customers supports learning, (Fieler et al. 2014). But these customers have high standards of quality and delivery which may be more difficult to learn than simpler tasks, even with deep relationships within the GVC. Firms ability to absorb quickly increasing amounts of more complex technology, know how, and ability to produce at high quality determines outcomes (Costinot et al. 2011).

³⁰ Dihel et al. 2018.

³¹ GSO Enterprise Survey 2014 (firms with >5 employees).

³² World Bank Enterprise Surveys for developing country sample of 81 countries.

³³ Cali et al. 2016. In a sample of 39 countries, the number of jobs supported by \$1 million of gross exports has declined from 38 jobs in 2001 to 16 jobs in 2011. The number of manufacturing jobs supported by \$1 million of gross exports has declined from 20 jobs in 2001 to 12 jobs in 2011.

³⁴ Similarly, the number of jobs per unit of domestic value added in exports has declined between 2000 and 2014 in seven developing countries, where technical change in GVCs has been biased against the use of labor (Pahl and Timmer 2019).

³⁵ Cali et al. 2016. In a sample of 39 countries with data for 2001 and 2011, 26 countries experienced a decline in the share of export jobs in total jobs. On average 28 percent of jobs were supported by exports in 2011 compared with 31 percent in 2001.

³⁶ Rodrik 2018.

³⁷ In Vietnam, firms that import and export employ more workers than firms that export only and firms that do not trade, controlling for sector and province fixed effects as well as state- and foreign-ownership. In Mexico, firms that have relationships with buyers, as well as firms that export and import, also see higher employment than firms that only import or only export. This holds even when considering regional, sector, and foreign ownership characteristics of firms. Across country, firms that import and export employ more workers than one-way traders or non-traders.

³⁸ Manufacturing firms with 10 or more workers. The share of GVC firms in total employment increased from 19 percent to 23 percent between 2000 and 2014.

³⁹ Costa 2018.

⁴⁰ In the non-agricultural enterprise sector. Employment in GVC firms increased by 130 percent between 2004 and 2014, compared to 115 percent for import-only and 47 percent for export-only firms (only considering firms with six or more employees). Total employment in non-trading firms increased slightly faster, by 136 percent, though this difference is likely not statistically significant.

⁴¹ From 30 percent to 31 percent.

⁴² World Bank n.d.

⁴³ Total manufacturing employment increased from 2.7 million to 5.7 million between 2004 and 2014. Formal manufacturing jobs (covered by social security) in formal enterprises increased from 2.4 million to 4.5 million. GVC firms accounted for 14 percent of formal jobs in 2004 and 17 percent in 2014.

⁴⁴ Annual employed population 15+ year of age in manufacturing was 5,031,200 in 2005 (first year of available data) and 7,414,700 in 2014.

⁴⁵ GSO Vietnam. Annual employed population and annual employed population at 15 years of age and above by kinds of economic activity by Economic activity, Items and Year.

⁴⁶ Lopez-Acevedo and Robertson 2016.

⁴⁷ Kumar 2017.

⁴⁸ World Bank 2018c.

⁴⁹ Faucheux, Del Rosario, and Gomera Economistas ASsociados 2014.

⁵⁰ Within provinces, a one percentage point increase in the share of firms that participate in GVCs is associated with a 3.2 percent increase in female employment and a 2.1 percent increase in male employment.

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- ⁵¹ The coefficient on import-only firms was significant and stronger in magnitude than the coefficient on GVC firms for both male employment and female employment.
- ⁵² Staritz, Plank and Morris 2016.
- ⁵³ Faucheux, Del Rosario, and Gomera Economistas ASsociados 2014.
- ⁵⁴ World Bank 2018c.
- ⁵⁵ There is a 28 percent decrease in the hazard of getting married, and a 29 percent decrease in the hazard of childbirth.
- ⁵⁶ Heath and Mobarak 2015.
- ⁵⁷ Heath and Mobarak 2015.
- ⁵⁸ Atkin 2016.
- ⁵⁹ Jensen 2012.
- ⁶⁰ Van den Broeck and Maertens 2017.
- ⁶¹ Suzuki, Mano and Abebe 2018.
- ⁶² Said-Allsopp and Tallontire 2015.
- ⁶³ There is no additional wage premium for relational firms over export-only or import-only firms.
- ⁶⁴ Using firm-level and customs transaction-level data covering the period 2000–2006 with the methods of propensity score matching (PSM), difference in differences (DID), and generalized propensity score (GPS).
- ⁶⁵ Lu, et al. 2019.
- ⁶⁶ Shepherd and Stone (2012) also find that firms with the strongest international linkages—export, import and are foreign owned—pay higher wages.
- ⁶⁷ The poverty elasticity of growth depends on various factors, including its incidence (changes in inequality), the initial distribution of land, wealth and income, education levels among the poor, other forms of past public investment, as well as local institutions including unions (Ravallion and Datt 2002; Ferreira et al. 2010).
- ⁶⁸ Dollar and Kraay 2002; Ferreira and Ravallion 2008.
- ⁶⁹ Food poverty is defined as the inability to, even if all the available income was used in the home to buy only the goods of said basket. Capabilities poverty is defined as the insufficiency of disposable income to acquire the value of the food basket and carry out the expenses necessary in health and education, even dedicating the total income of the home nothing more than for these purposes. Asset poverty is defined as the insufficiency of income available to acquire the food basket, as well as make the necessary expenses in health, clothing, housing, transportation, and education, even if the entire household income was used exclusively for the acquisition of these goods and services.
- ⁷⁰ Atkin, 2016
- ⁷¹ This is consistent with the observation that migrant workers are more likely to work in the formal sector in Vietnam (McCaig 2015).
- ⁷² Maertens, Minten and Swinnen 2012.
- ⁷³ FDI inflows—a key determinant of GVC participation—has similarly been associated to poverty reduction but also income inequality in Ethiopia, Vietnam and Turkey (World Bank 2019). In Ethiopia, the overall effects from FDI are largely positive, with high effects on poverty reduction and limited effects on income inequality. In Vietnam, FDI has seen significant benefits for shared prosperity but also some saw increases in income inequality. In Turkey, there have been some benefits for average workers, though many of the benefits have accrued to high-skilled workers, showing the greatest increase in income inequality.
- ⁷⁴ De Locker and Eeckhout 2018.
- ⁷⁵ Markups can increase because prices are higher, or because costs are lower, or a combination of both when markets are not perfectly competitive, meaning that firms can affect prices. The effect on firms’ markups depends on whether the reduction in costs, or the gains from GVC participation, are passed fully onto the consumer through lower prices.
- ⁷⁶ Autor et al., 2017.
- ⁷⁷ Including the Herfindahl index and the number of number of firms within an industry.
- ⁷⁸ Based on regression analysis that considers country and industry specific characteristics. It is possible that these producers focus on tasks that have highest value added because of demand (e.g. design, concept, service, etc., i.e. where market power is the result of innovation/merit) while they outsource those tasks that have lower value added (homogeneous parts, standard tasks, etc.). Ideally one would disentangle the channels and the different effects, but this is not possible with the data.
- ⁷⁹ De Locker et al. 2016.
- ⁸⁰ De Loecker et al. 2009.
- ⁸¹ Excluding china and controlling for country fixed effects. The negative correlation also holds without controlling for country fixed effects, for samples that excluding and including China.
- ⁸² Diez, Fan, and Villegas-Sanchez 2019.
- ⁸³ Controlling for state ownership, firm size, and capital intensity.
- ⁸⁴ Gradzewicz and Muck 2019.
- ⁸⁵ Dauda, Nyman, and Cassim 2019.
- ⁸⁶ Karabarounis and Neiman 2013.

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- ⁸⁷ Barkai (2016) also show in the United States that profits have risen as a share of GDP and the pure capital share in income (defined as the value of the capital stock times the required rate of return on capital over GDP) has fallen alongside the labor share.
- ⁸⁸ Autor et al. (2017) similarly identify outsourcing as a potential explanation of the declining labor share in the United States.
- ⁸⁹ Reshef and Santoni (2019) investigate the same phenomenon in a sample of 26 EU countries over the period 1995–2014 and suggest that the labor reducing of capital-intensity may be a short run phenomenon. The authors document a recovery from 2007 onwards, explained by within-industry changes, notably for skilled labor associated with the complementarities of capital intensity and skilled labor. Domestic within-industry factors also explain a recover in the labor share from 2007 onwards in the larger sample of 63 developing and developed economies.
- ⁹⁰ Oxera 2019.
- ⁹¹ Goldberg and Pavcnik 2007.
- ⁹² Feenstra and Hanson 1996, 1997.
- ⁹³ Verhoogen 2008.
- ⁹⁴ Kremer and Maskin 2003; Antràs, Garicano, and Rossi-Hansberg 2006.
- ⁹⁵ Bernard et al. 2018.
- ⁹⁶ Griliches 1969; Krusell et al. 2000.
- ⁹⁷ Becker, Eckholm, and Muendler 2013.
- ⁹⁸ Suppliers to GVCs are required to apply the brand’s global standards for health, safety, worker treatment, human resources, and management. Bloom and Van Reenen 2011; Dearden, Reed, and Van Reenen 2006; Hanson 2009.
- ⁹⁹ Hijzen et al. 2013; Javorcik 2014; Velde and Morissey 2003; Markusen and Trofimenko 2009.
- ¹⁰⁰ Other studies link GVC participation to an increased wage disparity between skilled and unskilled labor in developed countries, through little literature exists for developing countries. Using matched employer-employee data for Denmark from 1995 to 2006, Hummels et al. (2014), characterize the link between offshoring and wages across skill levels and find that offshoring increases (lowers) the high-skilled (low-skilled) wage. Similarly, using matched employer-employee data for Italy, Borghi and Crino (2013) confirm that offshoring contributes to the widening the wage gap between skilled and less skilled employees.
- ¹⁰¹ Shepherd and Stone 2012. There is a negative and statistically significant relationship with the share of skilled production workers and importing.
- ¹⁰² Crino 2012.
- ¹⁰³ Staritz and Morris 2014.
- ¹⁰⁴ Darko, Occhiali, and Vanino 2018.
- ¹⁰⁵ Lall 2019. Analysis of the OECD’s TiVA database for 61 countries shows that a one-unit standard deviation increase in domestic value added in exports of intermediate products is associated with a 0.1 decline in the dispersion of the urban size distribution within countries.
- ¹⁰⁶ Autor, Dorn, Hanson 2016.
- ¹⁰⁷ De Vries 2017; Farole et al. 2018.
- ¹⁰⁸ Chan 2013.
- ¹⁰⁹ Dihel et al. 2018.
- ¹¹⁰ Amanor 2012.
- ¹¹¹ ILO 2016a; Henry forthcoming.
- ¹¹² Better Work 2016.
- ¹¹³ Faber, Kraus, and Sanchez de la Sierra 2017.
- ¹¹⁴ Harrison and Scorse 2010.
- ¹¹⁵ Staritz and Reis 2013.
- ¹¹⁶ Veliu et al. 2009.
- ¹¹⁷ World Bank 2014.
- ¹¹⁸ Munoz Boudet 2018.
- ¹¹⁹ World Bank 2011.
- ¹²⁰ Costa 2018.
- ¹²¹ Staritz and Reis 2013.
- ¹²² Cite pending.
- ¹²³ Veliu et al. 2009.
- ¹²⁴ World Bank 2014.
- ¹²⁵ Munoz Boudet 2018.
- ¹²⁶ World Bank 2011.
- ¹²⁷ Ahmed 2013.
- ¹²⁸ Christian 2013.
- ¹²⁹ Barrientos 2014.
- ¹³⁰ Ahmed 2013.
- ¹³¹ World Bank n.d.b.

¹³² The focus of this section is on direct taxation. GVCs also pose challenges for indirect taxes, such as the VAT, although these are more tractable (see Clavey et al (forthcoming), *International Tax Reform, Digitization and Developing Economies* World Bank Policy Research Paper).

¹³³ As corporate profits have gone up, average revenue from corporate income tax has been stable over the same period. But as the share in GDP of other sources of income (such as wage income) has gone down, these factors have indirectly reduced the scope for governments to secure adequate tax revenue.

¹³⁴ Cooper et al. 2016.

¹³⁵ For a more complete listing, see Beer, de Mooij, and Liu 2018.

¹³⁶ UNCTAD 2015.

¹³⁷ Crivelli, De Mooij, and Keen 2016.

¹³⁸ Auerbach 2017.

¹³⁹ De Mooij and Ederveen 2008.

Chapter 4: Macroeconomic Implications

341. Global value chains strengthen the economic connections between countries. Rather than selling final goods and competing for the same customers, countries are increasingly associated through rigid production linkages that bind them to a common fate. This international interdependence means that policies and economic conditions in one country affect and spill over to its trade partners—and propagate to the rest of the world through the interconnections of modern economies. As a result, the benefits from international coordination (and the costs of not coordinating) have risen, challenging development agencies and the broader international community.

342. First, production linkages are associated with greater synchrony of economic activity across countries. When production in one country relies on inputs from its trading partners, the economic conditions in other countries affect domestic activity and its ability to thrive. Although international trade in finished products cannot be associated with any change in GDP co-movements, trade in intermediate inputs can—as an important driver of the strong increase in economic synchrony over the past decades.

343. Second, input–output linkages create strong links in price formation, implying that inflation in one country is more likely to spill over to its direct and indirect trading partners. In this sense, GVC participation is associated with the rising synchrony of both real economic activity and inflation across countries. National central bank actions, through production linkages between domestic and foreign firms, can have important consequences in other countries.

344. Third, given the interconnections in production, episodes of export growth are linked with similar growth in imports. So, the consequences of currency movements for export volumes are likely to be reduced and will become harder to predict. With less responsiveness of exports to exchange rate movements, some governments will be deprived of a major policy tool. Export volumes do not react to the exchange rate with the direct partner, but to the exchange rate of the country of final consumption. When a government changes the value of its currency, it affects the trade flows of other countries throughout the production chain.

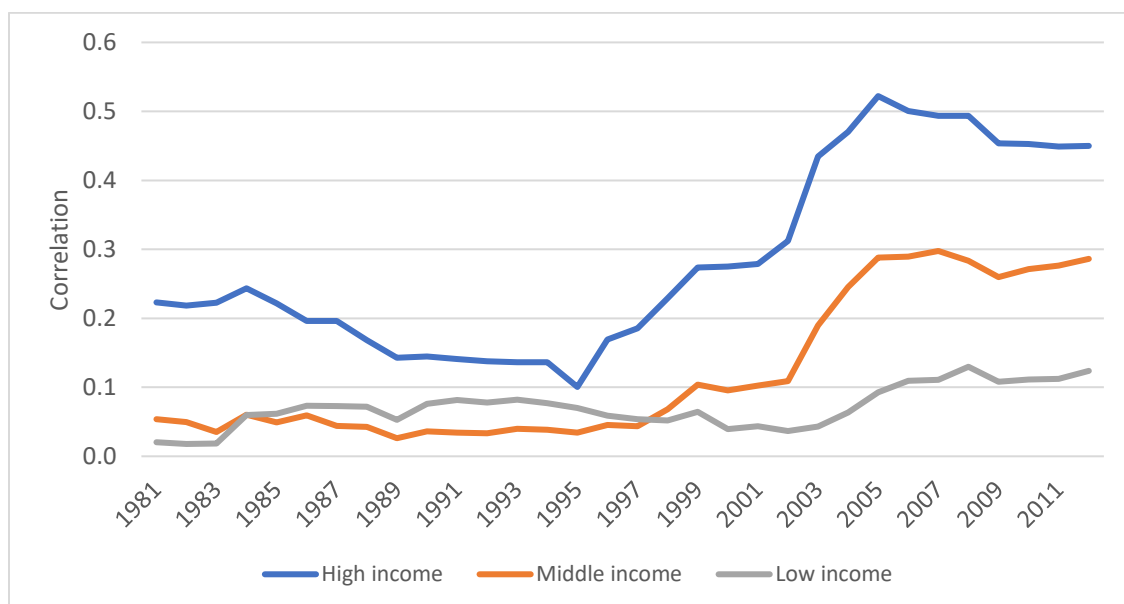
345. Fourth, the rise of GVCs affects regional trade agreements and how policy makers should think about the possible diversion of trade flows. When firm-to-firm relationships are rigid, the benefits of accessing new markets can be shared throughout the production chains with countries not part of the trade agreement. Conversely, the disruption created by trade wars and dismantled agreements might not be easily compensated by reorganizing all buyer–seller relationships. Production of goods and services can decrease when firms lose access to key suppliers.

346. Posing new challenges for governments and policy makers, these realities require closer cooperation between countries. National policies are now transmitted more strongly to other countries, and the GVC feedback loop can reduce their effectiveness. Given the high interdependence of production structures, decisions by governments and central banks are more likely to have a systemic impact, and their effectiveness depends on policies in various parts of the world. Moreover, regional agreements can have global ripples, and economic issues are more global, calling for coordinated solutions. Given their rigid ties, GVCs thus call for multilateral institutions to help coordinate policy making around the world.

A. Synchronizing economic activity

347. When the production of a good in Vietnam requires inputs from Indonesia and is then used for production in China, it is only natural that supply and demand shocks in one country will be felt by its suppliers and customers. Nike, one of the world’s most valuable sport brands, segmented its footwear production across several South Asian countries, with the first two countries being Vietnam and Indonesia and China only third.

348. Over the past 30 years, the co-movement of economic activity surged all over the world. In the 1980s, economic cycles in different countries were largely independent from one another, especially for middle and low income countries, with correlations below 0.1. But economic activity has since become much more correlated, most for high income countries, less for middle income, and least for low income (figure 4.1)

Figure 4.1 Countries’ economic activity is more synchronized than ever

Source: WDR 2020 team, based on World Bank’s World Development Indicators (database).

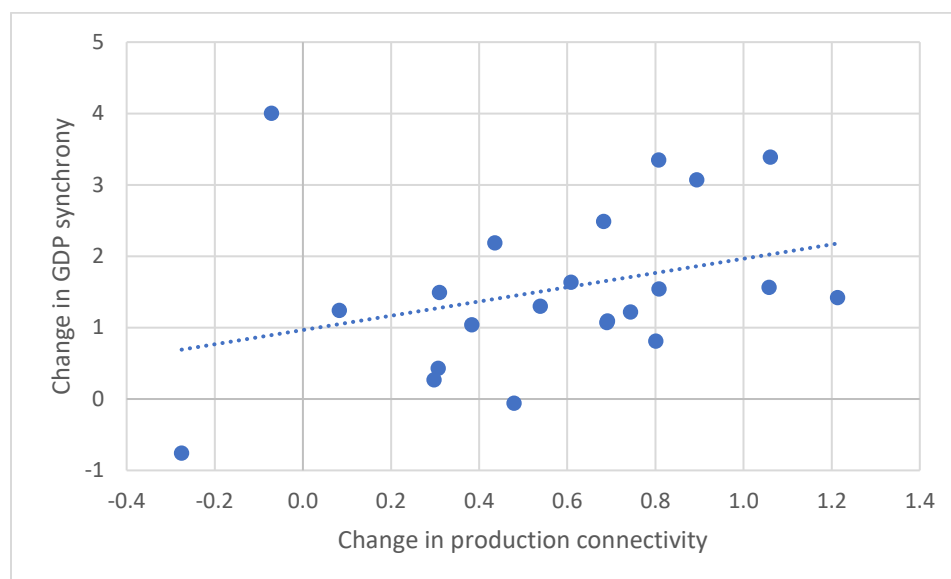
Note: Each date represents the midpoint of a 10-year moving window. Each line represents the average of all country-pair GDP correlations, taken over all country-pairs containing at least one country in the income group considered (high/medium/low).

349. The recent worldwide increase in economic synchrony is partly due to the rise of GVCs. Production is increasingly organized according to a “world factory” view, which drastically changes how shocks are transmitted across borders. To understand the importance of those changes, start by examining the world before the recent increase in international production linkages.¹

350. If two countries are open to trade and produce a similar final good—say, clothes—their firms compete in the same markets for the same customers. As a result, a country’s increase in productivity can increase consumer welfare everywhere but it can also mean tougher competition for its competitors. In this sense, good news in one country can be bad news for its trade partners. For example, increased efficiency in the garment industry in Bangladesh can be linked to production contraction in India.

351. In a world dominated by GVCs, however, countries increasingly trade intermediate inputs and are tied by rigid production linkages. From iPhone to Nutella, the design, production and after-sales services of many goods are spread over many countries. This new reality changes the extent to which economic fluctuations are transmitted across countries. If a country’s productivity rises, the consequences are good for trading partners buying its goods as inputs as well as for the countries’ own suppliers: they can share the competitive gains throughout all production stages, and they are less likely to cannibalize each other’s market shares.²

352. The positive historical association between total trade and business cycle co-movement was driven explicitly by trade in intermediate inputs (figure 4.2). While GVCs are not the only factor explaining the surge in GDP correlation across countries, evidence towards their role is growing. From both a micro-data and firm perspective³ and a more macro aggregate perspective,⁴ many studies have shown that the recent increase in input–output linkages increased the co-movements in economic activity.

Figure 4.2 Global value chains are associated with greater synchrony of economic activity

Source: WDR 2020 team, based on World Bank’s World Development Indicators (database) and World Integrated Trade Solution (database).

Note: Each dot represents a pair of regions—for example, East Asia and Pacific and Sub-Saharan Africa, and Latin America and Caribbean and South Asia are two different observations). The horizontal axis measures the change over time in production connectivity defined as the total trade in intermediates as a share of GDP of both regions. The vertical axis measures the proportional change in GDP correlation over time.

353. With global value chains, countries’ economic fates are tied to one another. Even if, at the microeconomic level, individual firms in different countries keep competing with one another, the aggregate health of an economy now depends on the health of other economies supplying inputs or buying outputs. Based on a panel of 150 countries for the last 50 years, studies shown that moving from the 25th to the 75th percentile of trade in intermediate inputs is associate with an increase in GDP correlation of 28 percentage points.⁵

354. Synchrony of economic activity across countries is a key indicator for many macroeconomic policies. For example, the extent to which the West African Economic and Monetary Union area can be considered as an optimal currency area largely depends on the synchrony of business cycles among all member countries. And beyond currency considerations, the synchrony of economic activity among countries signals interdependence, so both good news and bad news are transmitted from one country to the next.

355. Large firms dominate the global economy. For 32 developing countries, the five largest exporters in a country account, on average, for a third of its exports, and nearly half its export growth.⁶ While the importance of large firms in driving economic growth is not new, their impact reached a more global scale with the expansion of global value chains. With production more fragmented across countries, any local decision that improves a global firm’s ability to thrive will have a positive impact on many countries.

B. Propagating shocks

356. The strength of propagating shocks across firms and countries is a function of the “specificity” of the input–output relationship, which is not always well represented by simply looking at cost shares across countries. When an input is needed for production, losing access to it can be disastrous, even though the input might not represent a large share of total production costs (box 4.1). The interdependence of firms and countries thus increases to the extent that global value chains involve custom products that cannot be easily replaced.

Box 4.1 The Japanese earthquake and the costs of supply chain disruptions

Businesses tend to focus on the potential for inputs to increase in price or be delivered late. But disruptions due to extreme events are a rising threat. In 2018, extreme weather caused \$81 billion in global losses; in 2017, \$300 billion.⁷ Natural disasters can thus have unanticipated cascading impacts along global value chains, shocking distribution and supply networks worldwide.

In March 2011, the Tōhoku earthquake—measuring 9.0 on the Richter scale—hit Japan’s northeast coast. Several tsunami waves followed, devastating coastal areas, flooding and disabling local nuclear power stations, and leading to a national nuclear crisis. The triple disaster was catastrophic for global value chains, particularly the automotive, computer, and consumer electronics producers that rely heavily on Japanese suppliers of specialized parts and components. As Japanese production of automotive equipment drew to halt, senior executives at Toyota, Honda, Opel, Nissan, and General Motors froze production lines in several factories worldwide, causing losses of \$70 million a day.⁸

Famously, automakers temporarily restricted orders on cars in colors that required a specialty pigment called Xirallic, which gives cars a glittery shine. Xirallic is produced at only place, which was badly affected during the nuclear crisis.

In electronics, the problems were similar. Many specialized connectors, speakers, microphones, batteries, and sensors come from Japan and had few or no substitutes. At the time, it was estimated that around a third of Apple’s flash drives came from Toshiba, Japan, and the rest from South Korea.⁹

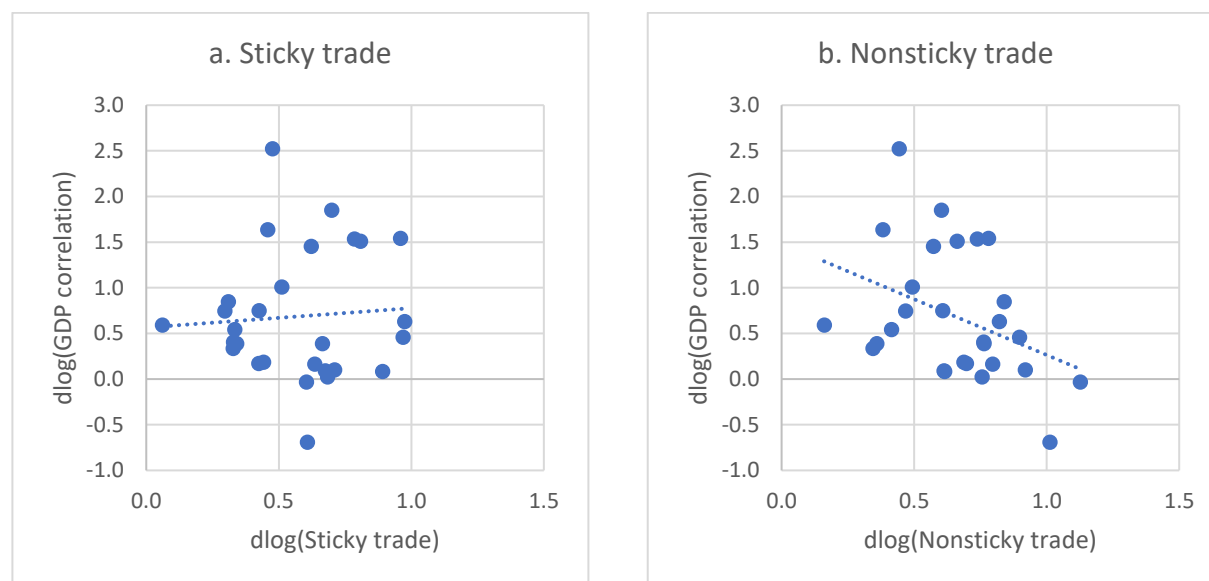
Quantifying the global impact of such a disaster is not easy. For the transport equipment industry, it has been estimated that the disruption cost \$139 billion (in value added), with Japan suffering about 40 percent of the impact, and the rest falling predominantly on the United States (25 percent), China (8 percent), the European Union (8 percent), and Canada (7 percent).¹⁰

The substitutability of inputs is a critical determinant of supply chain shocks. In one study of U.S. affiliates of Japanese firms, the degree of the shock depended not on the level of Japanese ownership, but on the U.S. affiliate’s ability to substitute imported intermediates from Japan with alternative inputs in the short run.¹¹ In the month following the crisis, U.S. manufacturing output fell about 1 percent and remained significantly below prior levels for the following six months.

These findings are particularly relevant to buyers and suppliers holding low inventories and relying heavily on just-in-time production to keep inventory costs low. Risk management strategies to diversify suppliers and reduce firm sensitivity to inventory shortages and delays in logistics become more important as environment-related disasters increase.

357. Global value chains are also linked to greater synchrony of financial cycles and stock market returns. Looking at the consequences of natural disasters, firms experience a larger drop in returns when disasters hit their specific suppliers than their nonspecific ones.¹² More precisely, a specific supplier is a supplier that produces an input that is specifically tailored for its customers. When such a relationship exists, both buyer and supplier might face less flexibility in changing their business partners when needed, as it takes time to find another firm that is able and willing to produce or buy specific inputs.

358. Another related feature of GVCs is their relational aspect. Some products are associated with a higher degree of rigidity in the buyer–seller relationships, which is sometimes associated with a high degree of product customization to integrate within the same production process. Trade in those products is also strongly related to the increase in GDP co-movements, meaning that the increasingly *relational* aspect of international trade creates rigid ties across countries (figure 4.3).

Figure 4.3 Sticky trade is associated with more GDP synchrony, while nonsticky trade is not

Source: WDR 2020 team, based on World Bank's World Development Indicators (database) and a classification of sticky vs. non sticky trade from Martin, Méjean and Parenti (2019).

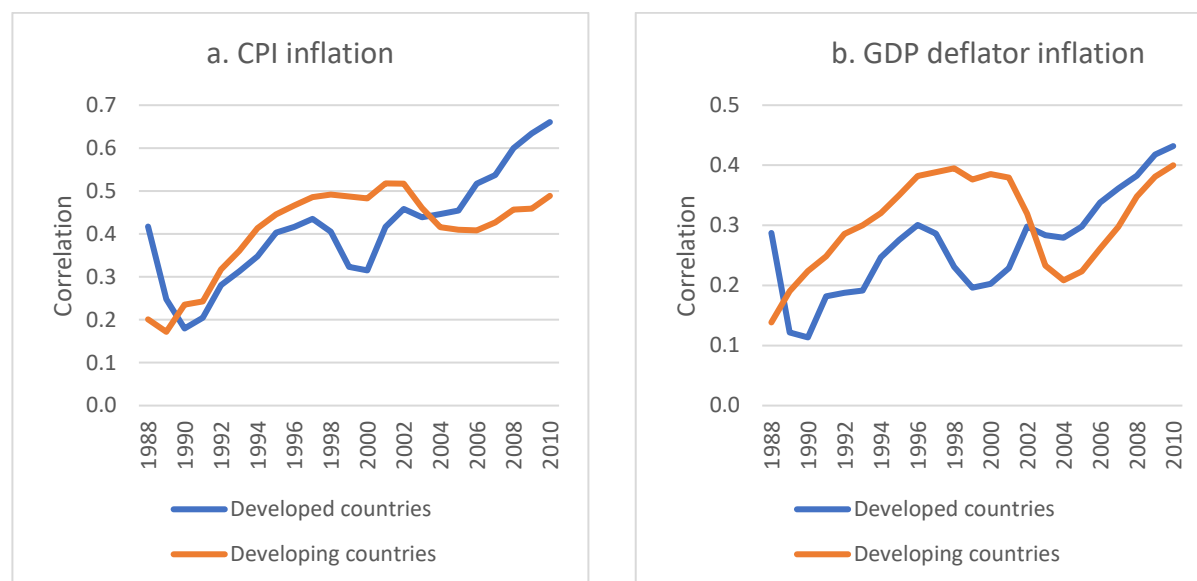
359. These realities pose new challenges for governments and policy makers—and require closer cooperation. National policies are now transmitted more strongly to other countries, and the GVC feedback loop can reduce their effectiveness. Economic issues are becoming more global, calling for coordinated global solutions. And with strong international interdependence, multilateralism is required to ensure efficient implementation of macroeconomic policies and ultimately shared prosperity.

C. Synchronizing inflation

360. International input–output linkages also create strong links in price formation, implying that inflation in one country is more likely to spill over to its direct and indirect trade partners (figure 4.4). Such linkages account for an estimated half of the global component of producer price index inflation.¹³ While imported inflation has been present for the consumer price index, its extension to producer prices has policy implications for central banks.

361. When designing their monetary policy and targeting a given inflation rate, authorities need to account for the economic conditions and strategies of their direct and indirect trade partners. In this sense, GVC participation will be associated with rising synchrony not only of real economic activity but also inflation across countries.

362. Backward GVC participation is associated with an increase in the globalization of inflation. For each country, the change in the correlation between domestic and world inflation over the past decade is associated with an increase in imported input in production.

Figure 4.4 The synchrony of inflation increased dramatically over the past decades

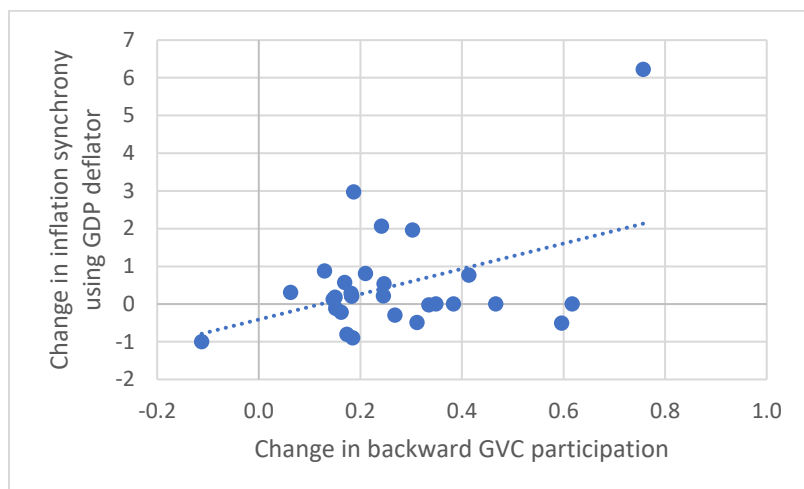
Source: WDR 2020 team, based on World Bank’s World Development Indicators (database).

Note: For each country, we measured the correlation between domestic and world inflation using two different measures of price levels (consumer price index on the left, GDP deflator on the right). We then took the average across two income groups and plotted the evolution of this average correlation. Each date represents the midpoint of a 15-year rolling window.

363. The fragmentation of production across countries also plays a role in the synchrony of inflation expectations, which feeds back into current inflation (figure 4.5). For example, while economists have long recognized domestic and global output gaps (measures of the “slack” in an economy) for estimating the inflation pressure in the economy, GVCs have been shown to significantly increase the global factors at the expense of purely domestic ones.

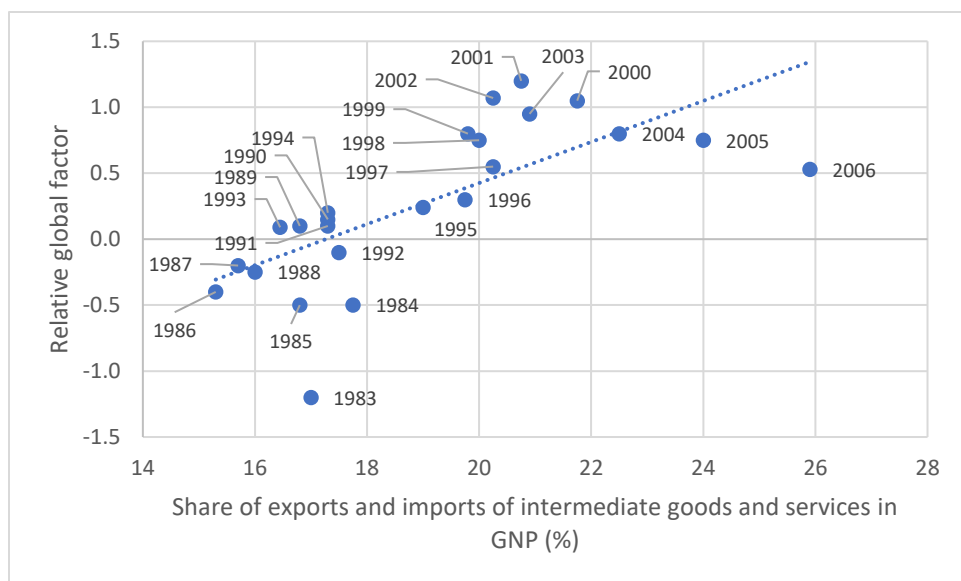
364. Furthermore, an increase in imports and exports of intermediate inputs is associated with a decline in the relative weight of the domestic output gap in favor of global economic conditions in the formation of inflation (figure 4.6). Since imported intermediates can be used to produce goods that are either re-exported further or consumed in the domestic economy, such a result points towards a synchronization of inflation across all sectors. This is in line with Ha et al (2019), who show that inflation synchronization has become significant across all inflation measures since 2001, whereas it was previously prominent only for inflation measures that included mostly tradable goods.

365. Finally, GVCs are not only associated with the co-movement of inflation patterns but might also linked to the global reduction in inflation. The emergence of independent central banks and a better monitoring in many countries played an important role, but a recent OECD study also suggests that GVCs contributed to lower inflation via downward pressures on labor through heightened competition across countries to attract tasks, in particular when low-wage countries are integrated in supply chains.¹⁴

Figure 4.5 Global value chains are associated with greater inflation synchrony

Source: WDR 2020 team, based on World Bank's World Development Indicators (database) and GVC data from Borin and Mancini (2019).

Note: Each dot represents a pair of regions (for example, East Asia and Pacific and Sub-Saharan Africa, or Latin America and Caribbean and South Asia are two different observations). The horizontal axis measures the change over time in production connectivity defined as the total trade in intermediates as a share of GDP of both regions. The vertical axis measures the proportional change in GDP correlation over time.

Figure 4.6 Trade in intermediate inputs increases the weight of global factors in inflation formation

Source: Auer, Borio, and Filardo 2017.

Note: The relative global factor is the difference between domestic and global output gaps in the formation of inflation. The upward sloping dotted line shows the positive relationship between the global weight in domestic inflation (vertical axis) and participation in GVCs (horizontal axis).

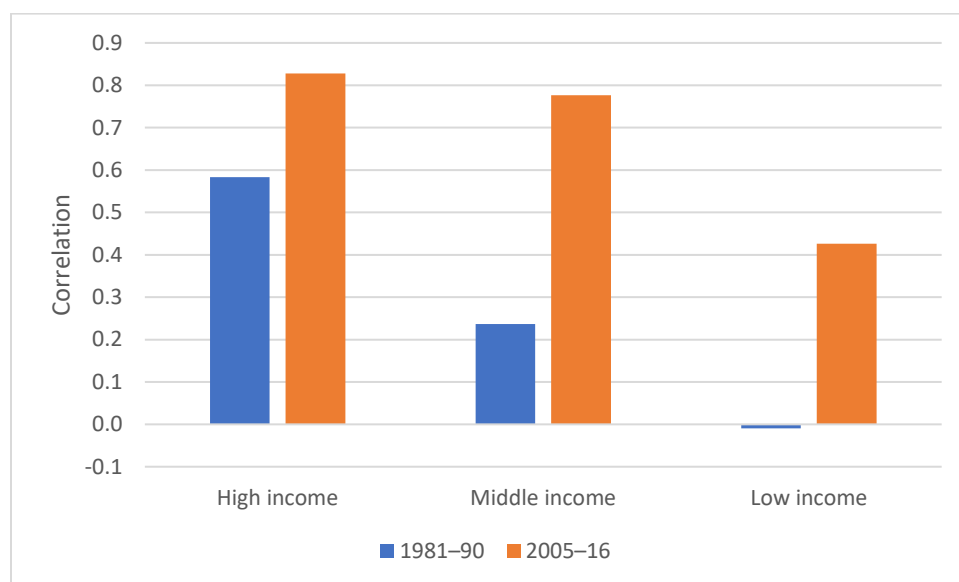
D. Reducing the effect of devaluations

366. Economics textbooks presume a clear-cut relationship between movements in a country's exchange rate and its export volumes. When the currency depreciates, export volumes are expected to increase by some

amount—and that amount is called the exchange rate elasticity of exports. Yet, some recent significant exchange rate movements, such as those in the United Kingdom (2007–09) and in Japan (2012–14), were not associated with very large movements in trade volumes.¹⁵ This perceived unresponsiveness of exports to exchange rate fluctuations has raised the question whether the exchange rate elasticity of export volumes has changed or even dropped to zero.

367. For all income groups, changes in a country’s exports and imports are more and more correlated (figure 4.7). Over the last decades, short-term growth in exports has been accompanied by import growth. Contrary to what standard quantitative trade models of importing predict, a country’s aggregate imported input share increases after large depreciations.¹⁶ This can be explained by the simple fact that exporting firms often are also importers, and export opportunities are accompanied by a need to import.

Figure 4.7 Today’s export boosts coincide with import boosts, more now than 30 years ago



Source: WDR 2020 team, based on World Bank’s World Integrated Trade Solution (database).

Note: For each country, we computed the annual growth in total imports and total exports for all years. Then we computed the correlation between the time series of import and export growth for different time windows of 10 years each, starting with the 1981–90 time window and ending with 2005–16. Finally, we took a simple average across income groups.

368. The latest research suggests that all production linkages can have an impact on export elasticities and that GVCs can have complex effects on devaluation. By loosening the effective of devaluation, the expansion of GVCs complicates the task of policy makers and creates the need for international coordination (box 4.2).

Box 4.2 Blunting devaluation’s effect on Turkey’s exports

Changes in imports and exports are driven by many elements, and the currency value is only one of them. Other important determinants include economic and financial conditions as well as the uncertainty in both direct and indirect trade partners, but also potential changes in tariffs and nontariff barriers and the design of industrial policy in both domestic and foreign economies.

Without accounting for all these other factors, it is difficult to draw strong conclusions about the way global value chains are changing the link between devaluations and export volumes. With those caveats in mind, the recent devaluations in Turkey illustrate the mechanisms described in this chapter.

Turkey has moved rapidly from a current account that was relatively in balance up to the turn of the millennia, to sustaining relatively large current account deficits over the past fifteen years. In 2015, the country was well integrated in global value chains, with a share of foreign value added in export reaching 30 percent, almost 10

percentage points above the world average. Between 2015 and 2018, the real effective exchange rate depreciated by 25 percent, and such a large movement translated into only a modest 5 percent in export growth (much slower than a world export growth of 8 percent during the same period) and 11 percent of import growth. This relatively small adjustment is especially striking when recent World Bank studies have shown that, historically, Turkey’s current account balance is found to be less persistent than is typically found in the cross-country literature, suggesting that it adjusts more rapidly in response to shocks.¹

¹ Knight et al. 2019

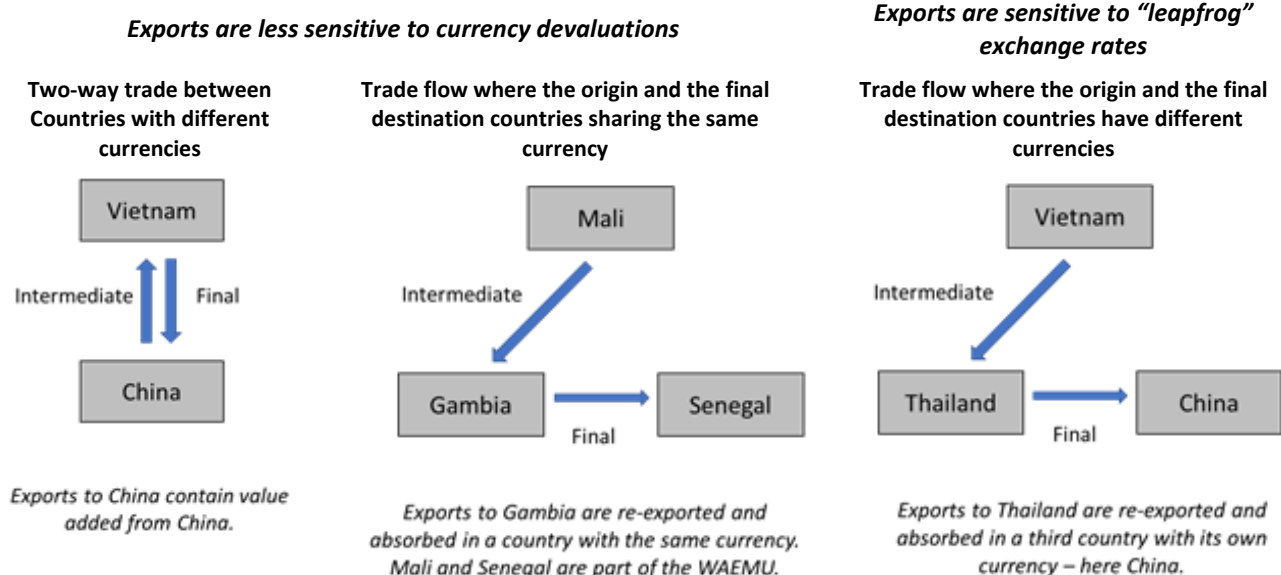
369. Greater participation in GVCs is expected to generate larger *bilateral* balances, but it is not necessarily associated with a larger *overall* trade balance. Indeed, current accounts at the country level are mostly determined by savings, investments, and cross-border finance and are little affected by changes in trade policy or by the links between imports and exports.

370. With GVCs, policy makers need to keep track of not only the currency composition of inputs for production, but also the currency in the country of final absorption (figure 4.8).¹⁷

- First, an increase in export’s share of foreign value added from a country with a different currency reduces the change in export price in response to exchange rate movements, thus lessening the associated change in export volumes.
- Second, a greater share of exports that return as imports to a country sharing the same currency weakens the exchange rate responsiveness of exports. Simply put, if the final demand driving exports is located at home or in a country with the same currency, a devaluation can do little to boost those trade flows.
- Third, an increase in the share of exports used in the destination country to produce further re-exports that are ultimately consumed in a third country increases the responsiveness of trade flows to the direct trading partner’s nominal effective exchange rate, creating significant interdependence across countries. This mechanism underlines the international interconnections that characterize today’s production processes.

371. With international segmentation of production across countries, export performance in one country can be driven by the demand addressed by firms located in other countries. In this sense, the consequences of devaluing a country’s currency value propagate upstream in the supply chain and trigger export growth from its suppliers.

Figure 4.8 With GVCs, devaluations can have complex consequences

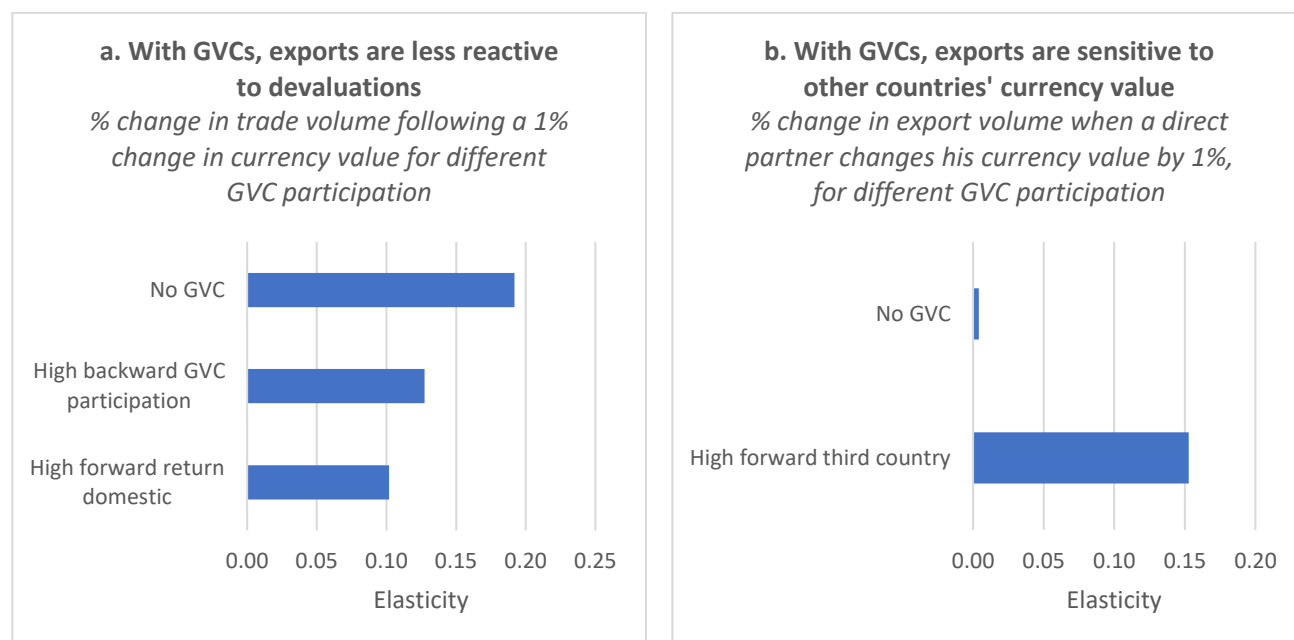


Source: WDR 2020 team, based on de Soyres et al. 2018.

Note: This graph summarizes the different channels for GVCs to influence the elasticity of exports to devaluations.

372. Interestingly, greater participation in international production not only decreases the exchange rate elasticity of exports, but it is also possible for a currency devaluation to *reduce* a sector’s exports to a specific destination. This happens whenever a sector has both a high share of foreign value added in exports and a high share of exports re-imported and consumed in a country with the same currency.

373. Current GVC participation around the world already accounts for a significant decline in the efficiency of devaluation in boosting exports (figure 4.9). Sectors in the top decile of the backward GVC participation have an export elasticity only 2/3 of the elasticity corresponding to sectors with no participation in GVC. Moreover, the rise of production interconnections is associated with a very significant sensitivity of export volume to foreign devaluations.

Figure 4.9 GVCs blunt the reaction of export volumes to currency movements

Source: WDR 2020 team, based on de Soyres et al. 2018.

Note: On the left, the bars plot the value of the exchange rate elasticity for the 10 percent highest GVC participation indices. “Backward GVC participation” refers to foreign value added embedded in exports. “Forward return domestic” refers to domestic value added embedded in exports and re-exported back in the domestic economy. On the right, the bars plot the value of elasticity of exchange rate to a direct partner’s change in nominal effective exchange rate.

374. The relationship between exchange rate movements and export growth is also affected by the choice of invoicing currency as well as potential changes in markups. For example, since many international transactions are invoiced in dollars, some countries are more sensitive to the dollar exchange rate than the bilateral exchange rate.¹⁸ Moreover, foreign investment enterprises in China are absorbing currency movement to partially stabilize their prices in local currency terms. In contrast, prices charged by private locally-owned Chinese firms exhibit much more sensitivity to currency movements.¹⁹

375. Most current measures of trade imbalances are based on gross trade data and simply reflect the difference between the values of total exports and total imports. But with global value chains, gross exports and gross imports are poor measures of the domestic value added exported and of the foreign value added consumed (see box 4.3). So, global value chains bias the distribution of trade deficits across trading partners, which might mislead trade policy. For example, the U.S. bilateral trade deficit with China is smaller when measured in trade in value added than when measured in gross trade. The reason? China buys many of the inputs for its exports from other countries. But U.S. bilateral trade deficits with many of those other countries are larger (or U.S. trade surpluses with them are smaller) when measured in trade in value added. The reason? Many U.S. imports from China incorporate the value of inputs originating in these countries.

376. Moreover, as noted in Amiti et al (2017), production linkages across countries naturally lead to bilateral imbalances across countries, in the same way that large companies routinely have deficits with their suppliers: the company purchases inputs but sells little to these smaller firms. For example, Germany, despite running a large aggregate trade surplus, runs bilateral trade deficits with the Czech Republic, Slovakia, and Hungary, the main low-cost suppliers in the European production chain.²⁰ Indeed, a bilateral deficit has little meaning for the aggregate trade balance. The same is true for the US-Mexico relationship, where new measures from de Gortari (2019) highlight the very high integration in the automotive industry (see box 4.3).

Box 4.3 Trade Imbalances in using Value Added data

Most current measures of trade imbalances are based on gross trade data and simply reflect the difference between the value of total exports and total imports. With GVCs, gross exports and gross imports are not accurate measures of the domestic value added exported and of the foreign value added consumed. Over the past few years, several papers highlighted the importance of building a more accurate picture of bilateral trade flows and the need to account for the evolution of value-added balances.¹

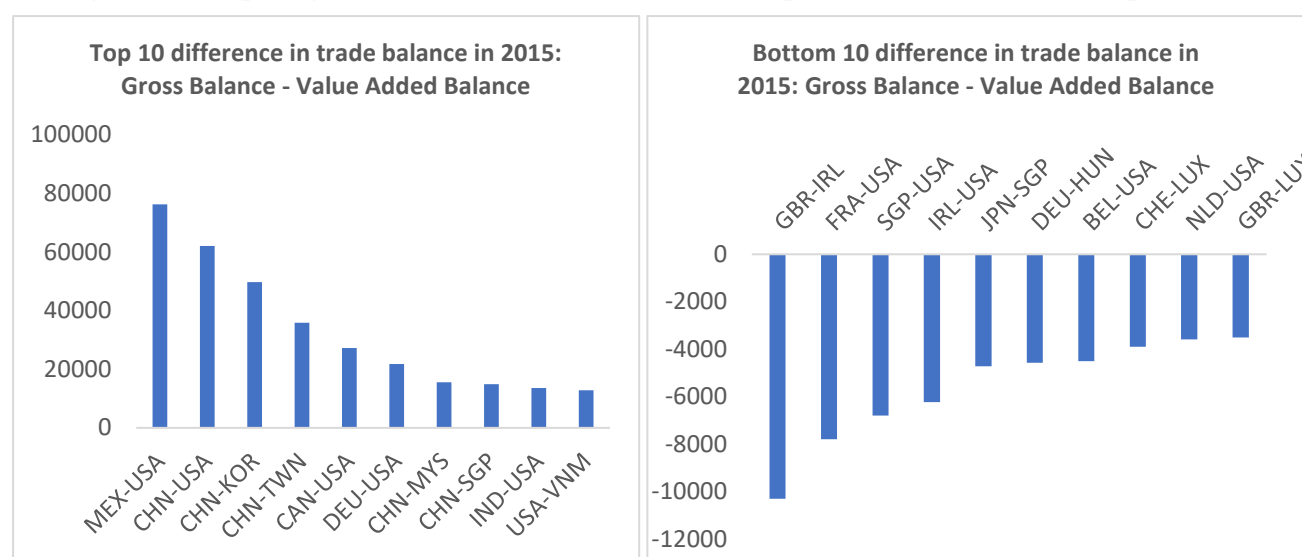
For example, the U.S. bilateral trade deficit with China is smaller when measured in trade in value added than when measured in gross trade, because China buys many of the inputs for its exports from other countries. However, U.S. bilateral trade deficits with some of those other countries are larger when measured in value added terms, since many US imports from China contain inputs originating in these countries.

Based on the Trade in Value Added database from the OECD, the figure below shows the largest differences between bilateral trade balances using gross exports and value-added flows respectively. While for some country-pairs, the trade balance in gross flows is larger than the trade balance in value added (left panel), there are other country-pairs for which the situation is reversed, and the value-added trade balance is larger than the gross balance.

One commonly used method to compute value-added trade flow is based on manipulations of input-output tables to calculate the share of value added coming from any country embedded in any gross flow. Such a method, however, relies on strong proportionality assumptions. For example, when looking at the automotive industry in Mexico, this method assumes that the share of inputs from the US is the same regardless of the destination of the trade flows – in other words, it assumes the same production process for all destination for a given industry in a given country.

New findings from de Gortari (2019) shows that this assumption does not hold in the data. Using data from the automotive industry, the paper shows that there is a strong link between the destination of exports and the origin of the imported input: about 74 percent of all the foreign parts used by vehicle assemblers in Mexico that export to the US are imported from the US itself. In contrast, only 18 percent of the imported parts used by Mexican firms exporting to Germany come from the US. This implies that just looking at sectors to understand trade flows is not enough: one needs to look deeper and deepen the analysis at both sector and destination level.

Finally, even though greater participation in global value chains is expected to generate larger bilateral balances, it is not necessarily associated with a larger overall trade balance. According to the IMF's 2019 World Economic Outlook, there is a strong positive relationship between a country's participation in global value chains and the size of its absolute bilateral balances, while the relationship is much weaker when it comes to the size of the overall trade balance. Moreover, it has been shown that targeting bilateral trade deficits does not, in general, reduce a country's overall current account deficit: indeed, macroeconomic policies as well as financial conditions tend to be the key forces explaining countries' overall trade balances.²

Box figure 1. Computing Bilateral Trade Balance in Gross Exports or in Value Added Exports matter

Note: For each pair of country, the trade balance is the absolute value of the difference between exports and imports.

Source: OECD Trade in Value Added database, 2020WDR team computation. Country are represented by their ISO3 code.

¹ Johnson and Noguera 2012a, 2012b, 2017; Koopman, Wang, and Wei 2014.

² IMF's World Economic Outlook, April 2019, Chapter 4. See also Ahn, Boz, Obstfeld and Topalova (2019) for more on this.

E. Mitigating trade diversions and increasing trade

377. Production fragmentation knits together the economic interests of firms (and workers) up and down the supply chain. Before the proliferation of global value chains, trade liberalization often benefited local consumers at the expense of local producers. But with these new linkages, the producer gains from trade that used to accrue only to foreign exporters are shared—and often divided differently—on both sides of the border.²¹

378. GVCs also change another standard paradigm of trade policy: the diversion of trade from a more efficient producer outside a trade agreement to a less efficient producer inside it. GVCs change the consequences of signing a trade agreement on the trade flows within the agreement zone as well as between members and nonmembers of the trade agreement.

379. Trade is not a zero-sum game, and many trade agreements can help improve welfare and reduce poverty—but they also re-allocate trade flows and create both winners and losers.²²

380. Looking at all regional trade agreements over the past 60 years, agreements are associated with strong and positive trade creation: on signing the agreement, exports between member countries grow significantly—with estimates ranging from less than 10 percent to more than 80 percent depending on the agreement and the countries. But there is also trade diversion: on average, exports from nonmember to member countries decrease, while exports from member to nonmember countries tend to increase very slightly.

381. The reduction in imports within the agreement zone is, among other things, related to rules of origin on final goods. Those rules are defined to prevent nonmember countries from transshipping products through low-tariff agreement members to avoid high tariffs. In effect, the rules act as an input tariff, in the sense that they distort sourcing decisions and divert trade in intermediate goods to higher-cost agreement members. Those mechanisms are quantitatively very relevant: On average, Mexican imports of intermediate inputs from third countries relative to NAFTA partners would have been 45 percent higher without rules of origin.²³

382. GVCs thus fundamentally change how local trade agreements affect global trade flows. With production fragmented across countries, rigid linkages have the potential to mitigate the diversion usually associated with regional trade agreements. For example, if a member country relies significantly on intermediate inputs from other member countries, signing a trade agreement actually strongly increases its exports to nonmember countries. The explanation comes from the supply side: Firms gaining preferred access to their supplier within the free trade zone have a lower marginal cost and can expand their market share in other countries. In other words, countries forming a trade agreement import less from and export more to the rest of the world. Such an effect can lead to efficiency gains not only within the regional free trade zone but also in other parts of the world.²⁴

383. Despite the rules of origin, when the share of intermediate goods increases between a nonmember country and a member country, the trade diversion of exports from the nonmember country to the member country is largely mitigated. Indeed, firms in member countries gaining access to larger markets within a free trade zone can transmit this positive shock to their own suppliers outside the agreement zone.

384. Moreover, an increase in the share of intermediate inputs between two countries is associated with higher trade creation upon signing a trade agreement and lower trade diversion when one of the two countries enters a separate trade agreement with other partners. This finding has consequences for trade negotiations. If signing a trade agreement creates positive spillovers to nonmember countries, the whole design of trade negotiations could be adapted to allow for more cross-country coordination, including countries that are not directly part of the trade agreement.

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- ¹ Burstein, Kurz and Tesar 2008.
- ² Johnson 2014.
- ³ di Giovanni, Levchenko, and Mejean 2017; Boehm, Flaaen, and Pandalai-Nayar 2019; Liao and Santacreu 2015.
- ⁴ De Soyres and Gaillard 2019a and de Soyres and Gaillard 2019b..
- ⁵ De Soyres and Gaillard 2019b.
- ⁶ Freund and Pierola 2015.
- ⁷ Swiss Re Institute 2018.
- ⁸ Automotive News 2011.
- ⁹ Lohr 2011.
- ¹⁰ Arto, Andreoni, and Rueda Cantuche 2015.
- ¹¹ Boehm, Flaaen, and Pandalai-Nayar 2018.
- ¹² Barrot and Sauvagnat 2016.
- ¹³ Auer, Levchenko, and Saure 2018; Auer, Borio, and Filardo 2017.
- ¹⁴ See Andrews, Gal and Witheridge (2018) as well as de Soyres and Franco (2019).
- ¹⁵ Leigh et al. 2015.
- ¹⁶ Blaum 2018.
- ¹⁷ See Amiti, Itskhoki, and Konings (2014) for a discussion of upstream GVC participation as well as its link with markup fluctuations. See Ahmed, Appendino, and Ruta (2015) and de Soyres et al. (2018) for the role of downstream GVC participation. See Mattoo, Mishra, and Subramanian (2017) for related evidence on the role of third country effects.
- ¹⁸ Boz et al 2017.
- ¹⁹ Corsetti et al. 2018.
- ²⁰ See Amiti, Freund and Bodine-Smith (2017) for more details on this.
- ²¹ Blanchard 2010; Blanchard 2017.
- ²² Freund and Koopman 2019.
- ²³ Conconi et al. 2018.
- ²⁴ De Soyres, Maire, and Sublet 2019.

Chapter 5: Impact on the Environment

385. The \$4,995 Pedego Conveyor electric bike is produced in China with parts from all over the world (figure 5.1).¹ Gears, pedals, brakes, and other components are shipped from Europe, Japan, Indonesia, and other economies to China, only to be assembled and then shipped to the United States for final sale. Roughly 60 percent of the bike’s value is from outside China.

386. Because parts are crisscrossing the globe, producing the Conveyor through a GVC has greater environmental costs than standard trade. Even more worrisome, some of the most environmentally damaging parts, such as the batteries and tires, may end up being produced in countries with the weakest regulations, leading to more environmental degradation.

387. But global value chains are also engines of innovation that help drive the creation and diffusion of less damaging products and processes. GVCs make new environmentally friendly products like this electric bike possible. And big international brands can use GVCs to encourage the global adoption of clean and efficient technologies and processes aimed at enhancing both profitability and sustainability.

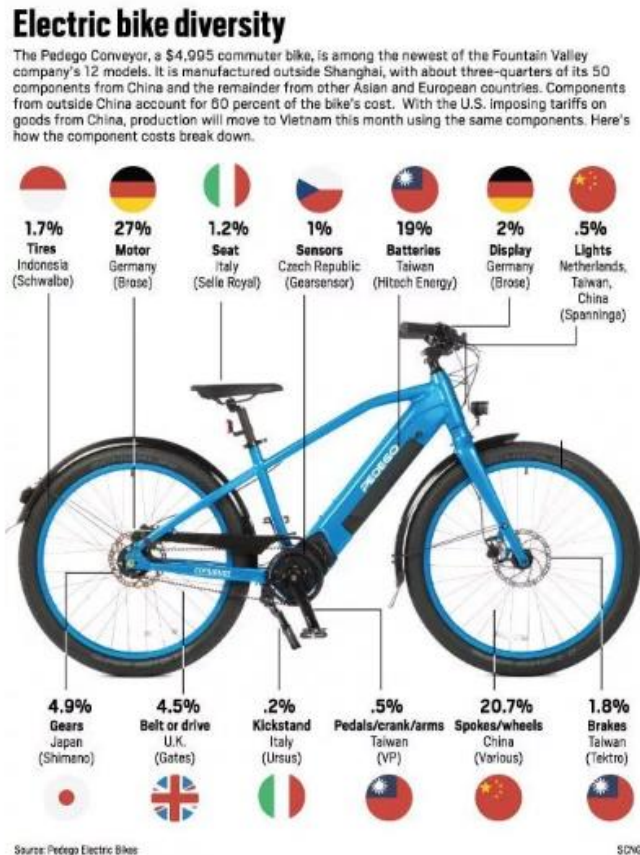
388. Environmental consequences arise from features of GVCs, including hyperspecialization of tasks, geographic dispersion of production, economies of scale, and market power of lead firms. The total environmental impact of GVCs is considered here along three dimensions:

- *Scale effect.* If GVCs cause economic activity to grow, and composition, consumer preferences, and production techniques remain the same, in the sense that pollution per unit of output is constant, then growth leads to environmental deterioration. GVCs have some consequences that extend beyond those of standard trade. In particular, GVCs are associated with more waste and more shipping in the aggregate, both of which have large environmental costs.
- *Composition effect.* GVCs, by promoting trading in tasks, cause certain types of economic activity to relocate internationally, thus transforming patterns of production and trade. Shifts in production toward countries with abundant natural resources allow scarce resources to be preserved, helping to sustain global resources like land and water. However, the fragmentation of tasks across countries increases the proportion of maritime shipping, which is particularly harmful to the environment. What’s more, as “dirty” and “clean” tasks are redistributed between countries, this may create environmental benefits for some countries and environmental costs for others. Importantly for global pollutants like CO₂, the evidence suggests that industries do not generally migrate to jurisdictions with lax environmental regulation.
- *Technique effect.* GVCs can also promote improvements in techniques of production. Knowledge flows among networks of firms can enable more environmentally friendly techniques to be developed or applied more quickly. When new techniques reduce environmental impact per unit of output, the technique effect leads to environmental improvement. The large scale of lead firms in GVCs allows them to sustain high rates of innovation. Market concentration can reduce coordination barriers to managing common pool resources such as fisheries and forests. The relational aspect of GVCs is also important in this context, as lead firms increasingly transfer environmentally friendly technologies to their suppliers and push for higher standards.

389. Policies can drive the net impact of the scale, composition, and technique effects of GVCs. Take subsidies. With subsidies on fuel, for example, GVCs can exacerbate overuse and overproduction of fuel-intensive exports. But subsidies for environmental goods can lead to more production and innovation with GVCs. New environmental goods, from solar panels to LED lightbulbs, many subsidized over the years, expanded rapidly because of GVCs, facilitating the diffusion of low-carbon technology. Variation in regulation can also lead to net global increases in environmental damage if polluting tasks migrate to countries with lax regulations. This theoretical possibility is called the Pollution Haven Hypothesis (PHH). A large body of literature does not find evidence of it. Comparative advantage for many of the most

polluting industries rests on such factors as capital and resource abundance, so they tend not to migrate to the least regulated countries because of the regulation per se. On the other hand, low- and middle-income countries are often reluctant to raise environmental standards, because in a world of liberalized trade and investment they fear losing the interest of foreign investors.² Policies for avoiding such investment diversion and for preserving the environment in a world of GVCs are discussed in Chapter 8.

Figure 5.1 Producing the Pedego Conveyor in China

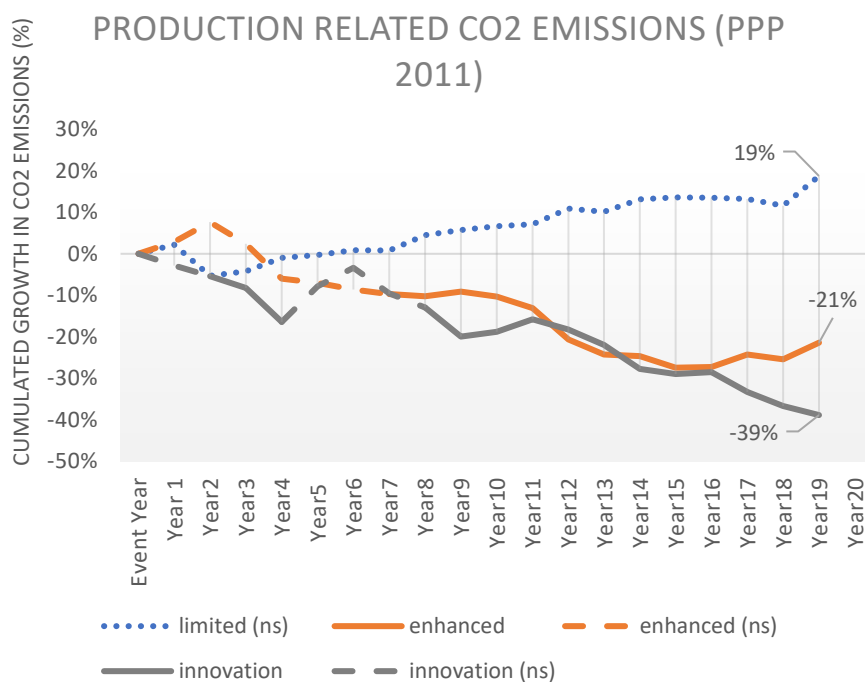


A. GVCs magnify the effects of trade and growth on the environment

390. As GVCs grow and economic activity expands, emissions increase—a simple scale effect. The effect could be greater if production is in more-polluting industries—a composition effect. Absent technological innovation, the scale effect of GVC trade tends to be negative for the environment. The reason is that while production-related pollution and CO₂ emissions decrease with rising incomes, consumption-related environmental emissions and degradation tend to increase.

391. Countries that recently transitioned into limited manufacturing-linked GVCs experience on average a faster growth of production-related CO₂ emissions than before they entered them, though there is considerable variation across countries that the results are not statistically significant (figure 5.2). That is, in some countries, manufacturing expanded without rising emissions. Meanwhile, countries that recently transitioned into advanced manufacturing and services GVCs, as well as innovation hubs, typically experience a decline in average production-related CO₂ emissions. In these countries, which tend to be at a higher stage of development, consumers may demand more regulations, and the technology of production becomes more environmentally friendly.

Figure 5.2 After upgrading, CO₂ emissions drop in countries that recently transitioned into advanced GVCs and innovation hubs



Source: WDR team using data from WDI and EORA.

Note: The event study quantifies cumulated CO₂ emissions in the 20 years following a switch from a lower to a higher stage of GVC engagement. See box 3.3 for a discussion of the methodology

392. These contrasting results are consistent with the literature. On the one hand the environmental Kuznets curve (EKC), later referred to as an inverted-U, shows that economic growth increases the presence of local pollution and production-related CO₂ emissions at low incomes. Beyond a certain turning point it is instead associated with improvements in environmental indicators,³ while higher incomes also appear to increase demand for environmental quality.⁴ On the other hand, there is a clear positive correlation between higher GVC activity and a number of indicators of global environmental damage. Given the urgency of the global environmental challenge, relying on countries growing first and cleaning up later may be misguided, and fail to deliver the emissions reductions needed to avoid climactic catastrophe.

393. One way in which GVCs can encourage manufacturing while also protecting the environment is through a greening of industrial parks, by inducing GVC firms to opt for parks that have higher standards and encourage environmentally friendly production techniques. More than 300 industrial parks now consider themselves to be environmental industrial parks (EIPs)—a number that is expected to increase. In many countries, governments have become more conscious of green approaches to manufacturing, and lead firms, concerned about reputation, are eager to improve the sustainability of production (box 5.1)

Box 5.1 Green industrial parks can provide sustainability and resilience and attract better investors

In 2018, there were 300 eco-industrial parks and economic zones in 40 countries, including Argentina, Bangladesh, China, Colombia, Egypt, Lebanon, India, Indonesia, Mauritania, Morocco, Republic of Korea, Thailand, Turkey, and Vietnam.⁵ Since a high share of export oriented industrial production in many countries is in industrial parks located in a special economic zone (SEZ), there is a correspondingly high share of industrial emissions originating in them, not only air and water pollution but also

greenhouse gases. The relevance of SEZs and industrial parks to pollution control and GVCs is three-fold.⁶

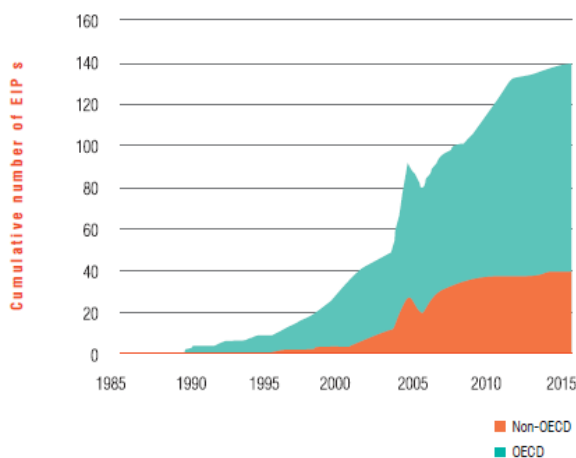
First, major issues for many developing countries are attracting foreign investment, diversifying export baskets, and creating better jobs. But in many old-style SEZs, the environmental standards were very low, with the traditional industrialization model based on the attractiveness of low production costs and taxes. GVCs now have the potential of creating strong incentives toward more sustainable production in SEZs. The Laws on sustainability reporting have made companies headquartered in many industrialized countries liable for risks along their value chains. To reduce those risks and ensure the traceability and quality of final products, increased transparency along value chains is now sought.

Second, as in other policy areas, SEZs provide an avenue for policy experimentation on making industrial parks sustainable. New environmental policies and disciplines can be implemented in a more manageable environment, as with promoting recycling, provisioning renewable energy and other green infrastructure, constructing environmentally friendly buildings, and reusing and commercializing waste products. Since waste re-use and energy co-generation can be designed to link different firms within the same SEZ, some of these policies can take advantage of the ecosystem aspects of SEZs (industrial symbiosis).

In a bid to address the negative environmental impact caused by the concentration of industrial production, the World Bank Group, in partnership with UNIDO and GIZ, developed an international framework for eco-industrial parks in 2017 to guide policymakers on the critical elements for both the public and private sectors to establish environmentally sustainable eco-industrial parks (EIPs) that go beyond compliance. To date, EIPs are increasingly being considered as critical frameworks for overcoming sustainability challenges within the scope of the SDGs. Countries such as Denmark, France, Japan, and Republic of Korea, among many others, have leveraged EIPs to promote more inclusive and sustainable action to improve industrial competitiveness in line with climate change goals.⁷

Third, from the perspective of an industrial park operator–developer, offering environmentally sustainable facilities is an opportunity to attract higher quality and higher paying tenants, as GVC firms tend to be. With thousands of industrial parks globally, operators are looking to use a more sustainable and cost-competitive operating environment to differentiate themselves from more basic industrial parks. For example, Hawassa industrial park in Ethiopia adopted zero-liquid discharge technologies for waste water treatment to attract high-end apparel manufacturers. Vietnam recently issued guidelines for improved environmental performance in its industrial parks. These approaches improve socio-environmental performance without having to implement additional regulations.

Box figure 1 Growth of eco-industrial parks, 1985–2015



Source: Kechichian and Jeong 2016; Yeo and Akinci 2011.

Transportation

394. A key concern of GVCs relates to the more intensive use of transportation than other types of trade, with parts and components being shipped to a country only to be shipped out after assembly. This back-and-forth transport of goods across long distances generates CO₂ emissions through the combustion of fossil-based fuels directly contributing to climate change. CO₂ emissions from international freight transportation account for about 7 percent of total CO₂ emissions globally.⁸ By 2050, it is expected that there will be a four-fold increase in CO₂ emissions related to international freight, which threatens the temperature goals under the Paris Agreement.⁹ In the past, industries where offshoring was more prevalent have shown the greatest increases in carbon emissions related to international trade.¹⁰

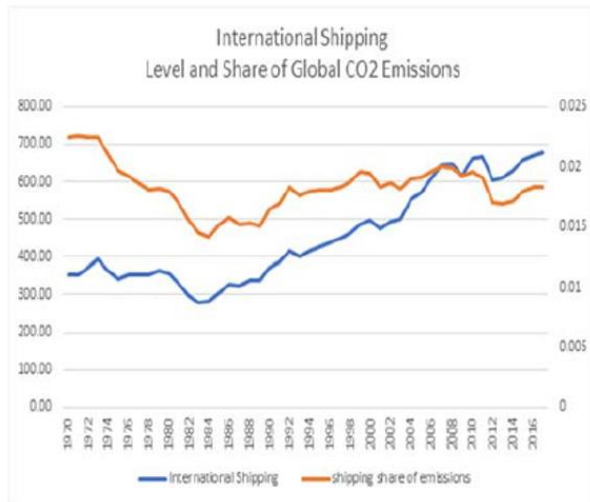
395. GVCs are most closely linked to maritime transport. More than 80 percent of world trade by volume and more than 70 percent by value is transported by sea.¹¹ The capacity of the merchant shipping industry has surged since 1990, and so have emissions from shipping. Current maritime CO₂ emissions are 2 percent of total CO₂ emissions (Figure 5.3a). This is not a small number: as a country, shipping would be the seventh largest emitter, ranking between Germany and South Korea.

396. Under business as usual conditions, these emissions are projected to increase by a further 50–250 percent by 2050¹²—that is, if the maritime sector keeps expanding at a yearly rate of above 3 percent, as it has over the past 40 years.¹³ While emissions from other sectors have started declining or are expected to peak soon, none of the business-as-usual scenarios for shipping foresee a decline in emissions before 2050. As a result, this risks raising the share of the sector in global CO₂ emissions to 10-17% by 2050.¹⁴ Technological advances and ambitious climate policy are needed to offset this trend. As transport technology has improved, growth in emissions since 1990 was already far less (1.85 times) than the near tripling of capacity over the same period (figure 5.3a).

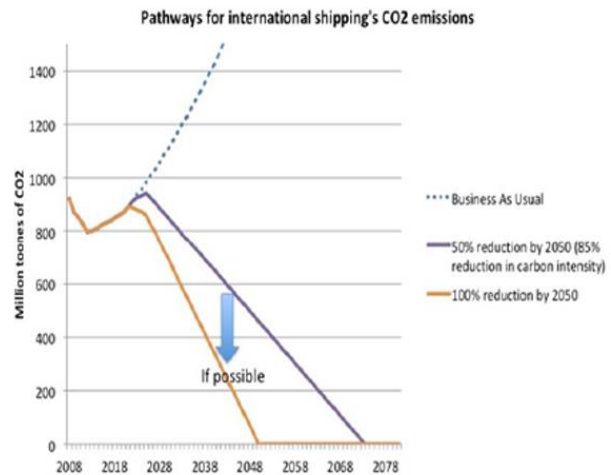
397. Aware of these rapidly rising emissions challenging the world's remaining carbon budget, the International Maritime Organization (IMO) has committed to at least halve CO₂ emissions by 2050, aiming at eliminating CO₂ emissions from shipping as quickly as possible (figure 5.3b).¹⁵ While technology and operational measures could reduce emissions by up to 60 percent by 2050, according to the Intergovernmental Panel on Climate Change,¹⁶ technological innovations will be required to achieve full decarbonization of the sector as envisaged by the IMO. Alternative fuels such as ammonia or hydrogen, synthetically produced by renewable energy, are estimated to represent the most promising decarbonization pathways.¹⁷

Figure 5.3 International shipping emissions

- a. International shipping emissions are increasing but are a smaller share of global CO₂ emissions
- b. Emissions may be cut drastically by 2050



Source: Muntean et al. 2018



Source UCL Energy Institute.

398. This energy transition in shipping towards zero-emissions fuels can be facilitated by effective policy support in the form of carbon taxes, emissions trading, low-carbon fuel standards, gradual ban of fossil fuels and others. From an environmental perspective, maritime activities are currently undercharged. Unlike domestic transportation, fuels in international transportation, for instance, are not subject to excise taxes. Charging for maritime fuels based on their true social cost can provide support for fully exploiting the existing energy efficiency potential and developing alternative fuels. The challenge is that ships are highly mobile: they travel mostly in international waters and can easily be registered anywhere. Thus, pricing emissions appropriately would work best with a global solution; for instance, taxing maritime fuels at a single international carbon rate.¹⁸ Yet, without a global solution and notwithstanding potential market distortions, some governments are taking unilateral measures. The European Parliament, for example, is considering a regional carbon pricing in the absence of a global agreement.¹⁹ Other options include taxing ships based on the type of vessel or taxing bills of lading that show the distance the imported cargo traveled. These and other policy considerations are considered in Chapter 8.

399. Next to climate change, maritime shipping also poses major pollution challenges in other areas. But in some cases, international solutions have started to emerge and lead to improvements.

- Air pollution: Shipping accounts for roughly 15 percent of global SO₂ and NO_x emissions. Ship engines burn the dirtiest fuel possible (heavy fuel oil, a residual product of refinery processes of gas, diesel, kerosene, and so on). A recent study by the International Council on Clean Transportation attributed 60,000 premature deaths annually to shipping emissions.²⁰ The IMO has, therefore, recently reduced the mandatory sulfur limit from 3.5 percent to 0.5 percent from 2020 onwards for maritime fuels.
- Solid waste: Although most plastic waste that ends up in the ocean comes from land-based sources and is transported through rivers, about 20 percent originates directly from ships. A big problem is that port reception facilities—waste disposal facilities provided for ships by authorities—are often nonexistent, inadequately equipped, complicated to use, or simply too expensive. Scrapping ships is also a huge problem in itself.²¹

- Invasive species: To float in a balanced way, ships often have to take on board ballast water. This water then gets discharged at another location when the weight and volume requirements change. Invasive species are transported around the globe in this water and released at locations where they can pose a threat to sensitive ecosystems.
- Water pollution: Other pollution-related problems are linked to oil spills, sewage disposal (from ship operations), and bilge water (oil leaking from the engines and machinery).

400. Aside from maritime transport, road and rail transport are also important determinants of the GVC impact on the environment, given their predominance in domestic value chains. The efficiency and performance of the trucking industry can have a significant impact on the carbon footprint of GVCs. The adoption of more fuel-efficient vehicles reduces associated emissions, and the reduction of empty backhauls improves overall efficiency and waste and contributes to lower prices. For example, when Lao PDR abolished restrictions on backhauling by foreign trucking companies, road transport prices declined by 20 percent. Substitution between road and rail modalities, and the associated development of more seamless containerized logistics is another important area that will determine the overall GVC impact on the environment. Rail is the lowest emitter of CO₂ emissions (3 percent of the total) while road freight is over 50 percent.

GVCs and waste

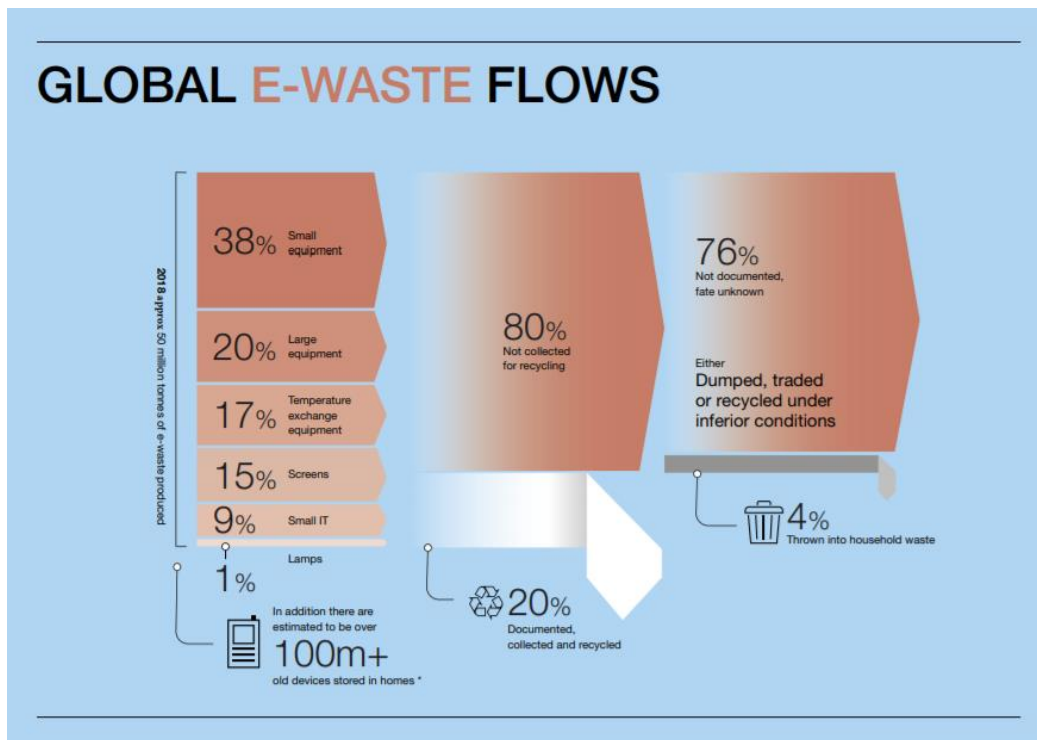
401. GVCs can influence the amount and type of waste generated during the production and transport of goods from source to consumer. They have contributed to a large share of the waste in the electronics sector, but they are also well positioned to be part of the solution.

402. E-waste is the fastest growing waste stream in the world, accounting for more than 70 percent of toxic waste in U.S. landfills (figure 5.4).²² GVCs have enabled rapid declines in the cost of electrical and electronic devices,²³ and increased the incomes of large numbers of people who could otherwise not afford even low-cost items. GVCs also drive the rate of technological innovation that leads to high replacement rates worldwide.

403. But GVCs have the potential to close the loop and turn e-waste into valuable resources. United Nations University conservatively estimated the value of recoverable materials in last year's e-waste to be US \$55 billion, more than the 2016 gross domestic product of most countries.²⁴ Some countries, such as Japan, have e-waste management laws that make manufacturers and retailers responsible for taking back used home appliances, recycling them, and publishing the costs of recycling.²⁵

404. E-waste flows should be seen as sources of inputs for next generation products.²⁶ The World Economic Forum's call for a circular electronics value chain represents a model of sustainability that is difficult to envisage without global value chains.²⁷ Inputs from retired electronics should be removed and recycled by the very companies that produce them.

Figure 5.4 The world produced 50 million metric tons of e-waste in 2018

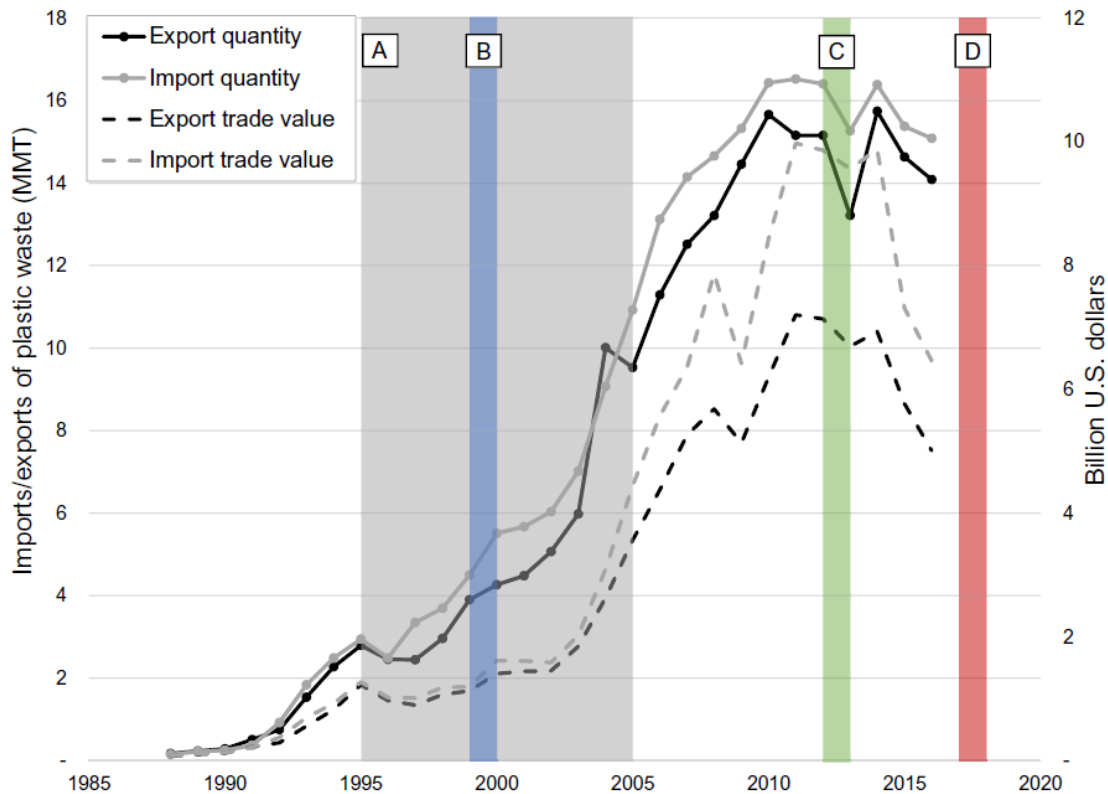


Source: <https://www.weforum.org/agenda/2019/01/how-a-circular-approach-can-turn-e-waste-into-a-golden-opportunity/>.

405. The rapid growth of use and disposal of plastic materials has also grown in lock-step with GVCs (figure 5.5). Plastic waste has proved a major challenge for solid waste management and has become a global crisis for the environment and particularly oceans. In 2018, the Centre for Biological Diversity estimates that swirling convergences of plastic make up about 40 percent of the world's ocean surfaces and that at current rates it is expected to outweigh all the fish in the sea by 2050.²⁸

406. Gross trade data from UN Comtrade alone are not well suited to portray what is happening to plastic waste worldwide. Input–output data are in principle able to better track and manage it. But in both statistical sources, information is too aggregated to track international flows. The two most common polymers—PET and PP—lack specific codes in UN Comtrade because trade codes for these waste materials are not yet harmonized across countries and available multi-region input-output data do not even include a category for waste. So, calculating plastic waste requires better statistical measurement.

Figure 5.5 Global trade in plastic waste has grown exponentially since 1990 but may be plateauing



Source: Brooks et al. 2018.

Note: Trade of plastic waste in mass and trade value (UN Comtrade data). Events: (A) Advances in municipal recovery facility (MRF) technology resulting in expansion of commingled recycling, especially single-stream recycling in the United States (1995–2005). (B) Surge in globalization. (C) Implementation of temporary Chinese import restrictions (Green Fence). (D) Implementation of the new Chinese policy banning the import of nonindustrial plastic waste (2017).

407. Today’s recycling technologies cannot handle the rapidly growing quantities of global waste. For many years, China was accepting a large share of the world’s plastic waste, but eventually the environmental costs of recycling “dirty” plastics became formidable, and China raised the import standards in 2017, all but cutting them off (box 5.2). With most plastic waste now ending up in landfills or incinerators, reducing waste and developing better technology for packaging goods and recycling is an environmental priority in many countries. These are promoting a shift away from plastics in bags and water bottles, encouraging reuse, and use of more economical and environmentally friendly packaging of parts, components, and goods traveling the world.

Box 5.2 The recent ban on plastics by China disrupted the waste GVC

One way GVCs extended a product’s life was through recycling of paper and plastic waste. In recent decades, goods shipped from China to the United States were consumed, and paper and plastic containers, along with domestic plastic and paper waste, were sent back to China for recycling.

At the end of 2017, China stopped accepting large amounts of imported waste for recycling because a large share was “dirty” and causing environmental damage. Prices of plastic scrap and low-grade paper collapsed, disrupting the global recycling industry. In the first half of 2017, China and Hong Kong SAR China absorbed 60 percent of the plastic waste exported by G7 countries, a year later they imported less than 10 percent (box figure 1).

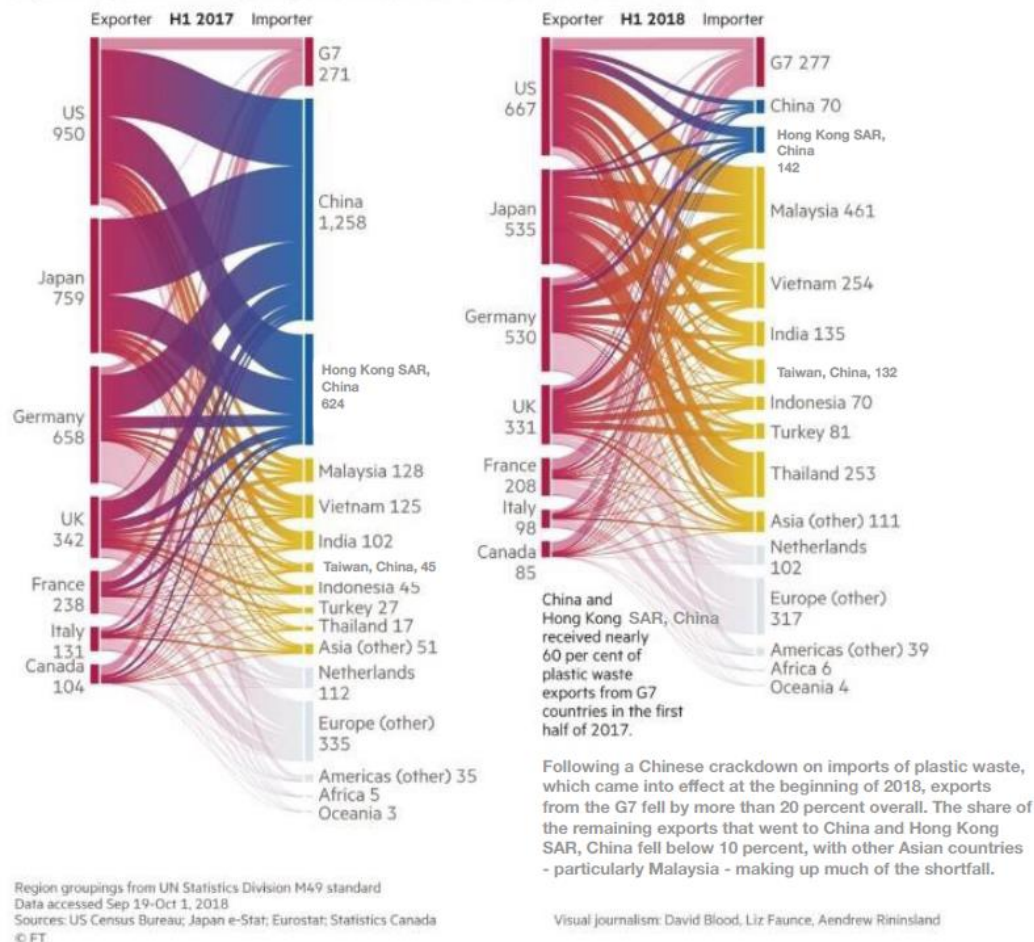
In their place, Malaysia, Thailand, and Vietnam, among other EAP countries, experienced significant increases in contaminated and plastic waste imports—many containers were misrepresented as plastic scrap, and when the contents could not be recycled it was burned or dumped. As a result, at least the Indonesia, Malaysia, the Philippines, Thailand, and Vietnam have announced they will ban or send back contaminated waste to the countries of origin, with the threat of abandoning the waste in countries’ territorial waters if it is not accepted.

Reducing the paper and plastics in packaging and using cleaner technology for recycling has become a priority for environmentally-concerned countries. In May 2019, 187 countries—excluding the United States—agreed to amend the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal¹ to better regulate the global trade of plastic waste and make it more transparent. Among the commitments, private companies will have to secure the consent of receiving countries before they can trade contaminated and most mixes of plastic waste.

Box figure 1 Sources of plastic waste imports into China in 2016 and cumulative plastic waste export tonnage (in million metric tons) in 1988–2016.

How the global river of plastic waste changed course in just 12 months

Exports of plastic waste, parings and scrap from G7 countries ('000 tonnes)



Source: Financial Times, <https://www.ft.com/content/360e2524-d71a-11e8-a854-33d6f82e62f8>.

¹ The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery, in the 1980s, in Africa and other parts of the developing world of deposits of toxic wastes imported from abroad.

B. GVCs and the composition of production

Falling trade costs, tighter environmental regulations, and pollution havens

408. As trade costs are falling while environmental regulations are tightening in many countries, polluting manufacturers might respond to new environmental regulations by relocating to countries with less strict standards. Moreover, because GVCs foster hyperspecialization, with tasks moved to the most productive location, lead firms from countries with tight environmental regulations might locate “dirty” production in countries where environmental norms are lax—pollution havens. Relocating conventional local pollutants improves the air and water quality in places with strict regulations at the expense of environmental quality in pollution havens.

409. In theory, concerns about pollution havens are well founded.²⁹ Pollution is an input to production, just like labor and capital. Think of pollution as the disposal services of the environment, where the unregulated price is zero. Countries export goods they have a comparative advantage producing, meaning their costs of producing those goods are lower relative to their costs of producing other goods. Countries with lax pollution regulations have a comparative advantage in goods whose production is pollution-intensive, and they will export those goods—they are the pollution havens.

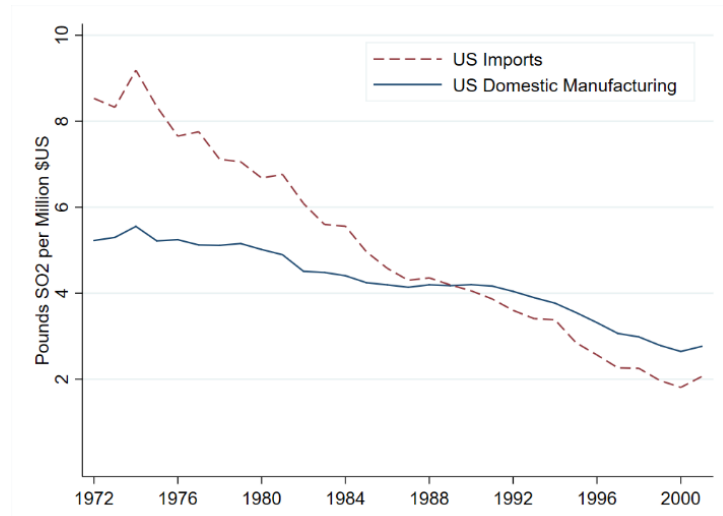
410. In practice, evidence of the pollution haven effect (PHE) has been difficult to find thus far. Polluting industries—paper, metals, cement, and refineries—tend to be costly to relocate, and production is tied to local factor or product markets. Paper plants locate near the trees, and cement plants near their customers. It is therefore not obvious that countries with an absolute advantage in polluting goods, because they have lax regulations, will also have a comparative—or even absolute—advantage in those goods. Environmental regulations are a small part of costs. Empirical evidence shows that strict environmental regulation on polluting industries has not led to large relocations to countries with less strict standards.³⁰ And causal relationships between incomes and environmental damage do not appear to be driven by composition effects.

411. Identifying the PHE however is difficult due to statistical issues. Places attractive to polluting industries—because they have abundant raw minerals or cheap energy—find themselves hosting a lot of polluting industry and suffering the resulting pollution. Those places may respond by enacting strict regulations. In practice, polluting industries and strict regulations are positively correlated.³¹ Of all the recent papers studying pollution havens, few attempt to untangle the causal negative effect of pollution regulations on polluting industries.³² Those that do untangle those effects find a statistically significant but quantitatively modest effect for the most polluting industries. One study showed that a 10 percent increase in pollution abatement costs in the United States leads to a 0.6 percent increase in net imports from Mexico and a 5 percent increase in net imports from Canada.³³

412. Concerns exist that falling trade costs could drive the flight of polluters to developing countries. Take, for example, what happened to the types of goods produced in the United States compared with U.S. imports:³⁴ Emissions from U.S. domestic manufacturing fell by 60 percent from 1990 to 2008, caused by changes in environmental policy.³⁵

413. Figure 5.6 plots the pounds of sulfur dioxide (SO₂) air pollution per million U.S. dollars of value shipped from the manufacturing sector between 1972 and 2001. That total is calculated using the World Bank’s Industrial Pollution Projection System, which is simply a list of emission intensities for each of more than 400 manufacturing industries in 1987.³⁶ U.S. imports of polluting goods has been declining even faster than domestic production of polluting goods.

Figure 5.6 U.S. output has increasingly shifted away from polluting goods, but imports have done so even faster



Source: Data from Levinson (2010).

Note: Manufacturing output in millions of 1987 U.S. dollars. Emissions intensity from Hettige et al. (1995). Graphs for nitrogen oxides, volatile organic compounds, and carbon monoxide look similar, with the pollution intensity of U.S. domestic manufacturing falling less quickly than imports.

414. Averaging across industries, weighted by their values shipped in each year, gives the average pollution intensity of the entire US manufacturing sector each year. (The solid line in the figure plots that average, holding pollution intensities fixed as of 1987.) The average drops over time due only to changes in the composition of the manufacturing sector. US output has increasingly shifted away from goods that generate the most pollution per dollar of output toward cleaner goods. (The dashed line in the figure reports the same calculation for imports.) Contrary to conventional wisdom about industrialized countries “offshoring” production of polluting goods, imports to the United States have been shifting away from pollution-intensive goods even faster than U.S. domestic production. As trade costs fall, the US increasingly imports goods in which it has a comparative disadvantage, which happen to be relatively less pollution-intensive. Trends in Europe are similar, with imports becoming progressively less pollution-intensive, especially from low income countries.³⁷

415. Although the PHE appears to have been overplayed to-date, it may become more relevant as some countries adopt more ambitious climate policies to reduce emissions rapidly, such as those required to meet the objectives of the Paris Agreement. If some countries aim at zero CO₂ emissions by 2050, can we assume that the PHE would still not take place? It may be impossible to reduce CO₂ emissions to zero globally without addressing the problem of pollution havens.³⁸

416. In conclusion, rising environmental costs in some countries have led polluting manufacturing to relocate to less regulated countries, but the effect is likely modest and concentrated in a few industries. And falling trade costs have not led to a shift of polluting manufacturing to poor countries. If anything, the reverse has been true. Nevertheless, the industries most relevant to the PHE include steel, cement, and petrochemicals, among others which are critical from an economic, national security, and social perspective.

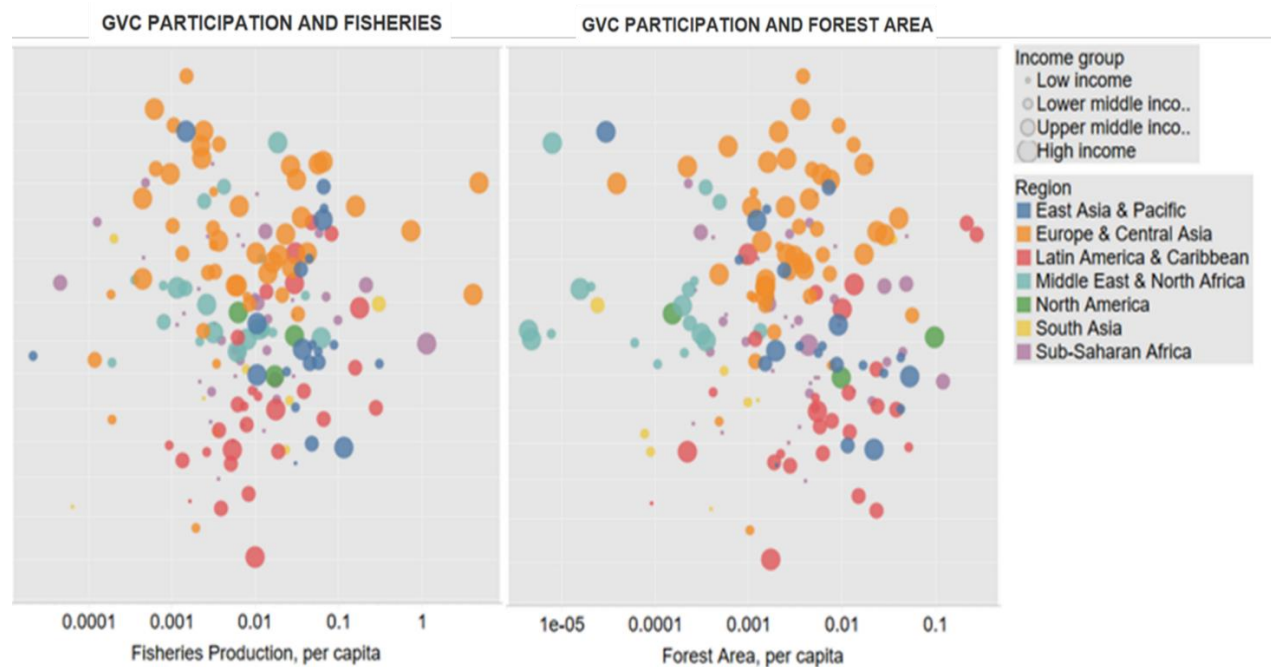
Environmental effects in agricultural and commodity GVCs

417. A large majority of the literature on trade and the environment, and the nascent literature on GVCs and the environment, focus on carbon emissions and, to some extent, on other forms of pollution. However, land-use changes such as deforestation and overfishing are equally important from a purely environmental

and human health perspective. These are conceptually distinct issues, with very different impacts from trade and GVCs.

418. Agricultural and commodity GVCs are a primary contributor to the state of the environment. Countries with higher GVC participation have higher per capita fisheries production and declining forest areas (figure 5.7)

Figure 5.7 Countries with higher GVC participation have higher per capita fisheries production and declining forest



Source: WDR team using data from WDI and EORA

Notes: The left plot represents per capita values of fisheries production and the right plot per capita values of forested areas. They are visualized on a log scale. Countries are sized by their income group and colored by their geographic region.

419. In agriculture, GVCs can help save scarce resources, by ensuring that raw materials are sourced closest to natural resources. But they can also lead to overuse, because of specialization and growing global demand. The pernicious effects are magnified when resource use is subsidized.

420. GVCs allow countries to preserve scarce resources by importing raw agricultural products from countries with more abundant resources. A good example is the water embodied in cereals and oils. Arid countries that do not have a comparative advantage in water intensive culture can import these goods for consumption or further processing without growing them domestically (box 5.3). Trade in “virtual water,” the water embodied in agricultural production, is estimated to have saved 4 percent of the global water footprint.

Box 5.3 Virtual water

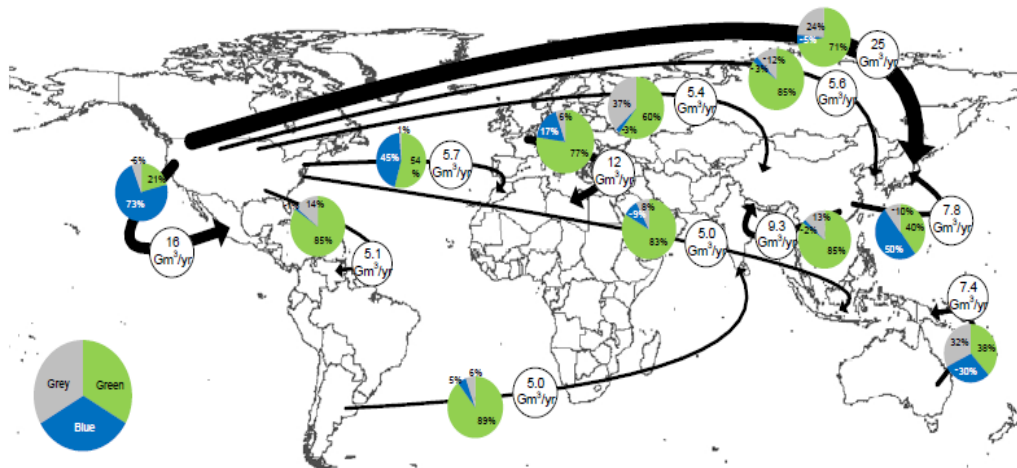
Are countries that have scarcer water reserves importing water-intensive goods?

The global water footprint in 1996–2005 was estimated at 9,087 Gm³/yr (74 percent green, 11 percent blue, 15 percent grey). Agricultural production contributes 92 percent to this total footprint, and about one-fifth of the global water footprint relates to production for export. Blue water is the freshwater used

to produce goods and services. Green water is the rainwater stored in the soil used to produce agricultural goods. Grey water is polluted water from production.

Because water-scarce countries can import water-intensive goods, especially agriculture products, from countries with abundant resources, trade has helped reduce the amount of water used in aggregate production. The global water saving related to trade in agricultural products in 1996–2005 was an estimated 369 Gm³/yr (58.7 percent green, 26.6 percent blue, and 14.7 percent grey), equivalent to 4 percent of the global water footprint related to agricultural production.

Box figure 1 Global water savings associated with international trade in agricultural products (1996–2005)



Source: Mekonnen and Hoekstra 2011.

Note: Only the biggest water savings are shown (> 5 Gm³/yr).

421. National policies can make the environment worse by subsidizing activities that lead to environmental problems. Subsidizing fisheries can lead to overfishing, recognized as a major global issue since at least the 1990s.³⁹ When agriculture is subsidized, deforestation, soil erosion, and chemical runoff into bodies of water are greater than they would be otherwise, and natural biodiversity will decline.⁴⁰

422. Even in the absence of subsidies, GVCs and trade create some concerns about hyperspecialization and degradation, especially in agriculture, a major driver of forest loss. Four products—soy, cattle, palm oil, and wood products—alone are responsible for 40 percent of global deforestation, at an average 3.8 million hectares a year.⁴¹ But many more commodities are experiencing growing global demand that threatens the environment in hotspots where these goods grow—cocoa, coffee, spices, vanilla, bananas, cut flowers, orange juice, natural rubber, and several others. Some fear that this may translate into a depredation of resources from developing countries.

423. By increasing global demand for certain agricultural resources and commodities, trade and GVCs contribute to deforestation, biodiversity loss, and other environmental problems in countries where resources are concentrated. But GVCs also present an opportunity to use value chain connections with receptive markets and consumers to address these issues through voluntary standards and regulated changes. Meanwhile, large-scale operations and upstream connections allow lead firms to efficiently provide information and services that allow small-scale producers to demonstrably meet standards that they otherwise could not. But regulation and policy are also needed.

424. The challenges and the possible solutions in a GVC world are well illustrated by the cocoa and chocolate industry. Cocoa—the essential ingredient in the world’s chocolate—has been identified as a major driver of deforestation in West Africa. For many years, soaring global demand and expanding cocoa production degraded forests. Suitable land is shrinking due to climate change, and trees are aging and need to be replanted, particularly in Ghana and Côte d’Ivoire. But the 5–6 million smallholder farms that provide almost the entire global production lack good agricultural practices to address these challenges. They also face difficulty obtaining farming supplies and financing any improvements they may want to make. Continued deforestation for increasing cocoa production is not sustainable.

425. Certification schemes provide a potential means to address environmental and socioeconomic issues in the industry. This opportunity for moving to more sustainable methods of cocoa production is supported by the downstream industry. Processing is dominated by a few large traders, grinders, and chocolate producers.⁴² Six companies alone process and trade 89 percent of the annual global cocoa production, while five chocolate producers buy 39 percent of it. That a few large companies dominate and compete at the downstream stages of production allows them to cooperate in fighting environmental degradation, a huge threat to their productivity, particularly as climate change makes cocoa harvest yields extremely unpredictable. Despite the strong incentives to work together for improving the social and environmental footprint of the upstream operations, the private sector commitments are not translating into improved sustainability of the supply chain in the absence of regulatory change. To address this problem, the World Bank has financed public–private collaboration for this supply chain to actively address environmental concerns. To improve sustainability of the cocoa value chains, domestic regulators and international development partners may need to intervene.

C. GVCs and improving production techniques

Lead firms can help raise standards

426. Environmental concerns associated with globalization might be alleviated in the age of GVCs. Because lead firms have a brand name to protect, they devote attention to how their supply chains function in terms of social and environmental standards. Lead firms in GVCs are typically well known, and their behavior can be easily monitored. Some firms are very active in promoting standards and addressing environmental challenges because consumers demand more sustainable products and doing so can have positive economic returns, either from cost saving or product recognition.⁴³

427. Recent studies provide empirical evidence that stricter regulation can enhance business performance.⁴⁴ At the country-industry level, higher compliance with social and environmental standards is correlated with economic upgrading.⁴⁵ A partnership among Swedish textile producers and the Swedish Development Corporation Agency showed how higher standards help save water and energy of supplying firms, with environmental and economic gains (box 5.4).

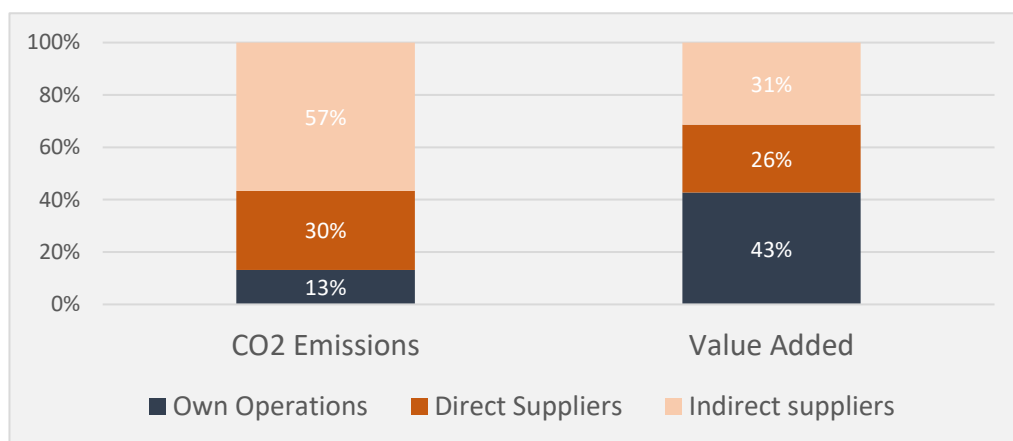
Box 5.4 Toward sustainable fashion

In 2018, the greenhouse gas emissions from textiles production totaled 1.2 billion metric tons of CO₂ equivalent, more than from international flights and maritime shipping combined.⁴⁶ Textiles production (including cotton farming) uses around 93 billion cubic meters of water annually and 20 percent of industrial water pollution globally is attributable to dyeing and treating textiles. If the sector continues on its current trajectory, resource consumption will triple between 2015 and 2050, while the industry share of the carbon budget associated with a 2°C pathway could increase to 26 percent.

Most emissions from the Swedish textile and apparel sector come from their suppliers, outside Sweden, suggesting that cross-country and cross-industry collaboration is needed (box figure 1). A partnership among Swedish textile producers and the Swedish Development Corporation Agency

shows how higher standards help save water and energy of supplying firms, with environmental and economic gains.

Box figure 1 Swedish lead firms in apparel and textiles produce a lot of value added with little CO₂, and their suppliers a lot of CO₂ with little value added



Source: OECD-WTO TiVA, WIOD and Exiobase.

Note: Estimates obtained through multiregional input–output model extended with satellite accounts for carbon emissions. The direct and indirect suppliers of the Swedish textile and apparel sector include upstream industries from both Sweden and foreign countries.

The Sweden Textile Water Initiative (STWI), which started in 2014, is a public-private development partnership between the Swedish International Development Cooperation Agency and 24 textile and leather companies that aim to improve water use efficiency amongst suppliers and sub-suppliers of STWI brands located in Bangladesh, China, Ethiopia, India, and Turkey. Sida provided the financing, clothing brands contributed by engaging their factories, and the Stockholm International Water Institute took care of implementation. This collaboration generated significant cost and time savings in terms of rolling out the initiative.⁴⁷

A total of 276 factories were supported in the five countries, with more than 1,300 managers and 37,000 staff trained. Almost 11 million cubic meters of water were saved and almost 80 million kWh of electricity (box table 1). Despite some variation in savings between different countries and across factories, the factory investments were generally sustainable given the cost savings in water and chemicals over time, and company awareness and capacity increased. These numbers show how development interventions can play a catalytic role in improving the sustainability of GVCs, by raising awareness and providing technical assistance. But cost-sharing with the companies is important to ensure ownership and engagement.

Box table 1 Total reported savings in the five countries

2015–17 Total savings	Bangladesh	China	Ethiopia	India	Turkey	Total
Water (m ³)	2,680,005	6,316,597	99,323	339,659	1,085,973	10,521,557
Electricity (kWh)	18,364,890	45,526,706	21,780	6,074,612	9,599,713	79,587,701
Thermal use (ton)	1,708,103	4,695,729	115,881	0	0	6,519,714

Chemical use (kg)	1,187,505	18,611,056	5,185	281,635	2,497,178	22,582,559
Waste water (m3)	16,319	2,435,680	0	0	229,860	2,681,859
Natural gas (m3)	20,798,126	1,407,313	0	24,514	5,130,815	27,360,768
Fossil fuel (ton)	702,334	0	444	1,904	625	705,309
Coal (kg)	0	1,002	0	6,319,396	3,823,737	10,144,135
GHG emissions (ton)	45,365	353,277	0	41,274	24,850	464,766

The initiative had limited impact on national water governance practices in each country. The STWI's upcoming Mill Improvement Alliance hopes to extend the program to a larger number of factories to achieve broader sector- and economy-wide impacts. But governments also need to get involved, particularly in updating their water governance frameworks. Private actors in initiatives such as the STWI can submit recommendations for regulatory change, and possibly counter push-back that might otherwise come from affected companies.

428. The relational nature of GVCs can promote the transfer of clean technology and know-how. Lead firms in relational GVCs can be a force for adopting higher environmental standards in production by other companies in their supply chain (box 5.5). This is important, because many of the environmental impacts are borne upstream, by the suppliers, even if most of the value is created downstream, as in the Swedish example.

429. Firms that have a brand to defend naturally tend to align practices within the corporation. Puma, Bank BNP Paribas, and fintech firm GT Nexus offer better receivable financing terms to suppliers who score high on Puma's sustainability index. Levi's has a comparable arrangement with its suppliers through the IFC's Global Trade Supplier Program. A push to more sustainable practices among the major brands is also coming from investment firms, which are paying more attention to environmental, social, and governance (ESG) performance and pushing firms to adopt higher standards.

430. However, the positive role of relational GVCs has limits. First, the technology transfer tends to benefit mostly direct suppliers, and to a much lesser degree second and lower tier suppliers, which in some cases are invisible to the GVC firm. Second, the positive local effects of relational GVCs may not translate in an overall gain for the environment globally. When a lead firm relocates a production to a developing country, and it produces there with lower carbon-intensity than the prevailing carbon intensity of the host country, that does not itself prove a reduction in pollution and emissions. The carbon intensity can still increase overall relative to a counterfactual where the firm did not relocate.

Box 5.5 Demanding environmental standards in GVC upstream firms

Saitex International from Vietnam and Zaklad Pierzakski Konrad Ozgo from Poland are GVC suppliers whose comparative advantage includes their ability to meet very demanding voluntary environmental standards.

Saitex produces denim jeans in a LEED-certified facility for the Californian company Everlane, whose "radical transparency" is core to its marketing strategy. Saitex produces denim jeans with state-of-the-art technology, according to its buyer's website.⁴⁸ It recycles 98 percent of its water, relies on alternative energy sources, and repurposes byproducts to create premium jeans minimizing

the waste. Standard denim manufacturers use “belly” washing machines, which consume as much as 1,500 liters of water for producing a pair of jeans. Saitex instead consumes only 0.4 liters of water per pair of jeans thanks to state-of-the-art recycling.

On-site rainwater collection pools allow them to minimize the impact of the consumption they do have, and their sophisticated five-step filtration process separates water from toxic contaminants, then sends clean water back into the system. Saitex is also committed to using renewable energy resources like solar power, cutting energy usage by 5.3 million kilowatt-hours of power per year—and CO₂ emissions by nearly 80 percent. It also plants trees to offset its emissions. And it minimizes waste from production. All denim creates a toxic byproduct called sludge, but at Saitex the sludge is extracted and shipped to a nearby brick factory. Mixed with concrete, the toxic material can no longer leech into the environment. The resulting bricks are used to build affordable homes.

Zaklad Pierzakski Konrad Ozgo, which preprocesses white goose down for Patagonia, has a fully traceable supply chain, to comply with its brand philosophy. Internal audits and third-party verification ensure that the birds are neither live plucked nor force fed and that they are raised in humane conditions. The buyer, Patagonia, traces their supply back to the more than 100 individual smallholder farms—including parent farms, hatcheries, raising farms—supplying them and transiting through the preprocessor.

Source: Everlane website <https://www.everlane.com/>.

D. Green goods

431. One of the biggest contributions of GVCs to the environment may be the many new and innovative environmental products they make possible. Trade and GVCs make a positive impact on the environment by promoting innovation and by making these clean technologies and environmental goods more affordable. The next paragraphs describe some of the most important green good value chains. It should be noted however, that green goods can also suffer from a negative environmental footprint, such is the case in the mining of rare minerals.

Solar energy

432. The solar value chain relies on innovation and complex production systems. Countries may be part of the value chain through producing silicon, manufacturing solar cells, and assembling modules, inverters, mounting systems, combiner boxes, and other components.⁴⁹ Older companies appear to be more vertically integrated, while newer entrants tend to source from multiple locations for assembly on site.

433. Solar photovoltaics (PV) products are generally tradable. Figure 5.8 illustrates the supply chain of a PV company. Solar cell production is primarily concentrated in China and Asia and dependent on the production of components from several countries. Europe and the US lead upstream service provision, including shipping, distribution, installation, and recycling.

434. Large parts of the supply chain have generally been located in countries or regions with strong demand, with the European Union as a case in point. Low labor costs have driven some production to China and Hong Kong SAR China, but also to high-cost producers such as Germany, Japan, Republic of Korea, and the United States. And policies to encourage deployment have grown in other countries.⁵⁰

Figure 5.8 The life cycle of a solar power plant⁵¹

Source: Trina Solar

435. Value created along the solar value chain starts with polysilicon and ends with the PV-module (table 5.1). Downstream activities generally account for a large share of value added, especially for services such as installation, system design, and research and development.

Table 5.1 Estimation of value added at different stages of supply chain of a solar PV module (US\$ per kilowatt)

Stage of production	Sales receipts (turn-over or gross output)	Cost of intermediate products and services	Value added
Polysilicon	150	50	100
Silicon wafer	330	150	180
Solar cell	460	330	130
Final product (PV module)	660	460	200
Total	1,600	990	610

Source: Jha 2016.

Other examples of green goods

436. The wind energy supply chain, though not as globalized as solar, has grown increasingly complex and fragmented. There are more than 8,000 parts in a single turbine. And major components include rotor blades, towers, and nacelles. In the U.S. supply chain, only about 50 percent of the value of components comes from domestic sources. Several European countries, such as Germany and Denmark, used to be the main manufacturing hubs, but the industry has become increasingly globalized over time. The sector is growing increasingly diverse geographically, with more than 50 percent of the suppliers from China, India, and other Asian countries, with countries like Brazil also important.⁵²

437. Global sales of new electrical vehicles passed a million units for the first time in 2017. On current trajectories, this number is set to quadruple by 2020, or around 5 percent of the total global light vehicle market.⁵³

438. China is the largest global market for electric vehicles, dominated by independent domestic firms. China's electric vehicle industry showcases how trade liberalization and increased access to foreign suppliers, combined with government intervention and strong competition in the traditional automotive market, allow independent domestic companies to enter the niche market of electric vehicles and become both innovative and cost-competitive. In the years after China joined the WTO, import volumes of parts for electric motors and generators picked up, as exports of electronic motors also increased.

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² This phenomenon is known as the Pollution Haven Effect (PHE), and it is different from the Pollution Haven Hypothesis (PHH). Empirical literature provides much more support for the PHE than it does the PHH (Copeland & Taylor, 2004; since then see for example He, 2006; Levinson & Taylor, 2008; Kellenberg, 2009). The PHE, and the associated problem of „carbon leakage“ hold even when the PHH does not. Although environmental policy is not a dominant determinant of comparative advantage, it does matter at the margin, particularly for countries whose competitiveness is based on producing at low cost.

³ The environmental Kuznets curve (EKC), later referred to as an inverted-U, describes a relationship between per capita income in a location and the environmental outcomes. See Grossman and Krueger 1991; Grossman and Krueger 1995.

⁴ Copeland and Taylor 2004; Stern 2017.

⁵ Kechichian and Jeong 2016; UNIDO, WBG and GIZ, 2017. <https://openknowledge.worldbank.org/handle/10986/24921>.

⁶ Special Economic Zones are spaces in a country that are intended to attract industrial production by offering those companies special concessions on taxes, tariffs, and regulations. Chapter 7 discusses SEZs in detail.

⁷ United Nations Industrial Development Organization; World Bank Group; Deutsche Gesellschaft für Internationale Zusammenarbeit. 2017. An International Framework for Eco-Industrial Parks. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/29110> License: CC BY 3.0 IGO.”

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- ⁵³ <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-global-electric-vehicle-market-is-amped-up-and-on-the-rise?reload>.

Chapter 6: Technological Change

439. Supply chains are rapidly changing under the pressure of digital innovation. Robotics, 3D printing, big data, blockchain, cloud computing, the Internet of Things, and the rise of platform firms are transforming the sources of value added in entire industries. Digital technologies offer productivity-enhancing instruments, but many could also be disruptive. As companies develop more sophisticated ways to leverage digital technology, they shift many processes that used to be labor intensive to computer-aided machinery. A substantial share of low-wage developing country exports is in sectors that are being rapidly automated by their trade partners. These developments have evoked fears that industrialization led by labor-intensive exports may no longer be a viable model for emerging economies seeking to develop by joining and moving up the value chain—and that labor costs are becoming a less important determinant of competitiveness. Moreover, technological change may raise the demands for skills, which may place developing countries at a disadvantage.

440. This chapter reviews the evidence on how emerging digital technologies, including advanced robotics and 3D printing, affect GVCs, trade flows, and the prospects for export-led industrialization. It reviews the channels for technological progress to have an impact on GVCs—reducing trade costs, inducing quality upgrading and product churning, and changing productivity and relative costs across countries and sectors, and thus changing comparative advantage. It explores how changes in trade policy might alter these effects¹ and offers a tentative assessment of the potential for a continued expansion of global supply chains and export-led development. New technologies will likely change GVCs and the trade and jobs they create. But forecasting exactly how is fraught with uncertainty, not least because technological progress is difficult to predict.

441. Trade costs are likely to continue to fall because of new digital technologies, offering greater opportunities for GVC participation. Developing countries may stand the most to gain from emerging digital technologies since they face the highest trade costs and biggest distortions. Extending access to high-speed internet and expanding e-commerce will likely facilitate greater GVC participation. But the gains from e-commerce are unevenly distributed across households, and not all firms benefit equally from internet access. Artificial intelligence applications, such as machine translation, can further reduce trade and logistics costs, and might also help reduce red tape. Platform firms make it easier to participate in global markets. But the reputation mechanisms they rely on to verify seller and buyer quality may make it more challenging for entrants to compete, because they foster concentration. Platform firms also pose new challenges for regulators concerned with ensuring fair competition and preventing abuse of market power.

442. Innovation will also create new products and thus new forms of trade, and other products are likely to become obsolete. Because of technological progress, more goods and services are likely to become tradable over time. In addition, new goods and services are likely to be developed, including ones that we may not even imagine today, which is likely to boost the incentives to trade.

443. Anxiety that automation will hinder export-led industrialization may not always be warranted. Evidence for reshoring is very limited, and new production technologies such as industrial robots and 3D printing have promoted North–South trade, although the effects are heterogeneous across countries and sectors. Those that do not supply intermediate inputs complementary to robots but mainly compete with robot adopting countries in output markets are at risk of being outcompeted by foreign robots and may suffer substantial reductions in employment. Robot adoption is driving down the share of income accruing to labor and increasing the demand for skilled workers that perform tasks complementary to the ones performed by robots, thus exacerbating inequality. While robots displace workers performing repetitive tasks in automating sectors, they also stimulate labor demand because of increased productivity and input–output linkages—boosting final demand and the creation of new tasks in which labor has a comparative advantage. Yet their adoption will likely entail substantial labor market pain.

444. Resorting to protectionism is most likely a counterproductive response, as it would lower efficiency, raise the prices of both inputs and outputs, and undermine incentives to innovate. The export-led development model remains viable, but successfully linking in to GVCs requires investments in skills, infrastructure, and innovation, as well as policies that ensure gains from export-led growth are equitably spread.

A. Trade costs will likely continue to decline because of digital innovation

The internet facilitates GVC participation

445. The ICT revolution that emerged in the mid-1990s has been an important enabler of the expansion of GVCs. The share of world population using the internet grew from less than 1 percent in 1993 to 46 percent in 2016. By 2014, almost all firms in high-income OECD countries (with at least five employees) used a broadband internet connection. Among firms in lower income countries, broadband usage remains lower but is rising rapidly.² At the same time, the cost at which information can be transmitted via an optical network fell dramatically. For instance, the time it takes to download a high-definition movie through a modem connected to fiber optics is by now almost imperceptible. This ICT revolution not only reduced trade costs by diminishing the cost of processing and transmitting information over long distances, but also enabled firms to improve productivity, and led a new range of (IT-related) services. These advances have contributed to a rise in global trade and production sharing, as firms are increasingly disintegrating their production process across borders and sourcing more intermediate inputs and services from abroad.³

446. High-speed internet facilitates international trade and enables firms in developing countries to link in to GVCs. The introduction of fast internet in Africa and China spurred employment and export growth, as recent studies of the economic effects of the rollout have shown.⁴ In Africa, the gradual arrival of submarine internet cables led to faster job growth (including for low-skilled workers) in locations that benefited from better access to fast internet relative to those that did not, with little or no job displacement across space. Increased firm entry, productivity, and exporting are among the drivers of the higher net job-creation in these locations. Similarly, in China, provinces experiencing an increase in the number of internet users per capita also witnessed faster export growth, with more firms competing in international markets and an increase in the share of provincial output sold abroad.⁵ These examples attest to the potential of ICTs to help countries become part of international supply chains. They also show that the uneven provision of ICT infrastructure can aggravate spatial inequalities if already productive regions are the prime beneficiaries of infrastructure upgrading.

Digital technologies are lowering logistics and coordination costs

447. Digital technologies can further improve customs performance by automating document processing and making it possible to create a single window for streamlining the administrative procedures for international trade transactions. In Costa Rica, a one-stop online system led to an expansion in the number of exporting firms and increased firm exports along the shipment extensive margin and the buyer intensive and extensive margins.⁶ Similarly, computerizing import procedures in Colombia increased imports, reduced in corruption cases, hosted tariff revenues, and accelerate the growth of firms most exposed to new procedures.⁷ In addition, digital technologies facilitate trade in existing services and may promote new services (such as videoconferencing and telecommuting) supporting GVCs. Services trade is becoming progressively more important, and the WTO projects that it will rise from approximately 21 percent of world trade today to 25 percent by 2030.⁸ Cloud computing offers a pay-as-you-go subscription model for storage and software, facilitating file sharing across cross-country teams, and lowering the fixed costs of investments in IT infrastructure.

448. Some robotics and artificial intelligence applications might further reduce logistics costs, the time to transport, and the uncertainty of delivery times (box 6.1). At ports, autonomous vehicles might unload,

stack, and reload containers faster and with fewer errors. Blockchain shipping solutions may lower transit times and speed up payments. The Internet of Things has the potential to increase the efficiency of delivery services by tracking shipments in real time, while improved and expanded navigation systems may help route trucks based on current road and traffic conditions. While empirical evidence on these impacts is limited, new logistics technologies could reduce shipping and customs processing times by 16 to 28 percent.⁹

Box 6.1 Digital innovation and agricultural trade

Distributed ledger technologies (DLTs) and smart contracts have significant potential to increase efficiency and transparency in agricultural supply chains by improving product traceability and integrity, contract certainty, verification of geographic origin, and compliance with sanitary and phytosanitary requirements. They can also improve the implementation and monitoring of WTO agreements and key provisions relevant for agriculture trade. DLTs can ensure that gains from trade accrue more directly to producers and consumers.¹⁰ Blockchain-enabled traceability can reduce food loss in food systems by up to 30 million tons annually if blockchain were to monitor information in half the world’s supply chains.¹¹ For net environmental effects, emissions would need to be assessed against potential increases in emissions arising from DLT applications’ energy use.

Blockchain is still in its nascence, but successful pilots testing its use are rapidly spreading. One of the most successful initiatives is the Food Trust consortium, run by IBM, focused on using blockchain technologies for improved food traceability. It brings together large retail and food industry companies from across the world, including Dole, Driscoll’s, Golden State Foods, Kroger, McCormick, and several others. As part of this consortium, Carrefour, a supermarket chain in France, uses blockchain to provide consumers with detailed information on purchased chicken, such as veterinary treatments, freshness, and other metrics.¹² Similarly, Barilla, an Italian pasta and pesto sauce manufacturer, uses it to improve transparency and traceability in its pesto production cycle along the entire supply chain—from farm to fork.

There are also many start-ups that aim at shortening agriculture value chains and reducing the role of middlemen. INS is an e-commerce platform that uses DLTs to directly connect producers and consumers through data integration. And AgriDigital, an Australian company, uses blockchain-enabled contracts to facilitate interactions among the various players of the grain supply chain.

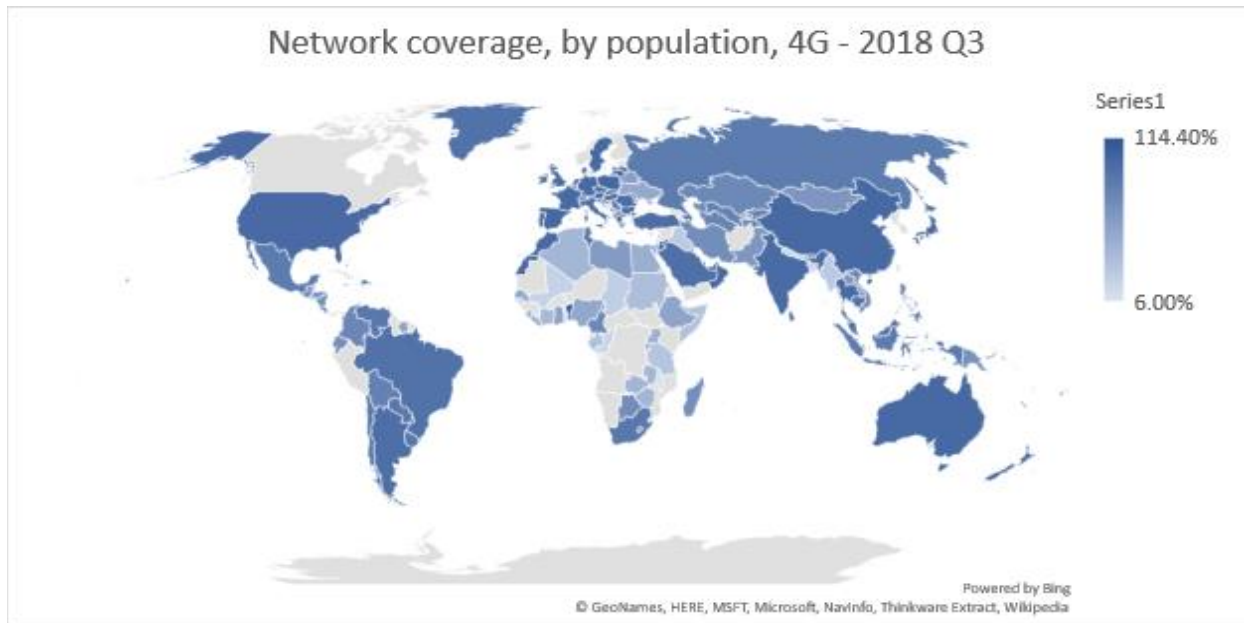
To ensure their scalability and accessibility, DLT solutions require appropriate ecosystems. While some elements of such ecosystems are technology-specific, they also largely entail enabling policy, regulatory, and institutional conditions as well as basic requirements for infrastructure, literacy (including digital), and network coverage.¹³ As one example, according to the recent PwC survey,¹⁴ regulatory uncertainty around blockchain-based solutions was identified as a major scale-up challenge across various sectors. Other major challenges included interoperability and the potential failure of different blocks within the chain to work together.

Investments in digital technologies may be especially beneficial for developing countries

449. Further technological progress, greater adoption of existing digital technologies, and investments in transport infrastructure are likely to reduce trade costs, promote trade, and lead to a continued expansion of GVCs. These developments may especially benefit developing countries, which currently face higher trade and transport costs and have comparatively limited ICT infrastructure. For example, 4G network coverage remains low in large parts of Africa compared with richer countries (figure 6.1). Tariffs and nontariff measures continue to be a significant source of trade restrictiveness for low-income countries despite preferential access programs.¹⁵ In addition, developing countries face large intranational trade costs, which determine the extent to which producers and consumers in remote locations are affected by changes in trade policy and international prices. For instance, the effect of distance on trade costs within Ethiopia

or Nigeria is four to five times larger than in the United States. Intermediaries capture most of the surplus from falling world prices, especially in more distant locations. Therefore, consumers in remote locations see only a small part of the gains from falling international trade barriers.¹⁶ Despite recent advances in the provision of ICT infrastructure, the scope for further expanding access to high-speed internet in developing countries remains huge.

Figure 6.1 4G network coverage, 2018



Note: the map depicts network coverage. Darker blue indicates more coverage. Countries in grey are ones for which no data are available.

450. In part because of high intranational trade costs, firms in low-income countries tend to operate at a small scale and are less likely to export or import. The modal manufacturing firm in the United States has 45 workers, and larger firms tend to be more productive, pay higher wages, and are more likely to export and import.¹⁷ In contrast, the modal firm in most developing countries has one worker, the owner. Among firms that do hire additional workers, most hire fewer than 10. In India, Indonesia, and Nigeria firms with fewer than 10 workers account for than 99 percent of the total. Relatedly, developing countries tend to exhibit a smaller number of exporters, and a lower concentration of export revenue in their top exporters, suggesting these firms face greater distortions.¹⁸ Investments in reducing barriers to competition and minimizing frictions may thus be especially beneficial for developing countries.

Digital marketplaces are on the rise, fostering GVC participation—and concentration

451. Increased access to (and more extensive use of) the broadband internet and digital-enabled devices would also connect more consumers and firms in low-income developing countries to online markets and business-to-business platforms.

452. Digital marketplaces and online retailers are on the rise. Platforms such as Alibaba Amazon, eBay, Taobao, and Mercado Libre are becoming an increasingly important interface between global manufacturers and consumers in several countries. At the same time, manufacturers and traditional retailers are seeking to achieve a stronger online presence, alongside their standard distribution channels. Consumers worldwide purchased approximately \$2.86 trillion worth of goods and services on the web in 2018, up from \$2.43 trillion the previous year. The share of online sales in total retail sales increased from 11.3 percent in 2016 to 13.3 percent in 2017.¹⁹

453. E-commerce is growing especially rapidly in China. The United States and China—the world’s two largest economies—accounted for more than half of global e-commerce sales of goods in 2017. China is the largest e-commerce market with sales of \$877 billion, up 28 percent from 2016.²⁰ The share of online sales in total retail sales reached 15 percent in 2017, up from 12.6 percent during the prior year. In the United States, consumers spent \$449.88 billion on retail sites in 2017, up 15.6 percent from the previous year, as online penetration reached about 13 percent of total retail sales.²¹ E-commerce sales are likely to continue to rise in developing countries as internet access and usage expands. Improvements in enabling infrastructure, such as e-payment systems, logistics, third party authenticators and dispute resolution support services can further augment e-commerce.

454. Platform firms have emerged as the largest companies in the world, but they are unevenly geographically distributed. Seven of the ten largest global companies by market capitalization in the first quarter of 2019 were platform firms, up from only three in 2015, and one in 2011 (figure 6.2). These platform firms are predominantly from North America and East Asia. Africa and Latin America are greatly underrepresented. The role of first-mover advantages in the establishment of platform firms may make it difficult for Africa, Latin America, and even Europe to bridge the gap.

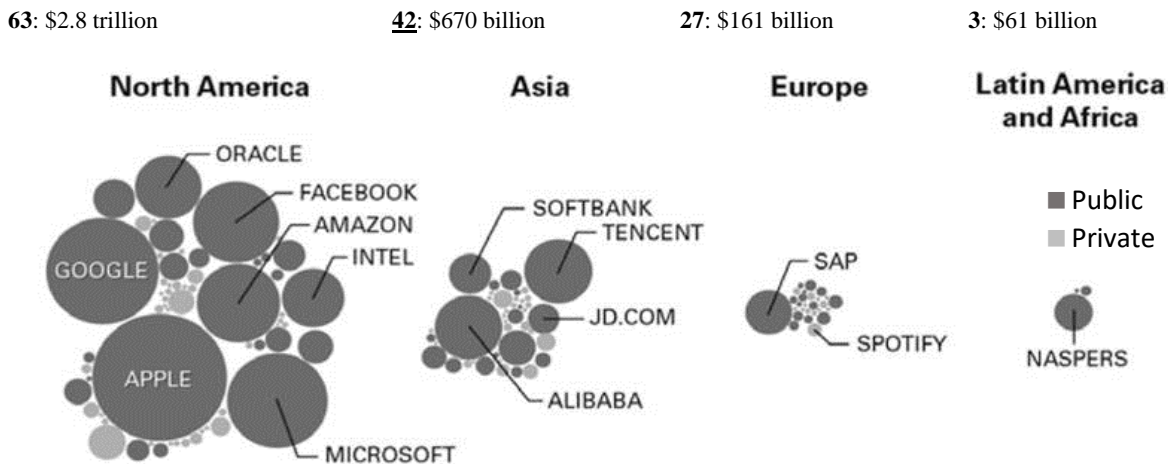
Figure 6.2 Platform firms ascend to top global ranks by market capitalization (millions)

2019			2015			2011		
Rank		First Quarter	Rank		First quarter ^[30]	Rank		First quarter ^[47]
1		Microsoft ▲904,860 ^[10]	1		Apple Inc. ▲724,773.1	1		Exxon Mobil ▲417,166.7
2		Apple Inc. ▲895,670 ^[11]	2		Exxon Mobil ▼356,548.7	2		PetroChina ▲326,199.2
3		Amazon.com ▲874,710 ^[12]	3		Berkshire Hathaway ▼356,510.7	3		Apple Inc. ▲321,072.1
4		Alphabet Inc. ▲818,160 ^[13]	4		Google ▲345,849.2 ^[34]	4		ICBC ▲251,078.1
5		Berkshire Hathaway ▼493,750 ^[14]	5		Microsoft ▼333,524.8	5		Petrobras ▲247,417.6
6		Facebook ▲475,730 ^[15]	6		Petro China ▲329,715.1	6	 	BHP Billiton ▲247,079.5
7		Alibaba Group ▲472,940 ^[16]	7		Wells Fargo ▼279,919.7	7		China Construction Bank ▲232,608.6
8		Tencent ▲440,980 ^[17]	8		Johnson & Johnson ▼279,723.9	8	 	Royal Dutch Shell ▲226,128.7
9		Johnson & Johnson ▲372,230 ^[18]	9		ICBC ▲275,389.1	9		Chevron Corporation ▲215,780.6
10		ExxonMobil ▲342,170 ^[19]	10		Novartis ▲267,897.0	10		Microsoft ▼213,336.4

Source: Financial Times Top 500 Companies. The figure lists the top 10 global countries by market capitalization for different years. Over time, platform firms have become progressively more important.

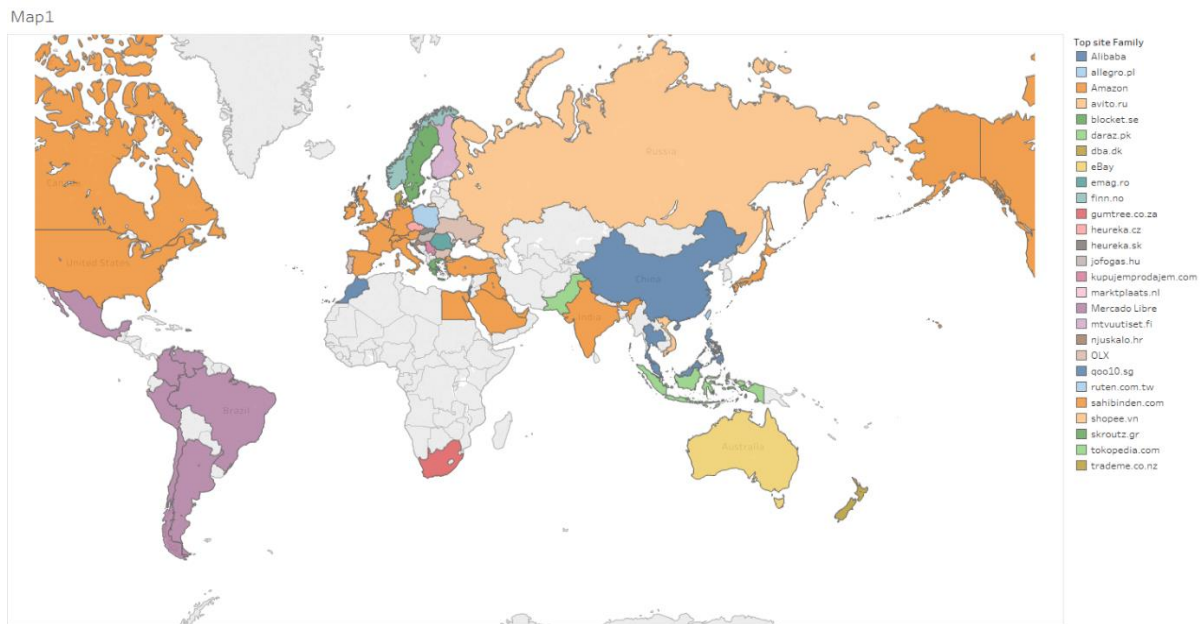
455. A limited number of e-commerce platforms dominates most markets: Amazon ranks first by traffic share in North America, Western Europe, parts of the Middle East and India; Alibaba is the most visited in China and some parts of the Middle East; and Mercado Libre tops Latin America (figures 6.3 and 6.4). Activity on platform firms is thus highly concentrated among a few large megafirms.

Figure 6.3 Large platform companies are concentrated in North America and Asia



Source: Parker, Van Alstyne, and Choudary 2016. The graph shows major platform firms by region, with bigger circles representing firms with more market capitalization.

Figure 6.4 Top e-commerce platform by traffic share, 2019



Source: Alexa and Similarweb.

Note: Data are not available for countries in grey.

456. Platforms enable GVC participation (box 6.2) but may foster concentration because their business model relies on building and exploiting network effects. They reduce transaction costs and help verifying the quality and reputation of suppliers and matching them to potential foreign buyers.²² One study finds that the extent to which distance reduces trade is 65 percent smaller on eBay than in total trade flows (for the same set of goods and countries).²³ Although they offer opportunities for new actors to connect and integrate into global value chains, the mechanisms that they typically use to overcome information frictions, such as consumer ratings that help firms establish a credible reputation, tend to favor concentration. While platforms enable small and medium enterprises to penetrate export markets, they also render reputation

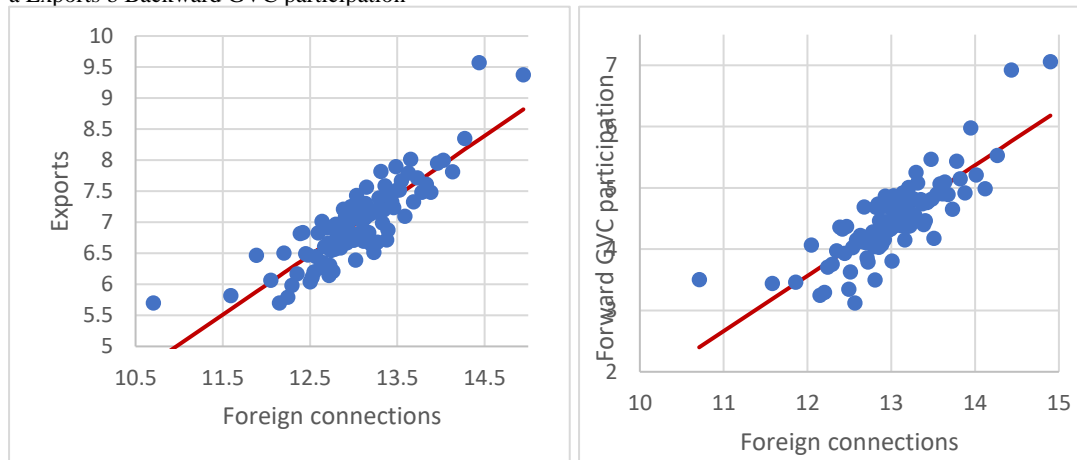
more widely visible, favoring the emergence of superstar exporters.²⁴ They make it easier to connect, but harder to compete.

Box 6.2 Platform firms are facilitating GVC participation

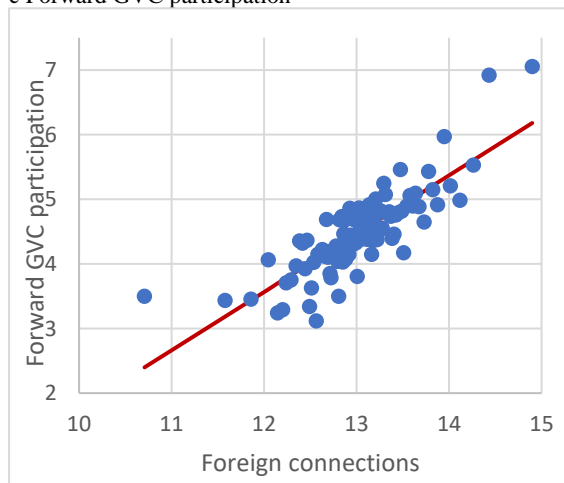
Global value chains require efficient processing of information to operate effectively. This is the point where platform firms enter the picture as they enable other firms to connect and communicate as well as foster the formation of new linkages. The most important information network is the one between people where professional networks enable the operation of GVCs. In order to explore the linkages between, the World Bank has partnered with LinkedIn, a professional platform consisting of more than 630 million members in over 200 countries and territories across the world. In addition to presenting information on an individual’s educational and career background, every member in this platform is part of a network and is “linked” to other professionals in other firms, sectors, and countries. Analysis of the LinkedIn data reveal that exports (box figure 1a) and both forward and backward global value participation (box figures 1b and 1c) respectively are strongly correlated with the number of foreign connections people on LinkedIn. Though causality is more difficult to establish, these patterns suggest that professional networks are complementary to the expansion of global value chains.

Box figure 1 Exports and GVC participation vs online foreign connections

a Exports b Backward GVC participation



c Forward GVC participation



Source: World Bank-LinkedIn Digital Data for Development. Each of the graphs shows the correlation between one of the three GVC measures and the stock foreign LinkedIn connections. The y-axis present data from the TIVA dataset at the sector level

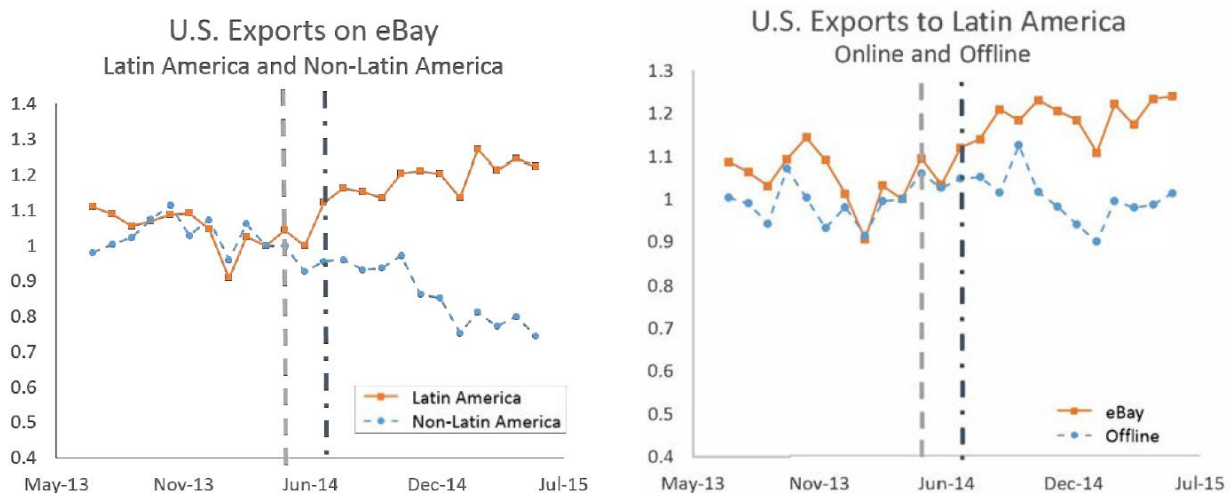
for 64 countries. The dataset includes 36 sectors. The variables are total exports on total output (figure 6.6a), forward and backward participation in GVCs (figures 6.6b and 6.6c). The x-axis data come from the Economic Graph at LinkedIn, showing the (natural log) of the total number of foreign connections in a given sector in the same 64 countries for 2015-2018. Each point in the scatterplot represents the mean of the y-axis variable in each of the one hundred chosen bins of the x-axis data. The red line is the prediction of the dependent variable calculated using linear regression with additional country and sector fixed effects and, therefore, its slope represents the elasticity between the y-axis and the x-axis measures.

Artificial intelligence applications are facilitating e-commerce

457. GVCs and e-commerce may be further supported by recent advances in machine learning. The current generation of artificial intelligence represents a revolution of prediction capabilities with potentially broad implications for transaction costs within and across countries. Machine learning applies statistics and inductive reasoning to provide best-guess answers in cases when formal procedural rules are not known. Enabling this transformation are enormously increased data, significantly improved algorithms, and substantially more powerful computer hardware.²⁵ Large firms, multinational enterprises, and big online retailers such as Alibaba and Amazon are increasingly relying on big data and machine learning to understand and forecast consumer behavior and manage their supply chain more efficiently.²⁶

458. Machine learning also reduces the linguistic barriers to trade and GVC participation. One application of machine learning—machine translation—experienced significant improvements in recent years. For example, the best score at the Workshop on Machine Translation for English to German improved from 15.7 to 28.3 according to a widely used comparison metric (the BLEU score). The introduction of machine translation by eBay has significantly boosted international trade on this platform, increasing exports by 17.5 percent (figure 6.5). These effects appear to reflect a reduction in translation-related search costs; and suggest that artificial intelligence has already begun to boost trade in the Americas and between the EU and Russia. The results further suggest that consumers benefit more than sellers, because consumers gain both from reduced language frictions and lower prices. Although the evidence refers to online trade, machine translation may also facilitate communication offline—for example, within multinational firms or across trading partners.

Figure 6.5 U.S. exports to Latin America through eBay increased after the introduction of machine translation



Source: Brynjolfsson, Hui, and Liu 2018.

Note: Exports in the left panel are measured in quantity and normalized to the level in April 2013. Exports in the right panel are measured in dollars and normalized to the level in April 2013. The dashed and dot-dashed vertical lines refer to the introduction of query translation and item title translations, respectively. The graph shows that the introduction of machine translation boosted exports to Latin America on eBay.

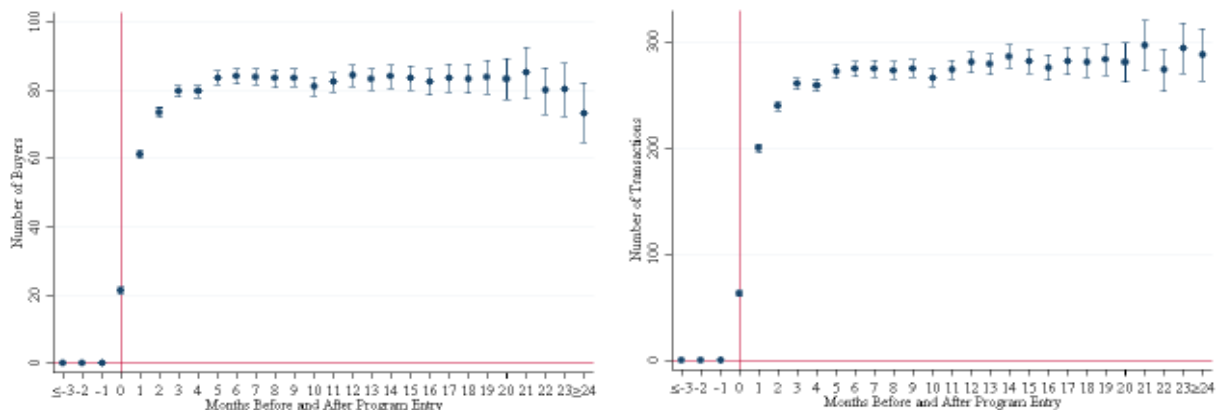
Platform firms and e-commerce have uneven benefits

459. Besides fueling GVCs and cross-border trade, deeper e-commerce integration may also help reaching more firms and households in rural markets in developing countries. In China, currently the largest e-commerce market, the number of people buying and selling products online grew from essentially zero in 2000 to more than 400 million in 2015. A clear upward trend was also observed in many other developing countries. Although most of this growth has so far been observed in urban areas, emerging economies such as China, Egypt, India, and Vietnam are developing policies aimed at expanding e-commerce to rural areas. This requires more than internet access alone. It also necessitates overcoming logistical and transactional barriers, such as the dearth of modern commercial parcel deliveries and the lack of familiarity of rural households with navigating online platforms and lack of access to (or trust in) online payment services. The sizable welfare gains from e-commerce stem predominantly from reductions in consumer prices and access to new products. In Japan, e-commerce has driven down overall prices, raising aggregate welfare by 1 percent; new varieties available through online shopping raised welfare 0.7 percent; and increased intercity price arbitrage raised Japanese welfare by 0.06 percent.²⁷

460. The gains from e-commerce are unevenly distributed across households. A recent study provides experimental evidence on the effects of a program that invests in the necessary logistics to ship products to and sell products from tens of thousands of Chinese villages that were largely unconnected to e-commerce.²⁸ Between the end of 2014 and middle of 2016, nearly 16,500 villages in 333 counties and 27 provinces were connected to e-commerce through the program. The results point to sizable gains from e-commerce trading (figure 6.6). However, the gains tend to accrue to a minority of rural households who tend to be younger and richer, and better positioned to take advantage of the opportunities e-commerce offers. Importantly, the gains are significantly stronger among villages not previously serviced by commercial parcel delivery, suggesting that the impacts of the program are mainly caused by overcoming the logistical barrier, rather than additional investments aimed at adapting e-commerce to transactional barriers specific to rural households.

461. Interestingly, the gains are driven by the consumption side, through a significant reduction in household cost of living that is more significant in remote rural markets. On the income side, e-commerce has displacement effects. In the United States, the growth of e-commerce from 3.8 percent of retail sales in 2010 to 8.3 percent in 2017 was associated with a reduction in employment in brick and mortar retail stores. In counties with retail fulfillment centers, the labor income of retail workers fell by 2.4 percent after the establishment of such a center, with both younger and older workers experiencing sharper decreases in labor income.²⁹ Consumption gains thus come at the expense of costly labor market adjustment.

Figure 6.6 Effects of the e-commerce program on the number of buyers and transactions in Chinese villages



Source: Couture et al. 2018.

Note: Figure shows point estimates from a regression of depicted outcomes on months since program entry and village and month fixed effects. Outcomes are the number of buyers (left panel) and the number of transactions (right panel). The data are from a major e-commerce firm’s internal database and contain the universe of village purchase transactions from November 2015 to April 2017 in the five provinces of Anhui, Guangxi, Guizhou, Henan, and Yunnan (roughly 11,900 villages in total). The last point estimate of each plot pools months 24 to 28. The figure shows 95 percent confidence intervals based on standard errors that are clustered at the level of village terminals. The figure shows that the introduction of e-commerce was associated with an increase in both the number of buyers and the number of online transactions.

Platforms create new regulatory challenges

462. As platform firms grow, gain access to more private data, and wield market power, so do concerns about their potential anticompetitive behavior. At least for now, however, the scope for raising consumer prices appears to be fairly limited. Online platforms still account for a fairly small share of the overall retail market. And consumers can compare prices across merchants, both online and offline. Indeed, recent evidence points to strong substitution between online and offline sales for personal computers, news, and advertising.³⁰ Services available in search engines such as Google Shopping facilitate price comparison across online merchants and marketplaces, and many online markets are still in their infancy. Moreover, many platform firms make negative profits at the beginning of their lifecycle when they are trying to establish market presence.

463. The interdependencies between platforms’ third-party sales for retailers and their own online retail operations can result in potential conflicts of interest and may enable anticompetitive conduct.³¹ Hybrid platforms like Amazon, JD.com, and Flipkart sell their own inventory in addition to operating an online marketplace for other retailers to sell their products, taking a commission for each order. Operating both on an upstream intermediation market for other firms and downstream retail markets to its final customers may give rise to conflicts of interest. Online shoppers may not be able to identify any difference between a platform’s own retail services and its marketplace activities for other merchants. And hybrid platforms might use the data they collect while operating as a marketplace to identify successful products on the marketplace to then market their own branded version in the same platform.

464. Another, more traditional, form of potential abuse is predatory pricing, whereby platforms use their privileged access to third-party data to temporarily charge prices below costs on their own products to gain a permanent competitive edge over other merchants. The concern is not that platforms offer their own products at a lower price than the original seller, which would benefit consumers. It is that hybrid platforms might only be able to offer such prices due to the use of third-party data; and might adopt temporary pricing strategies to gain more permanent advantages over their competitors and subsequently raise prices. At the same time, it is important to recognize that pricing structures are complex. Subsidies across users can help the platform increase its volume of transactions and benefits. In other words, platforms can charge prices below marginal cost to one side and this does not necessarily mean that they are engaged in predatory pricing. Alternatively, their charging prices above marginal cost to another side does not necessarily mean there is market power.

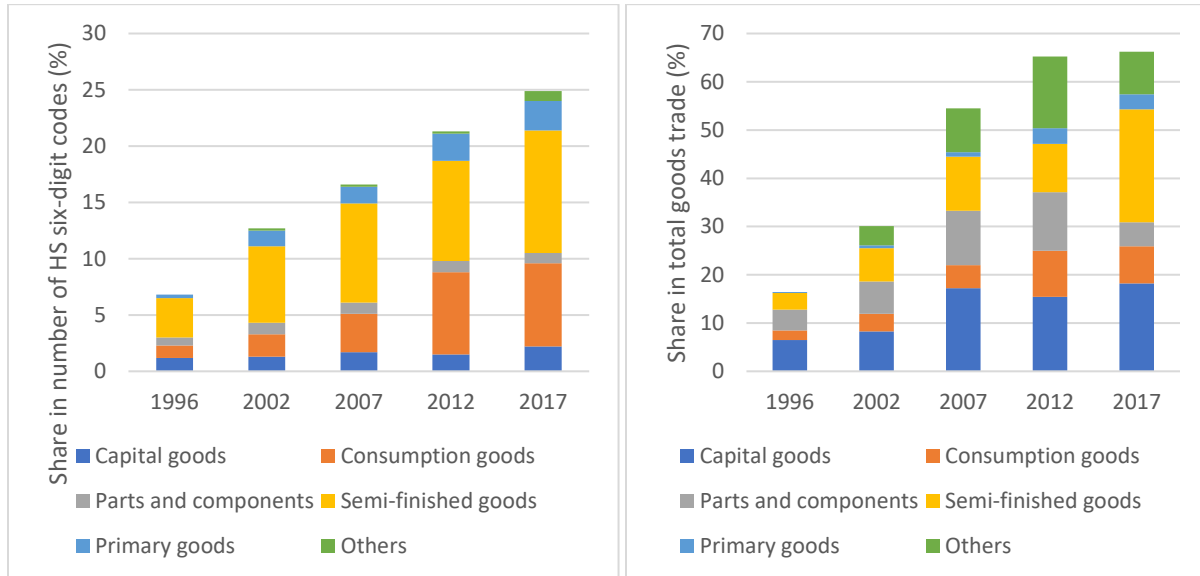
465. Concerns about anticompetitive behavior are not unique to platform firms. Markups have been rising in many sectors of the economy, and especially so in digital intensive sectors.³² Average U.S. markups have risen from 18 percent above marginal cost in the 1980s to 67 percent now. Similar trends in markups have been documented in other countries. According to the OECD, markups have grown more in digital intensive sectors than in others, with the growth driven by firms on the top end of the distribution. These superstar firms are thus accounting for a higher share of profits, which are increasingly unevenly divided.

B. Innovation is not only boosting trade—but also changing its composition

466. Since the 1990s, many new types of products have entered global trade, primarily intermediate goods, further demonstrating the increasing fragmentation of production and the emergence of entirely new

products (figure 6.7). In 2017, 65 percent of trade was in categories that either did not exist in 1992 or were modified to better reflect changes in trade. Trade in intermediate goods became more prevalent and entirely new products entered global trade. For example, trade in information technology products tripled over the past two decades, as trade in digitizable goods such as CDs, books, and newspapers steadfastly declined from 2.7 percent of total goods trade in 2000 to 0.8 percent in 2018.³³ Technological developments are likely to continue to cause product churning.

Figure 6.7 The number and trade share of new products have increased, 1996–2017



Source: United Nations Comtrade Database - International Trade Statistics - Import/Export Data.

Note: Products are classified by Harmonized System (HS) six-digit code. New products are classified relative to the set of products in the first HS classification in 1988/1992. New codes are either genuinely new products, or old product codes that split into two new codes, or two old codes that merged into one new code. Products are further classified as final (consumption and capital), intermediate (parts and components and semifinished), or primary and other goods using the Broad Economic Categories revision 4 classification from the United Nations Conference on Trade and Development. The graph shows that over time, trade in new products has grown dramatically.

467. Because of technological progress, more goods and services are likely to become tradable over time. For example, platforms such as Upwork and Mechanical Turk make it easier for businesses to outsource tasks to workers who can perform them virtually. And new goods and services are likely to be developed, including ones not even imaginable today, likely boosting the incentives to trade.

C. Is automation anxiety justified?

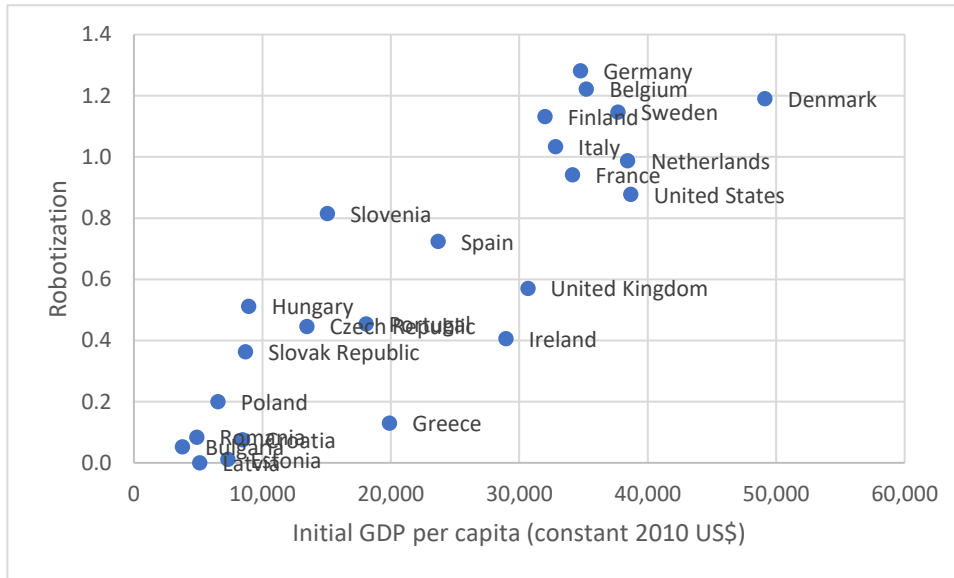
Robotization is on the rise, raising concerns about the future of GVCs

468. The spread of new production technologies, such as advanced robotics and 3D printing, has raised concerns about the future of trade and of GVCs. Robotics technology, having advanced greatly in the last two decades, is predicted to develop further in the coming years. The average price of an industrial robot has fallen by half in real terms, and even more relative to labor costs. Global sales of industrial robots reached a record of 387,000 units in 2017, up 31 percent from the previous year. Robots are used predominantly in high-wage countries in Asia, North America, and Western Europe (figure 6.8a). In recent years, China saw the largest growth in demand for industrial robots and is projected to have the largest operational stock of robots by the end of 2018, but still relatively low robot density.³⁴ Robotization is most pronounced in automotives, rubber and plastics, metals, and electronics, reflecting differences in the feasibility of automation (figure 6.8b). It is still limited in traditionally labor-intensive sectors like textiles, suggesting that export-led industrialization in these sectors is still a viable development path. Robot

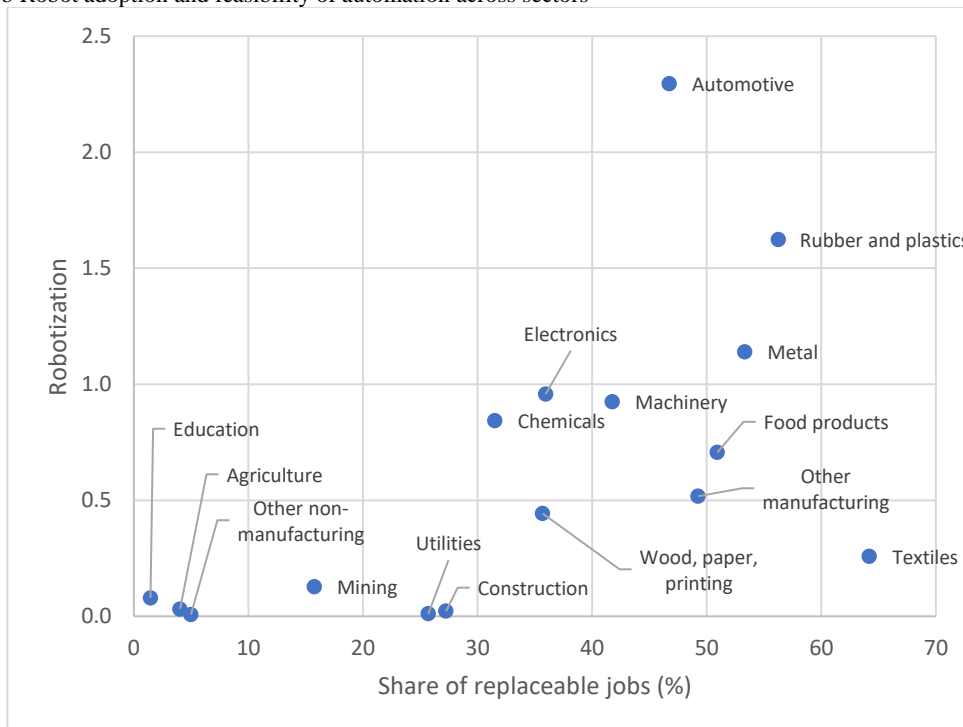
adoption is projected to increase greatly over the coming decade, reflecting further reductions in quality-adjusted robot prices.³⁵

Figure 6.8 Robot adoption is greater in high-income countries and in sectors where tasks are easily automated

a Robot adoption and income per capita



b Robot adoption and feasibility of automation across sectors



Source: Artuc, Bastos, and Rijkers, 2018.

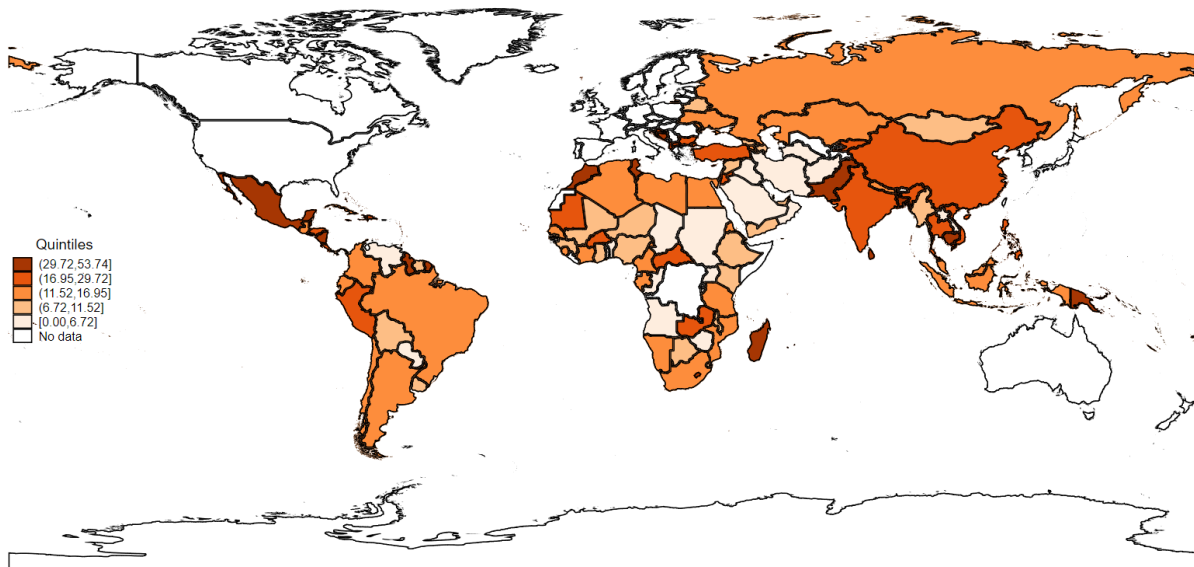
Note: Robotization is the logarithm of one plus the ratio between the average stock of robots and the number of working hours (in millions) between 1993 and 2015 (or the subsample of years over this period for which robot data from the International Federation of Robotics are available). The stock of robots was estimated using the perpetual inventory method based on the observed stock of robots in the International Federation of Robotics data and using a depreciation rate of 10 percent. The proportion of jobs that are replaceable by robots refers to the share of jobs that are potentially replaceable by robots based on

their task make-up. See Artuc, Bastos, and Rijkers (forthcoming) for a detailed explanation of how replaceability is measured. The graphs show that robotization is higher in countries with higher income per capita, where wages are higher, and in sectors in which robotization is feasible.

469. Modern industrial robots can be programmed to perform a variety of repetitive tasks with consistent precision and are increasingly used in a wide range of industries and applications. If tasks previously performed by low-skilled workers in the South (low-wage developing countries) are performed by relatively inexpensive robots in the North (industrial countries), there might be a reversal in North–South trade flows and a greater reliance on domestic production. Moreover, the skill and capital content of inputs that Northern countries demand from the South might increase now that they can use robots and other technologies more intensively, as we discuss in more depth below.³⁶ The criteria for becoming an attractive production location may change, with low labor costs becoming a less important determinant of competitiveness (at least in sectors in which automation is feasible), and complementary factors, such as the availability of skills and sound infrastructure, becoming more important.³⁷ While the risk of displacement of jobs or exports currently seems low (see below), middle-income countries like Mexico, Tunisia, and Pakistan would seem most exposed to the threat of robotized-induced reshoring, as their exports are heavily concentrated in goods that robots can help produce (figure 6.9). Not surprisingly, commodity exporters seem somewhat shielded from the threat of robotization-induced reshoring.

470. The advent of 3D printing also led to predictions that many goods will be printed locally, shortening GVCs and limiting trade. The concern is that if 3D printing becomes very cheap, then firms capable of creating a solid 3D object from a digital file will prefer to 3D print products at home rather than import them. 3D printers may thus perform the tasks previously performed by workers engaged in production and assembly activities located abroad. One study finds that as much as 40 percent of trade could be eliminated by 2040.³⁸

Figure 6.9 Export concentration in goods that can be produced by robots exported to high-income OECD countries



Note: The map shows exports as a percentage of total exports to high-income OECD countries weighted by the share of jobs in sectors that produce the exported goods that are potentially replaceable by robots based on their task make-up share of jobs. See Artuc, Bastos, and Rijkers (forthcoming) for a detailed explanation of how replaceability is measured. The graph shows that a substantial share of exports from developing countries are in goods that can be produced by robots.

471. These concerns are in part predicated on a few high-profile examples. For instance, the sports-good manufacturer Adidas recently established two “speedfactories” in Germany and the United States that use robots and 3D printing to more quickly produce customizable runners for high-income domestic consumers.

Adidas hopes the two factories can produce one million pairs a year by 2020, still a tiny share relative to the 403 million pairs it produced in 2017. The competitor Nike has several automated platforms in development.

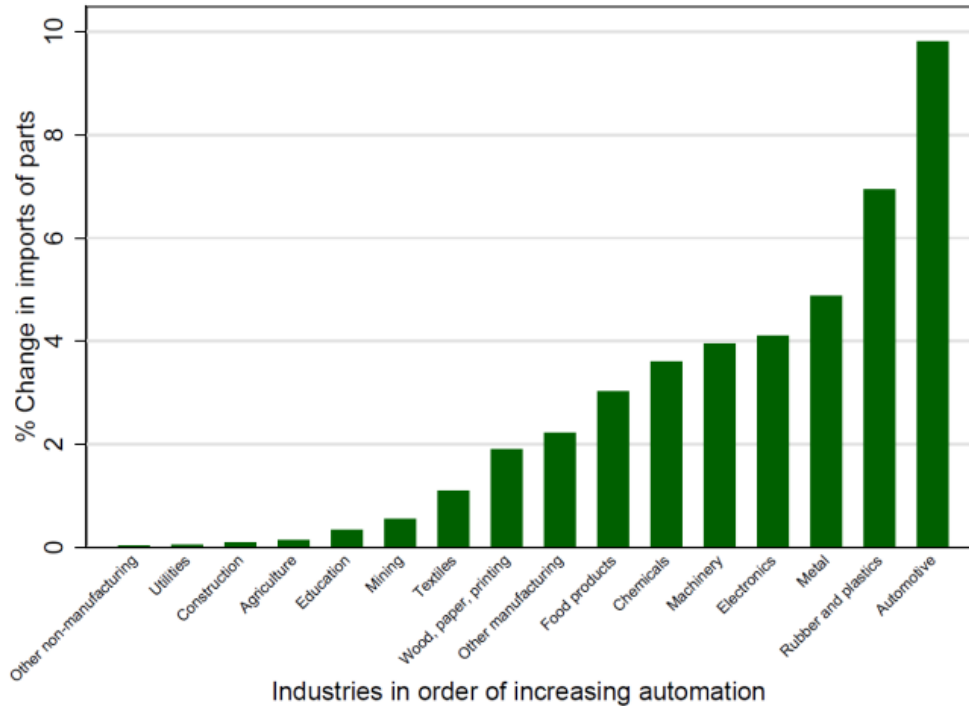
Evidence for reshoring is very limited. Robotization and 3D printing have promoted North–South trade with heterogeneous impacts across countries

472. Despite the grave concerns, the evidence for reshoring is very limited.³⁹ Moreover, these technologies might also enhance GVCs and boost trade. Increased automation in richer countries can improve productivity and income, and thus raise demand for inputs and final goods from countries with large pools of low-wage labor as a comparative advantage. Furthermore, developed countries with similar factor endowments and technologies trade a great deal between themselves. Even if the labor advantage of low income countries is (partially) annulled because of robotization, there will still be opportunities for trade in differentiated goods and for specialization in some stages of production.

473. Thus far, increased adoption of industrial robots and 3D printing seems to have promoted North–South trade. Greater robot intensity in production led to an increase in imports sourced from less developed countries in the same broad industry—and to an even stronger increase in gross exports (which embody imported inputs) to those countries. The surge in imports from the South was concentrated in intermediate goods such as parts and components. The positive impact of automation on imports, particularly on imports of intermediates, attests to the importance of examining trade effects of robotization through a GVC framework. More traditional trade models would predict the increase in Northern exports but fail to foresee the surge in imports from the South in the same industry.⁴⁰ Rather than reducing North–South trade, robotization seems to have been boosting it, though it is uncertain whether this trend is likely to continue.

474. These average effects naturally mask heterogeneity across countries and sectors, as for trade-induced increases in imports of material inputs of Northern countries that are automating from developing countries by sector (figure 6.10). The biggest increase in trade was in the automotive sector, which automated most rapidly. Countries already supplying inputs to automating Northern producers are well positioned to benefit from increased demand for their exports. But those directly competing with them in output markets and not supplying inputs can lose export revenue and manufacturing employment if their workers are outcompeted by foreign robots. The negative effects from reduced manufacturing employment could outweigh welfare gains associated with lower import prices associated with Northern automation, at least in the short run. But these countries might benefit from automation-induced increases in global productivity and income, which could translate into increased exports and activity in sectors where they retain a comparative advantage.

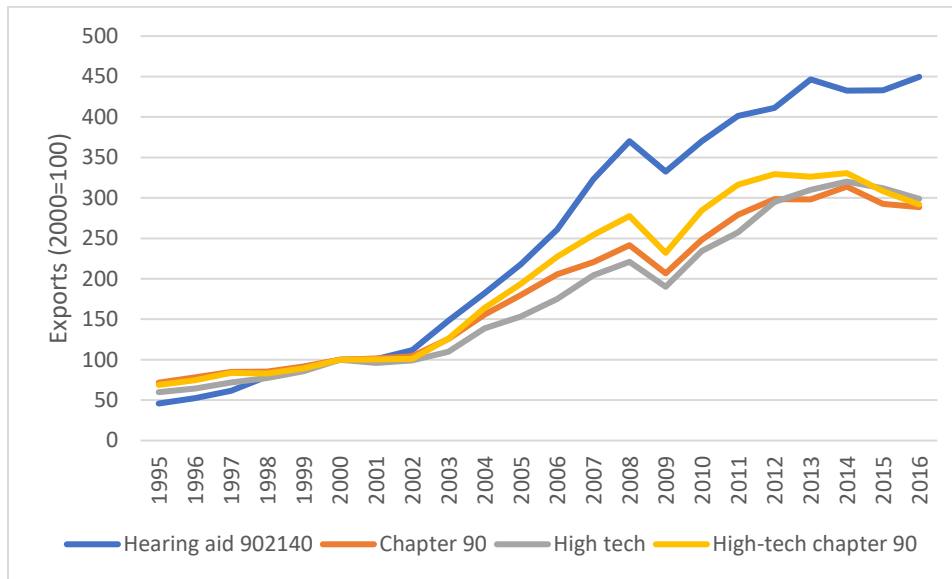
Figure 6.10 Increased adoption of industrial robots in the North has promoted imports of material inputs from the South



Source: Artuc, Bastos, and Rijkers 2018.

Note: The figure depicts the automation-induced increase in imports of material imports from developing countries into developed countries by broad sector over 1995–2015. The change in imports of parts is measured in log points; a 0.10 increase in log points is roughly equivalent to a 10% increase in imports.

475. A related dynamic of innovation-induced trade can be observed in goods that can be produced using 3D printers, such as hearing aids (box 6.3). In 2007, hearing aids shifted almost entirely to 3D printing, and trade increased as compared with other similar goods (figure 6.11). Estimates that take into account industry growth and standard determinants of trade show that trade in hearing aids was boosted by 60 percent following the introduction of 3D printing. Other industries producing goods that were partially 3D printed show similar positive effects of the technology on trade. The results are at odds with the view that 3D printing will shorten supply chains and reduce trade, at least for this set of products. The findings do suggest that gains may disproportionately accrue to middle- and high-income countries, and thus serve as a reminder that the gains from the introduction of new production technologies are likely to be unevenly distributed across countries.

Figure 6.11 Trade in hearing aids increased with the adoption of 3D printing in 2007

Source: Freund, Mulabdic, and Ruta 2018.

Note: The HS Code for hearing aids is 902140. The other three categories are included for comparison. Chapter 90 covers optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus, and parts and accessories thereof. High-tech are other goods similar to hearing aids, found both in and outside chapter 90. High-tech chapter 90 includes high-tech products selected from chapter 90.

Box 6.3 Fully automating production of hearing aids

It is a common refrain that automating production, as with 3D printing, will allow companies to produce goods closer to markets. Companies will drastically shorten their value chains, and this will reduce international trade. Lower income countries will be most affected, since their exports are often intermediate products founded on abundant, low-cost labor. One attempt to quantify and predict the trade impacts predicted that 3D printing could eliminate as much as 40 percent of trade by 2040. In contrast, new research around the production and trade of hearing aids suggests quite the opposite.

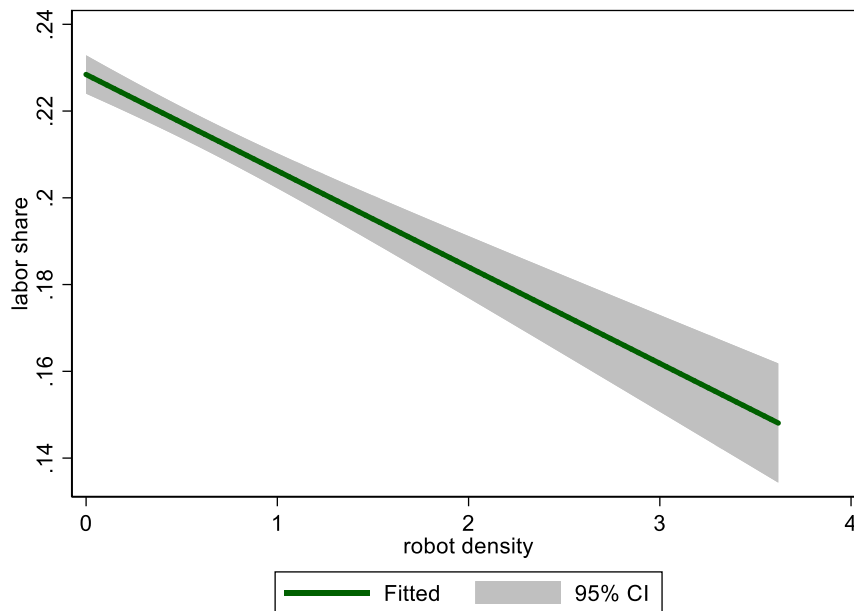
Similar to a standard ink printer, 3D printing uses very little labor and can generate customized products from the same machine. In 2007, following a series of inventions in 3D scanning, software development, and biocompatible materials, the production of hearing aids shifted almost entirely to 3D printing. And in the decade that followed, trade increased overall by 60 percent. 3D printing led to a reduction in the cost of production, and prices fell around 25 percent. And the product got better: 3D printing allowed for high levels of customization and cosmetic improvements in hearing aids, which reduced discomfort and stigma for users. In the United States, the number of people over 70 using hearing aids increased from 26 percent (2001–08) to 32 percent (2008–13). Demand increased and trade expanded. There was no evidence that 3D printing shifted closer to consumers or displaced trade—the comparative advantages of different countries in the hearing aid value chain remained the same.

Nor does this trend seem to be exclusive to hearing aids. Preliminary analysis on 35 other products that are partially 3D printed demonstrated similar positive effects on trade, though to a smaller degree. This may be because 3D printing had not yet been fully adopted for those products across the entire industry. Different from the hearing aids analysis, the results point to a reshuffling of comparative advantage from labor-abundant countries to countries that adopted 3D printing technologies for each product.

Automation is compressing labor’s income share but not necessarily reducing employment

476. As automation improves productivity, it also compresses the labor share in advanced economies. Higher robot density at the industry level is associated with a lower labor share of income, defined as total labor compensation over sales (figure 6.12). This pattern has implications for inequality, for it suggests that the primary beneficiaries of automation are capital owners. Moreover, technological progress and attendant cost reductions in the relative price of capital goods may be contributing to the global decline in the labor share observed across countries over the past few decades.⁴¹ While the jury is out on the drivers of this decline, the fall in the labor share across sectors is highest in sectors witnessing increasing concentration and the concomitant emergence of superstar firms. These firms make high profits and typically have a lower share of labor in sales and value added, in part because they are harnessing technological innovations.⁴²

Figure 6.12 Higher robot density is associated with lower labor shares of income



Source: Artuc, Bastos, and Rijkers 2018.

Note: The figure shows the association between the labor share, defined as total labor compensation over sales and robot density, the number of robots per million work hours, for EU-KLEMS industries for the period 1993–2015.

477. Robot adoption among OECD countries has reduced the employment share of low skilled workers in robot-intensive industries. Across local labor markets in Mexico and the United States, workers with a high exposure to domestic robotization have witnessed a reduction in employment and wages relative to those with more limited exposure.⁴³

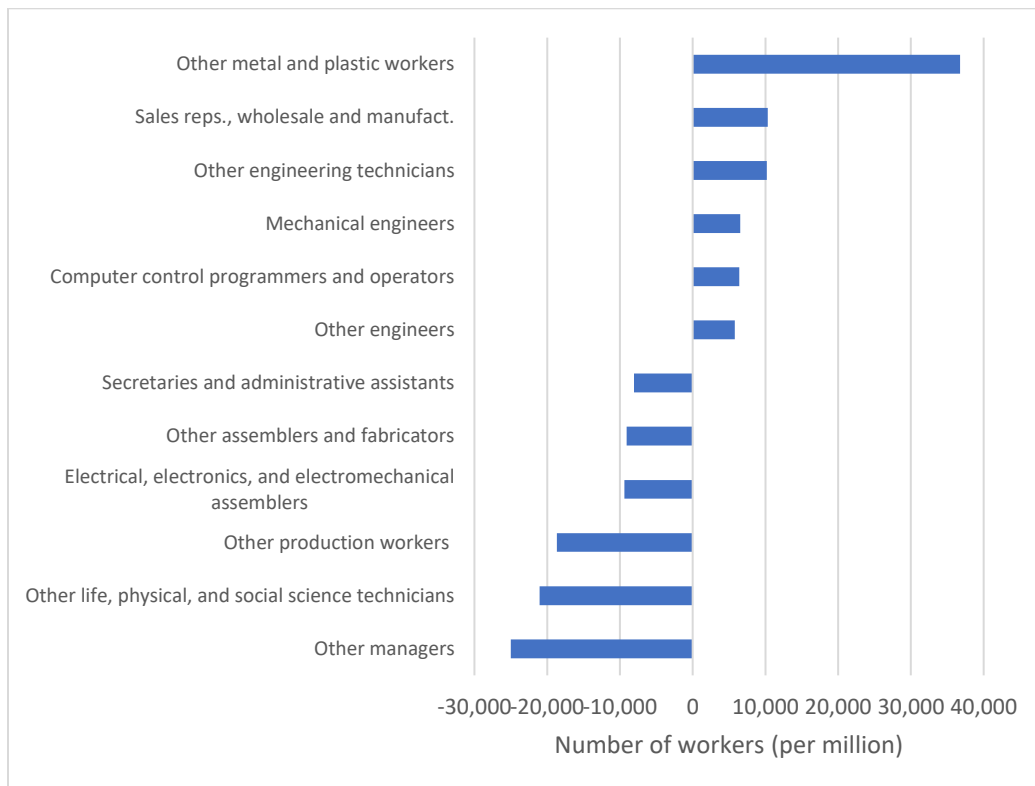
478. Although automation is causing important labor market pain, it would be unwarranted to assume that because robots replace workers, they always reduce aggregate employment. Robots are a labor-saving form of technological progress and may directly displace jobs, but their adoption can in fact spur job creation through a few indirect channels that are more challenging to measure. To start with, the productivity gains in supplier industries can yield steep increases in labor demand because of input–output linkages, as shown above. Second, productivity growth can boost final demand. Third, it may lead to compositional shifts in the structure of the economy and could create jobs by spurring the growth of sectors with high labor shares. Across the OECD, industry level productivity growth has been associated with job losses in the industries in which it originates, but these losses were more than compensated by indirect gains in customer and supplier industries, and growth in final demand. Since the early 1970s, aggregate employment in the OECD has grown, even though relative employment in industries experiencing the

fastest growth in productivity has fallen. While it is not clear whether automation ultimately helps or hurts net job creation, it certainly causes significant, and costly, labor market adjustment.

Automation is changing skill demands

479. The intuition behind these findings is that automating tasks that can be performed by robots almost surely raises the economic value of these complementary tasks, and thus the demand for laborers to perform them.⁴⁴ It may also lead to the creation of new tasks and products in which human labor has a comparative advantage, both at home and abroad. These forces give rise to a *reinstatement effect*, raising the labor share and labor demand by expanding the set of tasks allocated to labor.⁴⁵ For example, in industrial sectors where robotization is more prevalent in the United States, low-skill occupations such as assemblers and production workers experienced sizable job losses over the past decades, while occupations such as salesman, engineers, and programmers experienced strong increases in net employment (figure 6.13). At the same time, rising incomes due to automation may lead not only to new tasks, but also to new products and services, as well as greater product customization, which may require tasks that robots cannot perform (box 6.4).⁴⁶ Intriguingly, “retail salesperson” was the occupational category that experienced greater net employment gains in the whole U.S. economy between 1990 and 2010, along with other service occupations such as food preparation (which includes restaurant chefs and sandwich makers). These findings resonate with the *2019 World Development Report*, which documents how new technologies are changing skill demands and the nature of work.

Figure 6.13 Change in U.S. occupational employment in robot-intensive industries, 1990–2010



Source: WDR team tabulations with data from IPUMS-USA using the 2010 Harmonized Occupation Classification Scheme.
 Note: Data refer to the automotive, machinery, electronics, rubber and plastics, and metal industries. The figure depicts changes in employment for the five occupations with higher and lower net employment creations. The total number of workers in these sectors is normalized to one million per year. Occupations labeled as “Other” refer to those not listed separately. Other metal and plastic workers include electrical discharge machine setup operators, metal rivet machine operators, and tin recovery workers. Other engineering technicians include agricultural, biomedical, metallurgical, and optical engineering technicians. Other engineers

include optical, ordinance, photonics, and salvage engineers. Other assemblers and fabricators include air bag builders, crate builders, and doll makers. Other production workers include chemical processing machine setters, operators, and tenders; crushing, grinding, polishing, mixing, and lending workers; cutting workers. Other life, physical, and social science technicians include meteorological aide, and polygraph examiner. Other managers include clerks of court, social science managers, and utilities managers.

Future automation will likely continue to shift skill demands and comparative advantages

480. Future automation in developed and emerging economies will likely affect worker groups differently, and may exacerbate inequality. Low-skilled workers performing repetitive tasks are more likely to be displaced by robots. Women also tend to perform more routine tasks than men across all sectors and occupations—tasks most prone to automation. Female workers thus face a higher risk of automation than male workers, if with significant heterogeneity across sectors and countries. Less well-educated older female workers are disproportionately exposed to automation, even though the gender pay gap weakens incentives to automate tasks performed by women, who tend to be cheaper than men.⁴⁷ The potentially disqualifying effects of automation are likely to be compounded by the increase in the relative returns to capital that automation is likely to entail, at least in the short run.

481. This evidence is well aligned with results from model-based counterfactual simulations of the impact of further reductions in robot prices.⁴⁸ As robot prices decline, increased automation displaces Northern workers in a wider range of tasks, which initially depresses wages. Welfare nevertheless increases, as the income losses associated with lower labor income are more than offset by increased income from the rental rate of robots and lower consumer prices. The adverse impacts of automation on labor markets might eventually be overturned by further reductions in robot prices. As robot adoption proceeds in the North, production expands more and might raise demand for the tasks in which robotization is technologically unfeasible. This potentially leads to an increase in labor demand and in real wages.

482. Workers in the South may benefit from robotization. As high-income countries adopt more robots, production expands and so does demand for complementary imported inputs from developing countries (whose production might use assembly labor and some robots). This evidence is consistent with recent examination of the evolution of employment by occupation using census data.⁴⁹ While automation in advanced countries has been labor displacing, in developing countries, robots seem complementary to assembly labor, as in these countries the number of operators and assemblers has increased in absolute terms and as a share of the labor force.

483. That robot adoption can go hand in hand with job creation in some cases is exemplified by the U.S. automotive industry, which in recent decades has adopted more robots than any other sector in the United States, both in absolute terms and per worker. From 2010 until 2016, the operational stock of U.S. robots in the automotive sector rose by 52,000 units. At the same time, the number of jobs increased by 260,600 according to the Bureau of Labor Statistics, partly recovering from the steady decline in the previous decade.

484. As another example, almost 45 years after the introduction of the Automatic Teller Machine, the number of bank teller jobs in the United States has grown from a quarter of a million to half a million. ATMs made it cheaper to open new branches, which increased by about 40 percent. Although there are typically fewer tellers in each of these branches, many new tellers were hired to provide services in these branches. The nature of work shifted from routine tasks, such as counting money—to more cognitively demanding tasks, such as building relationships with customers and optimizing their financial services portfolio by introducing them to new products. But now the number of branches has started to decline, because of industry consolidation and technological change (including mobile and online banking). The Bureau of Labor Statistics is predicting the number of bank teller jobs to decline to 480,500 by 2024, down from 520,500 in 2014.⁵⁰

485. Besides directly affecting national labor markets in advanced economies, Northern robotization also affect the relative costs of production and thus international trade with developing countries. So, it may also indirectly affect wages, welfare, and industrial composition in the South. Evidence from Mexico suggests that U.S. robotization has had negligible impacts on Mexican local labor markets that were more exposed to robot-induced shifts in import-demand thus far.⁵¹ But more general results from model-based counterfactual simulations suggest that Northern robotization may lead to both real wage and welfare gains in the South, as well as to changes in industrial structure.⁵²

486. Robotization can induce labor reallocation in the South toward producing intermediate inputs for Northern firms and away from tasks that can be automated in the North. Real wages and welfare may increase in the South, reflecting lower consumer prices. Potential welfare gains in the South are likely amplified if robotization also becomes economically viable there. But it is also likely to impose adverse distributional consequences, akin to those in advanced economies. Over time, the range of tasks in which automation is feasible is likely to expand, which will most likely reinforce these patterns. The same is true for demographic developments, notably aging populations in much of the developed world, which will likely promote further automation there and amplify opportunities for labor-intensive exports in developing countries.

Box 6.4 How will artificial intelligence affect the Philippines’ 1.5 million call center workers?

The Philippines is a global leader in business process outsourcing (BPO). A competitive telecoms market, tax incentives, and a strong pool of local laborers with good English skills have attracted companies—mainly American and European—to outsource their customer service activities there. The industry directly employed about 1.2 million Filipinos and generated \$23 billion in revenues in 2017.⁵³

With the creep of automation and artificial intelligence (AI), jobs in this sector may be under threat. Global competition is increasing the pressure on companies to deliver better and faster customer service. Messenger bots—powered by AI—can take on many traditional customer services tasks through email, online chat, and social media, as well as over the phone due to improvements in voice recognition technologies. Some banks offer customer services to their youngest customers via Snapchat. Computers can complete associated clerical work more efficiently and with fewer mistakes. And by employing big data, AI can generate comprehensive FAQs and timely self-service options that reduce customer support inquiries from the outset.

Adjusting to these new dynamics will be crucial to the continuing success of Filipino BPO companies. The IT & Business Process Association of the Philippines projects that the number of low-skill jobs could drop from the current 50 percent to around 27 percent in 2022 as certain tasks are taken over by machines.⁵⁴ As jobs increasingly involve more sophisticated tasks, the demand for higher-skilled workers will increase. Investments in education, retraining, and stronger BPO worker protections are already in the pipeline.⁵⁵

AI will ultimately enable those workers and companies to focus on tasks that are more cognitively demanding and deliver better business services to clients. Companies are already going beyond basic customer service to focus instead on enhancing the customer experience,⁵⁶ which takes a more holistic approach to a customer’s interaction with and feelings toward a company.⁵⁷ Stock price growth and total returns are generally higher among companies that invest in customer experience. While chatbots can answer simple routine questions and process information in the background, human BPO workers deal with more complex, nuanced issues. Data collection and analysis of human interactions enable workers to optimize processes for customer engagement, better anticipate current and potential customer needs, and be more creative around outreach.

D. Openness stimulates innovation

487. How are these patterns likely affected by trade policy? Inflating trade costs, for example by imposing tariffs, will not only diminish trade, but will also influence patterns of technology adoption. Intriguingly, model simulations suggest developing countries may themselves be *more* likely to adopt labor-saving technologies when trade costs are high, because they would both be somewhat shielded from foreign competition in sectors where these technologies are used more intensively and not be able to import goods produced with them in developed countries. But this does not mean that protectionism stimulates innovation. Instead, it likely prevents efficiency-enhancing specialization across countries. Indeed, by opening up opportunities in new markets and fostering competition in domestic markets, trade liberalization tends to incentivize competition and scale and, by implication, innovation. About 7 percent of the increase in knowledge creation during the 1990s was due to trade reforms lowering barriers to entering foreign markets.⁵⁸

488. Recent firm-level studies, moreover, suggest that international sourcing strategies can serve as a conduit to innovation. For instance, evidence from Denmark suggests that offshoring allows firms to devote a larger share of their labor force to innovation-related activities, thus facilitating technological upgrading. These findings resonate with evidence from Norway showing R&D and international sourcing to be complements.⁵⁹ Cheaper access to imported intermediate inputs raises the returns to R&D. These estimates are also in line with broader cross-country evidence pointing to increased functional specialization in trade: high-income countries tend to specialize in R&D, lower income countries tend to specialize in fabrication, and specialization in management and marketing is unrelated to income.⁶⁰ Inflating the costs of international sourcing by raising trade protection could thus undermine gains from specialization and stunt productivity growth.

489. Put differently, openness stimulates innovation. The positive impacts of trade openness on technological progress are an often-overlooked source of gains from trade.

E. Implications for export-led industrialization

490. While predicting the future is a treacherous exercise, new technologies will likely reduce trade costs and make it easier to participate in global markets. This may offer new opportunities for developing countries to link into global value chains. Yet, the attendant intensification of competition and changing skill demands will make it more challenging to do so successfully, and may aggravate some of the challenges developing countries already face when trying to link into GVCs. Platform firms, for example, are making it easier to connect, but their reputation mechanisms for verifying supplier quality tend to foster concentration and make it harder for entrants to grow. They are creating new challenges for regulators both because they wield market power, and because their interactions with agents in different parts of the value chain may create potential conflicts of interest and enhance the scope for anticompetitive conduct.

491. Automation anxiety is not warranted for all developing countries. Adoption of new production technologies in the OECD will enhance productivity and is likely to boost trade. While some countries are likely to lose manufacturing employment because of greater competition in output markets, countries that are part of GVCs and supplying inputs to other countries that are automating may witness an increase in the demand for their goods. And across the globe, consumers will enjoy lower prices. Instead, the primary challenge arising from new production technologies is to ensure that benefits are evenly distributed, and that losers are compensated both across and within countries. Among the countries adopting these technologies, labor market disruptions are likely to be significant, skill premia are likely to rise, and the labor share of income may decline further. These outcomes point to the importance of sound social safety nets and redistributive and tax policies to ensure that gains are widely shared without distorting incentives to innovate. These policies will be discussed in Chapter 8.

492. Increasing protectionism would be the wrong response. It would not only reduce efficiency and lead to higher prices of both inputs and final goods. It would also undermine incentives to innovate, arguably one of the most overlooked sources of the gains from trade.

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¹ Artuc, Bastos, and Rijkers 2018; Bown et al. 2017; de la Torre et al. 2018; Dutz 2018; Lopez-Acevedo et al. 2016.

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- ² In lower-middle-income countries the share of firms (with at least five employees) using broadband internet rose from 39 percent in 2006–09 to 68 percent in 2010–14, while the share in low-income countries in 2010–14 was about 38 percent, as was shown in the *2016 World Development Report*
- ³ Freund and Weinhold 2002; Freund and Weinhold 2004; Antràs, Garicano, and Rossi-Hansberg 2008; Grossman and Rossi-Hansberg 2008; Costinot, Vogel, and Wang 2013; Fort 2017.
- ⁴ Hjort and Poulsen 2018.
- ⁵ Fernandes et al. forthcoming.
- ⁶ Carballo et al. 2016.
- ⁷ Lajaaj, Eslava, and Kinda 2019.
- ⁸ McKinsey and Company 2019 argues that traditional trade statistics do not fully account for the rising importance of trade in services, notably by underestimating: (1) services embodied in goods; (2) intangibles sent by firms to foreign affiliates; and (3) the proliferation of free digital services made available to global users.
- ⁹ McKinsey and Company 2019.
- ¹⁰ Jouanjen, 2019.
- ¹¹ World Economic Forum, 2018.
- ¹² OECD. 2018.
- ¹³ ⁴ Tripoli and Schmidhuber. 2018.
- ¹⁴ Pwc.com/blockchainsurvey
- ¹⁵ Hoeckman and Nicita 2008.
- ¹⁶ See Atkin and Donaldson 2018.
- ¹⁷ Hsieh and Klenow 2014; Hsieh and Olken 2014; McKenzie 2017.
- ¹⁸ Fernandes, Freund, and Pierola 2016.
- ¹⁹ Internet Retailer.
- ²⁰ China’s Ministry of Commerce.
- ²¹ U.S. Commerce Department.
- ²² See Garicano and Kaplan 2001 and Chen and Wu 2018.
- ²³ Lendle et al. 2016.
- ²⁴ Chen and Wu 2018.
- ²⁵ Agrawal, Lacetera, and Lyons 2016; Mullainathan and Spiess 2017; Brynjolfsson and McAfee 2017.
- ²⁶ Columbus 2018.
- ²⁷ Jo, Matsumura, and Weinstein 2019.
- ²⁸ Couture et al. 2018.
- ²⁹ Chava et al. 2018.
- ³⁰ Goolsbee 2001; Prince 2007; Duch-Brown, Martens, and Mueller-Langer 2017; Seamans and Zhu 2013; Goldfarb and Tucker 2011; Gertner and Stillman 2001.
- ³¹ Höppner and Westerhof 2018.
- ³² Calligaris, Criscuolo, and Marcolin 2018.
- ³³ World Trade Organization 2018.
- ³⁴ International Federation of Robotics 2018.
- ³⁵ A study by the Boston Consulting Group 2016 predicts that growth in installed robotic systems will rise from the current 3 percent annually to around 10 percent annually in the next decade.
- ³⁶ See Rodrik 2018 for a detailed discussion of this “technological-compatibility” channel.
- ³⁷ Hallward-Driemeier and Nayyar 2018.
- ³⁸ Leering 2017.
- ³⁹ Oldenski 2015 provides evidence that reshoring is not widespread in the United States.
- ⁴⁰ Artuc, Bastos, and Rijkers 2018.
- ⁴¹ Karabarbounis and Neiman 2013.
- ⁴² Autor et al. 2017.
- ⁴³ Graetz and Michaels 2018; Acemoglu and Restrepo 2017; Artuc, Christiansen, and Winkler 2018.
- ⁴⁴ World Bank 2019.
- ⁴⁵ Acemoglu and Restrepo 2018.
- ⁴⁶ For instance, in 2016 the car manufacturer Mercedes-Benz decided to replace some of its assembly line robots by more capable humans at its Sindelfingen plant in Germany. The wide variety of options for the cars demands adaptability and flexibility, two attributes in which humans currently outperform robots. Skilled humans can change a production line in a weekend, where robots take weeks to reprogram and realign.
- ⁴⁷ Brussevich et al. 2018.
- ⁴⁸ Artuc, Bastos, and Rijkers 2018.

- ⁴⁹ Maloney and Molina, 2019.
- ⁵⁰ <https://www.bls.gov/ooh/office-and-administrative-support/tellers.htm#tab-6>
- ⁵¹ Artuc, Cristiaensen, and Winkler, 2018.
- ⁵² Artuc, Bastos and Rijkers, 2018.
- ⁵³ Lema, 2017.
- ⁵⁴ IT & Business Process Association, 2019.
- ⁵⁵ IT & Business Process Association, 2018.
- ⁵⁶ Watermark Consulting, 2019.
- ⁵⁷ Blake, 2018.
- ⁵⁸ Coelli, Moxnes, and Ulltveit-Moe 2016.
- ⁵⁹ Boler, Moxnes, and Ulltveit-Moe 2015.
- ⁶⁰ Timmer, Miroudot, and Vries 2019.

Chapter 7: National Policies for Participation

493. What conditions facilitate the fruitful participation of firms in GVCs, and to what extent are these conditions under the influence of government policy? What needs to be done to fully reap the benefits from GVC? Using evidence from Chapter 2 on the determinants of GVCs, this chapter considers policies to enhance participation.

494. First, because market size matters, countries can liberalize trade to expand their markets and promote their participation in GVCs. A country's own liberalization of imported inputs expands its sources of supply, as well as the possible roles it can play in the value chain. Similarly, protection in other countries may limit the ability of one country's exporters to diversify into products downstream from those already being produced (chapter 8). Nontariff measures (NTMs) can similarly limit the ability to access a wide variety of imported intermediate inputs. While some NTMs support legitimate national regulations to support safety, health, and environmental protection, others have primarily a protectionist impact.

495. Because the goods and services economies are increasingly interlinked, liberalizing services trade should be part of any strategy for promoting GVC activity. Besides the service sectors named already, service policies should encourage the adoption of new, productivity-enhancing supply chain technologies. Thus, policies should seek to improve the enabling environment for e-commerce, liberalize telecommunications services, and promote free movement of data within firms.

496. Reducing policies that distort international trade can make GVCs more successful. In recent years, there has been a proliferation of domestic subsidies and export-related measures, including export subsidies. These policies can help address market failures but can be costly and foster the expansion of activities in which countries may not have a comparative advantage. They can also promote unnecessary environmental damage (chapter 5). In addition, the use of subsidies can bring countries into conflict with their trading partners.

497. Second, because geography matters, countries can overcome remoteness by improving their connectivity and lowering trade costs. Some countries are disadvantaged naturally by being landlocked or in remote locations. Others are disadvantaged by human action, by having slow, costly, and unpredictable border procedures. Since GVCs rely on fast and predictable movements of goods, reducing the time it takes goods to move predictably is key. For many goods traded in GVCs, a day's delay is equal to imposing a tariff in excess of 1 percent ad valorem. Improving customs and border procedures, promoting competition in transport services, improving port structure and governance, and opening the domestic market to global providers of third-party logistics and express delivery services—all are strategies that can reduce trade costs related to time and uncertainty.

498. Third, because institutional quality matters, countries can use deep preferential trade agreements to improve the rule of law and step up contract enforcement. GVCs thrive on the flexible formation of networks of firms. Therefore, attention should be paid to contract enforcement, to ensure that legal arrangements within the network are stable and predictable. Better contract enforcement supports the supply of business services, which support the development of GVCs. The ability to enforce contracts relating to intellectual property is also important for more innovative and complex value chains.

499. Fourth, because endowments matter, countries can promote foreign investment and upgrade capabilities. Some types of GVCs make intensive use of cheap labor, so those activities are attracted to countries with cheap labor. But GVCs also require capital, technology, and managerial know-how. Since the lead firms in GVCs are often multinationals, policies to attract foreign direct investment are critical for GVC formation. The participation of domestic firms in a value chain led by a foreign lead firm can be enhanced by qualified supplier programs, which help foreign firms identify domestic firms that can offer goods and services to a GVC supply chain, and thus capture more of the value generated by GVCs in the national economy.

500. The chapter also considers whether countries can use special economic zones (SEZs) to achieve islands of excellence to attract investors, especially when improving the business climate and improving connectivity on a broader scale is costly and will take time. SEZs can be successful when they address specific market failures, but there are numerous examples of SEZs that fail to attract investors or grow. Even in a restricted area, getting conditions right requires careful planning and implementation to ensure that the needed resources—such as labor, land, water, electricity, telecommunications—are readily available, that regulatory barriers are minimized, and that connectivity is seamless. Communication with businesses in the targeted sectors is critical to ensuring that the zone meets their needs. SEZs cannot, however, address all investor concerns, such as political or macro stability. For example, a volatile exchange rate will affect investors inside and outside the zone.

A. Policies to enhance participation in GVCs

Market size matters, so liberalize trade to expand markets and promote participation in GVCs

501. As Chapter 2 shows, countries with low tariffs are more likely to participate in GVCs. Low tariffs allow firms to import the needed parts and components. Countries also benefit from returns to scale by focusing on a specific stage of production. Market access abroad is also important to facilitate exports and expand GVCs.

Tariffs

502. Worldwide, MFN tariffs fell by about one-third between 2001 and 2013.¹ Of this liberalization, more than half was a result of countries cutting tariffs on their own initiative. This included unilateral cuts between 10 and 20 percent ad valorem for India, Morocco, Nigeria, Peru, and Tunisia, and between 5 and 10 percent for Bangladesh, Kenya, and Mexico. In Libya, an average 26 percent most-favored-nation tariff was replaced with an across-the-board 4 percent customs service fee on all but a few products.² While there is still scope for international cooperation to lower tariffs—bilaterally, regionally, or in a multilateral round (chapter 8), the remaining scope for countries to liberalize unilaterally is still substantial.

503. Despite some theoretical reasons for heterogeneous tariffs, economists tend to favor uniform tariffs because they do not discriminate across products, so relative prices reflect true economic costs, leading to an efficient allocation of resources. Uniform tariffs also lower the returns to lobbying for protection by special interests, since each group prefers protection only on its specific good. A history of trade agreements has reduced the extent of tariff escalation in high-income countries, which nevertheless need to go further, especially on agriculture.

504. While reducing tariffs will facilitate GVCs, raising tariffs will dismantle them and limit future participation. And currently, not all tariffs are falling. Protectionism witnessed a resurgence over the last two years, fueled by tensions between the United States and China. In the age of GVCs, this new wave of protectionism is likely to have significant costs (box 7.1).

- The hyper-specialization in tasks and parts across borders means that trade costs are incurred multiple times.
- Protective measures against any country have knock on effects on all its trade partners in the value chain.
- GVCs also amplify the costs of trade policy uncertainty, as firms are more reluctant to make further investments in new or existing relationships with foreign suppliers.
- Significant tariffs on inputs can make firms incur large costs to reshape their existing supply chains—and thereby cause potentially long-lasting disruptions to global investment and production.

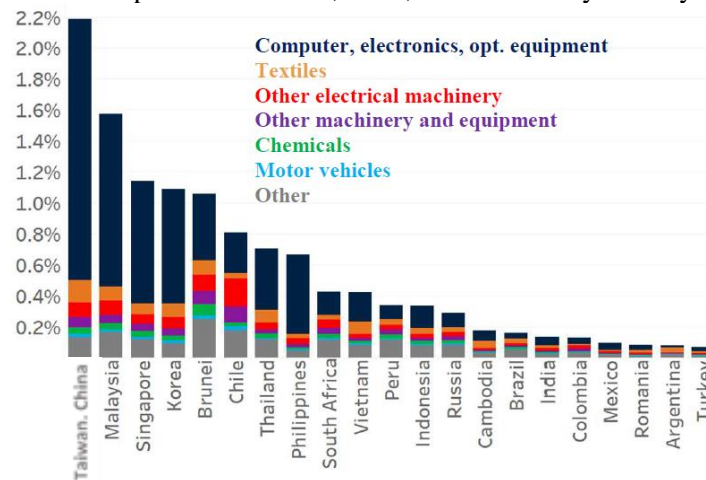
Box 7.1 Protectionism and GVCs

The United States and China imposed tariffs on each other since 2018 covering more than half of their bilateral trade (approximately 70 percent of U.S. exports to China and almost half of U.S. imports from China). The United States also imposed tariffs on other countries covering solar panels, washing machines, steel, and aluminum, sparking retaliation from affected trading partners. At the same time, negotiations continued over the terms and timing of the United Kingdom’s departure from the European Union.

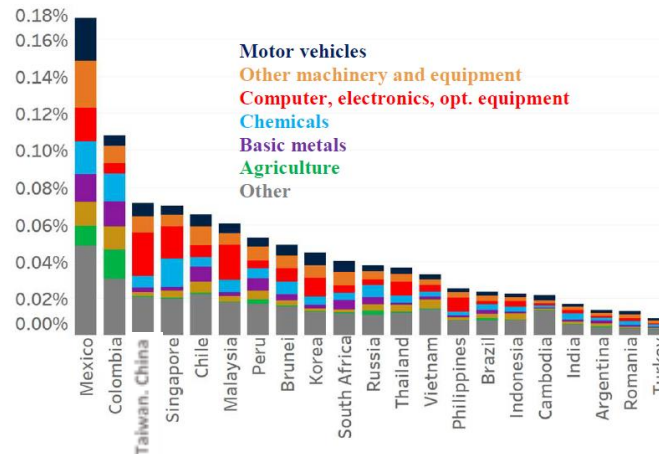
In a world of GVCs, protective measures against any country have knock-on effects on all its trade partners in the value chain. For example, China’s exports to the US have significant value added from Taiwan, China; Malaysia; and Singapore (box figure 1). US tariffs on Chinese final goods therefore affect intermediate producers in those economies. Similarly, Chinese tariffs on US goods affect producers in Mexico and Colombia. The supply chain *diffusion channels* determine how the local effects of a shock propagate up- and downstream to all other nations that are part of the same supply chains as the immediately affected countries.

Box figure 1 The multilateral dimension of the US-China trade war

A. China exports to the USA, 2015, value added by country of origin



B. US exports to China, 2015 Value added, by origin country



Source: World Bank calculations based on EORA.

Note: Only developing countries are considered among the sources of value added in US and China bilateral exports.

If bilateral measures of protection become permanent, they create incentives for firms to reorganize their supply chain. The effects of protection on GVC participation may differ when GVCs are relational in nature. Because of protectionism, some of the links in the chain may be unable to provide parts, components or services in time or under pre-specified terms. These supply chain disruptions are particularly costly when firms cannot easily resort to alternative suppliers.

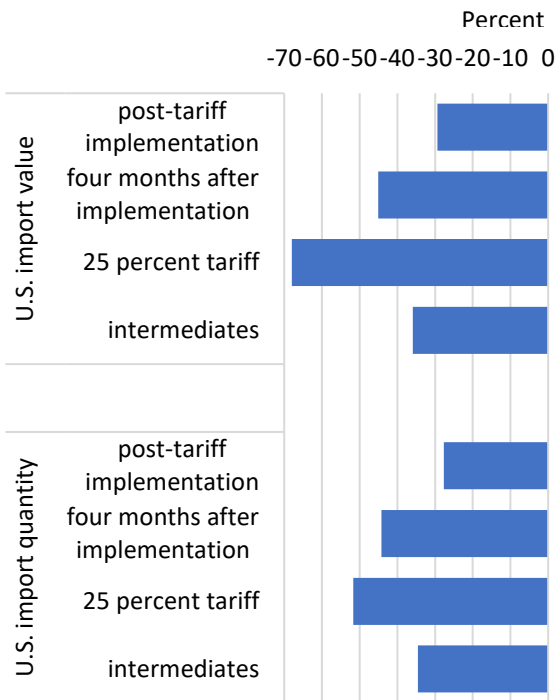
Recent evidence also reveals how the impact of U.S.-China tariffs changes with time, the magnitude of protection, and the nature of products. Econometric analysis focusing on import value and quantities in the U.S. and China for 2018 and the first quarter of 2019 shows that the tariffs have led to significant declines in the affected imports of U.S. from China and of China’s from U.S., respectively. This is not only relative to imports of affected products prior to tariff implementation, but also to imports of unaffected products, whether from U.S. and China or third countries. The analysis also shows that higher tariff rates lead to larger declines and that declines become bigger over time, as the policy change are seen as durable and agents adjust to the new situation (box figure 2).

Analysis using a computable general equilibrium model suggests that longer-term effects may be even larger. It is estimated that US imports of intermediate goods from China are likely to decline in the longer-term by over 41 percent, much more so than the declines in consumption goods by 9 percent and investment goods by 26 percent.

Box figure 2 Impact of U.S.-China tariffs on bilateral imports

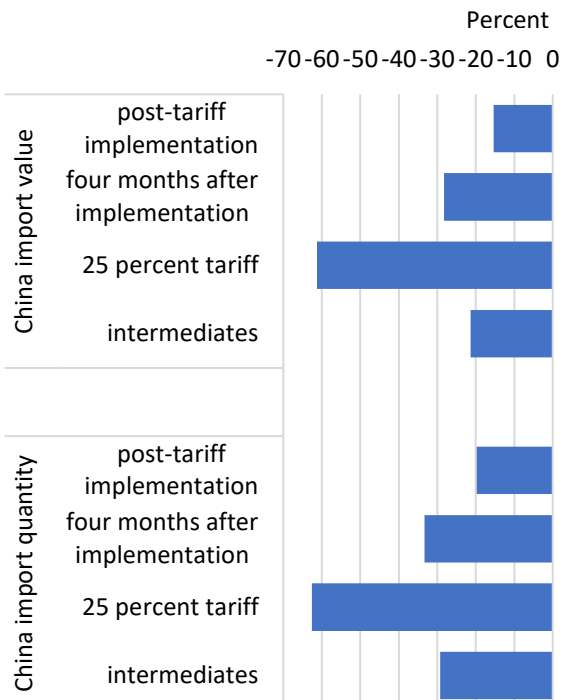
a. Average decline in tariff-affected U.S. imports from China

(relative to pre-tariff implementation period & to non-targeted imports from China and the Rest of the World)



b. Average decline in tariff-affected China imports from U.S.

(relative to pre-tariff implementation period and to non-targeted imports from U.S.)



Source: author’s calculations based on data from U.S. Census and China Customs Statistics.

Notes: Intermediates defined as categories 22, 42 and 53 of BEC classification.

¹ Bellora and Fontagné 2018

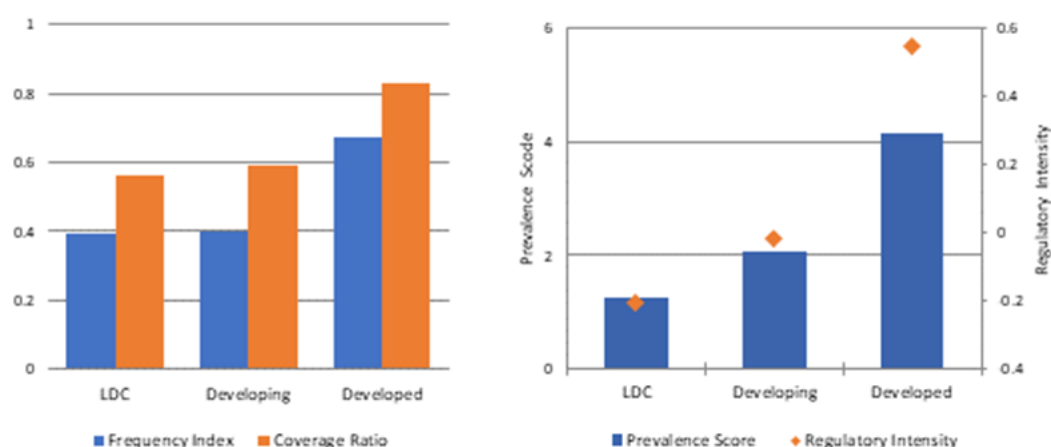
Nontariff measures

505. The use of nontariff measures (NTMs) is increasingly widespread. The number of tariff lines covered by such measures averages about 40 percent for least developed and developing countries and more than 60 percent for developed countries, and the trade covered by such measures is even higher (figure 7.1). Moreover, multiple NTMs are often applied to the same product category. Countries that have lower tariffs may have more elaborate systems of NTMs (figure 7.2).

506. While it may appear that countries are simply substituting tariff protection for NTM protection, this may not be the case in aggregate. A large share of modern NTMs are regulatory—technical barriers to trade (TBT) or sanitary and phytosanitary measures (SPS) are designed to protect human, animal, and plant life, health, and the environment. Higher income countries tend to have more such measures as well as lower tariffs. However, regulatory measures, even when they have legitimate goals, can pose challenges for low- and middle-income countries as their producers strive to meet more stringent standards, which may be costly.

507. NTMs such as quantitative restrictions and nonautomatic licensing have effects more like tariffs and serve primarily to restrict trade. Their presence can be particularly inhibiting for GVC formation.

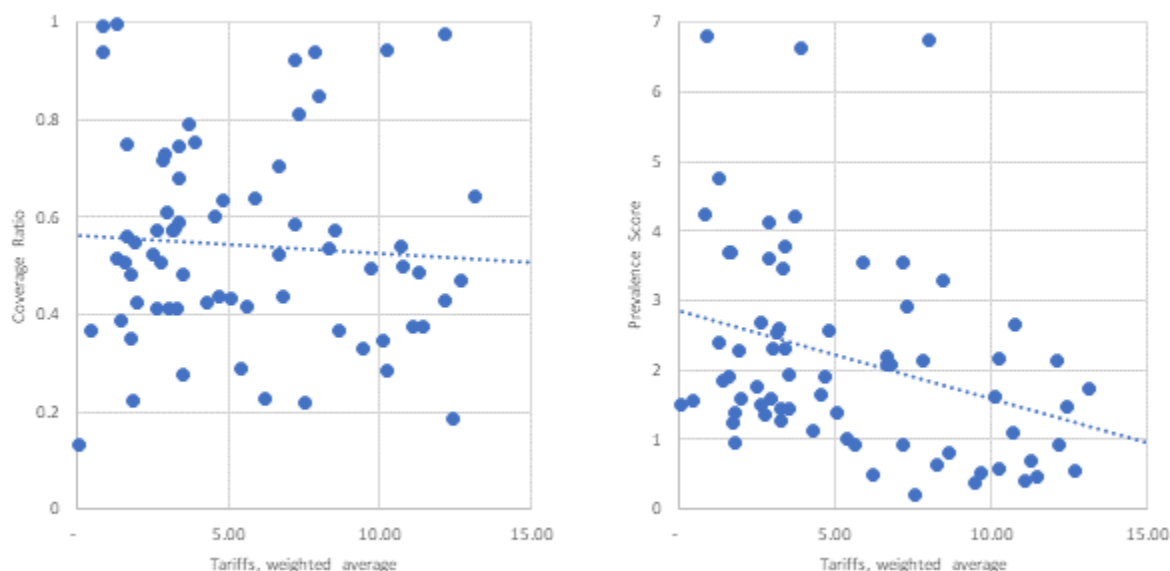
Figure 7.1 Nontariff measure use, by United Nations development status



Source: UNCTAD and World Bank 2018.

Note: The Frequency Index captures a country's share of traded product lines subject to at least one NTM. The Coverage Ratio captures a country's share of trade subject to NTMs. Unlike the Frequency Index, it is weighted by import values, rather than using traded product lines. The Prevalence Score indicates a country's average number of distinct NTMs applied on regulated products. In doing so, it measures the diversity of NTM types applied and provides some indication regarding the intensity of regulating. The Regulatory Intensity adjusts the Prevalence Score for differences in regulatory intensity and trade importance across products. In doing so, it adjusts for the fact that some products are more traded and regulated than others, for example medicines. Computed as an average for a country, the Regulatory Intensity is normalized by the average number of measures for each product around the world and then weighted by its importance in world trade.

Figure 7.2 Nontariff measure usage and tariffs: Countries that have lower tariffs tend to have higher NTM usage



Source: UNCTAD and World Bank 2018.

Regulation

508. While product standards and regulations effectively serve as non-tariff measures, many are necessary to protect consumers from dangerous products. These standards present problems for both exporters and importers. For exporters, it may be difficult to sell in other markets if standards are not met—such as those for quality and freshness standards in agriculture. Meeting them may require upgrading product quality by improving production methods and management practices and infrastructure for quality control. Ensuring that the country has appropriate institutions and labs to certify standards is critical to growing exports.

509. For importers, inappropriate standards may exclude the country from some valuable opportunities for GVC participation. For example, importers in most South Asian countries have difficulties in importing synthetic yarn and fabrics, which inhibits their apparel makers from serving the market for high-performance athletic wear and garments for first responders. Whether such difficulties are related to standards or high tariffs, the lack of key intermediate inputs precludes exporting whole categories of goods that could otherwise have been sold at a higher price-point than other apparel, capturing more value added.

Subsidies and the proliferation of distortionary trade-related policies

510. The incentives that governments offer for GVC formation may take the form of implicit or explicit subsidies. They often are not only fiscally costly, but can also be ineffective.³ Tax holidays and income tax exemptions are therefore rarely cost-effective, just like those aimed at investors producing for domestic markets or extractive industries.⁴ Tax incentives also transfer rents from host countries to investors. Other types of subsidies and tax credits to stimulate exports or attract an industry are also used.

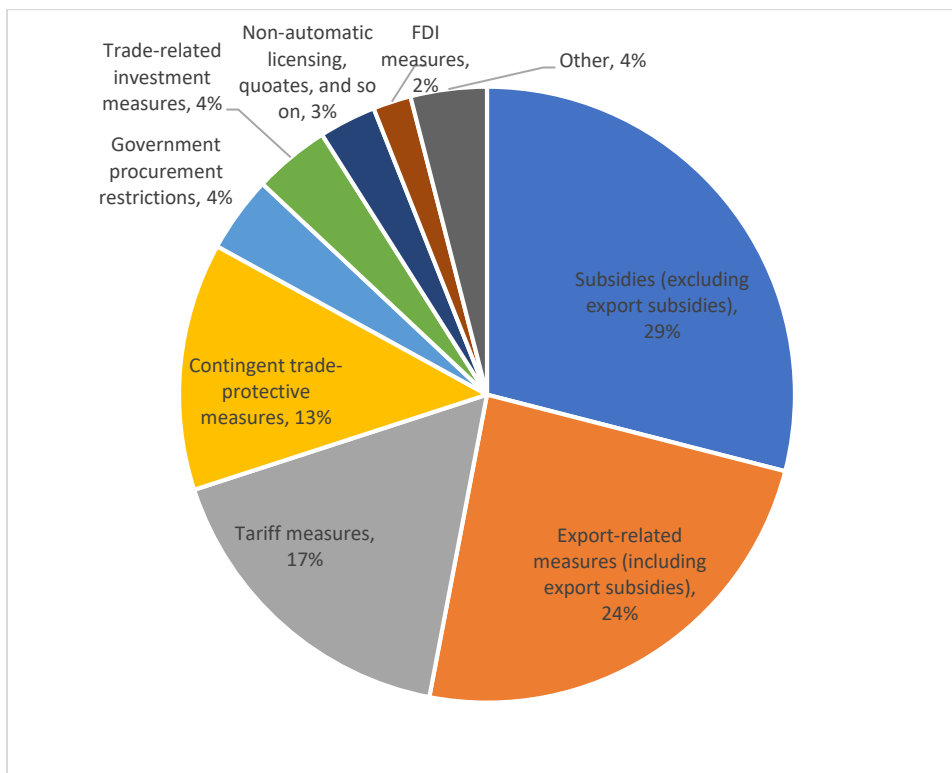
511. Industrial or investment subsidies may be the appropriate policy response when there is a market failure that leads to underinvestment by firms. For example, firms may underinvest in research and development if some of the returns to innovation will be appropriated by copycats. Similarly, firms are unlikely to invest in environmentally friendly techniques because the large social gains accrue to the public and are not monetized by the firm. If there is a coordination problem in developing an industrial cluster—

where several firms need to invest concurrently—a push from the government towards that sector may help solve the problem. For relational GVCs, in the absence of effective contract enforcement, firms may underinvest in trade linkages if they are worried about monopsony buyers of their inputs.⁵

512. While there are valid reasons governments employ subsidies, industrial subsidies can lead to resource misallocation and create negative spillovers in other countries. Subsidies pull resources into a given activity, so if there is no market failure to be solved, they directly lead to too much of that activity. Thus, some incentive schemes may go beyond efficiency-enhancing policies to distort market outcomes. Using them efficiently requires governments not only to recognize the distortion, but also to estimate its optimal magnitude. Subsidies often create a political economy problem, where once in place they are difficult to remove because the beneficiaries lobby to maintain them. The challenge to governments is utilizing subsidies appropriately, while limiting their negative effects.

513. In recent years, more than half the potentially distortionary trade policy instruments employed worldwide have involved subsidies, export-related measures (including subsidies), trade-related investment measures, or FDI measures (figure 7.3). Some part of these measures may arise in an attempt to attract GVCs. In addition, some portion of countervailing duties (which are included under “contingent trade-protective measures”) may arise as a result of attempting to offset the effects of GVC-attracting subsidies using the mechanism permitted by WTO rules.

Figure 7.3 Governments increasingly use distortionary subsidy policies



Source: Global Trade alert.

Note: Data are from November 2018.

514. One problem with subsidies is that they can lead to wasteful competition both within and between countries. In the United States alone, it is estimated that state and local subsidies competing for mobile firms consumed around 30 percent of state and local business tax revenue, and that states have strong incentives to increase subsidies to businesses in a way that reduces real income in other states.⁶ It is difficult to restrain subsidy competition among subnational governments, but it probably is even more difficult to

restrain subsidy competition among nations, though there would be welfare gains from international cooperation.

515. Subsidies to state-owned enterprises (SOEs) or other politically connected firms are particularly worrisome. When state-owned enterprises are able to attract a disproportionate share of capital, the rate of return on such capital declines, with negative consequences for national income. Put more simply, capital is wasted when it is misallocated. One estimate suggests that in 2002–04, China could have produced its existing output with an estimated 8 percent less capital if distortions favoring SOEs were corrected, thus enabling more household consumption.⁷ Rapid private sector growth in China since then is likely to have reduced the size of this distortion.

516. While lowering trade costs or improving contract enforcement in one country is likely to benefit all countries, subsidy-like support for GVC firms, whether foreign investors or network lead firms, is likely to have a “beggar-thy-neighbor” aspect and create trade tensions. If all countries subsidize, this would lead to global welfare losses. If a few subsidize in a frequent way, this could lead to trade tensions that the importer manages by imposing countervailing duties, which are a blunt instrument to address subsidies.

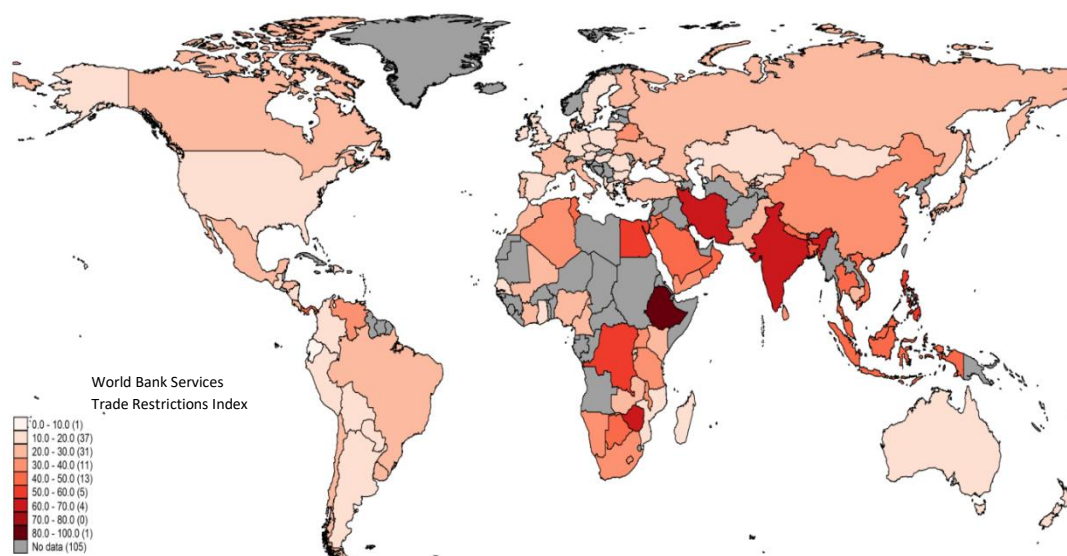
517. Countries may choose to limit their use of subsidies for budgetary reasons, or as part of a general reform to reduce microeconomic distortions. Improved international disciplines on subsidies might also help (chapter 8). Since some subsidized goods create pressure on the natural environment in their production, lowering subsidies can also have additional environmental benefits.

518. Under WTO rules, countries that find themselves importing cheap subsidized goods are allowed to impose countervailing duties. Thus, any gains in exports which are caused by subsidies may be reversed by action by the other country. By the end of 2018, there were 218 instances of countervailing duties notified to the WTO and currently in force. Of these, 162 were applied either to metals and metal products or to chemicals, rubber, and plastics and products thereof, suggesting that trade in those sectors is particularly distorted by subsidies.⁸ This state of affairs creates a less predictable trading environment for both countries. In addition, charges of export subsidies can entangle countries directly in WTO disputes, both about the subsidies and about the countervailing duties in response.⁹

Freeing up services trade

519. Eliminating impediments to trade in services also matters—but is a bigger challenge. Information on trade policy for services remains limited, unlike that for goods. The World Bank Services Trade Restrictions Database (which will be updated in time for the WDR) reveals interesting policy patterns. Although public monopolies are now rare and few service markets are completely closed, numerous restrictions remain on entry, ownership, and operations. Even where there is little explicit discrimination against foreign providers, market access is often unpredictable because the allocation of new licenses remains opaque and highly discretionary in many countries.

520. Across regions, some of the fastest-growing countries in Asia and the oil-rich Gulf states have restrictive policies in services, while some of the poorest countries are remarkably open—as measured by a Services Trade Restrictive Index which takes values from 0 for completely open regimes to 1 for completely closed (figure 7.4). Across sectors, professional and transport services are among the most protected in both industrial and developing countries, while retail, telecommunications, and even finance tend to be more open.

Figure 7.4 Services trade remains restricted in many countries, 2008–10

Source: Borchert, Gootiiz, and Mattoo 2014.

Note: The World Bank Services Trade Restrictions Database covers 103 countries (79 developing) and financial, basic telecommunications, transport, distribution and selected professional services. Data were collected between 2008 and 2010.

521. National decisions to open their market to certain types of services trade are critical for GVCs. Among them are *third-party logistics providers* and *express delivery services*. In addition, a great deal of innovation in value chains takes place at the downstream end, through retailers. It may be easier for large retailers to take advantages of new Supply Chain 4.0 technologies to enhance GVC productivity than for more traditional small retailers, and even easier for e-commerce firms.¹⁰ Policies that restrict entry of large retailers (either domestic or foreign) can thus have a negative impact on the ability to exploit the full efficiencies of GVCs. To the extent that Supply Chain 4.0 technologies are complementary with e-commerce, interventions to improve the enabling environment for e-commerce, and policies to enable free movement of data in firms, are likely to be complementary to the development of GVCs. Liberalizing telecommunications services, including access to the internet, is key for promoting the flow of information between buyers and sellers necessary to promote GVCs (box 7.2).

Box 7.2 Foreign services in India's manufacturing value chains

India offers a powerful example of the benefits of greater participation in manufacturing value chains by foreign services firms. Conventional explanations of the modest resurgence of Indian manufacturing since the early 1990s have focused on policy reforms in manufacturing industries. But a key factor lies outside manufacturing and in the services sector. Reforms in the 1990s visibly transformed services sectors, with greater openness and improved regulation leading to dramatic growth in domestic and foreign investment. Indian manufacturing firms were no longer at the mercy of inefficient public monopolies but could now source services from a wide range of domestic and foreign providers operating in an increasingly competitive environment. As a result, they had access to better, newer, more reliable, and more diverse business services.

These improvements enhanced firms' ability to invest in new business opportunities and better production technology, to exploit economies of scale by concentrating production in fewer locations, to efficiently manage inventories, and to coordinate decisions with suppliers and customers.

To analyze the link between services reforms and manufacturing productivity in India, Arnold et al. (2016) collected detailed information on the pace of reform across Indian services sectors, with a focus on entry and operational restrictions. To make this information amenable to econometric analysis, the

study aggregated it into time-varying reform indexes. They then related the total factor productivity of about 4,000 manufacturing firms to the state of liberalization in services sectors, taking into account other aspects of openness, such as tariffs on output and intermediate inputs as well as foreign direct investment in final and intermediate goods sectors.

The results suggest that procompetitive reforms in banking, transport, insurance, and telecommunications boosted the productivity of both foreign and locally owned manufacturing firms. A one-standard-deviation increase in the aggregated index of services liberalization resulted in a productivity increase of 11.7 percent for domestic firms and 13.2 percent for foreign enterprises. The largest additional effect was for transport reforms, followed by telecommunications and banking reforms.

Several other studies show that access to low-cost and high-quality (domestic or foreign) producer services can promote productivity and economic growth.¹¹ Evidence using firm-level data for the Czech Republic for 1998–2003 shows that services sector reforms leading to greater FDI had a positive effect on the productivity of domestic firms in downstream manufacturing.¹² Similarly, another study demonstrated that substantial FDI inflows in producer services sectors in Chile had a positive effect on the total factor productivity of Chilean manufacturing firms.¹³ The same study suggests that services FDI fosters innovation in manufacturing and offers opportunities for laggard firms to catch up with industry leaders.¹⁴ These benefits arise not just from foreign investment but also from cross-border trade in services. For example, services offshoring by high-income countries tends to raise their manufacturing sectors' productivity.¹⁵

Supply chain 4.0—supporting the digitization of GVCs

522. An example of new technologies that may be associated with large retailers (or indeed lead firms in manufacturing) is the “supply chain control tower.”¹⁶ In the best-practice supply chains of the 1990s, planning, ordering, and confirming take place at each step: original supplier (designer), producer, distributor, before goods reached the consumer. Methods of linear supply chain management have led to significant productivity gains, but still contain significant risks of de-synchronization between the steps, with concomitant efficiency losses. Under the “supply chain control tower” concept, a central monitor (lead firm) can optimize and share information across the supply chain. Thus, the purchase of an item by a consumer (whether in-store or on-line) can lead immediately to reciprocal flows of information extending back to a manufacturer in another country (box 7.3).

Box 7.3 Fast fashion through a supply chain control tower: Inditex-Zara®

The term “fast fashion” illustrates the paramount challenge for many retailers: how can supply chains respond to the constant changes in trends and consumer demands, all the while at affordable prices? Demand is often unpredictable and the latest fads are quickly replaced by something else. Spanish retailer Inditex and its lead clothing brand Zara® relies on data and information flows throughout its supply chain to deal with this challenge, and to great success.¹ Zara® is present in 202 markets and has stores in 96 countries worldwide. It can take a new product from conceptualization, through design, production, and delivery to arrive on the shelf in as little as 15 days, much faster than the average 6 months in the industry.² As a result, Zara® changes almost three-quarters of its available merchandise every 3–4 weeks.

Combining speed and flexibility in this way requires meticulous supply chain management, including close coordination and information exchange between different players in the value chain. Radio-frequency identity technology allows Zara® to identify individual garment items real-time for information on sales, stocking levels, and inventory movements. This technology facilitates the complete integration of stock management systems across stores and the online marketplace. It has also improved the customer experience, as customers can determine whether a product is still available and where.

While achieving a seamless flow of data across the supply chain is important, different departments need to have the ability to act on that information efficiently and effectively. Vertical integration within the

supply chain—across design, production facilities, logistics, and distribution services—grants Zara® significant control and oversight. In addition, geographical proximity is key. While design takes place at the headquarters in Northwest Spain, the network of fully owned production factories, partner factories, and original design manufacturers are primarily in Spain, Portugal, and nearby Bulgaria, Morocco, and Turkey. Proximity allows Zara® to fully exploit just-in-time manufacturing strategies, rapidly adjust production volumes in response to consumer demand, and avoid inventory backlogs that could otherwise drain profits.

¹ Aftab et al. 2018.

² *Inditex Annual Report*, 2017 through Aftab et al. (2018), Super Responsive Supply Chain: The Case of Spanish Fast Fashion Retailer Inditex-Zara. *International Journal of Business and Management*; Vol. 13, No. 5; 2018.

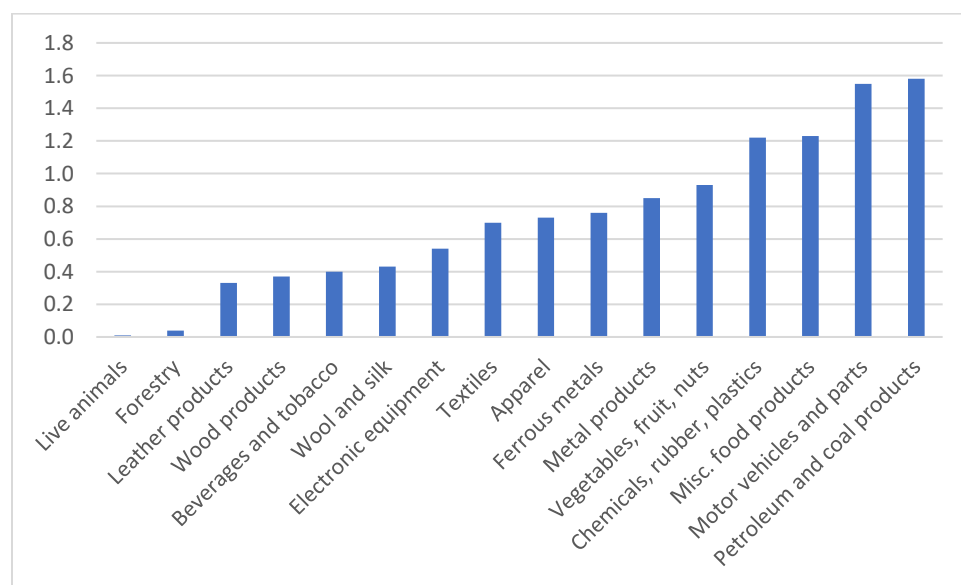
523. The potential gains from this approach are immense, but countries can stifle them either by denying entry to retailing or manufacturing firms operating Supply Chain 4.0, or by disrupting the data flows necessary for the Supply Chain 4.0 approach through policies such as data localization.

Geography matters, so increase connectivity to lower trade costs and facilitate trade

524. Trade costs other than tariffs remain substantial impediments to trade. It has been estimated that improving supply chain-related trade costs associated with border administration and transport/communications infrastructure halfway to global best practice would produce global GDP gains up to six times larger than would global elimination of all tariffs.¹⁷ One aspect of these costs relates to trade facilitation and logistics. Delays due to shipping and border procedures have a negative effect on trade comparable to that of tariffs. Estimates show that a day's delay reduces trade by more than 1 percent in Africa,¹⁸ and a day's reduction in inland transit times can boost exports by as much as 7 percent.¹⁹

525. Consider the estimated tariff equivalent of a day's delay in shipping for a wide variety of product categories (figure 7.5). Time costs in trade are significant for products with complex value chains such as motor vehicles; perishable products such as fruits and vegetables; and textiles and apparel, which both involve complex GVCs and changes in fashion which reduce their shelf life. By contrast, traders are willing to wait longer for such goods as live animals, leather goods, and wood and forestry products.

Figure 7.5 Tariff equivalent of one day's time to trade, selected sectors (percent)



Source: Minor (2011)], based on Hummels et al. (2007). The tariff equivalent on the vertical axis is measured as the ad valorem percentage tariff which is economically equivalent to a day's delay in trading. For example, a day's delay in moving chemicals, rubber, and plastics is approximately equivalent in economic terms to imposing a 1.2 percent tariff on imports of the same goods.

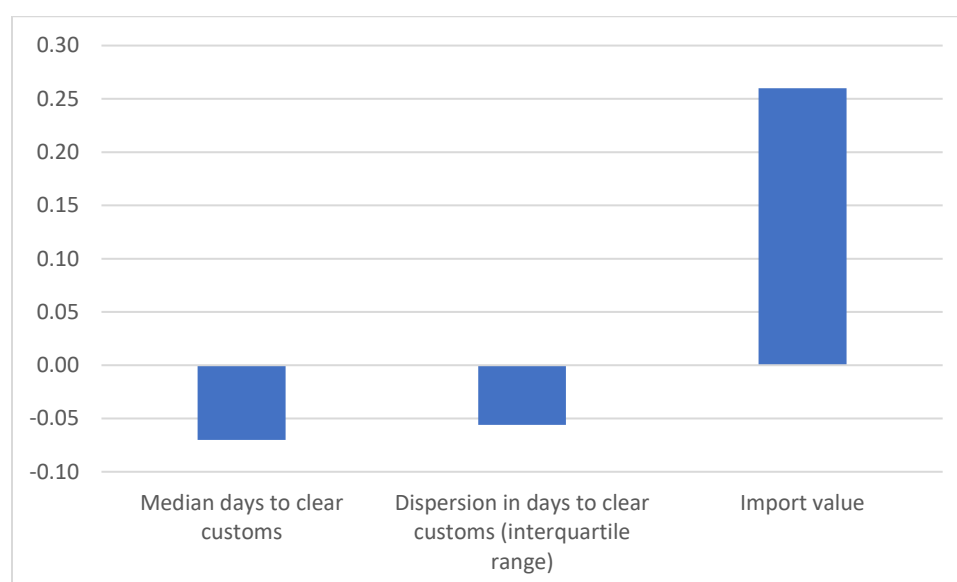
526. GVCs are impeded not only by slow movement of goods but by unpredictable movement, which disrupts the ability to perform the steps of a value chain in their appropriate sequence. In Sub-Saharan Africa, the slowness and unpredictability of land transport impeded the formation of GVCs in almost all countries until very recently.²⁰

Trade facilitation

527. Reducing the cost, time, and uncertainty of moving goods involves actions that countries can engage in unilaterally, though some may require external support:

- *Improving customs and border procedures*, such as implementing effective risk management systems, replacing paper-based with electronic-based documentation, and improving transparency through trade information portals and single windows.²¹ A concerted effort to implement the provisions of the WTO’s Trade Facilitation Agreement can go a long way in this area. In Albania, a risk management reform that sharply reduced the number of physical inspections of shipments shortened clearance times, reduced uncertainty of clearance, and expanded imports (figure 7.6).²²

Figure 7.6 Effect for a typical firm-product-origin country changing to not being physically inspected (percent)



Source: Fernandes, Hillberry, and Mendoza-Alcántara (2019). Assuming the probability that a shipment is inspected falls from 50 percent or more to under 50 percent. Import value is in percentages.

Connectivity and infrastructure

528. Many poor, remote, and landlocked countries are underserved by international shipping and air cargo services. In part, this is a vicious circle—weak economic activity means that few shippers schedule service to such countries, which increases trade costs. The ultimate way to improve service is to promote economic growth by other means. However, countries can now take some measures unilaterally to promote connectivity. These include:

- *Improving connectivity in landlocked countries, and in remote regions of countries with coasts.* While landlocked and remote regions tend to be poorer (20 of 54 low-income countries were landlocked in 2011, compared with 3 of 35 high-income countries), human action adds to naturally high trade costs. For example, cartels in road transport emerge in environments where roads are of low quality.²³ Cooperation between landlocked and transit

countries may be necessary to reduce costs, as well as cooperation between remote neighboring countries, such as the recognition of transit rights for trucking. “Hard” multimodal infrastructure (rail, road, air, and pipeline) needs to complement “soft” initiatives such as pursuing better border procedures through trade facilitation.

- *Improving port infrastructure and governance.*²⁴ There are vast differences between the world’s most and least efficient ports in cargo dwell time (the time ships spend in the water between arrival at the port and final departure unloaded), the time it takes to unload ships, and the adequacy of warehouses and port customs procedures. While technological solutions exist, such as use of electronics at customs or improvement in gantry cranes, needed reforms may be frustrated because some stakeholders benefit from delays.
- *Opening the domestic market to global providers of third-party logistics and express delivery services.* Moving goods and services is key to the operation of value chains in goods. Advances in logistics include not only companies engaged directly in shipping, road and air transport, but also freight forwarders, customs brokers, loaders and unloaders, “pick and pack” warehouses, and many other types of services. At the high end, the coordination of many of these services by a third-party logistics company can be critical in the design of a local or global supply chain (as for the organization of disk drive manufacturing in Thailand).²⁵ The supply of such services can be expanded both by liberalizing FDI in the relevant sectors and by removing impediments to doing business domestically in the same sectors.

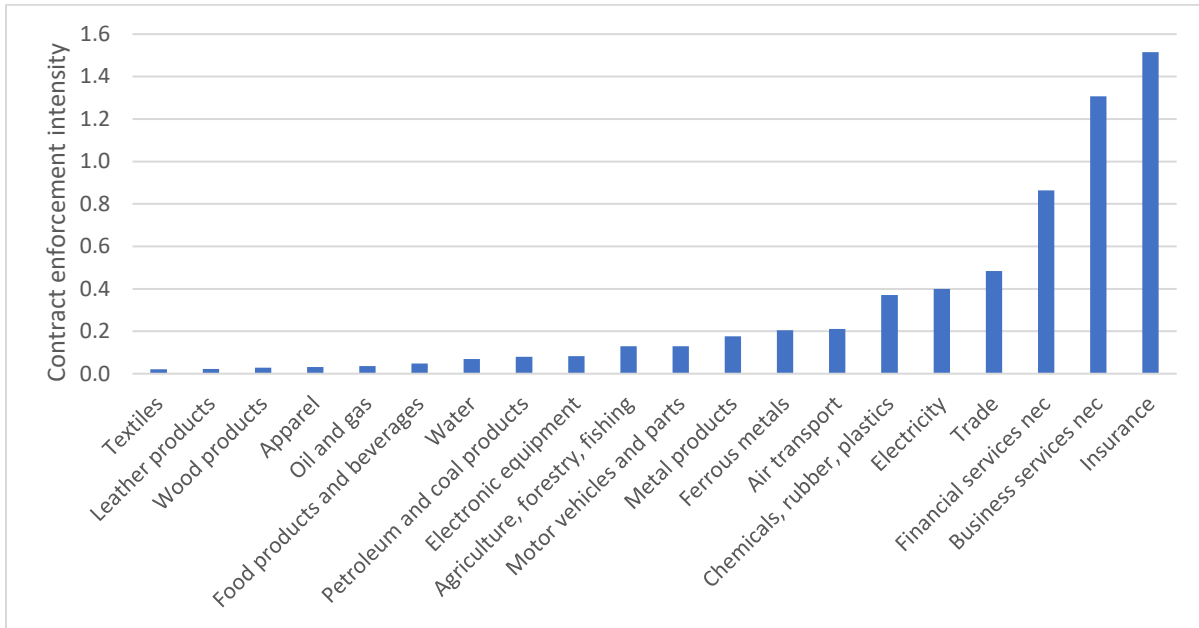
Institutional quality matters, so use deep preferential trade agreements to improve the rule of law and step up contract enforcement

529. To operate a global value chain, it is necessary to manage large networks of firms, which must share dispersed knowledge with each other, and often commit assets to relationships with specific partners. That makes it essential to center and enforce complex contracts among the partners in a GVC. Of course, in an environment where contract enforcement is relatively weak, the formation and ongoing conduct of GVCs is inhibited.

530. Litigation between pairs of U.S. firms show that contract enforcement issues are most prevalent in relationships between firms and their suppliers of insurance, business services, and financial services (figure 7.7). This implies that the supply of such services is lower when legal institutions are weak (figure 7.8).²⁶

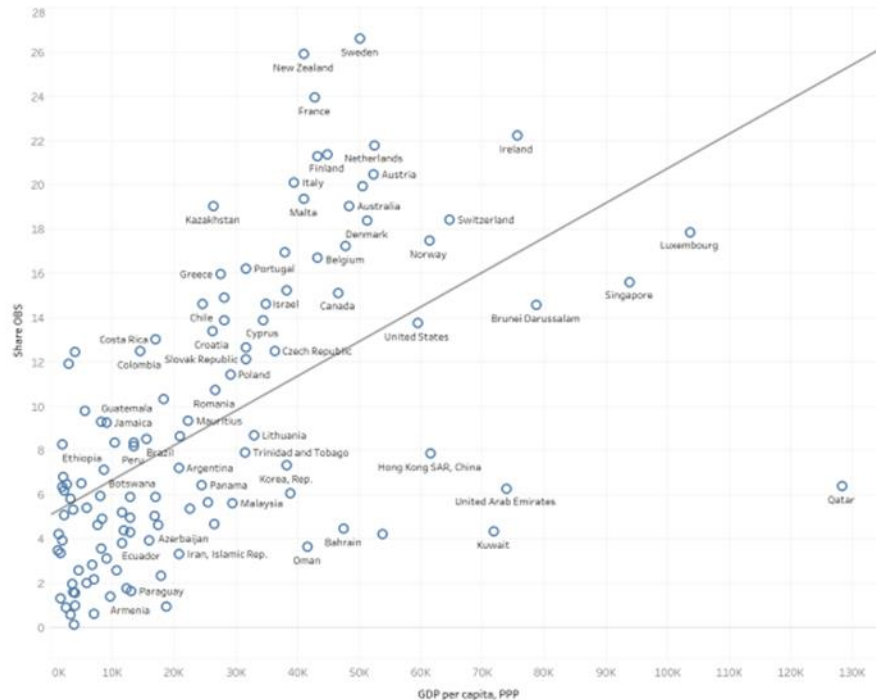
531. The scarcity of such services is important not only because they are essential for organizing and monitoring complex tasks but also because they have a key role in productivity and technological sophistication.²⁷ So, one thing countries can do to attract and deepen GVCs is to improve the quality and transparency of contract enforcement.

Figure 7.7 Contract enforcement intensity of selected upstream sectors



Source: Boehm 2018.

Figure 7.8 The share of “other business services” in total intermediate inputs is very low in poor countries



Source: Boehm 2018.

532. The scarcity of modern business services in poor countries, so essential for GVCs, may need to be addressed by multiple policies. In addition to difficulties in contract enforcement, addressing shortages of managerial know-how can enhance the supply of business services, as can removing any impediments to

importing services.²⁸ Such initiatives as liberalization of professional licensing are potentially subjects for regional cooperation.

533. A specific case for which complex and innovative GVCs to be influenced by a country's contract enforcement relates to intellectual property (IP), particularly where the contract involves licensing or some other form of technology transfer. Countries with stronger IP protection tend to attract more FDI and to receive more technology flows through licensing and royalties.²⁹

Endowments matter, so promote foreign direct investment and upgrade capabilities³⁰

534. The attraction and retention of FDI can be a powerful tool in promoting GVC activity (chapter 2). FDI brings the capital, technologies, and managerial tools for competitiveness in GVCs. It is important to consider not only attracting FDI but also retaining it since some investments change locations frequently in response to small changes in incentives.

535. All countries have some sort of FDI policy, whether explicitly written or tacit. A strong vision for an FDI policy should include:

- Removing legal, regulatory, and administrative impediments to attracting and retaining FDI in intermediate goods and services.
- Ensuring trade and investment regimes are compatible and supportive.
- Maximizing the integration and spillovers from FDI into the domestic economy.

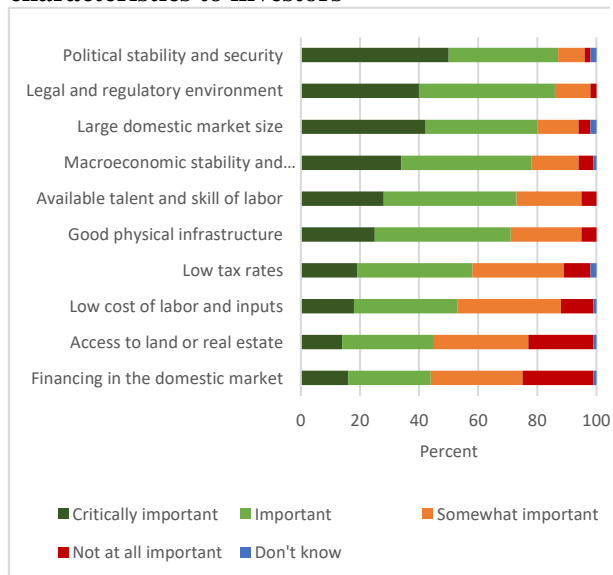
536. Political stability, investor protections, and a business-friendly regulatory environment are especially important in attracting FDI (box 7.4). However, FDI is not homogenous. Investors with different motives consider different factors in their decision to invest. MNCs that primarily seek access to natural resources—as in extractive industries—care more about access to land and resources they wish to exploit than other variables. Market-seeking FDI tends to prioritize the size of and purchasing power in the domestic market. It values policies that facilitate the import and export of goods and services, and lower production costs. It is most closely related to GVCs, as it is about finding the best environment for a given stage of production.

Box 7.4 Determinants of investment decision-making

Here is an overview of locational determinants of FDI using findings from the Global Investment Competitiveness survey on investor perceptions and preferences.

What are the most important locational factors in investment decisions?

- Country characteristics. Political stability and security (87 percent) followed by a business friendly legal and regulatory environment (86 percent) are the most important factors in investment decisions.
- Investment climate factors. All investors cited transparency and predictability in the conduct of public agencies, investment protection guarantees in the country's laws, and the ease of starting a business as important in deciding where to invest. Investors seek strong legal protections and predictability and efficiency in implementing laws and regulations.

Box figure 1 Importance of country characteristics to investors**Box figure 2 Importance of investment climate factors**

What are the most important determinants for MNCs in efficiency-seeking FDI?

Compared with investors with other motives, efficiency-seeking firms, which directly connect countries to GVCs, differ in the following ways:

- MNCs involved in efficiency-seeking investments view most characteristics of host countries as more important than investors involved in other types of FDI. Among them, the difference is largest for low cost of labor and inputs, which 66 percent of firms involved in efficiency-seeking investment find important or critically important compared with only 39 percent of investors with other motivations.
- Investors involved in efficiency-seeking FDI also rate most investment policy factors as more important than investors involved in other types of FDI. These include investment protection guarantees, ease of obtaining approvals, investment incentives, preferential trade agreements, and bilateral investment treaties. The difference is notable for preferential trade agreements, which 65 percent of firms involved in efficiency-seeking investment find important or critically important compared with only 45 percent of investors with other motivations.
- Incentives also matter more for firms with efficiency-seeking investments. In this group, 63 percent find incentives important or critically important, in contrast with 43 percent of investors with other motivations. These firms rated eight different incentive instruments more highly than other investors, with an average difference of about 13 percentage points. They also received incentives more often.
- MNCs involved in efficiency-seeking FDI view efficiency of obtaining approvals, owning all equity, hiring expatriate staff, and importing production inputs as more important compared to investors involved in other types of FDI. For firms seeking efficiency, the ability to import production inputs is rated slightly more important (73 percent) than the ability to bring in expatriate staff (71 percent)
- The capacity and skills of local suppliers are important or critically important for 77 percent of MNCs in efficiency-seeking FDI, compared with 70 percent of investors with other motives. Government initiatives including information about availability of local suppliers, upgrading potential suppliers, and incentives to invest in supplier upgrading are rated more important by 8–12 percentage points for firms involved in efficiency-seeking FDI relative to firms involved in other types of FDI. To promote linkages, 55 percent of MNCs involved in efficiency-seeking FDI have internal “talent

scouts” to find local suppliers, compared with only 45 percent of investors involved in other types of FDI.

- MNCs in efficiency-seeking FDI value the services of investment promotion agencies more highly, with 52 percent of respondents identifying IPA services as important or critically important, compared with 37 percent of investors involved in other types of FDI. Specifically, meetings with the agencies to discuss investment opportunities, information, and assistance in setting up an affiliate, and assistance in problem resolution are valued more by firms with efficiency-seeking investments, by about 9 to 12 percentage points, than by other investors.

Source: This box draws on World Bank 2017.

537. Policy makers may seek to shape the behavior of GVC firms in ways seen as promoting national welfare or noneconomic national objectives. They may have preferences for various features of the GVC. Often, they seek linkages with firms located in their own country, rather than cross-border linkages. They may wish to establish backward in-country linkages to broaden the range of domestic supply capabilities.

538. But such linkages are unlikely to develop as a result of heavy-handed rulemaking. For example, some countries employ local content performance requirements either as conditions for establishment of foreign investments or as requirements for foreign investors to access public procurement (box 7.5). Such requirements tend to deter FDI inflows and trade because domestic inputs are likely of inferior quality. Local content requirements can be effective only if there are domestic firms with the capability to provide the quality goods and services that foreign investors require. Thus, it is necessary to plan for domestic content by ensuring the existence of qualified suppliers.

Box 7.5 Local content requirements are a mismatch in the global auto industry

Brazil has used import tariffs of 35 percent and high local content requirements to create its own auto industry, at a high cost to consumers.³¹ Because of the large domestic market size, the industry has succeeded in attracting the lead firms from Europe, Japan, Korea, and the US. It employs nearly 500,000 workers and 89 percent of vehicles sold in Brazil are produced in the country. However, because the industry was built for Brazil, it is not globally competitive. It comes at a high cost for consumers, who pay nearly 20 percent more per domestic vehicle than other similar markets that produce the same car models, and consumers are limited to the set of vehicles produced domestically. Moreover, if Brazil was part of an efficient global value chain, there may be even more jobs, because the industry would grow.

The global auto industry is characterized by extended value chains, with parts and components being produced on large scale and exported around the world, to maximize efficiency. In contrast, a high share of the domestic value added (roughly 60 percent) is required to originate in Brazil, making the domestic industry less competitive. Many of the parts used to produce autos, like windshields, radiators, brake pads, and others, also face high tariffs pushing up the costs of production. Despite high levels of protection, Brazil has a trade deficit in autos. The market is overpopulated with relatively inefficient automakers with low capacity utilization and poor economies of scale, resulting in high prices, low productivity, and low skilled jobs. If instead of focusing on the whole value chain, Brazil found a niche in certain tasks, exports could grow and cars would be cheaper in Brazil, generating more demand.

Notwithstanding the high levels of protection, imports rose in the late 2000s prompted the domestic industry to lobby the government for further protection. Additional local content requirements, this time including incentives for R&D spending, structured primarily around tax benefits, were adopted through the *Inovar-Auto* policy (2011-2017). While the policy diminished the effects of Brazil’s 2014 economic crisis on the auto sector, it has not been effective in boosting productivity.³² The policy did not improve export competitiveness or increase GVC participation by incentivizing the production of intermediates or knowledge-intensive business functions like R&D and vehicle development. The industry remains low value-added and heavily dependent on the domestic market.

Overall, a study of the 12 largest manufacturers between 2007 and 2015 shows that average production per automaker declined from 233,186 units per year to 195,747 units. Scale-efficiency likely worsened due to the over-investment that was incentivized by the program, and employment levels did not change. Rising costs, declining productivity and declining profit margins continued across the industry. And while competition amongst domestic producers increased (the policy attracted new market entrants and increased investments from existing producers), prices went up because domestic automakers were protected from import competition.

Inovar-Auto is in the process of being replaced by a new policy for the automotive industry, “Rota 2030,” which will go into effect in 2019. Rota 2030 seeks to simplify complex local content rules and increase R&D spending requirements in part through additional government grants. Energy efficiency targets, vehicle identification, structural performance, and incentives for electric cars are also included. As with *Inovar-Auto*, however, the policy continues to focus on the domestic market over exports, and importers will be excluded from the program, suggesting that it may not be enough to bring Brazil’s auto industry into modern value chains, which thrive on global content.

539. Policies should instead be targeted around the principle of increasing MNC and local firm competitiveness, not import substitution. The ability to import high-quality inputs and services are key for MNC’s and local firm’s competitiveness. Because FDI has location options, developing policies that go with the grain of GVCs and markets are the key to success. MNCs are looking to maximize efficiency of production (not localization), and local supplier’s competitiveness against global peers is considered a non-negotiable.

540. The potential for MNCs to expand backward linkages in the host economy depends on many variables. The characteristics of the foreign investor, the motivation to invest, value chain organization, and global sourcing strategy all play a critical role in determining the potential for localization and opportunities for local firms to become suppliers. Host country characteristics and the enabling policy environment as well as the width and depth of the pool of local firms and their absorptive capacity are also key determinants that shape the scope and scale of backward linkages development. There is thus no one-size-fits-all country policy prescription, and solutions are highly specific to the context and value chain.

541. Market-based policies and programs are therefore needed to foster local firm capabilities and backward linkages. The best practices in the design of backward linkages and domestic-value-added policies and programs include four key elements:

- *Enable.* A first step in developing backward linkages is articulating clear goals as well as a data-driven and market-based strategy for promoting vertical linkages and in-country sourcing and value addition. Linkage policies and programs are often cross-departmental and require clarity on a strong lead institution to drive implementation—and on the roles and responsibilities of other government entities. Identifying and addressing potential policy barriers or inconsistencies (such as locational incentives, contract enforcement, access to finance for local firms) is also a key part of creating such enabling environments.
- *Attract.* When MNCs pursue a localization strategy, access to competitive suppliers not just local suppliers is what matters. A competitive supplier base is also attractive to potential new investors. Targeted investment promotion to attract internationally competitive suppliers may be needed, however, to help fill gaps in areas where local firms are nonexistent, or the technology gap is too large to be bridged any time soon. Removing barriers to entry for competitive suppliers, especially in important services sectors underpinning export manufacturing and the efficient operation of GVCs, remains an unfinished agenda in many countries.
- *Connect.* Successful linkage programs have agencies that systematically provide information services on the local suppliers and their capacity, in the form of supplier handbooks or online

databases with high-quality and up-to-date information, which can substantially reduce the time foreign investors need to spend on identifying and selecting local suppliers. Furthermore, putting in place systematic MNC-local supplier matchmaking services—say, as part of investor aftercare programs—is another practical step government can take to foster linkages and technology transfers.

- *Upgrade.* Targeted supplier development programs are the cornerstone of any successful FDI linkages policy and program, but they require adequate resources and capacity to design and implement (box 7.6). Targeted and MNC demand-driven local supplier development programs have been successfully introduced over the years in a number of countries. The selection of local firms to participate in the program must consider their potential to be long-term suppliers from an MNC perspective.

Box 7.6 Supplier development programs help deliver backward linkages for inclusive and embedded GVCs

Newmont Ghana’s Ahafo Linkages Program³³

In February 2007, Newmont Ghana and the IFC jointly established the Ahafo Linkages Program for Newmont’s Ahafo gold mine in Ghana. The program was based on a previously successful program run by Newmont in Peru. The Ahafo program focused on local supplier development with the objective to build capacity of local MSMEs, while also supporting broader local economic and institutional development. Between 2007 and 2010 the program trained 53 local suppliers in the area immediately surrounding the Ahafo mine, contributing to US\$14m in local procurement.

Chile’s World Class Supplier Development Program³⁴

Chile’s World Class Supplier Development Program was launched in 2008 by BHP Billiton, and since expanded to include other mining companies such as Codelco, is coordinated by Fundacion Chile, a non-profit corporation that aims to support technology transfer and innovation and increase the competitiveness of Chilean firms across the economy. The project aims to create 250 world-class suppliers in Chile by 2020. The model encourages mining companies to identify areas where innovative solutions could assist operational efficiency across its operations and identify local suppliers who have the capacity to work on the problem. The selection procedure is rigorous - only 16% of identified projects at Codelco reached implementation stage. Selection criteria include: economic benefit, replicability, urgency of the problem, technological risk, and impact on health, safety, and the environment.

Malaysia’s Industrial Linkages Program

Established in 1996, the Industrial Linkages Program (ILP) is a cluster-based program centered on fiscal incentives for both MNCs and SMEs, but also includes components of business matching, support for skills development, access to industrial sites, and financing for SMEs. SMEs become eligible to participate in the program if they meet certain criteria most importantly that they supply at least one MNC and manufacture products under a “List of Promoted Activities and Products”. Once accepted, they received fiscal benefits, allowing them tax exemption of 100% of statutory income and Investment Tax Allowance of 60% on qualifying capital expenditure incurred within a period of 5 years. They are also offered “matching services” from SME Corp. (Malaysia’s SME Agency) which facilitates relationships with MNC for the purposes of supporting upgrading. In its first decade of operation, more than 900 SMEs were registered with ILP, of which 128 were linked to MNCs.

Czech Pilot Supplier Development Program in Electronics and Automotive³⁵

Through CzechInvest, the Czech investment promotion agency, the Czech government implemented a pilot National Supplier Development Program in 2000-2002 in the electronics and automotive sectors. The motivation for the program was to raise local content in these sectors (the country had been one of

the most successful locations in attracting FDI following the fall of communism in the 1990s, but relatively little of benefits connected with FDI had been felt in the local economy) to widen FDI benefits to the local economy and embed these sectors in the country. The program was demand-driven and aimed at improving the competitiveness of Czech SMEs to enable them to enter GVCs by becoming suppliers to MNCs. A dozen MNCs were involved throughout the project and 45 SMEs received targeted training based on needs uncovered during business reviews. An evaluation showed that within 18 months of completion of the program, one-third of participants had gained new business which they attributed to the program, with these contracts worth US\$46 million for the period 2000-3. The share of components sourced from Czech companies by the MNCs participating in the program correspondingly increased from a rate of 0-5% at the start to 2.5-30% by 2004. Driven by supply-side improvements in export performance, the Czech Republic experienced significant gains in global market shares and have continuous improvement in product quality.

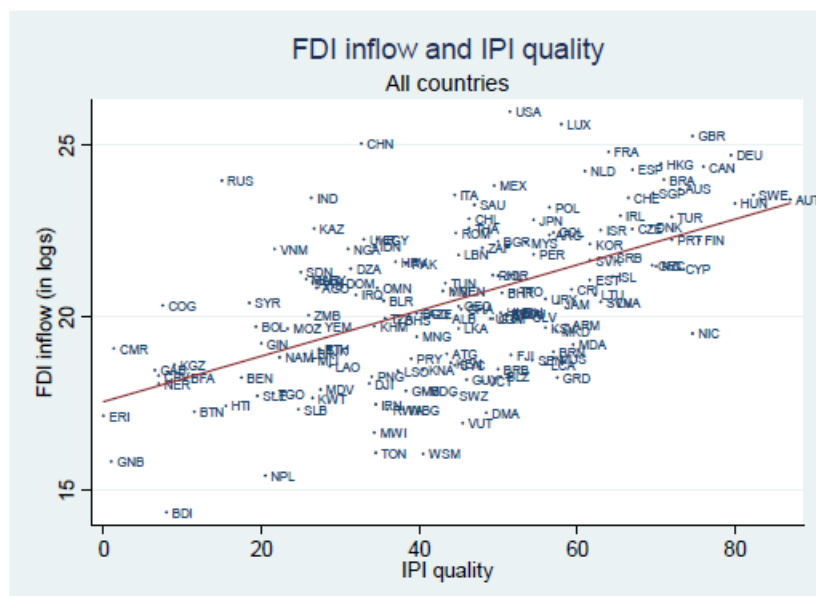
542. Finally, it is worth noting, that linkages with GVC lead firms are not only an aim of building absorptive capacity, they are also a source of building absorptive capacity. In fact, research shows that direct technical assistance from lead firms is one of the biggest sources of spillovers to local suppliers³⁶.

543. Attracting FDI is thus clearly important in a national strategy to promote GVC formation and upgrading. The incentives offered to firms include fiscal incentives; subsidies, loan guarantees, risk insurance, and other types of financial incentives; subsidies for infrastructure and services; preferential government contracts; liberalized capital controls for specific firms; and easier conditions for importing and exporting.³⁷ These incentives overlap to a large extent the types of conditions associated with special economic zones (see below). These types of incentives also create a beggar-thy-neighbor problem, with investors extracting rents as countries compete for investment (see chapter 8).

544. Countries may, however, also discourage FDI by a variety of performance requirements. Some of these are prohibited by the WTO TRIPS agreement (local content requirements, trade-balancing requirements, firm-specific foreign exchange restrictions, export controls). Others are not as explicitly prohibited, such as requirements to transfer technology or other proprietary knowledge; requirements to engage in joint ventures with national partners; requirements for domestic equity participation; requirements to do R&D in the host country; requirements for a minimum level of domestic equity participation; requirements to employ a certain share of domestic workers or managers; and so on. If policy-makers seriously intend to promote GVC participation in the face of competing objectives, these requirements need to be carefully considered as they can have unintended negative consequences.

Investor promotion agencies

545. Investor promotion agencies can generate foreign direct investment for global value chains.³⁸ They can attract larger FDI flows,³⁹ especially if they provide quality services to investors (figure 7.9).⁴⁰ Cost-benefit ratios for targeted investment promotion in competitive sectors are also favorable: On average, \$1 spent on investment promotion yields \$189 in FDI inflows, and \$78 create one job in the promoted sectors.⁴¹

Figure 7.9 Better quality investment promotion agencies attract more FDI inflows

Source: Harding and Javorcik 2012.

546. IPAs can also help attract high-quality investment projects that transform their economies when governments and IPAs focus on relevant competitiveness aspects to attract large MNCs.⁴² Costa Rica, Malaysia, and Morocco, for example, attracted a few large efficiency-seeking MNEs, through a strong IPA and key policies such as macroeconomic stability and skills development. These economies saw a boost in revealed comparative advantage and better integration into GVCs.⁴³

547. Empirical research and on-the-ground World Bank experience find that developing-country IPAs are most effective when they have:

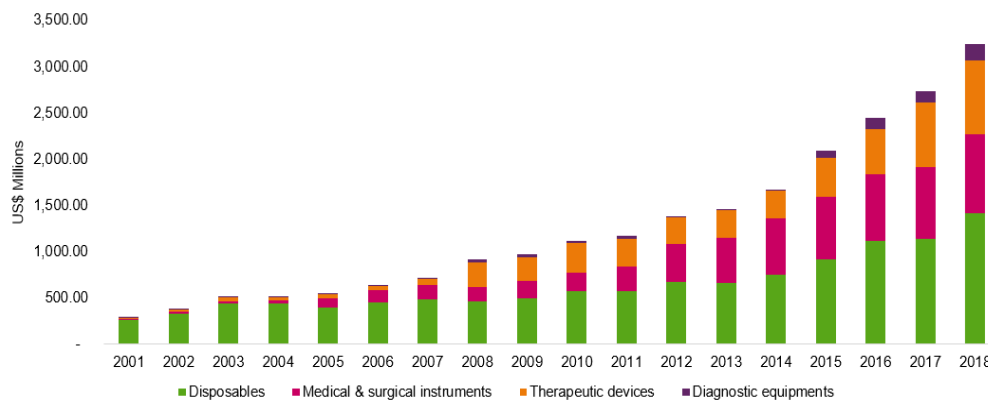
- A sharp strategic focus on investment promotion in a few competitive segments—on specific links in a value chain, and types of investors, as specified in strategy stemming from a clear national development plan.
- A coherent institutional framework including:
 - High-level government support, clear mandate on investment promotion, and a high level of autonomy.
 - Adequate funding with budget, procurement, and independence to hire the CEO and key promotion staff for qualifications, including private sector experience, international exposure and languages, and a private-sector consulting mindset and transnational learning capacity.
 - Independent boards of directors or advisory boards with strong private-sector representation.
 - Strong partnerships and coordination mechanisms with both public and private sectors.
- Well-designed investor services that support investors throughout the entire investment cycle, not only at the attraction stage—an important feature in relational GVCs (box 7.7). IPAs should approach investors with relevant compelling value propositions to persuade them about investing and expanding in the location. Investors also appreciate assistance with setting up/registration, solving issues, and improving the business environment. IPAs should advocate on their behalf to improve the investment ecosystem, as active connectors between investors and policy makers in a productive business-to-government feedback loop.

Box 7.7 Costa Rica’s investor promotion agency

CINDE, the Costa Rican IPA, is a private-sector led IPA with significant autonomy, it has enjoyed a high level of government support and strong partnerships since the late 1990s when it landed Intel, Abbott Laboratories (now Hospira), P&G, and other anchor investors to the country’s most dynamic sectors.

It has continually sharpened its focus, from an all-purpose development agency when founded in the mid-1980s, to a fully focused investment promotion agency attracting and expanding FDI projects by the turn of the century. It has also sharpened its sectoral focus from broad “light manufacturing” in the early 1990s to strategic and specific GVC links by the late 1990s, such as “assembly and test of electronic circuits,” “legal and financial global shared services,” “global projects architectural design,” and “assembly and sterilization of therapeutic devices” (box figure 1).

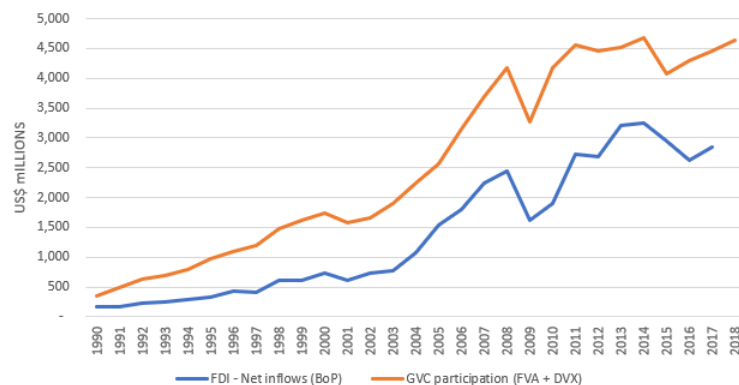
Box figure 1 Costa Rican medical device exports have increased in volume and sophistication since this FDI sector was strategically identified in 2000



Source: World Bank (forthcoming) based on CINDE, Procomer, Duke University Trade Classification (2019).

CINDE also improved its service offering beyond attraction, now accompanying strategic investors through their investment cycle. Advocating on behalf of investors and connecting investors and government, CINDE has helped catalyze key reforms, unlock strategic investments, and increase the country’s GVC participation 10-fold in the three decades (box figure 2).

Box figure 2 Costa Rica’s 10-fold increase in FDI and GVC participation since the 1990s



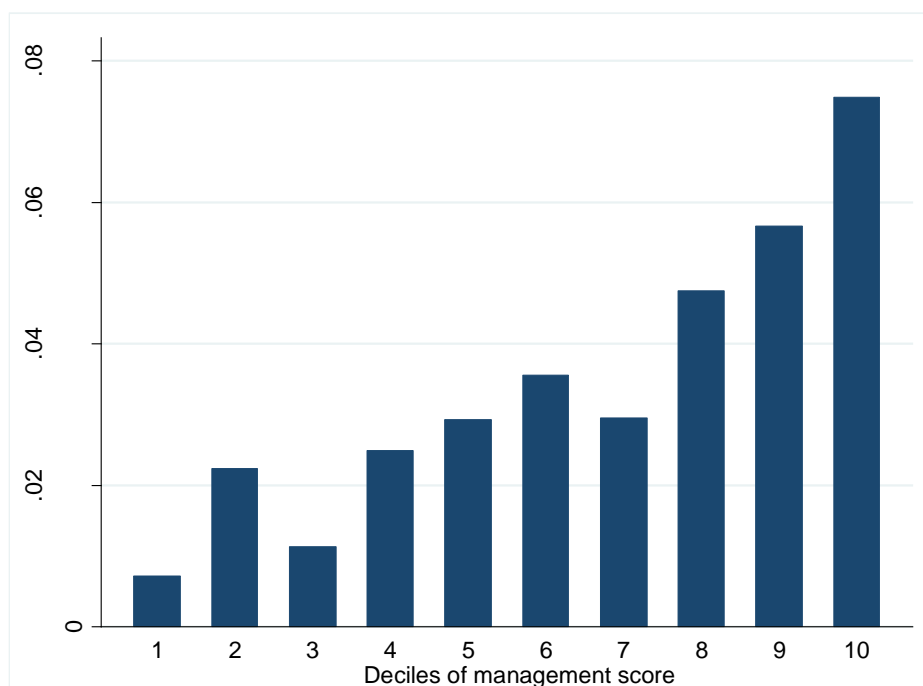
Source: World Bank forthcoming, based on WBG, IMF, UNCTAD-Eora Global Value Chain Database.

Investing in firm capabilities

548. In addition to promoting FDI, governments can take action to support firm upgrading and boost firm productivity by correcting market failures. Two specific examples of such policies are encouraging firms to improve their managerial practices and build relationships with buyers, and successful supplier development programs often combine aspects of these interventions.

549. Recent literature (e.g., Bloom et al (2013) and Bloom et al. (2019)) points to several market failures that result in firms under-investing in management. Information asymmetries manifest in managers who “don’t know what they don’t know” and therefore systematically mis-diagnose the quality of organization and management in their company (Bloom et al 2013). These are further compounded by uncertainties about the returns of investing in improving management and organization, as well as lack of information about the quality of providers of management consulting services (Cirera and Maloney, 2018). When firms do invest in improving management, they not only experience significantly higher profits, productivity, and jobs growth (e.g., Bloom et al, 2013; Bloom et al, 2018a, Bruhn et al, 2018), but also increase product quality and the likelihood of exporting (Bloom et al, 2018b). In Mexico, firms in the top decile of the managerial practices index are more than seven times more likely to participate in GVCs than firms in the bottom decile (figure 7.10). This and other evidence from developed and developing countries shows that financial incentives or direct support to firms to facilitate improvements in management is not only a cost-effective way to boost productivity, but also a useful tool to support GVC integration.

Figure 7.10 Managerial knowhow and GVCs



Source ENAPROCE and Authors’ calculations

550. Another type of market failure concerns uncertainty and limited information about demand, which results in firms unwilling to invest in searching for potential buyers when competitors may also benefit from their investments in “discovery” of good customers. This is particularly true of young firms, who are often more productive than incumbents but less likely to survive adverse shocks because of under-developed relationships with buyers.⁴⁴ In this context, helping firms discover markets and build relationships with clients can improve product quality and raise overall productivity. Atkin et al (2017)

show this by conducting a randomized controlled trial providing Egyptian carpets’ producers access to demand from high-income foreign markets (US, EU, etc.). The treated firms experienced a 16-26 percent increase in profits, driven by higher quality and learning-by-doing as their product quality improves over time (see also Box 7.8 for additional discussion of how interventions to boost demand increase firm performance).

551. Firms’ ability to effectively match the needs of foreign buyers – a core requirement of participating in GVCs – requires a combination of good management and active demand accumulation. Successful programs to support supplier development (e.g., Chile and the Czech Republic) typically combine interventions that address both types (supply- and demand-side) of market failures. In the case of Chile, the Chilean Innovation Agency (CORFO) set up a large matching grant program where lead firms applied for support to their SME suppliers (minimum 10) and CORFO co-financed a six-months consulting diagnostic and up to three years of diagnostic implementation. An impact evaluation of this program showed significant increases in supplier sales, employment, salaries, and survival one year after joining the program, as well as positive effects on sales and exporting likelihood of the lead firms two years after joining the program.⁴⁵

Box 7.8 Boosting employment by promoting demand – lessons from rigorous impact evaluations

One recent study explores the role of demand constraints in driving the gender profit gap.¹ First, relying on detailed weekly data on prices, costs and inputs, the authors show that female owned firms charge similar prices and have similar costs of production for same garments products but produced significantly lower quantity than male-owned firms, even when controlling for product quality, hours worked, and reasons to start the business. Following their market research survey pointing towards “lack of clients” as key constraints, they then provide a random demand shock for both women and men owned enterprises. The results suggest that while male-owned firms are producing at their full capacity, and the random order displaces their usual production, the women-owned firms instead are producing below their capacity as the new order is accommodated without any displacement. These results point to the importance of the “demand scarcity” as a key driver of gender profit gaps, and the author argue this is driven by an over-supply of female micro-entrepreneurs caused by limited alternative employment opportunities for women.

Ferraz et al (2016) exploit a quasi-natural experiment provided by the procurement mechanism of the Brazilian Government for off-the-shelf goods. The procurement mechanism relies on an online auction which ends randomly within a 30 minute window, and the firms need to enter their bid manually, which leads to these firms normally outbidding each other several times until the auction ends at random. The authors compare winners and runner-ups in “close auctions”, defined as those when at least two firms bid in the last 30 seconds and the difference between the two best bids is a small fraction of the contract amount. The impact of this “exogenous” demand boost generates an employment increase by 2.2 percentage points, a sizeable impact which moves a firm growth from the median to the 75th percentile. Even more, this positive effect persists two years after the demand boost. What is especially interesting is that most new jobs created (93%) generate employment for people that were either unemployed, in the informal sector or out of the labor force. When investigating more in details the mechanisms driving these results the authors find that the treated firms are likely to get more contracts in the future, enter more valuable auctions, penetrate more markets and increase the variety of their products.

Another quasi-experiment assessed the impact of accelerating payments in public procurement. In September 2011, the US Federal Administration announced Quickpay reform which cut the time for paying the small business contractors of the US Federal government from 30 to 15 days, when typically the payment time is between 1-2 months after the invoice’s approval. The authors find that the impact of this “accelerated demand boost” increases payroll by .15% on average at the county-sector level. What may seem a small impact but it is driven by the typically small number of firms with government

contracts and at the firm-level it translate into an increase by 5.7% in employment over the next four years for a firm which has 100% of its contracts “treated” by the acceleration in the payment terms.

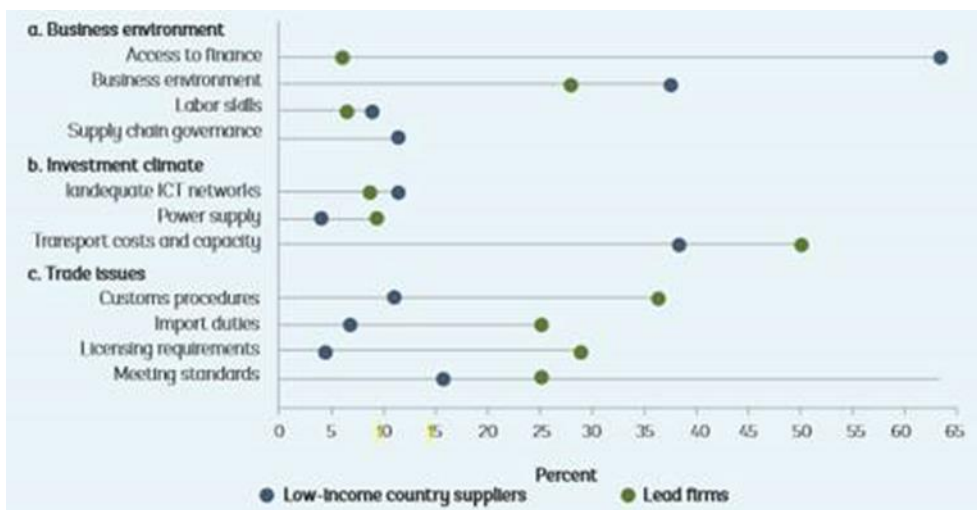
¹ Hardy and Kagy, 2018

Access to finance and technology

552. For local SMEs to absorb spillovers from GVC participation, ongoing investments are required in technology, process improvements, and training. Policies that facilitate access to credit – through financial sector reforms, information provision, as well as potentially through incentives (e.g. matching grants, loan guarantees, etc) – can play an important role. Innovative approaches may involve leveraging GVC supply relationships to improve access or terms available from local financial institutions. Beyond pure financing, incentives can be made available to support technology transfer and licensing, a major source of spillovers for local suppliers in GVCs.

553. A lack of financing is one of the main obstacles to GVC participation among suppliers in developing economies (Figure 7.11). But new financial technologies are helping GVC suppliers improve their access to supply chain financing—effectively leveraging the higher credit rating of their global buyers to access financing, on better terms. Tools like electronic invoices and e-receivables speed and improve communication between customs brokers, freight forwarders, transportation carriers, government agencies, and banks. For instance, seven global banks recently announced the formation of the “[Trade Information Network](#)” to digitize trade finance. Other examples of FinTech innovations include the use of “smart” factory technology that collects frequent data on production and assembly lines and can be used for credit scoring, and Bluetooth scales that are used in agribusiness chains to accurately weigh farmer’s harvests and provide real-time lines of credit at the point of sale.

Figure 7.11 Barriers faced by firms entering GVCs



Source: Reproduced from Cusolito, Safadi, and Taglioni (2016).

554. In addition, new models rewarding firms with better sustainability ratings with cheaper financing, to support the significant costs imposed on SMEs to meet international standards. For instance, Puma, BNP Paribas bank, and fintech firm GT Nexus offer better receivable financing (discount) terms to suppliers who score high on Puma's sustainability index. Levi's has a comparable arrangement with its suppliers through the IFC's Global Trade Supplier program. Investors are also designing ‘green’ bonds that pool smaller loans for GVC suppliers to invest in environmentally-friendly technology.

Can special economic zones work as islands of excellence for GVC participation?

555. This chapter outlined a set of policy priorities that are critical for enabling countries to participate in GVCs. Yet delivering on these – a sound trade and investment policy regime, quality infrastructure, robust institutions, etc. – is no easy task. Least of all for developing countries, which almost by definition have serious deficiencies across many of these priorities policy areas. In this context, can special economic zones (SEZs) offer a shortcut for entering GVCs?

556. By providing for a partial package of reforms, SEZs fundamentally to create island of excellence specifically designed to attract GVC-oriented investment. SEZs have a long history as an instrument to shortcut GVC integration, particularly in light manufacturing sectors like garments and electronics. This policy regime allowed for FDI to outsource basic, labor-intensive manufacturing to factories based inside customs-controlled industrial parks, enabling these factories to import all the necessary inputs without paying taxes and duties, assemble in the low-cost factories, and re-export semi-finished or finished goods with no export taxes.

557. But features that make successful SEZs attractive are the same ones that are supposed to make whole countries attractive, and the evidence suggests that zones tend to be successful where countries are successful; and where national policy environments are poor, zone policy environments tend also to underperform. Moreover, SEZs are difficult to get right. Designed effectively SEZs can play a key role in support GVC integration, and even upgrading. But countries should approach them with caution, with focus, and with a clear strategy not only for how the SEZ will be implemented in the short term but also how successful policy demonstrations in the SEZ will roll out to benefit the broader economy.

What are SEZs and why do countries use them

558. SEZs are demarcated geographical areas within a country’s national boundaries where the rules of business are different – generally more liberal – from those that prevail in the national territory (box 7.9). Specifically, most economic zones create a ‘special’ regime that confers four main advantages to investors relative to what they could normally receive in the domestic environment⁴⁶:

- *Infrastructure* (including serviced land, factory shells, and utilities) that is easier to access and more reliable than is normally available domestically;
- *A special customs regime* including efficient customs administration and (usually) access to imported inputs free of tariffs and duties;
- *An improved regulatory and administrative regime*, including streamlined procedures for company set-up, licensing, and operations; and usually,
- *An attractive fiscal regime*, including reduction or elimination of corporate taxes, VAT, other taxes, labor contributions (e.g. pension / social security), and sometimes training or other subsidies.

559. SEZs are designed as instruments of trade, investment, and ultimately of spatial industrial policy. First, and foremost, SEZs are designed to facilitate trade, primarily by attracting FDI. But governments may also seek to take advantage of other potential benefits from SEZs. For example, capturing agglomeration economies. By concentrating economic infrastructure and public goods in one geographic area, SEZs enable industries to overcome minimum size thresholds and begin to leverage scale economies⁴⁷ - this happens through exploiting backward and forward linkages⁴⁸; through labor pooling which facilitates matching between firms and workers⁴⁹; and through technology spillovers⁵⁰. And in some countries SEZs have been used to pilot experimental policy reforms. In China, for example, financial, legal, labor, and even pricing reforms were introduced and tested first within the SEZs before being extended to the rest of the economy.

560. Whatever the objective, one the main attractions of SEZs as an instrument has always been the idea that it can provide a shortcut – to infrastructure investments and/or policy reforms that would take many years to deliver, if at all, across the country. Instead, countries would not have get infrastructure or policy working everywhere, which may be financially, technically, and politically infeasible. Rather, they rather could concentrate efforts on one or two specific locations where the environment could be designed specifically to meet the needs of GVC investors, and where difficult policy reforms could be contained.

Box 7.9 A simplified guide to SEZ terminology

In this report, we use term special economic zone (SEZ) to refer to any of the broad range of similar spatial-industrial instruments sometimes referred to as free zones, free economic zones, export-processing zones, industrial zones, economic and technology development zones, high-tech zones, science and innovation parks, free ports, enterprise zones, and others.⁵¹

To keep it simple, when discussing SEZs, it is worth understanding the differences of the following three types of instruments:

- **Industrial parks or industrial estates:** Industrial parks are simply property developments that are zoned for industry / manufacturing activity and where government or a private property developer may prepare services sites or even build infrastructure. But industrial parks are not necessarily governed by any special fiscal, customs, or regulatory regime –so industrial parks are not necessarily SEZs.
- **Export processing zones (EPZs):** EPZs are industrial parks designed specifically to promote investment in export-oriented manufacturing. What makes EPZs different to a standard industrial park is that they have a special customs regime (usually enabling duty-free import and export). They also often are subject to specific fiscal incentives and may have a special regulatory regime (e.g. impact company registration, labor law, etc.). Therefore, EPZs are considered to be SEZs.
- **Comprehensive special economic zones:** What differentiates a comprehensive SEZ from a basic EPZ is that the former usually: i) covers a much larger areas; ii) caters to a wider range of activities (while EPZ is mainly for manufacturing, comprehensive SEZs typically allow for mixed-use development, including services, and may also include commercial and residential activities. Both EPZs and industrial parks may be located within a comprehensive SEZ.

SEZs are associated with some of the most successful examples of GVC integration, but the overall experience has been mixed

561. In some countries, the model has delivered spectacularly, with SEZs playing a catalytic role in growth and structural transformation. This includes East Asia’s ‘tiger economies’ and of course China, which used SEZs as platform to support the development of export-oriented manufacturing. In Latin America, the Dominican Republic, El Salvador, and Honduras, among others, used free zones to take advantage of preferential access to U.S. markets and have generated large-scale manufacturing sectors in economies previously reliant on agricultural commodities. In the Middle East and North Africa, SEZs have played an important role in catalyzing export-oriented diversification in countries like the Egypt, Morocco, and the United Arab Emirates. And in Sub-Saharan Africa, Mauritius is an example where SEZs were a central policy tool supporting a highly successful process of economic diversification and industrialization

562. But despite high profile success stories like China, SEZs have a decidedly mixed record (box 7.10). SEZ-related infrastructure investments in some countries became huge fiscal drains. Worse still, in some countries the zones failed to attract investors, leaving ‘white elephants’ that did both fiscal and political damage. More often, SEZs have been exploited by investors take advantage of tax breaks without delivering substantial employment or export earnings. And in many locations, traditional EPZ programs have been successful in attracting investment and creating employment in the short term but failed to sustain

competitiveness in the face of rising wages or eroding trade preferences. More often, however, failure is undocumented and subtler – in programs that fail to grow, that never deliver benefits to justify the incentives they transfer to investors, or that simply create employment at wages that are economically and socially unsustainable⁵².

Box 7.10 Comparing SEZ experiences- China, India, and Sub-Saharan Africa

China

The experience of countries with SEZs of all types has varied widely by region. China is exceptional by any standard: its zones accounted for 60 percent of global employment in SEZs in 2006.⁵³ They accounted for 65 percent of China’s exports of advanced technology products (ATPs) to the United States, over 90 percent of which were subject to the special customs regime for processing trade, foreign-invested enterprises accounted for 85 percent of China’s bilateral ATP surplus with the United States.⁵⁴

It has been estimated that by 2006, SEZs (including all types of industrial parks and zones) at national levels accounted for about 22 percent of national GDP, about 46 percent of FDI, and about 60 percent of exports and generated in excess of 30 million jobs.⁵⁵ An analysis of panel data for 270 cities at the prefecture level over 23 years shows that opening a major zone in a city led to a GDP increase of 12 percent on average in the post-reform years, with the effect depending on the type of zone. The long-term (cumulative) effect of a SEZ could be a roughly 20 percent increase in GDP.⁵⁶ Another analysis of 321 prefecture-level cities between 1978 and 2008 shows, on average, that a SEZ program increases per capita FDI by 21.7 percent and the growth rate of FDI by 6.9 percentage points.⁵⁷ It also shows significant agglomeration economies, increasing the technological progress of the earlier treated municipalities by 1.6 percentage points compared with the later ones. And the average wage of workers in the treatment group increased by 8 percent more than that in the control group, against a 5 percent rise in the cost of living.”⁵⁸

The performance of Chinese zones has not been uniformly bright. As the number of zones proliferated, particularly at the provincial level, the marginal effect of adding more zones was diminished.⁵⁹ Moreover, many zones suffered from environmental degradation, as well as challenges in providing for the social and cultural life of workers, including inadequate health, education, and transport services as well as a relative lack of cultural and recreational activities. In the 2000s, China’s response included shutting down a large number of poorly planned industrial zones, improving the coordination between zones and urban and regional planning, and seeking to increase the role of market forces.

*India*⁶⁰

Locating in an SEZ no longer guarantees better incentives, casting doubts on the “specialness” of zones in India. Firms in a domestic tariff area (DTA) can benefit from several fiscal and non-fiscal incentives,⁶¹ including export incentives under the foreign trade policy (2015–20). The overall incentive and support package available to firms in the DTA is often more beneficial and easier to use than zone-specific incentives. In addition, firms in the DTA can access the domestic market. With the proliferation of new free trade agreements (FTAs) with Republic of Korea, Japan, and ASEAN countries, exporters in the DTA can import with reduced or no duties from these countries rather than import tariff-goods from zones.

India’s SEZ policy framework restricts market access to the DTA and constrains value chain development. Zone tenants are only permitted to sell a fixed proportion of their output in the domestic market, and these sales are subject to the full MFN tariff.⁶² Income tax exemptions extended under the 2005 SEZ Act are applicable only to products exported from zones. Suppliers and ancillary units co-locating within the SEZ to supply anchor investors are unable to claim income tax exemptions. Such tensions, a direct result of competing policy objectives, have constrained the development of linkages between zones and the DTA, further eroding the “special” environment of zones in India.

The Indian experience suggests that zone performance depends on a combination of operational factors working in tandem, rather than a single dominant factor. Zone performance, often measured by export growth, ability to attract investors, and other indicators, is a complex function of internal and external factors. Almost all zones with higher exports are in states with a supportive regulatory environment, are close to seaports, and have access to skilled labor through proximity to urban centers. Several were set up by the central government under the previous export promotion regime, giving investors a sense of confidence. New zones set up as public–private partnerships offer superior infrastructure and quick approvals, attracting more investors. But some zones could not sustain operations owing to inexperienced private developers and underinvestment in infrastructure improvements, despite having state support.

Sub-Saharan Africa

Several Sub-Saharan countries launched zone programs as far back as the early 1970s (Liberia in 1970, Mauritius in 1971, and Senegal in 1974), but most came in the 1990s or 2000s, and modern large-scale multi-use SEZs not until after 2006. The early SEZ record in Africa is less than spectacular. Except for the Mauritius success story and some modest achievements in Lesotho, Kenya and Madagascar, the vast majority of Sub-Saharan SEZs have not had a transformative impact.

An earlier analysis of African SEZs compared with those in other parts of the world developed several stylized facts, including:⁶³

- The takeoff of export growth in SEZs was less than in other places outside of Africa.
- SEZ’s accounted for a smaller share of industrial employment (except in Lesotho) and much smaller absolute levels of industrial employment.
- While structural transformation of exports, as measured by diversification into manufacturing, took place fairly rapidly in SEZ-intensive countries outside Africa, it has been more limited in Africa.
- African SEZs provided weaker enabling conditions than the rest of the world.

Despite the relatively poor performance to date, SEZ programs remain highly popular across the continent, and there has been keen attention by policymakers to learn from the lessons of the past, both within Africa and globally. As a result number of countries have revisited and reformed their SEZ programs in recent years – for example Ghana, Kenya, Tanzania, and South Africa. Moreover, the early evidence from the rapidly developing SEZ program in Ethiopia, including at Bole Lemi, Eastern, and especially Hawassa, suggests that Ethiopia may have the ingredients and approach to make SEZs successful as an instrument of GVC integration.

SEZ success appears to be closely linked with structural features and the broader national economy, which raises questions over their potential role as “islands of excellence”

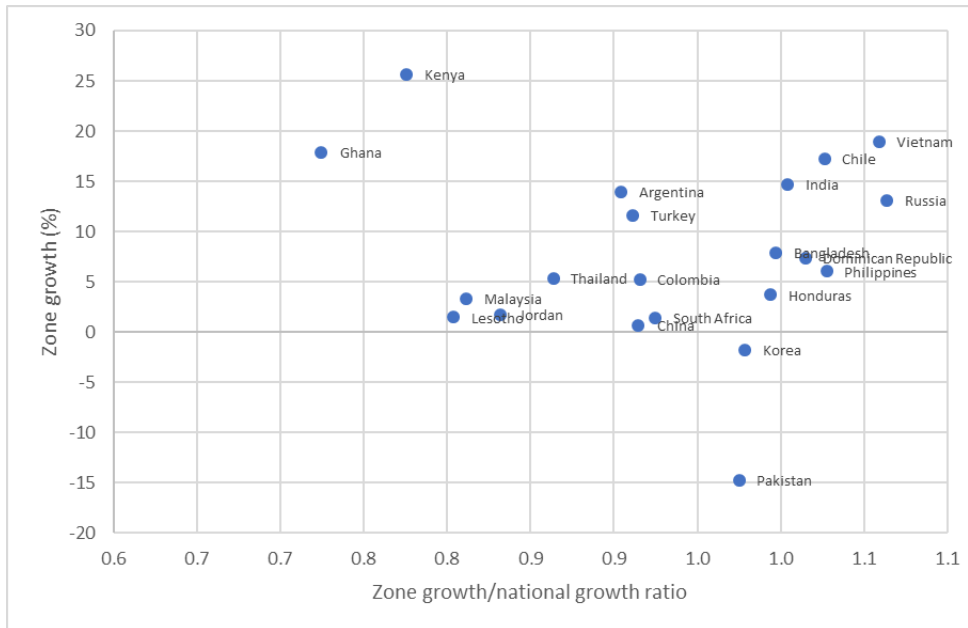
563. Overall, assessing the success of SEZs, beyond individual zones and country programs, and their determinants empirically has proven difficult. Even the most serious studies have tended to be plagued by small sample size and the difficulty in obtaining comparable measures of SEZ performance. More recent work examines 346 zones in 22 countries across the developing world and Republic of Korea, using “night lights” data from satellite observations as a novel way of measuring zone activity.⁶⁴ The intensity of night lights has been shown to be highly correlated with measures of economic performance such as employment and the number of firms in a geographic location.

564. Basic geographic features have a lot to do with SEZ performance: large zones outperform small zones, as do zones close to large markets and with pre-existing industry. Incentives provided in zones and design features (public, private, or public-private) show little or no correlation with SEZ performance according to the nightlights measure. This does not mean that it is not important how policy-makers design

a zone, but available knowledge does not yet permit us to identify a policy mix that creates growth using SEZs.

565. One critical finding from the study, which reinforces conclusions from previous work⁶⁵, is that it's hard for SEZs to outperform the underlying economy. While most countries showed economic growth in SEZs during 2007–12, only a few showed zone growth to be much higher than the national average, and many showed zone growth lower than the national average (Figure 7.12). SEZs tend to perform better in national economies that are open, growing, and competitive, and worse in those that are not.

Figure 7.12 Growth in special economic zones compared with national growth, 2007–12



Source: Frick, Rodríguez-Pose, and Wong 2018.

Implementing successful SEZs is no easy task

566. SEZs tend to be costly – both in terms of financial costs and political capital. And despite their promise as a “shortcut” – attracting FDI, integrating in GVCs, expanding exports and creating jobs – the evidence is that even successful SEZs usually take a decade or more to start showing results. Moreover, SEZs are quite difficult to get right. Making SEZs work requires clear positioning, effective strategic and technical planning, along with good implementation across the board – in engineering and construction, policy development, and national and local government operations. In this context, policymakers would be prudent to approach SEZs with caution. And, in addition to consulting widely to learn from the many emerging global lessons, to focus and concentrate in their approach to SEZs. Specifically, this means: i) concentrating on only the best location; ii) understand the market and leverage comparative advantage; and iii) focus on making the zone ‘special’.

567. One of the clearest findings from empirical research as well as anecdotal experiences with zones is that location choice is critical to success (box 7.11). International experience supports theory, with SEZs typically flourishing in core areas and around key gateway infrastructure (seaports, airports). Cities offer a number of factors which tend to be critical for the success of large-scale, labor intensive SEZs, including access to deep and specialized labor pools, access to specialized suppliers and business services, connectivity to national and global markets, as well as access to quality social infrastructure (e.g. health and education) and cultural amenities. Yet despite long-standing evidence to the contrary, governments

continue to try (and fail) to use zones as regional development tools. The majority of countries that have implemented zones decide to locate at least one in a “lagging” or remote region; few have done enough to address the infrastructure connectivity, labor skills, and supply access that these regions tend to lack. Not surprisingly, FDI shuns these locations in favor of more central areas.

Box 7.11 Location matters for SEZ success

Examples of countries facing challenges with zones located in lagging areas include⁶⁶:

- *Bangladesh*: Under the EPZ program, Bangladesh established 8 zones, of which three are located in remote areas. While those in near the urban centers of Dhaka and Chittagong reached capacity quickly, those in remote areas remained largely vacant for anywhere from two to five years and never reached large-scale employment.
- *Thailand*: Of 47 industrial parks, those in rural areas have lagged far behind in attracting investment and creating jobs.
- *Indonesia*: Almost all Indonesia’s operating EPZs are located in and around the two largest cities and main ports on Java (the main island) – Jakarta and Surabaya – and on the island of Batam located nearby Singapore. In the 1990s Indonesia launched the concept of “potential zones” and Integrated Economic Development Zones to target more outlying areas, without success.
- *Philippines*: Of almost 250 zones, well over half are located around Manila or in Luzon (the second major region, located in the south).
- *Turkey*: 20 FTZs, but 74% of the jobs were created through the free zones in Marmara (Istanbul and wider region) and Izmir; Similarly, most of the Organized Industrial Zones (OIZs) that have generated substantial investment and jobs are located in these same areas or around major ports (e.g. Gaziantep).

Cases where successful zones have emerged in more peripheral areas are attached with some important caveats. For example⁶⁷:

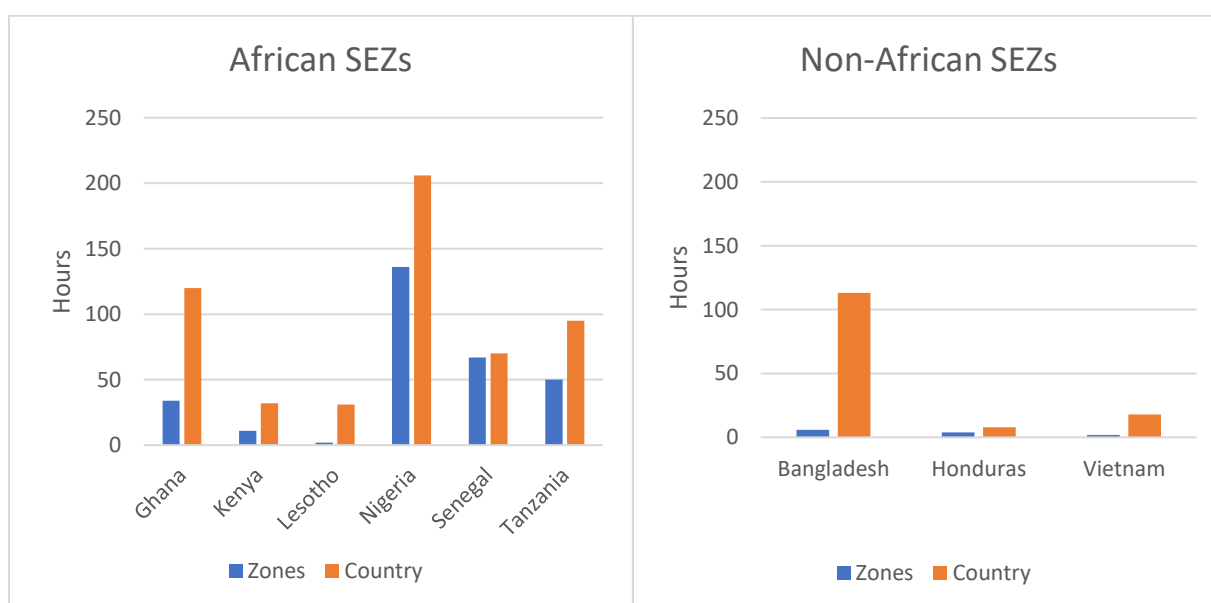
- *Poland*: A number of successful free zones emerged in lagging regions of Poland just prior to and following accession to the EU. These zones tended to be located in or near the main urban agglomerations in the peripheral regions. They also benefited from large subsidies and incentives, which were allowed by the EU on a transitional basis and which gave Polish zones an advantage over existing EU locations.
- *Turkey*: While the majority of successful OIZs are in the core (*see above*) several emerged in previously lagging internal regions, most notably in the “Anatolian Tigers” (including Kayseri and Eskişehir). These areas were notable for having strong entrepreneurial and manufacturing cultures, providing domestic investors with access to capital and business networks that allowed them to exploit the advantages offered by the OIZs.

568. While SEZs are often implemented specifically with the intention of catalyzing the development of new sectors, consideration of a location’s comparative advantage remains essential. This requires undertaking extensive market assessment to understand what factors drive investment decision making for specific sectors and taking a realistic view on what the location has to offer. Gaps between comparative advantage and SEZ targeting may explain why countries specialized in natural resources, and without competitively-priced labor and efficient infrastructure – for example Nigeria, Ghana, Kuwait, and even to some degree Indonesia and Peru – have struggled to developed manufacturing-oriented zones. Mauritius represents a good example of a country leveraging the zone instrument over several to exploit evolving sources of comparative advantage. The EPZ model, so successful in transforming the Mauritius economy from reliance on sugar and vanilla plantations to becoming a major garments exports, eventually became

obsolete. However, as its source of comparative advantage shifted away from low wages, the government returned to the zones instrument to promote emerging industries such as ICT and financial services⁶⁸.

569. With a clear understanding of what GVC investors are looking for in a country's comparative advantage, countries can design and deliver zones that fully overcome the existing constraints to investment. If investors need reliable electricity, the SEZs should guarantee no downtime. If they need smooth customs clearance as a priority, SEZs should ensure that customs authorities resolve all possible reasons for delays. Too often SEZs are not, in fact, special. For example, a survey of global SEZ investors found that infrastructure (especially electricity quality) was among their top considerations for choosing an investment location, and that customs and trade issues were also a high priority. But that study found that while non-African SEZs studied virtually eliminated downtime from electrical power outages, issues with electricity remained fairly frequent in African SEZs, though there were some improvements compared to the rest of the country (figure 7.13). And customs clearance times at seaports were actually worse inside the SEZ than outside the SEZ in half of the African countries studied

Figure 7.13 Average monthly downtime resulting from power outages



Source: Farole (2011)

570. Finally, it is important to recognize that SEZs cannot overcome all the constraints that may restrict access to GVCs. Once outside the gates of the SEZ, problems of poor infrastructure, predatory institutions, and lack of safety and security may become binding. They can impact SEZ inputs and outputs travelling between the zone and the port. They can also impact managers and workers who must come in and out of the zone on a daily basis. More broadly, macro factors, such as a volatile exchange, presents problems that are difficult to shield from SEZ investors.

B. GVC-friendly policies for countries in different situations

571. As already shown, a wide variety of policies can enhance participation in GVCs, capture greater gains from GVCs, and mitigate the costs of GVCs. But some policies are likely to be particularly salient for countries in different situations (table 7.1).

Table 7.1 Different factors drive transitions between different forms of participation

	Commodities to Limited Manufacturing	Limited manufacturing to advanced manufacturing and services	Advanced manufacturing and services to innovative activities
Endowments	<ul style="list-style-type: none"> ● FDI 	<ul style="list-style-type: none"> ● FDI ● Basic technical, management & language skills 	<ul style="list-style-type: none"> ● Advanced technical, research, and managerial skills
Location	<ul style="list-style-type: none"> ● Logistics & customs 	<ul style="list-style-type: none"> ● Basic ICT ● Liberalized transport ● Improved infrastructure 	<ul style="list-style-type: none"> ● High ICT connectivity ● Seamless logistics
Market Size	<ul style="list-style-type: none"> ● Liberalize access to key inputs ● Market access 	<ul style="list-style-type: none"> ● Broad-based liberalization Trade agreements 	<ul style="list-style-type: none"> ● High degree of openness ● Deep trade agreements ● Stronger services regulation
Institutions	<ul style="list-style-type: none"> ● Political stability ● Standards and testing 	<ul style="list-style-type: none"> ● Trade agreements ● Contract enforcement 	<ul style="list-style-type: none"> ● Intellectual property protection

Developing GVCs from a base of primary product specialization

572. Many countries are mainly exporters of primary products, including agricultural or extractive (mining) products. For them, export diversification is important as a way to mitigate risks and capture value added. A natural diversification path for many is to process the primary product—for example, using oil or natural gas to produce chemicals, rubber, and plastics; using raw agricultural products to make prepared foods; and using metallic ores to make metallic forms and tools. Countries with similar natural resource endowments vary greatly in their ability to integrate forward into manufacturing. For example, Saudi Arabia is more extensively integrated into chemicals, rubber, and plastics than other crude oil exporters. Belize, Côte d'Ivoire, and Malawi specialize in processed food.

573. In a technical sense, such countries may be considered to have “forward participation” in GVCs (see chapters 1 and 3), since their exports are used in other countries’ manufacturing and those manufactures may in turn be exported. But policy-makers in countries specializing in primary products may see themselves as excluded from GVCs altogether, having complex manufactures or services in mind.

574. Moving into downstream manufacturing from a primary product base generally requires that a country acquire new technological and managerial capabilities. The quickest way to do this is through FDI, which makes it essential to create an attractive business climate and establish simple procedures for registering foreign investors. For agricultural exporters, there is an additional concern: product quality. Importers of jams and jellies will want to know that the local fruit incorporated in such products satisfies SPS standards in the importing country. This requires raising the technical capabilities of farmers to meet such standards—as well as enhancing the testing and quality assurance infrastructure to provide formal certification to the foreign buyer that such standards have been met.

Establishing limited manufacturing

575. Manufacturing is often the key to making the transition from low and lower-middle income to upper-middle income. Certain industries feature frequently in this transition, notably food, beverages, textiles, and wearing apparel. They are labor-intensive and capable of generating significant formal-sector employment. Bangladesh and Cambodia successfully entered them to a large degree.

576. What are the characteristics to attract this part of GVCs? While food processing may be based in part on local agriculture, textiles and apparel are footloose—cheap labor is available in many countries. At

a minimum, it is necessary to be able to import capital equipment in which the production technology is embodied, as well as intermediate goods (fibers for yarn, yarn for cloth, cloth for apparel). So, tariffs must not be too high. If they are, at a minimum some processing-trade or duty-drawback policy must allow the tariff to be waived or rebated on assurance that the intermediate goods are being used in the production of exports. The use of imported intermediates, as well as the speed of the fashion cycle, require that logistics, trade facilitation, and customs procedures be above a minimum threshold by international standards. For agribusiness, quality and standards certification are important, along with an adequate cold chain supply.

577. Attracting FDI is important at this stage as well. In some cases, producing labor-intensive goods is on a contract basis, with the lead firm a global retailer, apparel brand, or a middleman like Li & Fung. In this case, basic political stability and a legal system that permits basic contract enforcement is key. Well-designed special economic zones and industrial parks can foster agglomeration economies and provide access to good infrastructure, reliable utilities, training, and housing.⁶⁹

578. Kenya is the third largest exporter of fresh cut flowers. Its sunny climate, enabling year-round production makes it possible. But endowment is not enough. Kenya also has excellent transport links to Europe through Nairobi airport, which has a terminal dedicated specially to the transport of flowers and vegetables. Seamless and efficient transport is critical because flowers are perishable and must be moved from growers to consumers swiftly.

579. Market access, the business climate, and connectivity right was critical to Lesotho’s success in apparel. AGOA allowed Lesotho tariff-free access to the US market. To take advantage, Lesotho constructed industrial zones with factories available for rent by foreign investors, allowing investors to avoid cumbersome bureaucratic processes. Two large industrial zones were built between 1991 and 1995, additional zones followed. By the mid 2000s, 60 factories employed about 40,000 workers. The industrial zones solved land issues through long term leases and had one agency charged with all administrative procedures. In addition, the buildings were fully serviced with electricity, telephone, water, and sewerage. All zones had strong connectivity, with tarred roads and access to rail links connecting them to apparel distribution hubs in Johannesburg. Timing was also crucial to the success of industrial zone construction in Lesotho, because they moved quickly when market access was granted.⁷⁰

Establishing advanced manufacturing and services

580. A more challenging stage of GVC participation involves activities that divide labor even more than in textiles and apparel. Archetypal examples of such sectors are electronics and motor vehicles. Medical devices, precision instruments, and chemical-based consumer products have a similar profile. Countries that have recently been successful in one or more of these sectors include Costa Rica, Poland, Turkey, and Vietnam.

581. Low-cost labor is still important for some pieces of the value chain—for example, in electronics final assembly and in some auto components such as ignition wiring sets—but other aspects require a more educated workforce. Some skills can be transmitted through formal education, but others will need to come from the foreign partner. So, the policy regime needs to be not only attractive to FDI but sufficiently flexible that the foreign investor has an incentive to transfer training and tacit know-how. Such “soft” transfers of knowledge can be inhibited by prescribing a domestic partner or forcing technology transfers.⁷¹

582. The demands for lower trade costs and speedy movement of goods are even greater for complex manufactures than for more simple ones. Lower tariffs are key, including zero-tariff treatment of regional partners through trade agreements (chapter 8). Trusted trader programs, which give shipments of established value chain firms expedited customs treatment, are also useful at this stage. The capacity of national innovation systems also needs to expand.⁷² The range of technical, engineering, and managerial skills to sustain complex manufacturing is substantial. Though national innovation systems vary in their

configurations—for example, in the varying roles of universities, government, firms, and specialized research institutions—the desired outputs of an innovation system’s capabilities are similar.

583. As one example of the establishment of a GVC in complex manufacturing, Costa Rica’s medical devices exports have grown rapidly in recent years (Box 7.7 above). There are a number of public policies, both Costa Rica’s own and those of other countries, that have influenced the development of this sector. These include human capital policies, openness to FDI, institutional support, and responsiveness to the regulatory systems of other countries.⁷³

584. The labor force required to produce medical devices according to standard specifications is unusually high compared to other manufacturing sectors, due to the fatal consequences of human error and the potential for liability suits. Though Costa Rica is not the lowest-cost potential source of labor, the training of its workforce more than offsets this. Planning for human capital in Baja California, Mexico, and in Ireland was essential to attracting the sector to those locations. Direct labor for medical devices in Costa Rica tends to be drawn from technical high school graduates, while the university system trains specialized workers like materials handlers, engineers, and microbiologists.

585. The technology required to produce medical devices is proprietary. Similarly, the management practices required to secure regulatory approval for such devices in foreign markets is mostly held in firms with prior experience. Foreign firms bring with them “follow-on” suppliers in the medical devices GVC, which are also foreign investors. This allows for rapid growth of the GVC activity within Costa Rica. Linkages to Costa Rican domestic firms have been concentrated in areas such as packaging but are gradually deepening to include parts and components manufacture.

586. Costa Rica has a unique non-governmental organization, CINDE, devoted to promoting economic growth through FDI attraction. CINDE provides a forum for firms to share information and to address challenges in coordination with other government and non-government actors. Among the former include PROCOMER, the export promotion organization, and COMEX, the Ministry of Foreign Trade, responsible for trade policy and trade negotiations as well as having an investment promotion role.

587. The regulatory systems of the EU, Japan, and the United States distinguish medical devices according to the risk facing the consumer, with more stringent regulations for higher-risk devices. Devices such as elastic bandages, blood pressure cuffs, and X-ray film may be regulated lightly as “Class I,” while more stringent “Class III regulations” apply to devices implanted in the human body, such as pacemakers, artificial heart valves, and silicone breast implants. An increasing number of Class III products are fabricated in Costa Rica, reflecting a growing confidence in the capabilities of producers to follow strict regulatory protocols. Regulatory cooperation across borders is also important – the Latin American Headquarters of the U.S. Food and Drug Administration was established in San Jose in 2011 to enable access to regulatory information and to work with local regulatory authorities, industry, and academics.

588. A GVC in traditional manufacturing, like apparel, can be upgraded by moving into additional stages like design, and by enhancing the capabilities of firms. An example of this is in Turkey, where government agencies and industry associations targeted the higher-value design segment of the apparel value chain, with the goal of establishing Istanbul as a global fashion center. Turkish firms have upgraded from being full-package suppliers to global brands, through original design manufacturers (ODM) and now into own-brand manufacturing (OBM).⁷⁴

589. One representative Turkish firm in this development is Gamateks. Gamateks maintains design teams in the UK, Germany, Australia, and Italy. It is engaged in fully integrated production from fabric to clothing and manufactures in a variety of locations including Egypt. Its customers include global brands such as Marks and Spencer, Inditex, United Colors of Benetton, and Zara. These global brands train, certify, and audit Turkish suppliers on quality control, information systems, and working conditions.⁷⁵

590. One area in which public policy has played a role is workforce development. The Istanbul Textile and Apparel Exporter Association partnered with the private sector and government agencies to promote vocational training in fashion design. The Istanbul Fashion Academy is a partnership of the European Union and IKTIB. KOSGEB (Small and Medium Enterprises Development Association), a quasi-government organization, has also been involved in workforce development, and also provides marketing support, training, and consulting services.

591. The movement into own branding was also supported by government incentives, including reimbursements of up to 60 percent of the cost of personnel expenses for a maximum of three years (including training and recruiting highly qualified personnel), machinery, equipment and software, consultancy, and R&D related materials.

Innovative activities

592. As countries transition to high income, innovative manufacturing and services becomes increasingly important. The increasing intertwining of services and manufacturing (“servitization”) means that the development of services in GVCs is not entirely autonomous.⁷⁶ Nonetheless, high-income countries have been able to establish leading positions in services value chains ranging from research and consulting to motion pictures to software design. Some middle-income countries have established positions in services value chains as well—Nollywood in Nigeria, call centers in the Philippines, and software, call centers, and Bollywood in India.

593. To maintain international collaboration in services, national markets must be open to foreign participation—not only for cross-border supply and commercial presence but also for the temporary movement of national persons. High degrees of education are necessary to produce innovative services products. A business environment which supports start-ups and SMEs is also essential—many services firms are small start-ups that are “born global.”⁷⁷

594. The video game industry is an example of a services industry with a fully developed value chain, one whose principles apply also to other services industries. The stages of innovation and R&D, production (including graphics and sound), marketing (including both traditional and non-traditional such as through social media), distribution in digital form (including payment solutions), and consumption, are all present in video games. Another feature of the gaming industry, also present in other service value chains, is that there is a high level of feedback between the community of customers and the firms in the value chain, leading to a constant cycle of innovation and re-design which benefits and empowers consumers.

595. By 2018, revenue in the Swedish video game industry had reached USD 231 million, an over tenfold increase from 2010.⁷⁸ The largest player in the industry is Mojang, developer of the popular game Minecraft. Minecraft is about mining different blocks to create and build structures of choice, and can be played with one or multiple players. Because Mojang is a Swedish company, it might be assumed that everything involved in bringing Minecraft to life is of Swedish origin. But in fact its entire value chain is global.

596. Minecraft is played on a variety of digital platforms built by companies associated with the United States, such as Microsoft’s Xbox Live Arcade (XBLA), Amazon Instant Video, Netflix, and the sports channel ESPN, as well as incorporating social networks such as Facebook. Japanese/Swedish Sony Ericsson marketed an Android-based version of the game. Programmers involved in game design are located in Holland, Canada, and the United Kingdom as well as in Sweden. The programming for the XBLA version of the game was done at 4J Studios in Scotland, an important partner in Minecraft’s GVC. Sounds and music are done by a music producer in Germany. The PC/Mac version of the game is distributed on servers powered by U.S.-based Amazon. Payments for downloads are made through Skrill (UK) and PayPal (USA). Spinoff products and services include Minecraft Lego (Denmark) and MinecraftEDU (an educational version driven by a Finnish company under license.⁷⁹

597. Differences in intellectual property across countries are also important. For example, the uncertain status of software patents in U.S. law originally inhibited Mojang from establishing a U.S. commercial presence, thus affecting the architecture of its value chain. Because Sweden is open to inbound FDI, this was resolved in 2014 when Mojang was acquired by Microsoft.⁸⁰

598. The innovation systems of countries specializing in innovation itself need to be very strong. Whatever forms they take, knowledge needs to flow among firms, government, and universities. Agglomerations of innovation—such as Silicon Valley in California, Cambridge, UK, Bangalore, London, Berlin, and Dublin—are a feature in this stage. Governments can form innovation parks to induce agglomerations of innovators.

599. As an example, the German innovation system primarily focuses on developing complex innovations along known technology trajectories. Existing knowledge in car manufacturing, mechanical and electrical engineering, and chemicals is mature enough so that incremental improvements tend to have clear market applications. In turn, the development of both services and advanced manufacturing is a key determinant of the long-run rate of economic growth.⁸¹

600. The development of a rich national innovation system involves a great deal of networking and a wide variety of institutions – in effect, value chains of knowledge. In Germany, knowledge-intensive service sectors include both traditional professional services such as marketing and advertising and technology-based services such as software and computer systems design and R&D.

601. A wide array of institutions mediate the relationship between private-sector R&D, the university system, and the government, fulfilling the functions of coordination and cooperation. These institutions vary both in their focus on non-appropriable basic research versus marketable applied research, and by their mix of private and public funding. The Max Planck Institutes, ‘Blue List’ institutes, national research centers, and subnationally-focused “Länder” institutes are largely public-funded institutions focusing on basic research. Universities receive a mix of public and private funding. The Fraunhofer Society is responsible for applied contract-based research that bridges basic research and industrial demand. A variety of industrial research institutes are more market-oriented and more privately funded.

602. Emergent new forms of cooperation within the innovation system, mainly privately-funded, involve the creation of institutions to bridge existing centers of knowledge and skills. Of these, new forms of collaboration between universities and industry have proliferated. For example, DTAG is a collaboration between German Telecom and the Technical University Berlin. DTAG and the Technical University further collaborate with Siemens and Daimler in the European Information and Communications Technology Center. The catalysis lab CaRLa is jointly operated by BASF and the University of Heidelberg.

603. In another variant, the German Research Center for Artificial Intelligence (DFKI) is a large non-profit contract research institute organized as a limited liability company. Its shareholders include both U.S. (Google, Microsoft) and German (SAP, Daimler) multinationals.

C. Takeaways

604. Countries seeking to attract and benefit from GVCs need to consider a host of policies. Especially important are attracting capital and connectivity. Foreign investors demand political stability and security. They also seek a friendly business climate. Incentives to attract investment should be carefully considered, as they reduce national gains.

605. Connectivity expands market access for firms and gives them access to imported intermediates. Lowering tariffs for goods and reducing restrictions on services allow firms to function in a competitive environment. Improving trade facilitation ensures that excessive transport costs and delays do not impede global supply chains.

606. Countries lacking the right environment for FDI on a broad base can try special economic zones to create small areas where the climate is ripe for investment. But those zones must be well located for trade and access to resources, have the necessary infrastructure, and be supported and well managed. Getting the investment climate right even in a small space can be daunting.

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¹ Bureau, Guimbard, and Jean 2013.

² Bureau et al. 2013, and “Libya Customs Information” at <https://dlca.logcluster.org/display/public/DLCA/1.3+Libya+Customs+Information;jsessionid=0A1669B5D8048922A0F8FD3B96C2E408>.

³ James 2014.

⁴ IMF et al. 2015.

⁵ Antras and Staiger 2012.

⁶ Ossa 2015.

⁷ Dollar and Wei 2007.

⁸ WTO I-TIP database and WBG staff calculations.

⁹ See the discussion of India's policies in the section below on special economic zones.

¹⁰ Ferrantino and Koton 2019.

¹¹ Hoekman and Mattoo 2008.

¹² Arnold, Javorcik, and Mattoo 2011.

¹³ Fernandes and Paunov 2012.

¹⁴ Similar results have been found for Sub-Saharan Africa (Arnold, Mattoo, and Narciso 2008) and Indonesia (Duggan, Rahardja, and Varela 2013).

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- ¹⁵ Amiti and Wei 2009a. While services offshoring has both positive and negative effects on domestic employment, Amiti and Wei 2009b show, at least for the United States, that it tends to enhance domestic employment on average.
- ¹⁶ PriceWaterhouseCoopers 2016.
- ¹⁷ World Economic Forum 2013.
- ¹⁸ Djankov et al. 2010.
- ¹⁹ Freund and Rocha 2011.
- ²⁰ Christ and Ferrantino 2011.
- ²¹ World Bank 2012.
- ²² Fernandes, Hillberry, and Mendoza-Alcantara 2019.
- ²³ Arvis et al. 2011.
- ²⁴ Londoño-Kent and Kent 2003; Raballand et al. 2012. Some issues with transport may require regional or multilateral coordination, such as anti-competitive conduct in shipping and air markets (Clark, Dollar, and Micco 2004; Fink, Mattoo, and Neagu 2002), and low connectivity in remoter developing countries (Arvis and Shepherd 2011).
- ²⁵ Hiratsuka 2005.
- ²⁶ Boehm 2018.
- ²⁷ Costinot 2009; Liu 2017.
- ²⁸ Huria et al. 2019.
- ²⁹ Smith 2001.
- ³⁰ This section relies on material from Roberto Echandi (2019), “Connecting the Dots between International Trade & Investment Regulation, Investment Climate Reform & Development,” processed.
- ³¹ Barros, Daniel and Luciana Pedra (2012). O papel do BNDES no desenvolvimento do setor automotivo brasileiro, in BNDES 60 anos: perspectivas setoriais, vol. 1. 1. ed.—Rio de Janeiro.
- ³² Sturgeon, Lima Chagas, and Barnes 2017.
- ³³ Newmont Ghana, 2010, Local Procurement Policy and Action Plan
- ³⁴ Source: Farole and Winkler 2014
- ³⁵ Malinska and Martin for World Economic Forum Global Agenda Council on the Future of Manufacturing
- ³⁶ Farole and Winkler 2014
- ³⁷ Dunning and Lundan 2008.
- ³⁸ World Bank 2020.
- ³⁹ Wells and Wint 2000; Morisset and Andrews-Johnson 2004; Charlton and Davis 2007.
- ⁴⁰ Harding and Javorcik 2012.
- ⁴¹ Harding and Javorcik 2011.
- ⁴² Moran, Gorg, Seric, and Krieger-Boden et al. 2018; Monge-González and Tacsir 2014.
- ⁴³ Freund and Moran 2017.
- ⁴⁴ Foster et al (2016).
- ⁴⁵ Arraiz et al., 2011.
- ⁴⁶ FIAS 2008
- ⁴⁷ Collier and Page, 2009
- ⁴⁸ Ottaviano and Puga, 1998
- ⁴⁹ Combes and Duranton, 2006
- ⁵⁰ Rodriguez-Pose and Crescenzi, 2008
- ⁵¹ Zeng 2015.
- ⁵² Farole 2011
- ⁵³ Farole 2011 p. 43.
- ⁵⁴ Ferrantino, Koopman, Wang, and Yinug 2010.
- ⁵⁵ Zeng 2010.
- ⁵⁶ Alder et al. 2013.
- ⁵⁷ Wang 2013.
- ⁵⁸ Zeng 2015.
- ⁵⁹ Wang 2013.
- ⁶⁰ This section relies on the background paper “Performance of Special Economic Zones in India: Experience and Lessons,” by Abhishek Saurav
- ⁶¹ Programs such as Duty Drawback Scheme, Focus Product Scheme, Focus Market Scheme (PHD Chamber of Commerce and Industry 2017), Mega Food Park Scheme, Integrated Textile Parks Scheme.
- ⁶² This has disincentivized potential investors in the electronics, consumer durables, textiles, handicrafts, and leather sectors from locating in SEZs (Mukherjee et al. 2016).
- ⁶³ Farole 2011.

⁶⁴ Frick, Rodríguez-Pose, and Wong 2018.

⁶⁵ see Farole 2011

⁶⁶ See Farole, Norman, and Kilroy (2014) and Rothenberg et al (2017)

⁶⁷ See Farole and Sharpe (2017) and Farole, Norman, and Kilroy (2014)

⁶⁸ Baissac 2011

⁶⁹ Lopez-Acevedo and Robertson 2016.

⁷⁰ Shakya 2011.

⁷¹ Ivarsson and Alvtsam 2005.

⁷² Fagerberg and Srholec 2008.

⁷³ Bamber and Gereffi (2013).

⁷⁴ Fernandez-Stark, Frederick, and Gereffi (2011).

⁷⁵ “About Us”, <http://www.gamateks.com.tr/read.php?dl=en&p=kurumsal>

⁷⁶ Kommerskollegium 2012.

⁷⁷ Knight and Cavusgil 2004.

⁷⁸ “Video Games Market in Sweden – Statistics and Facts,” <https://www.statista.com/topics/4201/video-games-market-in-sweden/>

⁷⁹ Kommerskollegium (2013).

⁸⁰ “About”, <https://www.mojang.com/about/>.

⁸¹ Koschatzky and Stahlecker (2010).

Chapter 8: Promoting Inclusion and Sustainability

607. The policies and institutions that maximize the aggregate gains from GVC participation will not necessarily ensure that these gains are distributed optimally – across locations, across skill levels, and across different groups in society (e.g. women and youth). To the degree that the GVC model may aggravate labor market and spatial inequalities, they risk becoming socially unsustainable. This calls for consideration of a broad range of policies to share benefits more widely and mitigate their negative consequences.

608. In many cases, lead firms directly help to improve social and environmental outcomes. Most global brands have developed social and environmental compliance standards for their global supply chains. Such initiatives have had significant success, not only in improving working conditions, but in showing that employers need not trade off protection against profits. For example, the IFC-ILO Better Work Program, which covers nearly 2.5 million workers in 1,700 GVC-linked garment factories in 8 countries, has documented large direct and indirect impacts of improved working conditions across countries through strengthened supply chain compliance, including, critically, higher productivity and returns to employers. Such programs arose to protect workers and are in demand by producers who want to safeguard brand names.

609. While working conditions increasingly meet international standards in the direct suppliers of lead firms, significant shortfalls are still common in second and third tier suppliers. For example, the Rana Plaza disaster in Bangladesh in 2013 in which more than 1,100 garment workers lost their lives and the Baldia textile factory fire which killed close to 300 in Pakistan in 2012, highlight the need for governments to play a central role in ensuring workers in GVCs are protected.

610. Government regulation is needed to ensure that GVCs are beneficial for the workers and the country more broadly. Raising labor and environmental standards is important in many developing countries, as are policies to promote employment of women or minorities. Shortfalls in enforcement of existing regulations also indicate a need to build capacity for implementation.

611. In advanced countries, in contrast, the primary threat to the sustainability of trade and GVCs comes from displaced workers left behind in communities where factories have closed. GVC integration, like any positive trade or technology shock, yields aggregate gains, but also creates winners and losers. This is normal, and there is no serious expectation that the gains from GVC participation will be shared evenly. However, to the degree that the GVC model may aggravate already large and increasing labor market and spatial inequalities, they risk becoming socially unsustainable. Rather than restricting trade, labor adjustment policies can be used to ensure workers have the skills to migrate to new places and industries. Interventions designed to stimulate new investments and transform local economies should be taken carefully, recognizing the possibilities (and constraints) of structural endowments, and favoring targeted initiatives to address coordination failures rather than blunt investment subsidies.

612. This chapter focuses on inclusion, including adopting trade and industrial strategies that are consistent with comparative advantage and aim to attract GVC investment that will absorb the current stock of workers. Inclusion also requires in-built protections of workers to ensure that wages reflect productivity, that firms in GVCs have the incentive to invest in building worker productivity, and that no false choice is made between profits and protection. The chapter also acknowledges that rapid adjustments are central to the GVC model and advocates flexible labor markets supported by robust, universal social protection systems and well-targeted active labor market initiatives.

613. Policies to maximize the economic gains of GVCs in the short and medium term will generate some negative environmental effects. Chapter 5 showed that there are environmental costs linked to more – and more distant – trade in intermediates, greater CO₂ emissions and more waste. GVCs may also strain natural resources because of hyper specialization, especially if accompanied by production or energy subsidies. The concern that firms may choose to locate the most polluting stages of production in countries with laxer

norms is not borne by the data, though there is some evidence that regulatory improvements may be stalled if government believe that stricter regulations may drive international investors away.

614. Adopting policies that are politically and economically feasible in a GVC world is not an easy task. An important first step is to price environmental degradation accordingly. Prices of goods should reflect both their economic and socio-environmental costs, and trade should be carried out based on comparative advantages that account for these costs. But there is also a role for regulation, in addition to pricing, especially for specific pollutants and industries.

615. These national measures need to be complemented by global cooperation, including to modernize and ensure that trade agreements protect the environment. Recent major agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and the new EU Free Trade agreements all include important environmental provisions. Meanwhile, other international treaties such as the 2015 Paris Agreement on climate change include binding requirements on environmental protection for signatories at all income levels. But more can be done.

616. This chapter first discusses the types of policies that promote social sustainability of GVCs by sharing the gains across all groups of people, including the low skilled poor, women, and youth. This is followed by a brief discussion on policies to mitigate the negative effects that GVCs may have on certain groups of people, notably as a result of trade and technology-induced adjustments. The chapter then shifts to place-based policies, including policies that help embed GVCs in places and those that mitigate spatial dislocations. The third part of the chapter discusses policies to support environmental sustainability of GVCs. It closes with a short discussion of governance for the delivery of inclusive and sustainable GVCs, with a focus on the roles of the public and private actors in the relational context of GVCs.

A. Sharing the gains from GVCs – policies for people

Leverage comparative advantage for jobs-intensive GVCs and support inclusive access to these jobs

617. While GVC participation confers a range of benefits to an economy, including foreign exchange and access to global technology, jobs are the most direct and important channel through which GVCs contribute to poverty reduction and shared prosperity. And the degree to which the gains from GVCs are shared widely depends significantly on the intensity of job creation, and of who has access to those jobs. Chapter 3 provides evidence of strong links between GVCs and job creation at both the national and the firm level. Importantly, it shows that jobs growth in GVCs is complementary with both greater use of imported inputs and greater use of technology – so while higher imported input and capital intensity of GVC production may mean less labor is needed per unit of output, the output boost induced by GVC participation means more jobs are created overall. Chapter 3 also shows that GVCs are, on the whole, inclusive, being both pro-poor and a significant source of jobs for women. But these positive outcomes are not necessarily inherent and can be facilitated by supportive domestic policies.

Jobs for poor and low skilled workers

618. An obvious starting point for countries aiming to leverage GVCs for inclusive job creation is to focus on participating in GVC sectors and activities that demand labor with the skills, attributes, and locations of the *current* stock of poor workers. For many developing countries, particularly those engaged only in selling commodities, leveraging GVCs for the poorest will come first and foremost through integrating smallholders into agricultural value chains and home-based workers into manufacturing and services GVCs. Integration of smallholders is particularly important for Africa, where 55 percent of jobs and more than 70 percent of the earnings of poor are reliant on the agricultural sector¹.

619. As discussed in Chapter 2, FDI may play a critical role in supporting development of agricultural value chains, including through lead firms' investment at both the production and distribution (e.g.

supermarkets) ends of the value chain. Lead firms offer a solution to addressing many of the challenges of raising smallholder productivity, including by providing access to inputs, technical support, finance, and markets. The integration of smallholders to offtakers or direct to processors adds significant value addition options as the farmgate, through direct extension support offering a range of services including technology transfer, quality or certification premiums, and continual access to the market. Rapid development of floriculture value chains across East Africa, which has contributed to substantial jobs and earnings opportunities for smallholder farmers and women (in packing and distribution), was made possible through subcontracting models organized by market-linked lead firms. Agriculture development models organized around lead firm global supply chains have been successful in incorporating smallholders even in complex, FCV environments. For example, in Afghanistan, a World Bank project, in coordination with a leading global food manufacturer, focused on producer organization and compliance with international standards, resulted in integrating female smallholders into the high-value global saffron supply chain. By contrast, the near-collapse of Ghana’s export pineapple sector in the mid-2000s was partly due to the lack of effective organization of smallholders, which contributed to overproduction and lack of flexibility to respond to changing market demand.

620. However, lead-firm organized value chains are not a panacea – they are not always effective and not necessarily inclusive. A case study in Ghana and Cote d’Ivoire on participation in the pineapple and cocoa value chains found that, although participation leads to improved growing processes, higher yields, and increased incomes to successful commercial farmers, it was also associated with an increase in casual labor hiring as well as displacement of farmers from land due to low bargaining positions and knowledge on rights to land ownership.² Countries must still get a lot of things right in their domestic policy environment to maximize the job-creating potential for agricultural value chains. This includes the policy domains discussed in Chapter 7 – notably trade and investment policy and infrastructure. But ensuring that smallholders can participate and share the gains in GVCs may require additional support, including through agricultural extension services, access to risk management instruments (e.g. insurance), and perhaps most importantly in the context of GVC lead firms, convening and coordinating smallholders to leverage scale through cooperatives and other producer organizations.

621. As countries seek to integrate into manufacturing and services value chains, the objective of delivering jobs for the current stock of poor workers calls for policies that reinforce comparative advantage rather than attempt to defy it³. Comparative advantage reinforcing approaches would mean, for example, a relatively small, agriculturally-rich country focusing on agriprocessing or a large, low-skill labor surplus country implementing policies conducive to attracting light manufacturing GVCs. Examples include: strategies to expand agriculture value added and move downstream to processing to raise returns to smallholder coffee farmers in Rwanda (Box 8.1) and Cote d’Ivoire; developing labor intensive light manufacturing to absorb labor transitioning away from agriculture in Ethiopia by leveraging FDI in industrial parks; and upgrading to high value manufacturing to create jobs for an underemployed skilled population in Morocco. By contrast, comparative advantage defying approaches might involve either one of these countries trying to promote development of high technology, innovation-driven value chain nodes, strategies which, even if successful, will unlikely have significant impacts on lower-skilled workers and may contribute to wage polarization. Focusing on comparative advantage, countries can leverage the GVC model to deliver market access and greater value for domestic firms and workers.

Box 8.1 Taking more advantage of comparative advantage – upgrading and value addition in agribusiness GVCs in Rwanda and Cote d’Ivoire

Rwanda coffee value chain

In the late 1990s, as Rwanda looked to rebuild its economy and create jobs and earnings opportunities following the civil war, it faced a number of structural challenges to developing internationally competitive tradables, notably being small and landlocked, in a poor and fragile neighborhood. The

coffee sector was historically the country’s key export crop and a major source of earnings for up to half a million rural Rwandans. But at the end of the 1990s, fallout from the civil war, contributed to put the sector on the verge of collapse due to lack of sufficient quantity of supply and low quality of product. To address this challenge, the country put in place a strategy, completed in 2002, to raise production and move to a higher value-added position in the coffee GVC. Working closely with the private sector and NGOs, the government introduced a two-pronged approach, with a series of key interventions along the coffee value chain that focused on: i) upgrading technology and increasing production; and ii) boosting skills and improving quality

These interventions proved a critical turning point for the sector and unlocked upgrading along the coffee value chain. This led to more skilled farming techniques, better use of technologies (inputs and tress), and higher productivity. During the first five years of implementing the National Coffee Strategy, private investment in coffee washing stations grew on average by 120% per year in locations with the highest cherry availability, water supplies, and road linkages. The total number of CWSS has risen from just two in the entire country in 1998, to 299 as of early 2015. As a result, higher quality coffee began to warrant higher prices, with Rwandan coffee now fetching a premium in international markets. According to USAID, as a result of the reforms in the coffee GVC, approximately 50,000 rural households have seen their incomes from coffee production more than double, and some 2,000 jobs have been created in coffee washing stations.

Source: Adapted from Karuretwa, K. for World Economic Forum Global Agenda Council on the Future of Manufacturing

Cote d’Ivoire cashew value chain

Cashews are Côte d’Ivoire’s third-ranking export after cacao and refined petroleum products, and a crucial source of cash for smallholders and processors in the poorer north of the country. Although Côte d’Ivoire produces 23 percent of the world’s cashew supply, fewer than 7 percent of raw cashew nuts are processed domestically. Low yields and quality result from poorly maintained plantations, a lack of quality stock and inputs, weak extension services, losses in post-harvest handling and storage, and lack of finance to make improvements. With coordinated support from the World Bank and IFC, and working closely with private sector, a comprehensive program to upgrade the cashew sector and increase domestic value-addition was put in place. The program included the establishment of four cashew “platforms” and eight satellite hub that provide training, access to inputs, and market information, along with processing demonstration units. This was supported with access to new sources of finance for smallholders, notably through the introduction of a warehouse receipts system t enables processors to use unprocessed nuts as collateral for working capital loans.

About 225,000 cashew farmers are expected to benefit from upgrading and improved value chain integration, with annual raw cashew yields increasing by 20 percent contributing to substantially higher smallholder earnings. Moreover, increased domestic processing is expected to create 12,000 direct jobs, half of which will go to women.

Source: World Bank Group

622. At the heart of comparative advantage reinforcing policies are those that minimize distortions to market prices – of land, labor, and capital – so that factors flow smoothly to the sectors and places where comparative advantage can be best exploited. This includes economywide policies to support land market reforms, competition, open labor markets, and access to finance, along with investments in critical infrastructure. It may also require targeted policies designed to build capabilities in these priority sectors.

623. In low income, labor-surplus countries with large pools of unskilled labor transitioning from the agricultural sector, labor externalities arising from the divergence between the market price and the opportunity cost of labor may call for additional, targeted incentives for the private sector to invest in labor-intensive activities⁴.

Women and youth

624. The propensity of GVCs to employ women and youth is partly related to the sectors and activities which lend themselves to outsourcing and global relocation; and this is associated with some of the negative consequences of GVCs, in particular around low wages and poor working conditions. Nevertheless, the potential of GVCs to employ large numbers of young, female workers, means they may play a major role in supporting many countries' objectives of increasing female labor force participation and reducing youth NEETs (not in employment, education, or training). In the case of Bangladesh, more than 3 million women, mainly young rural-urban migrants, gained employment in the garment sector as it integrated into GVCs in the early 2000s, contributing to an almost 10 percentage point rise in the rate of female labor force participation in just a decade.

625. Education and skills development policy is the starting point for helping youth take advantage of the opportunities for employment in GVCs. *The World Development Report 2019: The Changing Nature of Work* highlighted the rapidly changing demand for skills, along with the increased importance of advanced cognitive skills, socio-behavioral skills and, most importantly, adaptability to respond to changing circumstances and to 'unlearn and relearn quickly.'⁵ Research shows increasingly large pay-offs from such adaptability – for example, in Armenia and Georgia, the ability to solve problems and learn new skills yields a wage premium of nearly 20 percent⁶. GVCs are at the forefront of these changing demands for skills. But in many if not most countries there remains a large gap between the needs of employers and the approaches of existing education and skills development institutions. Countries need to work toward a system that emphasizes employability of youth and actively facilitates the transition from study into work. Promising policy directions include adoption of dual education systems that provide flexibility for combining general and vocational education, development of vocational training curricula with active private participation to ensure relevance to employer needs, and expanded use of innovative apprentice models that allow youth to leverage the learning opportunities of work. Public-private models are common to develop pathways for GVC-specific employment. For example, in Kenya, the national Coffee Board and industry bodies have teamed up with the Kimathi University of Technology to develop a 'Coffee Diploma' program, combining classroom training on technology and quality management with a 3-6 month industry placement.

626. Governments can help facilitate women's access to jobs in GVCs through policies that generally support women's participation in the economy, including establishing the legal and regulatory environment for access to quality childcare, facilitating access to safe transport, as well as ensuring that women are protected from unfair treatment, discriminatory practices, and harassment and gender-based violence in the workplace. Even from a purely legal perspective, much less the *de facto* situation, gender gaps in these policy domains severely restrict the potential for women to exploit earnings opportunities that may be created from GVC investments – for example, recent research from *Women, Business, and the Law*⁷ shows that in MENA women have on average less than half the legal rights as men in measured area. Beyond closing legal gaps, governments can support women with access to information about employment opportunities and take active measures to break down social norms that inhibit women from working outside the home. Particularly in the early stages of a country's integration into GVCs, there is likely to be a large gap in knowledge and understanding about what it means to work in a formal business establishment. This is especially true of a factory environment and even more so of one that is linked to global markets and may have foreign ownership. Box 8.2 highlights two contrast approaches to integration of female workers in GVC factories – one which brought women workers to the factories and another which brought factories to the women workers.

Box 8.2 A tale of two zones: Comparing experiences of women’s employment in garment GVCs in economic zones in Jordan and Bangladesh

Jordan’s Qualified Industrial Zones (QIZs), established in the late 1990s, were expected to not only generate exports by integrating Jordan into the garment global value chain, but also create large-scale employment for women, in a country where female labor force participation is among the lowest in the world. However, while the QIZs attracted investment and created jobs, manufacturers faced large barriers in integrating local women into the factories in the QIZ, due in part to lack of transport but largely to perceptions about the safety and social acceptability of work in these factories. As a result, virtually all the jobs created for women in the initial stages of the QIZ were taken up by migrant workers, mostly from South and Southeast Asia. In response, one initiative taken by Government involved creating ‘satellite’ production units in rural areas (around the villages where women resided), supported by substantial financial incentives for manufacturers to hire through these ‘satellite’ units. The initiative, which started in 2010, has shown positive results, even if on a small scale: as of August 2017, approximately 3,300 jobs have been created in 12 satellite factories, with a 90% female workforce.

In **Bangladesh**, women’s integration into the workforce in export processing zone (EPZ) garment factories – mostly in the cities of Dhaka and Chittagong – was almost immediate. Given the location of the EPZs in the largest cities of Dhaka and Chittagong, urban females faced somewhat lower transport and social barriers to working in GVC factories. The challenge in Bangladesh was how to make these same opportunities available to rural women, for whom these constraints were binding. An innovative pilot project – the *Northern Areas Reduction of Poverty Initiative*, supported by the World Bank in cooperation with the Bangladesh Export Processing Zones Authority, brought women from the poorest regions of northern Bangladesh into Dhaka for training and employment in the EPZ-based garment factories. The program provided information and awareness building in the local community to help overcome social stigma, transport and living stipends, and a comprehensive program of technical and life skills training, followed by employment. Results from the pilot were positive – more than 6,000 women (two-thirds of those who completed training) took up employment in the garment factories at earnings above the industry average. And initial evidence indicates positive spillovers from the pilot, which many of the constraints of information and social norms overcome, opening up new opportunities for other women in these northern villages.

627. Countries also need to consider how upgrading in GVCs may impact their inclusivity. Many of the GVC manufacturing sectors that are the largest employers of women have experienced substantial ‘defeminization’⁸ of the labor force as they invest more in technology and move into higher value-added activities. For example, research in Mexico⁹ shows that the female share of employment in *maquiladoras* declined from 77 percent in to 41 percent as the sector slowly upgraded between 1977 and 1999. More recently, the rapid slowdown in job creation in the garment sector in Bangladesh has coincided with a more than 10 percentage point decline in the female share of employment in the sector in less than five years. These dynamics also work against employment of youth, as they tend to occupy lower-skill positions. These patterns of defeminization with GVC upgrading align with the findings presented in Chapter 3 on the lower ‘glass ceiling’ for women in GVCs. A number of factors contribute to the defeminization and lower glass ceiling, most notably gender norms (of employers but also women workers) and occupational segregation which restrict women’s access to jobs involving mechanization and technology, as well as management, but also skills gaps and narrowing gender pay gaps.

628. While governments can close legal gaps that contribute to occupational segregation, the biggest opportunities to ensure that GVC upgrading does not come at the expense of good jobs for women and youth will happen through actions taken within enterprises rather than through government programs or regulation. Examples include innovative, comprehensive training and development programs (Box 8.3) and setting internal quotas. Where government has the largest role in addressing this issue is in the education

and training system, where active efforts are needed to overcome gender segregation in access and uptake of relevant skills needed for occupational upgrading.

Box 8.3 Pilot initiatives to upgrade opportunities for female workers in GVCs

Two innovative training pilots supported by the International Finance Corporation (IFC) were designed to increase women’s access to higher-level positions (e.g., technical, supervisory, management) in GVCs sectors where women have traditionally dominated the lower-skilled positions but have had limited opportunity for career advancement.

In the **Solomon Islands**, training and advisory support was provided to management and female employees of SolTuna (a tuna processing company employing 1,800). Initial results included appointment of two women to senior management positions and significantly expanding the number of women in non-traditional jobs. The project catalyzed interest by the private sector and mobilized additional funding to create a follow-on project. In **Bangladesh**, an initiative in partnership with the ILO-IFC Better Work Program, developed, implemented, and evaluated an innovative training program for women operatives in 28 apparel factories. Of the 144 women who attended the training program, 92 were offered a promotion with an increase in salary within weeks of completing the program. The evaluation also found an average efficiency increase of five percent and reduction of absenteeism in lines where trained female supervisors worked.

Labor market policy should balance adequate returns to workers with sustainable competitiveness

629. The inclusivity and social sustainability of GVCs depends not only on the scale and distribution of jobs in GVCs, but also the quality of those jobs. The concept of ‘job quality’ here incorporates both wages (or earnings more broadly) as well as working conditions, including working hours, benefits, the health and safety environment, treatment of workers, and the degree to which workers have voice and agency to help shape employers’ decisions on issues that impact workers. This is line with Agenda 2030’s Sustainable Development Goal (SDG) 8, which highlights the importance of ensuring improvements in working conditions—combining aspects such as productive employment, social protection, social dialogue and rights at work—together with economic growth. The issue of job quality is particularly relevant for labor-intensive GVCs, where outsourcing to developing country locations is fundamentally motivated by the desire to access low-cost labor.¹⁰

630. Because many of the most prominent GVCs involve fully globalized outsourcing of low-skill, labor intensive activities, very low nominal wages in some countries often grab the attention. For example, recent press headlines have referred to the fact that t-shirts being produced for charities or high-profile brands were being produced in factories paying less than 50 cents an hour. Certainly, to readers in high-income countries where even the lowest skilled factory jobs pay 20-30 times that level, this is a shockingly low wage. But this does not necessarily mean there is a problem of low wages in GVCs. In fact, as discussed in Chapter 3, international experience shows that firms operating in GVCs pay higher wages than firms operating in direct trade only¹¹.

631. However, where GVCs can be problematic is where they contribute to the emergence of ‘low wage traps’, whereby wage suppression is used to maintain international competitiveness. While such ‘low wage traps’ are not inherent to GVCs, the globalized and footloose nature of GVC production in many sectors may make them more likely, particularly where lead firms in GVCs use international production cost comparisons to maintain pricing pressure on suppliers in developing countries. Moreover, because GVCs can emerge as enclaves and/or dominant sectors in developing country economies, there is a risk that employers take advantage of monopsony and political power in labor bargaining. For example, in 2009, garment factory owners in Honduras secured an exemption for their industry from a 60 percent increase in

the national minimum wage. Similarly, in Bangladesh, the industry has been successful, despite repeated large-scale protests, in avoiding any real term increase in garment factory wages. Depressed wages can be particularly problematic for low-income workers in developing countries where GVC integration is associated with rapid urbanization, with housing and transport costs rising far more quickly than overall inflation rates.

632. In this context, countries need to institute policies which protect workers' earnings and provide them a pathway to improved wellbeing, while maintaining competitiveness to attract GVC investment and ensuring the appropriate incentives are in place for firms to invest in productivity growth. Minimum wages play an important role in this, particularly in a global market for investment. Virtually all countries have some minimum wage established for regular workers, although this varies dramatically (even considering purchasing power) from just US\$2 monthly in Uganda and Burundi to more than US\$2,900 in Norway¹². Minimum wages should be set as a floor at a level which, at minimum, protects workers from poverty and vulnerability while also keeping an eye on firm competitiveness. Perhaps most importantly, they should be raised at regular intervals and in a systematic and transparent way¹³, with some link to productivity growth, avoiding excessively sharp rises or increases during significant economic downturns. Moreover, the impact on workers is unequal and depends on compliance and enforcement, as well as the degree of segmentation between formal and informal workers. As such, minimum wages should be seen as just one mechanism to support inclusivity in GVCs.

633. In many cases, minimum wages are not binding, even where exemptions to minimum wages have been granted to employers. In other cases, however, distortions in the domestic market may drive a significant wedge between a 'living wage' for workers and the wage at which firms can remain competitive in international markets. Government policy can help bridge this gap – over the medium and long term by addressing regulatory, infrastructure, and other bottlenecks that cause a disconnect between wages and productivity; and in the short term by interventions that change relative prices. In South Africa, for example, government introducing a wage subsidy for youth workers, and later extended this to all workers based in SEZs. Governments may also seek to raise net returns to workers, for example by lowering the cost of transport to access jobs (e.g. through transport subsidies and/or investments in public transport services) or lowering the costs of housing (e.g. through social housing schemes and/or unlocking constraints to private development). Such instruments are often incorporated directly into SEZs, with SEZ-based employers routinely providing transport for workers, and in some cases (mainly in China) providing housing in on-site dormitories.

634. As countries shift from commodity and basic manufacturing value chains toward advanced manufacturing and innovation-based GVCs, wages are less fundamental to competitiveness. However, in many developing countries the problem is a lack of a sufficient base of skilled workers (particularly technical workers), which in turn creates large wage premiums contributing to polarization but also undermining competitiveness. And as skilled workers in these GVCs are typically complements rather than substitutes for unskilled workers, it also has a negative impact on inclusion. Aside from the obvious role of education policy, countries should be open to skilled immigration as a strategy for both competitiveness and inclusion.

Take no shortcuts to protect the well-being of workers

635. But workers care about more than just wages. Evidence from Vietnam shows that workers' reported wellbeing is affected also by the incentive structure, benefits packages, training, absence of sexual harassment, strikes and health and safety. Beyond wages, occupational safety and health considerations impact wellbeing at four times the rate of any other measure of working conditions, such as length of hours worked¹⁴. Yet working conditions are commonly found to fall short of international standards in GVC supplier countries, ranging from violations of core labor standards such as child labor, forced labor, lack of freedom of association, exploitative and abusive practices to unsafe working conditions, low wages,

excessive working hours, precarious contracts.¹⁵ While serious breaches of standards are increasingly rare in the direct supplier networks of multinationals, they remain rife in second and third-tier suppliers. High profile examples, like the Rana Plaza disaster in Bangladesh in 2013 in which more than 1,100 garment workers lost their lives and the Baldia textile factory fire which killed close to 300 in Pakistan in 2012, are prominent, but below the radar millions of workers in globally-linked industries work daily in vulnerable situations. And while poor working conditions in Dickensian factories tends to garner the most attention, problems exist in global commodity chains like agriculture¹⁶ and even in high technology value chains, as attested by recent news reports documenting casualization, discrimination, harassment, and retaliation in some of the world’s largest technology multinationals.

636. It is important to acknowledge that many of the specific features of poor working conditions (particularly around workplace safety) are less a feature of GVCs per se as they are of GVC sectors of the countries to which GVC activities are outsourced. In fact, as with wages, working conditions in GVC-linked enterprises tend to be better on average than those enterprises in the same country operating outside of GVCs. But aside from the fact that the GVC model enables global enterprises (and consumers) to profit from offshoring to avoid the costs of protecting workers, GVCs may also exacerbate the problems of poor working conditions by creating incentives for GVC-linked suppliers in developing countries to similarly seek to cut these costs. For example, an underlying factor in the Rana Plaza disaster is the common practice of first-tier suppliers subcontracting work to smaller, often informal producers to reduce costs and avoid scrutiny from lead firms.

637. Even where developing countries have robust national policy regimes in place to support international labor standards, they are ultimately only as good as their enforcement capacity. It is here that many developing countries come undone. Lack of technical capacity, financial resources, corruption, and distorted incentives are all powerful forces that undermine both national and private standards designed to promote quality jobs in GVCs. As countries engage more deeply in GVCs, investing to upgrade the capacity and governance of their labor regulatory regime will be increasingly critical both to protect workers and to maintain the ‘national brand’ for supply chain compliance.

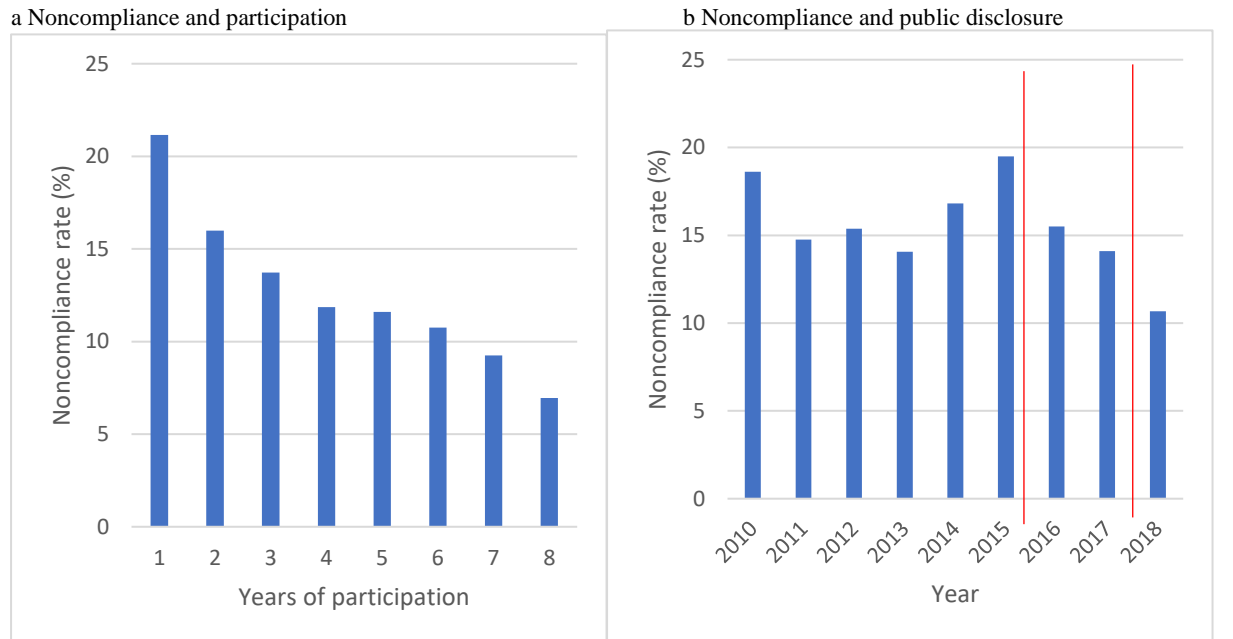
638. In response to concerns over working conditions in GVC supply chains, over the last decade or more virtually all global brands, particularly from Europe, North America, and Japan, have developed comprehensive social and environmental compliance standards for their global supply chains. Such initiatives have had significant success, not only in improving working conditions, but in showing that employers need not trade off protection against profits. For example, the IFC-ILO Better Work Program – which now covers nearly 2.5 million workers in 1,700 GVC-linked garment factories in 8 countries – has documented large direct and indirect impacts of improved working conditions across countries through strengthened supply chain compliance, including, critically, higher productivity and returns to employers (Box 8.4)¹⁷.

Box 8.4 Improving working conditions and profits– evidence from Better Work

Global evidence from the Better Work program shows that garment factories in GVCs are more productive and more profitable when they comply more with labor standards—particularly on ensuring freedom of association and collective bargaining,¹⁸ eliminating sexual harassment¹⁹ and verbal abuse,²⁰ and improving workers’ sense of physical security and assurance in wage payments. Greater compliance with labour standards, particularly on freedom of association, is associated with higher profitability and higher productivity.²¹

In Vietnam, for example, the noncompliance rates of firms in the apparel sector declines with program participation (box figure 1a); and the introduction of a policy to publicly disclose the names of firms that fail to meet key labor standards has additionally improved firm compliance with labor standards (box figure 1b).²²

Box figure 1: Working conditions improve through participation in ILO-IFC Better Work Vietnam as well as public disclosure, 2010–18



Source: Hollweg and Kanz 2018; Better Work 2016.

Note: Figure a plots the average non-compliance rate of firms for each year of program participation. Figure b plots the average non-compliance rate of firms over time since the start of ILO-IFC Better Work Vietnam. The policy of public disclosure of firms that failed to meet key labor standards was announced in 2015 and implemented in 2017.

639. Despite the success of private and public-private initiatives, they are limited in scope and coverage. National governments have a critical role to play and private and public governance in GVCs should be viewed as complements rather than substitutes. At the very least, national governments must ultimately play at least a supportive role in facilitating compliance through regulatory enforcement, even if their capacity is often weak. In addition, national governments, in partnership with the private sector, can support their GVC-linked enterprises, and particularly SMEs, to meet international standards on wages and working conditions. Governments should also continue to pursue cross-border dialogue and international framework agreements,²³ alongside labor provisions in trade agreements.²⁴ A starting point is for countries to adopt international labor standards – notably ILO’s core conventions²⁵. By adopting these core conventions and putting in place the regulatory regime to enforce them, countries send an important signal to GVC investors that they will not engage in a ‘race to the bottom’ on wages and working conditions.

B. Managing GVC adjustment: policies to support the people and places that are left behind

640. Trade and technology changes always have big implications for labor demand, with shifting comparative advantage creating winners and losers across sectors, locations, and skills profiles. While GVC trade is not fundamentally different in this regard, it perhaps represents the most extreme version of the model, as GVC networks are inherently built around the trade and technology nexus. Thus, changes in labor demand triggered by GVCs may be large and sudden, leaving firms workers, and places with little time to adjust. As highlighted in Chapter 3 and recent research²⁶, as GVC trade tends to be strongly comparative advantage reinforcing, lower-skilled workers, and the places in which they are concentrated, typically lose out as countries upgrade in GVCs. In this context, there is a role for policy not only to support upgrading of capabilities to extract the gains from GVCs over time but also to manage the adjustment process for workers that may be displaced during the transitions across GVC development stages.

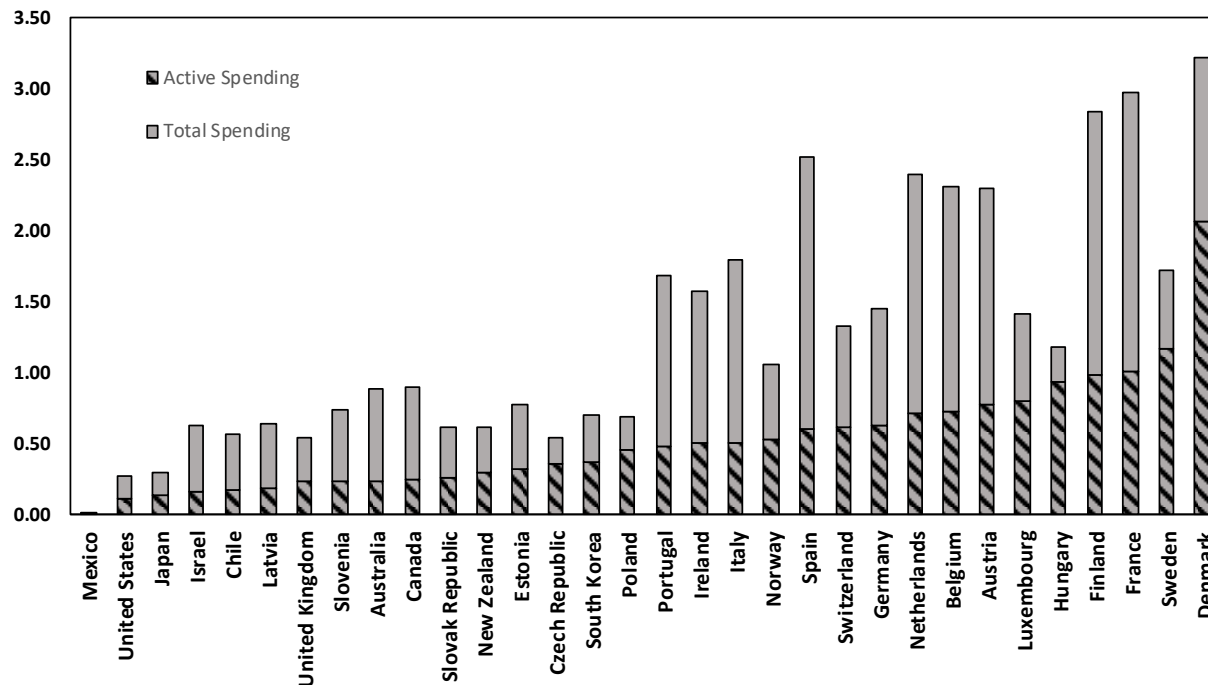
“Flexicurity” and “progressive universalism” can help manage adjustment while maintaining competitiveness

641. Countries may take various approaches to mitigate the negative effects of labor adjustment. They may use regulatory policy targeted to employers (e.g. setting strict terms around firing workers including on notice period and severance pay) to minimize adjustment or the costs society must bear for adjustment.

642. They may also use policies targeted at workers, including: i) *income protection policies*, like unemployment and disability insurance, along with other forms of social protection, which aim to mitigate income loss of workers without taking active steps to return them to work; and ii) *active labor market policies* (ALMPs), including employment services (e.g. counselling, job search assistance, and intermediation), training, wage subsidies, entrepreneurship programs, among others, which are designed to match displaced workers with income earning opportunities²⁷.

643. Given the need for GVC employers to compete in absolute terms in global markets and the dynamic trade and technology landscape that governs GVCs, a general consensus is emerging that allowing flexible labor market (i.e. limiting the use of labor regulation that significantly restricts employers) coupled with highly supportive social protection, de-linked from employment, may be the best way to balance inclusion and competitiveness. This approach, proposed in the WDR 2019 and guided by the principal of ‘progressive universalism’ calls for strengthened and expanded social minimum, complemented by mandated social insurance (along with more flexibility in labor markets).

644. For example, Denmark’s ‘flexicurity model’ gives businesses the flexibility to hire and fire workers with few restrictions, while providing a generous, broad-based unemployment benefit system that cushions the negative income effects on displaced workers, combined with strong support to enhance employability and connect workers to jobs. Despite unemployment below average in the OECD 2016, Denmark invested more heavily in labor market policies than other countries (figure 8.1). Much of the spending that years was on active labor market policies to help workers in sectors or regions that were undergoing adjustments. This contrasts somewhat with the United States, where minimal, broad-based protection is norm, and ALMPs are deployed narrowly for specific ‘trade adjustment assistance’.

Figure 8.1 Spending on total and active labor market policies as a percent of GDP, 2016

Source: Bown and Freund 2018.

Note: Data for France, Italy and Spain is 2015 and 2011 for the United Kingdom.

645. While significant resources are needed for such programs, they pay off to both to protect workers and maintain political support for open trade. Denmark has not experienced the kind of backlash against trade that several other industrial countries have. Instead, the Danish recognize that they are dependent on trade, that some industries and workers may lose from increased import competition (and other economic shocks), but those workers will eventually find new jobs.

Active labor market policy interventions must be carefully targeted, but they can be effective

646. Designing and delivering labor market programs remains a challenge, particularly in low and middle-income countries, where lower formal education in the work force limits the benefits of vocational training, higher labor market informality limits the reach of adjustment beyond the formal economy, and weak institutional and administrative capacity limits the ability to ascertain eligibility and control fraud. Research concludes that ALMPs have relatively limited effectiveness. For example, a meta-analysis of 113 employment programs around the world targeting youth found only one in three to have positive and significant impacts²⁸. However, the effectiveness of employment programs appears to be nuanced and context-specific, with some types of programs seemingly more effective than others (figure 824).

647. Research in OECD countries found job placement services, and especially training and wage subsidies to have been moderately effective in helping workers find employment, while public works and other programs that provide direct employment over the short term have had little impact over the long-term²⁹. In middle and low-income countries, skills training and entrepreneurship programs had greater impact³⁰. Moreover, while many traditional ALMP interventions may have limited effectiveness, research has found that approaches involving demand-side interventions (e.g. helping enterprises overcome barriers to job creation) and those specifically targeting structural and spatial mismatches – giving workers the mobility to take advantage of opportunities in sectors and locations where jobs are being created – show

promise³¹. For example, a program sending seasonal workers to New Zealand increased per-capita incomes in Tonga and Vanuatu by more than 30 percent³².

Figure 8.2 Labor market barriers and ALMP interventions



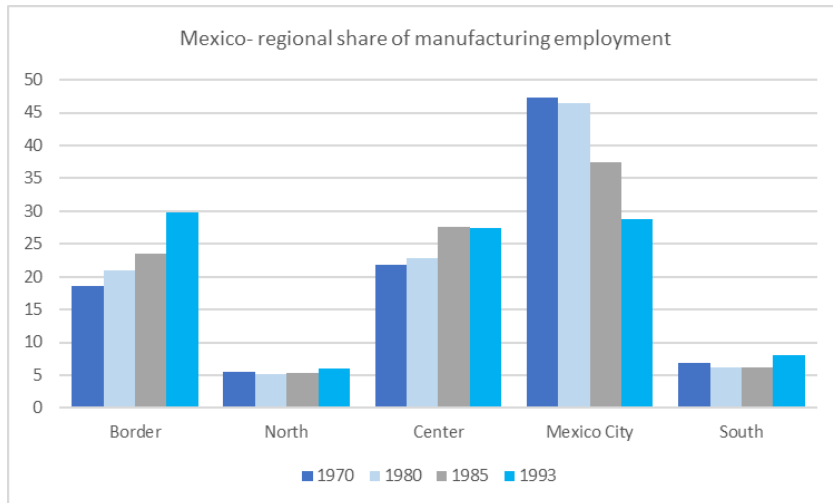
Source: Adapted from Almeida, Ort, and Robalino 2014; Cunningham, Sanchez-Puerta, and Wuermil 2010; Kluge et al. 2016; and Rosas and Rossignotti 2005. Note: * Evidence-based interventions; ** mixed evidence, theoretically sound.

Source: Datta et al (2018) Integration : A New Approach to Youth Employment Programs

Managing GVC adjustment requires targeting places as well as people

648. The challenge of labor adjustment is fundamentally linked to the spatial distribution of economic activity in GVCs, both across and *within* countries. These spatial patterns of development are relevant at the initial stages of GVC integration and throughout stages of upgrading. As countries integrate globally, they often experience fragmentation nationally, with GVC investment tending to concentrate in the places that are well-connected to regional and global markets (Figure 8.3). This may aggravate existing disparities by reinforcing the competitiveness of leading regions, particularly where large infrastructure gaps and regulatory barriers prevent integration of domestic markets³³. And the fact that GVCs, particularly at the manufacturing and innovation stages, benefit significantly from agglomeration economies, means that GVC investments tend to be spatially concentrated.

Figure 8.3 GVC integration may fragment domestic markets and benefit locations near trade gateways



Source: Hanson (1998)

649. As a result, the dislocations that come with GVCs adjustments do not just happen to people, they happen to places. Examples are easy to come by. Think of Detroit, and other Rust Belt cities in the US which have seen automotive and other machinery and equipment manufacturing offshored to Mexico. Or Northeast France and the Ruhr Valley in Europe. But also in many developing countries, both former industrial hubs and agricultural hinterlands may no longer be able to rely on captive domestic markets. This can be seen in Africa, for example, in places like Bulawayo and East London. Wherever places are facing adjustment, there has emerged a strong political imperative for targeted, ‘place-based’ policies designed to create new sources of demand to absorb displaced workers in the short term and to shift the local economy onto a more sustainable path for the future.

Support people in left-behind places through service provision, skills, and mobility

650. The focus of any policies addressing these regions must be the people in them, a principle which is set out clearly in the *WDR 2009 – Reshaping Economic Geography*. Thus, priority policies for these regions facing trade and technology-related adjustment must focus on giving residents of these regions the tools to take advantage of opportunities that arise in situ or elsewhere. This includes investment in skills development, including through retraining programs, along with removing barriers to labor mobility, which, in addition to skills development, may include other elements of ALMPs including access to information on job opportunities, and subsidies for relocation (e.g. transport, housing). China’s relaxation of strict controls on internal mobility and the integration of Germany after 1989 are natural experiments that prove the positive impact of promoting labor mobility, not just on the individuals that migrate, but on both on the places receiving *and* sending migrants.

651. Spatially targeted interventions may also be relevant to raise investment and support job creation, but they must be targeted and designed with a clear understanding of structural conditions of the region. Regions that are peripheral and sparse in population may well have niche opportunities that can be exploited, but should prioritize raising welfare, strengthening human capital, and promoting mobility. By contrast, regions that have sufficient density to foster agglomeration economies and relatively good market access are candidates for place-based interventions that aim to overcome coordination failures that block investment and prevent the formation of productive agglomerations.

652. Traditionally, efforts to support regions lagging or suffering from trade adjustment have emphasized subsidies to attract (usually foreign) investors, in many cases combined with the development

of SEZs or other industrial infrastructure. In most cases, such incentives have been ineffective in attracting investment to lagging regions. One reason for this is because the level of subsidy required to overcome other constraints (e.g. poor infrastructure, distance to markets, lack of agglomeration-induced productivity gains, etc.) is usually infeasibly large. Second, there is a major risk that regions within the same country will engage in territorial competition and a ‘race to the bottom’ with fiscal incentives. The ‘fiscal wars’ engaged in by Brazilian states competing for global automotive investment in the 1990s is instructive – investment subsidies amounted in massive transfers to private, mainly foreign investors, at huge fiscal cost, with limited impact on job creation, no guarantees of sustainability through embedding supply chains, and potentially contributing to undermine competitiveness of the overall sector³⁴. Moreover, governments face risks in offering large incentives to attract investment in ‘footloose’ activities common in many GVCs (e.g. garment manufacturing), which may relocate quickly in response to political factors, global market conditions, or ending of subsidies. This was exemplified clearly in recent cases of Foxconn and Amazon in the US.

653. Recent proposals³⁵ have called for a shift away from targeting firm investment broadly and instead to deploy a geographically-targeted wage subsidy or a hiring tax credit, which directly target job creation in regions impacted by trade adjustment or otherwise lagging. Such approaches may indeed be effective to support increased investment and targeted employment, as discussed previously in this report. However, as they do nothing to change the structure of the local economy, they are likely to be effective only as a short-run measure, in the absence of complementary interventions.

C. Environmentally sustainable GVCs... and GVCs for environmental sustainability

654. Chapter 5 highlighted how GVCs can have significant negative environmental impacts, both in terms of aggregate global effects of the GVC-oriented production and distribution systems, as well as the place-specific effects of the concentration of GVC activities in a country or region. At the same time, Chapter 5 outlined how GVCs offer opportunities to support environmentally sustainable production models. Building environmental sustainability directly into both the production and governance models guiding GVCs will be increasingly critical for the ongoing viability of GVCs. This can be ensured through a combination of appropriate pricing, regulations, and cooperative arrangements.

655. For countering the negative impacts on the environment from the scale and composition effects discussed in Chapter 5, both pricing environmental degradation accordingly and mandating sustainable production is necessary, in particular for local pollutants. Among others, this is the case for the energy transition in shipping towards zero-emissions fuels that the International Maritime Organization (IMO) has committed to. Effective policy support in the form of carbon taxes, and regulations, including emissions trading, low-carbon fuel standards, a gradual ban of fossil fuels and others are needed. The combination of taxing shipping fuels and regulations could provide support for fully exploiting the existing energy efficiency potential and developing alternative fuels and other innovative solutions. The challenge however is that ships are highly mobile: they travel mostly in international waters and can easily be registered anywhere. Thus, cooperative solutions are required.

Pricing environmental degradation

656. Pigouvian taxes equivalent to the environmental harm done by the activity, for example a tax on carbon, would reduce the use of energy and lead to more innovation in energy-friendly products. Not pricing the environmental costs implies a subsidy for fuels. Using the difference between existing and efficient (inclusive of environmental costs) prices and consumption, the IMF estimates of the unpriced externality caused by fossil fuels is more than ten times the direct financial subsidy.³⁶

657. What can countries do? Many still have energy subsidies in place that lead to excess pollution. The subsidies are often regressive because the poor tend to have smaller houses and fewer appliances, and thus use less energy. Removing explicit fuel subsidies shifts business incentives away from energy-intensive production and toward labor. Shifting from a system that is subsidizing carbon emissions or is neutral to taxing those emissions is optimal.

658. Production subsidies are also problematic because they encourage production above the efficient level, especially in agriculture, where overuse can be harmful. To the extent that businesses need time to adjust, switching to lump-sum transfers, while allowing firms to face market prices, is better for the environment. By decoupling subsidies from production, there is less incentive to overuse resources.

659. To minimize distortions to trade, the most efficient implementation of a carbon price would be through an international agreement on a “carbon price floor.”³⁷ Universal adoption may, however, suffer from free-rider problems for public goods. Some have suggested that incentives to join the agreement could be improved if participating countries agreed to grant preferential access to each other’s markets.³⁸

660. Countries can also act unilaterally. To maintain competitiveness, they can tax the consumption of pollution-intensive goods rather than their production (Box 8.5 Cost-effectiveness and equitability of environmental regulation). Different forms of consumption-based carbon pricing are available, but a simple design that is consistent with trade law is to tax carbon in a way similar to how countries use corrective taxes for tobacco or alcohol—by applying a consumption-based excise tax. In many countries, imported and domestically produced alcohol are taxed alike when they are consumed within the country, but alcohol headed for export is exempt from the tax. This way, corrective taxes can be applied unilaterally without harming external competitiveness and in compliance with trade law.³⁹

661. The same policy design can be used for taxing environmental costs from traded commodities. For example, a country could tax carbon-intensive aluminum by fixing an excise tax according to the social cost of the emissions typically released per ton of the metal. And the tax would be levied at the same rate for all aluminum used in the country, but not for exports. The efficiency of the tax scheme can be further improved by granting output-based tax rebates to domestic and overseas firms that adopt low-emissions production techniques.

662. Despite the clear efficiency of a carbon tax, its feasibility from a political perspective is far from guaranteed. In late 2018, when France announced an increase in fuel taxes, in part to help the country transition to renewable energies, it provoked the so-called “Gilets Jaunes” or “Yellow Vest” movement: large, at times violent, protests broke out across the country, led by commuters and those in the transport industry. Protestors argued that the rise in fuel tax imposed a disproportionate burden on the poorest in society, particularly those living in nonurban areas who suffered already from stagnating incomes and poor public transport services (all vehicles must carry yellow vests in case of emergency). Meanwhile, large multinationals—deemed to bear greater responsibility for rising emissions worldwide—could find ways to minimize their tax burden and still reap large profits. Ultimately, the government was forced to withdraw the proposed tax increase. The yellow vest symbol has been adopted by a variety of other movements worldwide.⁴⁰

Mandating more sustainable production

663. Countries can also use regulatory (command-and-control) policy to deal with externalities from traded commodities, especially to maintain clean water, prevent overfishing and over-farming, curb emissions and specific pollutants, and reduce the production of disposable, single use goods. For example, agricultural runoff, contaminated with high levels of pesticide and fertilizer residue, as well as organic matter and sediment, is the primary source of water pollution in many countries, particularly advanced and emerging. A 2018 FAO report on the topic identifies the following regulatory measures to reduce agriculture-related water pollution: water quality standards; pollution discharge permits; mandatory best

practices; environmental impact assessments for certain farming activities; buffer zones around farms; restrictions on agricultural practices or the location of farms; and limits on the marketing and sale of dangerous products.⁴¹ China, the world’s largest pork producer, adopted new laws in 2015 to manage runoff from pig farms, and institute more efficient, sustainable farming methods. In fisheries, quota systems are used to prevent overfishing, though there is concern that quotas, which are set based on commercial considerations, may be too high to avoid the depletion of certain fish stocks. The European Union has committed to set all fishing quotas based on scientific advice (the “maximum sustainable yield”) by 2020.⁴²

664. Regulations can also be used to achieve emissions reductions targets adopted as part of the COP21 agenda. For example, vehicle emissions standards are in place in the majority of high and middle income countries, regulating not only CO₂ emissions but also methane, hydrofluorocarbons (HFCs), and nitrogen oxides, which have a higher global warming potential than CO₂. Nevertheless, the effectiveness of mandatory standards depends ultimately on the efficacy of related compliance and enforcement mechanisms. A study across major vehicle markets in Asia, Europe, North America and Latin America identified in almost all cases deficiencies that compromised the ability of these countries to meet emissions reductions targets.⁴³ Establishing a clear legal authority, providing adequate funding, requiring data transparency, creating reliable testing mechanisms, and using corrective actions, such as recalls and penalties, are all important for success.

665. Reducing and eliminating the consumption of disposable goods such as single use plastics is of increasing concern. The European Union announced in March 2019 that single use plastics will be banned from 2021 and has implemented a target to recycle 90 percent of plastic beverage bottles by 2029. Canada announced a similar measure in May 2019, banning single use plastic items such as bags, straws, cutlery and stirring sticks from 2021. Many more countries have long imposed bans on single use plastic bags, including Bangladesh (2002), Kenya (2017), and Rwanda (2008), among others. In Kenya, carrying plastics bags can provoke heavy penalties and jail terms, and manufacturing and importing plastic bags attract penalties ranging between \$19,000 and \$38,000 and jail terms of up to 4 years. Although some large firms have announced the elimination of certain single use plastics in their supply chain, government measures are needed to achieve broad based change across society.

666. Developing countries sometimes worry that environmental policies would come at their economic disadvantage. However, economic literature on “double dividends” and “economic co-benefits of environmental policies” over the last 30 years finds that internalizing external costs through fiscal policy raises economic development more often than it deflects it.⁴⁴ Exactly in those economic circumstances representative of developing countries—informality,⁴⁵ difficulty in rising domestic tax revenue,⁴⁶ highly distorted pre-existing tax systems,⁴⁷ high air pollution,⁴⁸ among others—the probability of a double dividend is higher.

667. A private-sector solution to externalities from traded products is sustainability certification. Certificates started in the timber market, specifically as a solution for trade. Now they are now spreading to other commodities. Sustainability certificates can improve the sustainability of trade a lot, but they have also clear limits.

Box 8.5 Cost-effectiveness and equitability of environmental regulation

This year marks the 100th anniversary of Pigou’s description of environmental pollution as “externalities” and his suggestion that they be addressed with taxes. Pollution taxes are more cost-effective than other types of environmental regulations, meaning that taxes reduce pollution the most per dollar of cost or, equivalently, taxes cost the least per ton of pollution reduced. They are more robust to tax evasion than direct taxes and are a fiscally efficient means of domestic resource mobilization, since their coverage extends to the informal sector.

Despite that cost-effectiveness, and despite advocacy by economists, policymakers around the world have largely chosen other types of regulations in lieu of pollution taxes. A main argument offered is that the burden of paying pollution taxes would be unfair, or regressive, falling disproportionately on poor households and poor countries. But evidence that pollution taxes harm poor people is not straightforward. Richer people are indirectly responsible for more pollution, because they spend more money and consume more goods whose production generates pollution. So, if we follow economists' 100-year-old advice and tax pollution, rich households would pay more than poor households in absolute terms. But that spending on polluting goods may constitute a larger share of poor households' incomes. So, in relative terms, those tax payments could fall disproportionately on the poor.

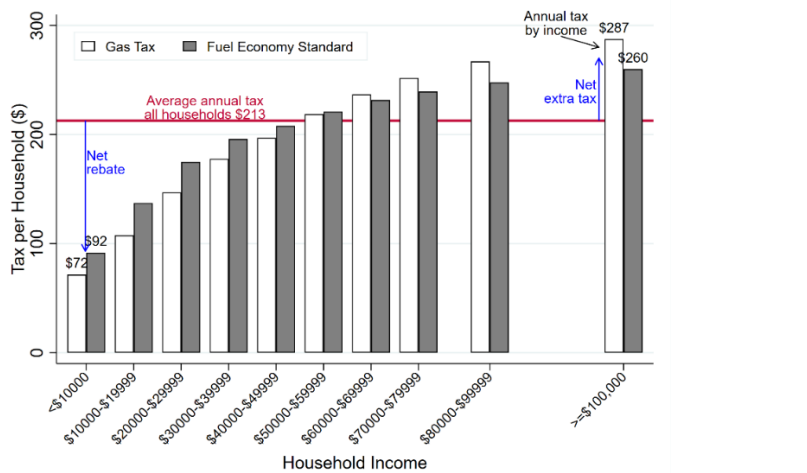
Grainger and Kolstad (2009) demonstrate this regressivity of pollution taxes in the context of a hypothetical US carbon tax. Even though in absolute terms wealthier households pay more, when expressed as a share of annual income the poorest fifth of Americans would pay over three times as much as the richest fifth. Sager (2019) shows that in large developing countries such as China and Indonesia, that pattern is reversed. It is the richer households that would spend a larger share of their incomes on carbon taxes. But importantly, the burden of a carbon taxes would vary more across countries than within. It would fall harder on average consumers in poor countries than on average consumers in rich countries.

That general argument—that pollution taxes are worse for poor households—fails to consider the case in their favor for two reasons. First, it ignores what happens to the tax revenues. If revenues are distributed to rich households or used to fund programs that mostly benefit rich households, of course they will be regressive. But if the revenues are paid to or fund programs for poor households, that can offset the higher relative tax burden poorer people pay. If the revenues are divided evenly, there would be a net benefit to poorer households. Poor consumers would pay more in taxes as a share of their incomes, but receive an even larger share of the dividends.

The box figure demonstrates this point for a hypothetical \$0.29 per gallon tax on gasoline in the US. The tax would cost households earning less than \$10,000 a year \$72 annually and households earning more than \$100,000 a year \$287. Since \$72 is a larger share of a \$10,000 income than \$287 is of a \$100,000 income, the tax burden would be regressive. But if we disburse the revenues evenly, each household would receive a payment of \$213, the red horizontal line in the figure. The poorest would pay \$72 and receive \$213, receiving a net rebate of \$141 per year. The richest would pay \$287 and receive \$213, a net tax of \$74. Even though the tax alone is regressive, the program as a whole is progressive.

A second shortfall of the regressivity argument is that policies enacted in lieu of pollution taxes can be worse for poor households, no matter what is done with the revenue. Consider energy efficiency mandates—the type of technical rules that require appliances, buildings, and vehicles to use less energy in their operation. For vehicles, these take the form of fuel economy standards that amount to a tax on gas guzzlers and a subsidy for efficient cars. Whereas a gas tax targets fuel directly, a fuel economy standard effectively taxes vehicles based on their fuel-consuming attributes.

If U.S. households were taxed based on the vehicles they own, in a way designed to mimic a fuel economy standard and raise the same revenue as a \$0.29 a gallon gas tax, poor households would pay an extra \$92 a year and rich households an extra \$260. Even if all the revenues were refunded evenly, or if the tax-subsidy combinations were designed to be revenue neutral, poor households' net tax rebates would be lower with the fuel economy standard than the gas tax. Fuel economy standards are both less cost effective and less progressive than Pigou's 100-year-old, mostly disregarded suggestion.

Box figure 1 Gas tax or fuel economy standard?

Source: Prepared by Arik Levinson, University of Georgetown, drawing from Levinson (2019).

Note: Data are from the 2009 U.S. National Household Travel Survey. Includes all 101,000 households, including those without vehicles.

Using trade policy and agreements?

668. Trade policy can have a negative environmental bias if it does not take into consideration the GVC features of international trade. In most countries, import tariff and non-tariff barriers are substantially lower on dirty than on clean industries, measured as CO₂ emissions per dollar of output.⁴⁹ Dirtier industries tend to be located upstream in the value chain. The differences in trade policy affecting industries that enter GVCs in different stages of production create a global implicit subsidy to CO₂ emissions in internationally traded goods that totals several hundred billion dollar annually and therefore contributes to climate change.⁵⁰ The greater environmental protection of downstream industries accounts for this pattern and it is explained by the fact that downstream industries lobby for low tariffs on their inputs but final consumers are poorly organized and cannot lobby effectively for stricter regulations on upstream industries. If countries applied similar trade policies to clean and dirty goods, global CO₂ emissions may decrease substantially without inducing a decrease of global real income.⁵¹

669. For countries located upstream in GVCs, where pollution from production is higher, the evidence provided in this Report suggests that it is difficult to capture more value from the chain because of competitive pressures. In a world of GVCs, countries upstream in the chain are more likely to be reluctant to raise environmental standards. This leads to a “regulatory chill” (i.e. the theoretical possibility that regulatory progress could stall across all policy areas that may potentially impact foreign investors), which is most likely higher for the countries in the early phases of GVC engagement.⁵² Importantly, the extent of regulatory chill is a function not of whether firms will actually relocate, but of whether governments believe the threats that they will.⁵³ There is evidence from the economic literature and the WBG’s operational experience that governments tend to believe these threats, even when they are not credible.⁵⁴ Information asymmetry, loss aversion and political economy considerations are important reasons for this. International investment agreements – especially those with investor-state dispute settlement (ISDS) provisions seem to be particularly vulnerable to “regulatory chill”.⁵⁵ As GVCs entail more FDI than traditional forms of trade, all else equal, GVCs may cause more regulatory chill problems than traditional forms of trade; especially when host states have agreed to binding investor protections supported by ISDS. A solution is not to forgo ISDS, which can help compensate for weak institutions, but to exclude environmental and health provisions.

670. Trade and investment agreements can be used to help address the risk of regulatory chill and to implement environmental regulations, because countries that do not adhere to them lose the preferential

market access from the agreement. Recent trade agreements have taken into account the need for environmental policy. International treaties include ambitious commitments for environmental protection and emissions reduction—for example, the Paris Agreement. Deep trade agreements increasingly include environmental provisions. For example, the Comprehensive and Progressive Trans-Pacific Partnership Agreement (CPTPP) has an environmental chapter that promotes sustainable fisheries (see chapter 9). And new agreements include trade-exposed industries in environmental policies without the need for exemptions for competitiveness problems and without violations of trade law.⁵⁶

671. For GVCs to continue to drive pro-poor growth and preserve the environment, all trade and investment agreements should envisage provisions for the progressive tightening of environmental regulations in line with the targets of the Paris agreement, as well as correction mechanisms in light of new information about environmental risks, allowing policy change based on the precautionary principle and the polluter pays principle.⁵⁷ They should also encourage countries to provide policy certainty - needed for attracting GVCs (see Chapter 2) - by planning out their long-term climate and environmental strategies and including them transparently in long-term macro and sectoral strategies.

672. Chapter 5 correctly highlights the role of rising incomes in driving demand for better environmental protection. This is another reason why countries need support identifying policies which support optimal investment levels by providing the correct elements of stability and flexibility to respond to changing circumstances. It is crucial that countries do not sign trade and investment agreements that lock them in to sub-optimal levels of protection.

673. Trade agreements on environmental goods can also promote their use. In the summer of 2014, a group of nearly 50 WTO members launched negotiations to reduce tariffs on green goods. The proponents had a laudable goal, but few developing countries signed on because their tariffs tend to be relatively higher on the targeted goods, so the agreement would have required more liberalization from them. In addition, the large countries could not agree on the final list of products. The agreement remains stalled to this day. The idea behind the agreement remains smart, however, increasing trade, reducing the price of environmental goods, and reducing CO₂ emissions. And if the agreement was multilateralized, the magnitude of the identified impacts would increase substantially.⁵⁸

Subsidizing environmental goods?

674. The development of the green goods has been encouraged by policy. The electric vehicle sector, for example, was fostered by government interventions tailored to stimulate supply and demand in both the United States and China. This raises the question of whether subsidies of green goods should be viewed as desirable in some circumstances. Solar PV firms have pointed out that deployment incentives have been important in China, Europe, and Latin America, especially for new projects. But incentives may distort trade and be fiscally burdensome to governments.

The need for better metrics

675. If standards are demanding—such as those discussed in box 5.2 of Chapter 5—the cost of meeting them may hinder participation, especially of small firms. So, regulatory solutions need to be complemented by other policies—finance, technical assistance, and education—that ensure inclusivity.⁵⁹ Without them, the costs of meeting the standards can be prohibitive for small businesses that lack access to capital and technical expertise.

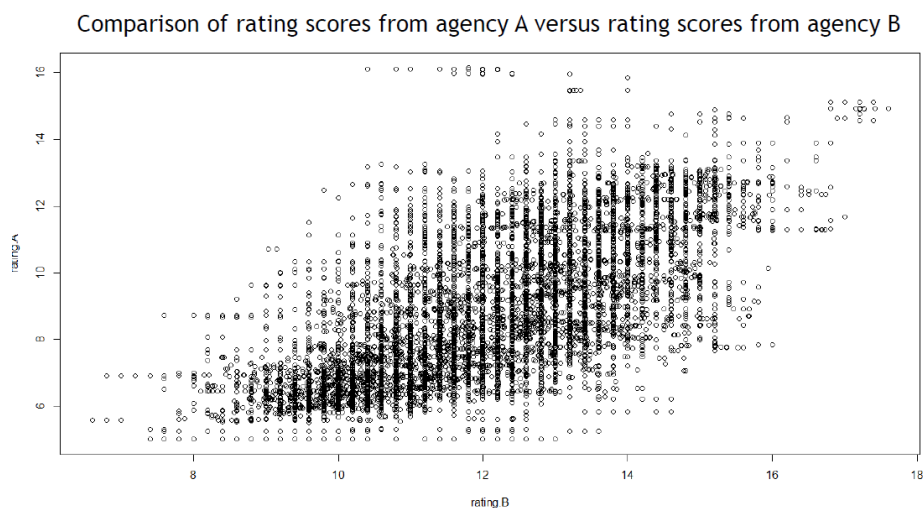
676. Better metrics are needed for reporting on sustainability and environmental, social, and governance (ESG) practices. Private multinational companies, as well as larger firms, are more likely to report on their own sustainability practices than other firms.⁶⁰ But information and analysis of corporate sustainability performance are often hard to access and compare. Companies' efforts are never visible in real time and often go unrecognized altogether. There is no agreed mechanism for accountability. And, although a

number of firms are developing methodologies for carbon and environmental full cost accounting, there is increasing realization that these methodologies are difficult to standardize and scale up beyond the single firm, and that they are not useful for making business decisions. This reduces firms’ incentives to improve sustainability performance in radical ways. It makes it difficult to price environmental degradation effectively in firms’ profit and loss accounting, and to design adequate solutions.

677. “Materiality” accounting seems a promising route. It focuses on “material” ESG issues that affect a firm’s valuation. For example, greenhouse gas emissions are material for an electric utility company and a large manufacturer, but less so for a financial services firm, depending on the scope of accounting.⁶¹ Management of waste and water is material for an apparel company using low-cost workers in developing countries but less so for a company in the digital sphere. Standardized methodologies for environmental sustainability practices would complement the ability of lead firms in GVCs to push better environmental practices upstream to foreign suppliers.

678. Transparent, consistent, and standardized information on what firms do is not available. Multiple sets of sustainability standards exist, from public to private, and mandatory to voluntary but they are not standardized. There is a critical lack of consistent information, as different sustainability scores diverge greatly from one another (Figure 8.).⁶² Moreover, rating methodologies are often opaque. The underlying data are seldomly accessible. There is no mechanism to validate the quality of data. The objectives and assumptions of the ratings are not clear. And the lack of established accountability mechanisms weakens the trust in reported scores. As a result, it is difficult to hold firms accountable. An international agency tasked with these ratings could change behavior.

Figure 8.4 Rating agency scores diverge



Source: Koelbel, Berg, and Rigobon 2017 (processed).

679. Finally, industry may intervene only when the gains from sustainability can be appropriated and less so when sustainability has a strong public good dimension. For example, corporate contributions to meeting the Sustainable Development Goals (SDG) have been concentrated in a subset of the targets.⁶³ Broader adoption of environmental protections through better information should be encouraged.

680. Policies to green GVCs and for them to green growth are highly complex and controversial. Both national policy interventions (removing distortions, such as energy and production subsidies) and shifting to taxing carbon,) and global cooperation, including to modernize trade agreements, are required. Experience to-date demonstrates how difficult it can be to adopt such measures in a way that is perceived as fair, while also being effective and capable of rapidly reducing consumption and production patterns in line with the urgency of the situation.

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² Citation pending.

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- ⁷ World Bank Group 2019
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- ⁵³ [Neumayer, 2001](#)
- ⁵⁴ [Zarsky, 2006](#)
- ⁵⁵ Examples include cases of countries allowing mining in forest protection areas ([Gross, 2003](#); [Brown, 2013](#)) and repealing science-based environmental regulations on oil mining due to threats of investor-state disputes ([Tienhaara, 2010](#)).
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Chapter 9: International Cooperation

681. Developing countries have benefited enormously from the rules-based multilateral trade system. It is hard to imagine any current GVC operating outside its members. The trade system has provided developing countries with incentives to reform, market access around the globe, and recourse in case of disputes, even against the trade heavyweights. Estimates suggest that acceding to the WTO boosts a developing country's growth rate by 2 percent a year for five years after joining if the country made reforms upon accession.¹ The tariffs they face fall significantly. For example, 90 percent of US tariff lines facing WTO members are below 10 percent, while for non-members 50 percent of products have tariffs above 30 percent. Developing countries also have had success in WTO dispute settlement, even against the largest members. For example, Indonesia recently won a case against the EU regarding anti-dumping measures on biodiesel products.

682. Supporting the rules-based trade system is therefore important for development, but a series of events have weakened it. The failure of the Doha negotiations was the first strike and recent disputes among members have further damaged it. Regional initiatives, such as the EU and NAFTA, have also been hurt by disagreements among member countries. In this chapter, we argue (i) that multilateral trading system matters profoundly in a GVC world, (ii) that the system is under stress because of the forces of economic convergence, and (iii) its revival requires deepening trade cooperation and extending cooperation to new areas.

683. The multilateral system is especially important with GVCs because the costs of protection are magnified when goods and services cross borders multiple times. Similarly, the gains from a coordinated reduction of barriers to trade are even larger with GVCs than in the case of conventional trade. Access to information about trade and investment policies and their predictability is required by firms to invest in long-term international relationships. To address this need, international trade agreements include rules to enhance the transparency of national policies and to help reduce policy uncertainty through legally binding commitments. Trade agreements and WTO commitments can also help to discipline the protectionist impact of differences in regulatory regimes.

684. But rapidly growing trade, especially with low income countries, has put pressure on both existing and new industries in advanced countries. While the rapid trade growth of the 1990s and early 2000s supported overall income growth, it also created winners and losers. Those forces were magnified with the expansion of GVCs because of the hyperspecialization that occurred. Some manufacturing communities in advanced countries experienced large job losses, as imports took market share from domestic firms. And, as developing country production grew rapidly, exporters from advanced countries--the traditional supporters of open trade policies--also experienced more intense competition at home and in third markets. Because some of the new developing country markets were still relatively protected and their exporters were supported by the state, trust in the trade system to ensure equal treatment was eroded.

685. In addition to challenges from increased competition, the new global economy brought other significant risks that led to disenchantment. A greater share of the burden for resource mobilization shifted to workers, as capital became much harder to tax in the GVC world. Because firms operate around the world and a high share of value added has become virtual, they can easily shift profits to low tax jurisdictions. The new economy also brought concerns of market failure in international markets where regulation remains mostly national, ranging from abuse of privacy in data-based services and anticompetitive practices in platform-based services. Finally, some developing countries also felt disenchantment with the international trading system, especially in light of the failed Doha "development" Agenda, because the areas that matter most to them, like agriculture and apparel, have failed to be liberalized.

686. The path forward requires more cooperation between the new players in global trade, the large developing countries, and the incumbents, the large advanced countries. The large developing countries

were mostly inactive during earlier episodes of reciprocal liberalization but have now grown to a size where their markets and protection matter. Traditional trade negotiations may deliver more meaningful outcomes if they engage as equal partners and even leaders, instead of seeking special and differential treatment (box 9.1); and if the large industrial countries continue to place their faith in rule-based negotiations, instead of resorting to unilateral protection; and if all countries together define a negotiating agenda that reflects both development and business priorities.

687. To sustain beneficial trade openness, it is essential to “walk on two legs.” The first priority is to deepen traditional trade cooperation to address the remaining barriers to trade in goods and services, as well as other measures that distort trade, such as subsidies and the activities of state-owned enterprises. In parallel, there is a need to widen cooperation beyond trade policy to include taxes, regulation, and infrastructure.

Box 9.1 Special and differential treatment

An important feature of the WTO is the approach taken to reflect disparities in economic size and capacity of WTO members. This is encapsulated in the principle of special and differential treatment (SDT) for developing countries. This has been part of the trade system almost since its origins. It arose because export earnings of developing countries were insufficient for development needs and unpredictable because of commodity price fluctuations. The solution was to give developing countries more flexibility in tariff setting and more market access in developed countries.

SDT also served a purpose for the advanced countries. It made negotiations easier because advanced countries could focus on exchanging market access among a small group, without having to reach consensus with the full GATT membership. At a time when developing countries accounted for less than one third of global exports, this approach made sense to the advanced countries. However, times have changed, and with developing countries accounting for nearly 45% of global exports, it is no longer palatable to advanced nations.

A peculiar feature of SDT is that countries can declare themselves developing countries on particular issues to avoid full commitments. For example, South Korea and Japan used SDT to postpone commitments on changing from a quota to a tariff system on rice in the Uruguay Round. The WTO does not define what constitutes a developing country, leaving it to members to self-determine their status. Outside the group of 47 (UN-defined) LDCs, the only distinct group of developing countries formally identified in the WTO, there are no criteria that allow differentiation between developing countries. WTO members have not been able to agree on criteria to differentiate between countries and determine when graduation should occur.

Notwithstanding the rhetoric by opponents and proponents of SDT, building blocks for a more differentiated approach towards addressing economic development disparities have gradually emerged. In practice differentiation has been negotiated on an issue-specific basis. An important example is the classification of developing countries based on per capita GDP and export competitiveness in the Agreement on Subsidies and Countervailing Measures. Other examples include the flexible approach taken in the TFA towards scheduling of commitments by developing countries and the ability for developing countries to link implementation of specific TFA provisions to technical assistance. The TFA embodies a new approach towards SDT that is not centered on exemptions for developing countries, but on letting countries decide on the sequencing of implementation depending on which elements of the agreement are priorities from a national perspective, and commitments by high-income countries to assist those countries that request it to implement specific provisions.

Research shows that traditional SDT has not served developing countries well (for example, Ornelas, 2016). It has meant that their trade interests, such as agriculture and apparel, have been liberalized slowly or not at all. It has also lessened the ability of the trade system to act as an external force for domestic reform. As a result, average tariffs in developing countries are on average bound at the WTO at 30

percentage points above actual levels. Tariff liberalization among developing countries has been largely unilateral, it has not occurred from external negotiations. Studies also find little evidence that countries have gained much from trade preferences, another dimension of SDT, because of their unilateral and uncertain nature and associated conditions, such as restrictive rules of origin.

A. The Case for Cooperation in a GVC World

688. GVCs span boundaries, and policy action or inaction in one country can affect producers and consumers in other countries. International cooperation can help address the policy spillovers and achieve better development outcomes.

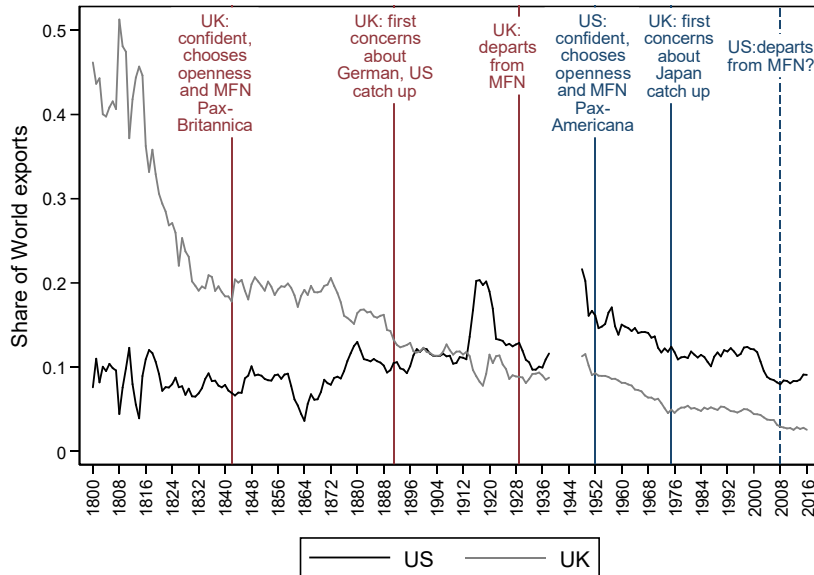
689. First, since the costs of protection are magnified when goods and services cross borders multiple times, the gains from coordinated reduction of barriers to trade are even larger with GVCs than in the case of conventional trade. Since foreign investment and GVCs are inextricably linked, creating an open and secure climate for investment is vital for GVC participation, especially by capital-scarce countries. International cooperation has so far delivered greater openness in goods and services, but significant barriers remain.

690. Second, access to information about trade and investment policies and their predictability is important for firms, especially when investing in international relationships. To address this need, international trade agreements include rules to enhance the transparency of national policies and to help reduce policy uncertainty through legally binding commitments. But the failure of countries to honor WTO requirements that they provide regular notifications on subsidies and other measures that affect trade has led to policy opaqueness and caused trade tensions. Similarly, large wedges between legal bindings and applied policies in both goods and services has perpetuated policy uncertainty. For example, developing countries typically have tariff bindings set 20 percentage points above actual tariffs, meaning they can raise tariffs significantly at any time.

691. Third, many of the policies affecting GVCs are regulatory, including technical regulations, sanitary and phytosanitary measures, and a range of services regulations. Trade agreements and WTO commitments have made some progress in disciplining the protectionist impact of these measures but tend to view them primarily through a producer-centric market-access lens. Accordingly, countries have focused on attempts to harmonize or mutually recognize product standards and other regulations in the context of regional agreements, seeking to emulate the progress in the European Union, particularly in goods. But progress has been limited because of the significant divergence in social preferences across countries on regulatory issues.

Why the system is under stress

692. The current retreat from globalization is sharpest in industrial countries: many workers feel they have not benefited, firms feel they face unfair competition, and consumers feel insecure (figure 9.1). Convergence inflicts domestic adjustment costs on sections of the population of erstwhile leaders. Their market- and private enterprise-based policy regimes favoring innovation tend to be less well suited to softening the pain associated with adjustment. Sharp adjustments in trade patterns have also threatened the existing international order potentially exacerbating tensions between countries (box 9.2)

Box Figure 1: Shifts in trade shares and changes in policy stance

Source: Hoekman and Mattoo (2019)

Box Figure 1 shows that those events during the pax-Britannica bear an uncanny resemblance to the US's role as a pillar of the multilateral trading system during the pax-American in the 20th Century. The US share of world trade had touched 20 percent before the second World War. In 1947, the United States was the unquestioned dominant power in the world economy and played a central role in the creation of the GATT. It accommodated the formation of the EEC without departing from MFN itself and, when it started to feel the discriminatory effects of European integration, it pushed for reductions in MFN tariffs through multilateral GATT negotiations (in the Kennedy and Tokyo rounds) rather than through unilateral action. The US' commitment first wavered at the end of the 1970s when Japan emerged as a major trader and the US share of world trade declined below 15 percent. But the US relaxed when Japan did not threaten further declines in shares and because of the success in expanding the policy coverage of the trading system through the Uruguay Round negotiations to areas in which it had a comparative advantage, services and innovation.

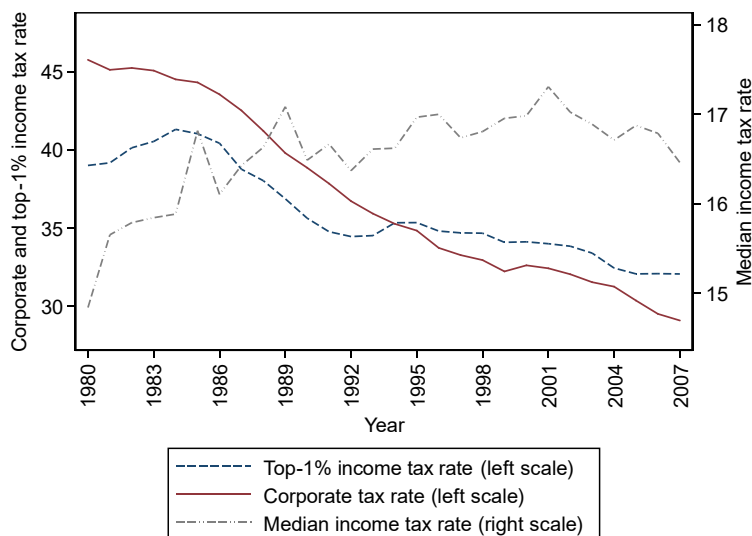
A more significant recent retreat from non-discriminatory trade was provoked by China's rise. Initially, following the creation of the WTO, the US was willing to accommodate China's accession to the WTO and inclusion into the MFN world. Unexpectedly rapid growth by China and other emerging economies in the late 1990s and the 2000s drove the US share below 10 percent, which seems to be a critical threshold inducing the incumbent power to depart from MFN. The result was first an attempt to negotiate modern day "imperial preferences" under the TPP beginning in 2008, before the recent recourse to discriminatory tariffs, bilateralism, and weakening of the dispute settlement function by the refusal to appoint WTO Appellate Body members.

693. A consequence is increasing political sensitivity to the plight of industrial workers whose incomes have stagnated during periods of rapid globalization (figure 9.2). While there is evidence that trade contributed to job loss in some industrial countries, technological change reduced the number of jobs in manufacturing for unskilled workers to a much greater extent. At the same time, the emergence of winner-take-all industries concentrated income growth in the top 1 percent.

694. Even though trade may not have been the only source of the problem, globalization makes remedial action difficult. The winners from globalization, internationally mobile capital and skills, are increasingly

hard to tax. So, workers bear not only the burden of adjustment, but also increasingly the burden of taxation. And governments are tempted to use trade policy as an instrument of social protection.

Figure 9.2 Corporate tax rates and personal labor income tax rates for the top 1 percent have fallen but for median workers are higher in 65 economies over 1980–2007



Source: Egger, Nigai, and Strecker 2019.

695. To sustain beneficial trade openness, it is essential to “walk on two legs.” The first priority is to deepen traditional trade cooperation to address the remaining barriers to trade in goods and services, as well as other measures that distort trade, such as subsidies and the activities of state-owned enterprises. In parallel, there is a need to widen cooperation beyond trade policy to include taxes, regulation, and infrastructure. Table 9.1 records the policy areas where national incentives can produce an outcome that is bad for all or most countries, and a potential cooperative solution that is better for all.

Table 9.1 Policy rationale, externalities, and cooperation

Policy area	National motive	International externality	Cooperative solution
Tariffs and other restrictions on trade and investment	Improve terms of trade, protection of special interests, revenue	Negative impact on trading partners, and potential Prisoner’s dilemma	Mutually agreed reduction in protection plus legal binding to reduce policy uncertainty
Subsidies	Infant, senescent, or strategic industries or stages of production; market failures (climate change...)	Negative impact on trading partners’ industries but positive impact on foreign consumers—at least in the short run	Disciplines on use of specific types of subsidies and other forms of assistance such as tax incentives
Regulatory requirements	Consumer, environmental protection; IPRs	Increased costs of compliance for industries in trading partners, but benefits from enhanced supply of public goods	Regulatory cooperation, taking the form of harmonization, mutual recognition or exporter regulatory commitments
Corporate taxes; investment incentives; FDI policies	Attract investment	Negative impact on other investment locations and tax jurisdictions, potential tax competition, and race-to-the-bottom	Tax cooperation (e.g. the existing BEPS initiative at the OECD); destination-based taxes

Competition law; public ownership and control	Promote contestable markets; provide public goods	Abuse of market power; foreclosing ability of firms to compete on a level playing field	Cooperation and common disciplines to control firm behavior
Investment in trade facilitating infrastructure	Reduce trade costs	Positive externality for trading partners; potential coordination failure and underinvestment	Investment coordination to exploit synergies across countries and forms of infrastructure

B. Deepening Trade Cooperation: Tariffs on goods, restrictions on services, gaps in rules

696. Since the costs of protection are magnified when goods and services cross borders multiple times, the gains from coordinated reduction of barriers to trade are even larger with GVCs than in the case of conventional trade. Since foreign investment and GVCs are linked, creating an open and secure climate for investment is vital for GVC participation, especially for capital-scarce countries. International cooperation has so far delivered greater openness, if unevenly.

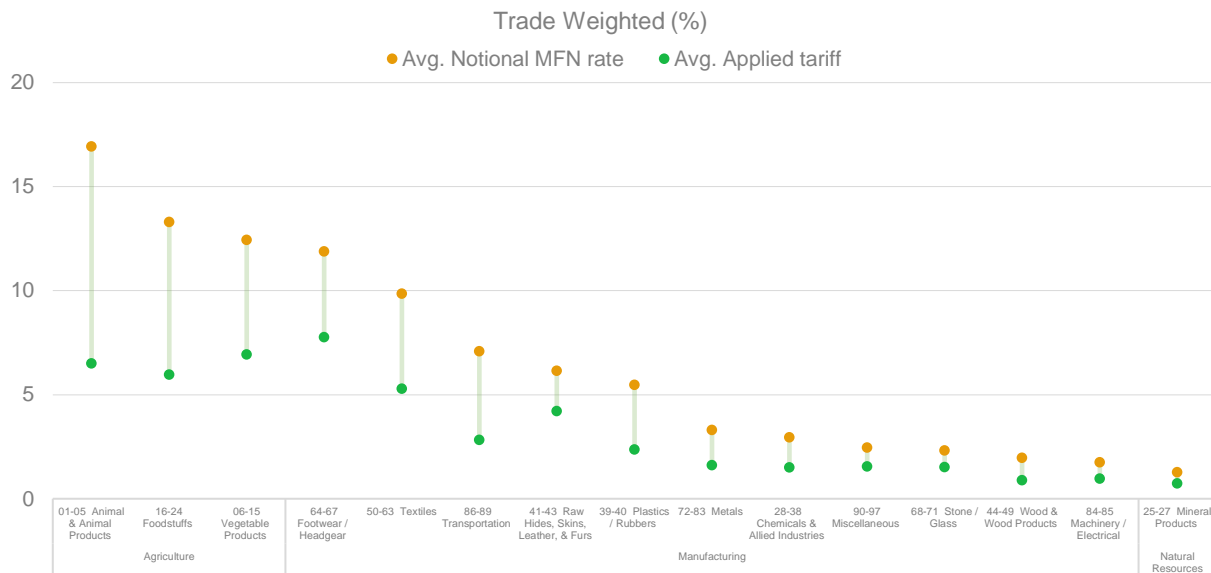
- For goods, multilateral and preferential initiatives have worked in tandem to reduce goods tariffs and greatly enhanced market access for the poorest countries. But problems remain from a GVC perspective: High tariffs in many of the poorest developing countries hurt GVC participation by increasing the transaction costs of acquiring inputs even when they are notionally tariff-exempt. Tariff escalation in important destination markets inhibits processing activities in agroindustry and other labor-intensive areas such as apparel and leather goods. And restrictive rules of origin curtail sourcing options.
- For services, international negotiations have not delivered much liberalization beyond that undertaken unilaterally. Key GVC-relevant services, such as air and maritime transport, for which liberalization needs to be coordinated, have typically been excluded from negotiations.
- For goods investment, there are no multilateral rules, and relevant policies are covered by a patchwork of preferential trade agreements (PTAs) and bilateral investment treaties (BITs).
- On subsidies, trade rules have sought to allow space for legitimate use while preventing protectionist abuse, but recent frictions suggest that they have not succeeded.

697. Two policy areas where international cooperation can help developing countries engage in GVCs are in reducing tariffs and restrictions in services both at home and abroad.

Tariffs and tariff preferences

698. A new ITC-World Bank database reveals that unilateral, multilateral, and preferential liberalization has reduced trade-weighted average tariffs rates to less than 5 percent for most industrial countries. Preferential liberalization has reduced the applied tariffs confronting many countries to a fraction of the most-favored-nation (MFN) rate. Although preferential liberalization has targeted highly protected sectors, pockets of protection remain for agricultural products, textiles, and footwear—areas of export interest for developing countries (figure 9.3).

Figure 9.3 Tariffs have been liberalized across sectors but pockets of protection remain



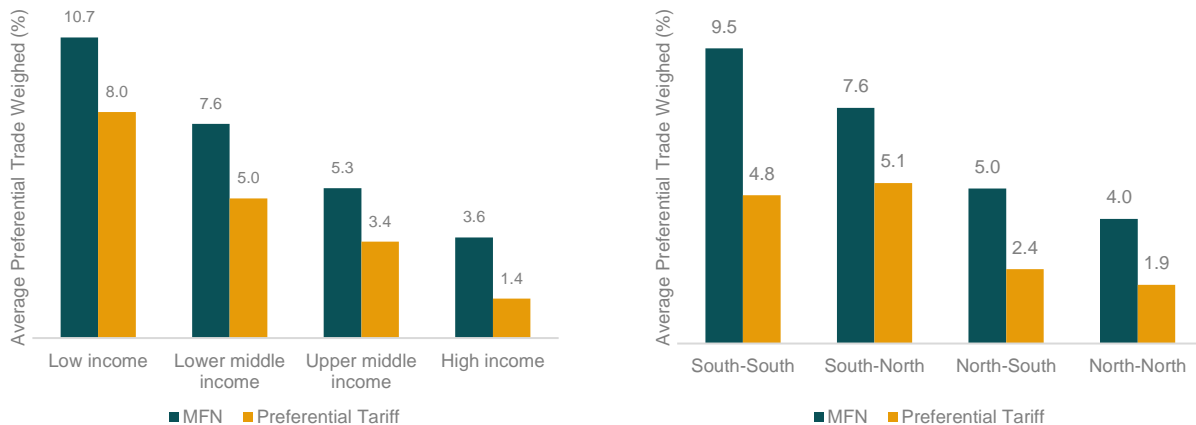
Source: Espitia et al. 2018.

699. There is greater room for further liberalization in lower income countries. Low income and lower-middle income countries still have trade weighed preferential tariff levels over 5 percent on average (see Figure 9.4). When preferential tariffs are split by level of development of the importing and exporting countries, trade weighed preferential tariffs imposed by the countries of the “south” on other countries (of both the south and north) are more than twice higher than those imposed by the “north” (see Figure 9.4.b).

Figure 9.4 There is room for further liberalization

a. Especially in lower income countries...

b. ...in their trade with both developing and developed nations

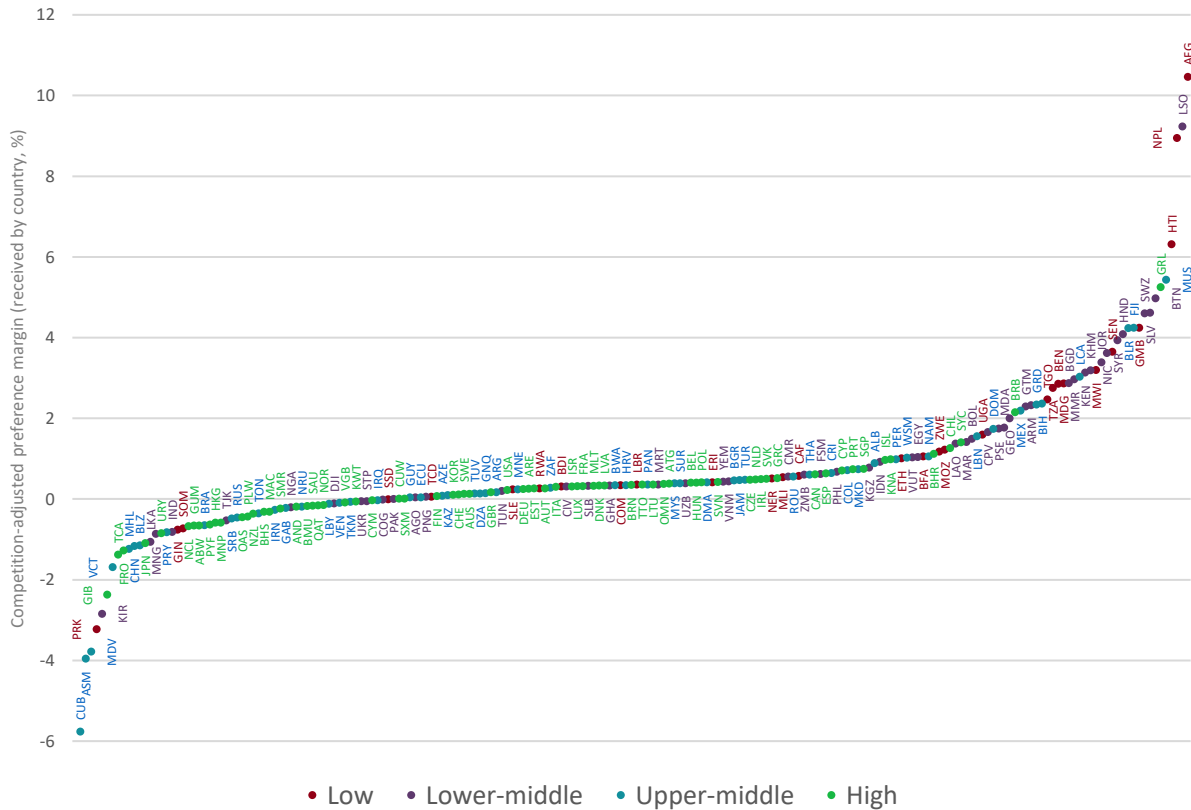


Source: Espitia et al. 2018

700. Lower income countries tend to be granted duty-free access to large markets and tend to benefit the most from preferential access, with competition-adjusted margins over 3 percent. Competition-adjusted preference margins are calculated as the percentage-point difference between the weighted average tariff rate applied to the rest of the world and the preferential rate applied to the beneficiary country, where

weights are represented by trade shares in the preference-granting market. Some countries such as Afghanistan, Lesotho, and Nepal receive positive preferential margins of 8.9, 9.2, and 10.5 percent, respectively, whereas a few countries, such as American Samoa, Cuba, and the Maldives, pay 4 percentage points higher tariffs on their exports than the competition-adjusted levels (figure 9.5).

Figure 9.5 Lower-income countries tend to have the largest preferential advantage over competing suppliers from other countries



Source: Espitia et al. 2018.

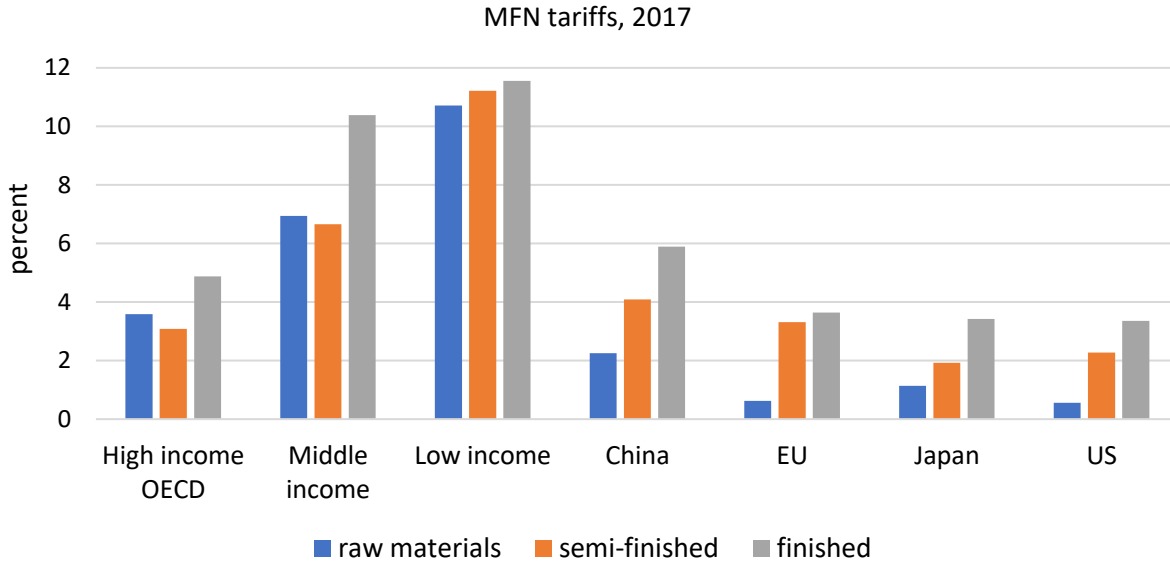
Note: Competition-adjusted preference margins are calculated as the percentage-point difference between the weighted average tariff rate applied to the rest of the world and the preferential rate applied to the beneficiary country, where weights are represented by trade shares in the preference-granting market. Competition-adjusted preference margin for product i granted to partner j by country $k = CAPM_{jk,i} = T_{k,i}^w - T_{k,i}^j$. Where $T_{k,i}^w = \frac{\sum_v X_{vk,i} T_{k,i}^v}{\sum_v X_{vk,i}}$ is the export-weighted (X in the formula denotes exports of v into k) average tariff imposed by country k on all other exporting countries v (excluding country j) in respect of product i . The preferential rate applied to country j is $T_{k,i}^j$.

Tariff escalation

701. A goal of many developing countries is to move into higher value-added production. For example, coffee bean producers would like to sell roasted coffee and cocoa bean producers would like to export chocolate. One difficulty is that tariffs on processed goods tend to be higher than tariffs on raw material or semi-processed goods in many of the largest markets. This *tariff escalation* is designed to protect the high value-added industries, while allowing producers access to needed imported inputs. Tariff escalation implies especially high rates of effective protection on final goods, because not only are these goods protected against competing imported goods, it is relatively cheap to produce them because tariffs on intermediates are below the average tariffs on other goods.²

702. All countries and groups show some degree of tariff escalation. Tariff escalation is particularly pernicious in middle income countries, where processed goods face average tariffs above 10 percent (figure 9.6). From a GVC perspective, tariff escalation tends to push countries into backward participation.

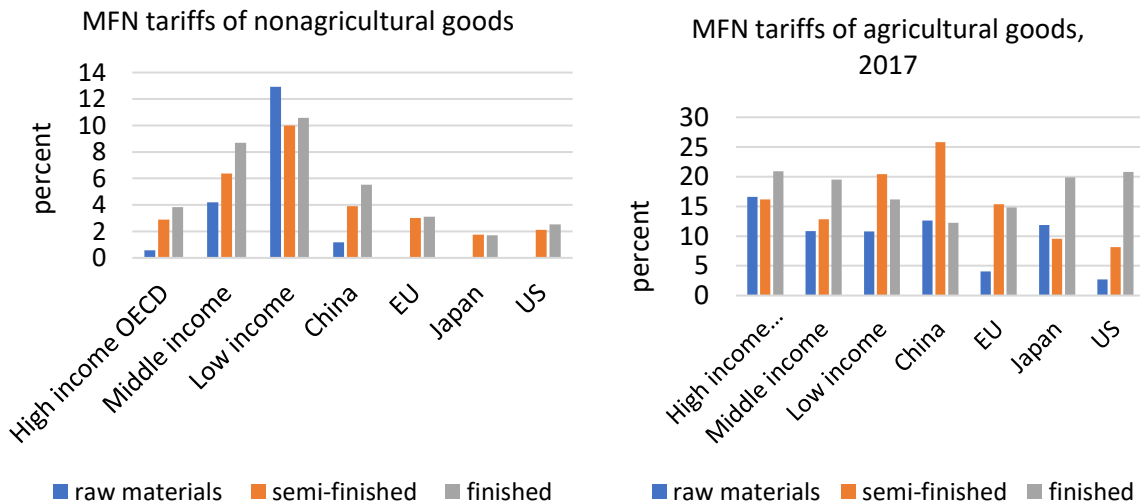
Figure 9.6 Most countries impose higher tariffs on semi-finished and finished goods



Source: World Bank WITS.

703. Examining industrial and agricultural goods separately reveals distinct patterns (figure 9.7). High tariffs on raw materials in low income countries can prevent them from joining later stages of supply chains. In contrast, middle and high income countries tend to have high tariffs on processed non-agriculture and agriculture goods, preventing other countries from accessing their markets. These patterns hit low income countries twice. First, for low income countries, there is a self-inflicted wound from relatively high domestic tariffs on raw materials and the semi-finished goods needed for production of most final goods. Second, if they are able to produce final goods, their exports face higher levels of protection abroad.

Figure 9.7 Low income countries are penalized by tariff escalation both at home and in their destination markets



Source: World Bank WITS.

Services trade restrictions

704. In services, trade agreements have not done much to deliver liberalization. From the Uruguay Round, the General Agreement on Trade in Services (GATS) emerged as a framework for negotiating liberalization, but there was limited liberalization of access to markets. In telecommunications services, the GATS did have a mutually reinforcing relationship with a broader liberalization trend. For instance, several countries that were not ready to open markets immediately nevertheless chose to commit themselves legally to opening up at specific future days—an exercise that lent credibility to reform programs. Unfortunately, the Doha negotiations in services were a victim of the broader negotiating inertia, and the initial offers did not promise any meaningful liberalization.

705. Typically excluded from services agreements are air and maritime transport services, two services vital for connectivity and participation in GVCs. In international transport, it takes two to liberalize. Zambia cannot unilaterally introduce greater competition on the Lusaka–London or Lusaka–Johannesburg air routes. Both the United Kingdom and South Africa also need to agree to allow entry by third country airlines on each route. Both industrial and developing countries use restrictive bilateral air service agreements to fragment the international market into a series of route-specific duopolies. The WTO would have been a natural platform to negotiate liberalization, but powerful members have ensured that air traffic rights are excluded from its scope.

Trade-related regulatory costs

706. An important area of traditional trade cooperation relevant for GVC participation is concerted action to reduce trade costs associated with trade-related regulation. Examples are customs clearance procedures; enforcement of product health, safety, and environmental standards; control of counterfeit imports; and rules to establish the origin of products needed in applying trade preference programs and PTAs. Both WTO and PTA disciplines ensure that traders know what the rules are and that enforcement procedures are predictable. Governments are increasingly cooperating to facilitate trade by agreeing on good practices to reduce trade costs without undermining regulatory goals (product safety, tax collection, and so on).

707. Complying with standards is critical to participating in GVCs. Two WTO agreements—one on sanitary and phytosanitary measures and another on technical barriers to trade—encourage the adoption of international standards where they exist, require that national product standards have a scientific basis, do not restrict trade unnecessarily, and are applied on a nondiscriminatory basis.

708. International standards are being developed not by the WTO but by specialist organizations. For example, international standards for phytosanitary measures, which are particularly significant for agricultural GVCs, are developed and adopted by contracting parties to the International Plant Protection Convention. These standards provide harmonized guidance to countries on the implementation of regulations in the trade of plants, plant products, and conveyances that may carry pests and diseases of plants. The 104 standards adopted provide cover risk analysis, inspection, surveillance, inspection, certification, sampling methodology, the application of treatments, and the identification of pests and diseases.

Gaps in rules

709. There are gaps in multilateral rules in at least three important GVC-relevant areas: investment, subsidies and state-owned enterprises (SOEs).

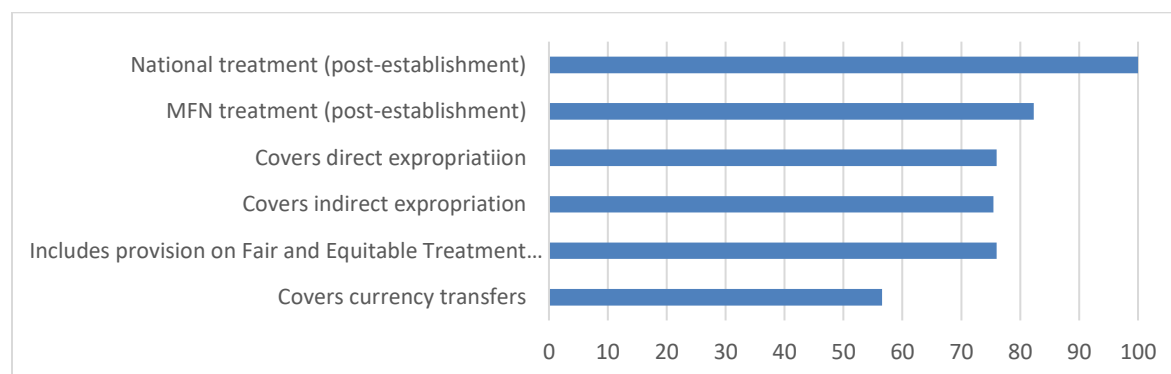
Investment

710. The WTO has uneven rules for policies affecting investment. Policies toward foreign investment in goods are not covered. The existing national treatment rule on goods trade does not allow governments to give incentives or require firms, including foreign-invested companies, to source locally as against importing. But governments are free to restrict or provide investment incentives to FDI. Policies affecting the establishment of a commercial presence by foreign firms in services are covered in the GATS. WTO members may make commitments on access to markets through FDI, but this is not a general obligation—it is up to each WTO member to decide whether to do so sector-by-sector.

711. The main focal point for international cooperation on the treatment of foreign investment has been bilateral investment treaties. These are not always instruments of liberalization in terms of market access; instead they provide protection to foreign investors against governments taking action against investors once they have entered the country. The main goals are to ensure that foreign investors are treated the same as domestic investors and to put in place international arbitration mechanisms to determine appropriate compensation for a foreign investor if the host government takes actions to expropriate the investment. The arbitration dimension of BITs has become contested in recent years, resulting in revisions to the regime by some jurisdictions.

712. Increasingly, PTAs provide for investment liberalization as well as investment protection.³ Liberalization may include access during the pre-establishment or entry phase of investment, including national treatment, which requires the host state to remove all discriminatory market access barriers and allow foreign investors to invest on the same terms as domestic investors. Investor protections in PTAs generally grant national treatment to other members and MFN treatment once the investment has been made (in the post-establishment phase) and covers direct and indirect forms of expropriation (figure 9.8). Finally, dispute settlement is a key provision in the investment chapters of PTAs, particularly investor–state dispute settlement provisions, which allow investors to bring disputes over the treaty’s substantive provisions. Almost all PTAs that cover this area provide for a mechanism for consultations and state-to-state dispute settlement, and 77 percent provide for investor–state dispute settlement provisions

Figure 9.8 A majority of PTAs protect investors from discrimination and expropriation



Source: Deep integration database (Mattoo, Rocha, and Ruta 2019).

Subsidies

713. Subsidies, like taxes, are an important policy tool for governments. Subsidies can be used to pursue numerous legitimate goals. In many cases, they are the best measure to promote greater efficiency by addressing market failures that lead to under-provision of certain goods. They can also promote social objectives such as supporting access to basic services in marginalized areas. But subsidies can also have distortive effects, including on trade. In some situations, they can undermine the benefits of trade and investment by distorting international prices or limiting market access, as when they are granted conditional on the use of local content. This can have negative welfare effects on other trading partners and the global

economy. Ensuring that subsidies pursue desirable goals and are not captured by special groups to further their own interests is a challenge. Trade rules have sought to allow space for the legitimate while preventing the protectionist, but it is not clear that they have succeeded.

714. The impact of a subsidy is less clear in a GVC world, in terms of the resulting distortion as well as who benefits from a “subsidy” and who might be hurt (Hoekman, 2016). The most obvious feature is that subsidies can be targeted at specific stages of production or types of economic activity—presumably associated with immediate or future spillover benefits—rather than entire industries. That may imply a greater responsiveness of location decisions to financial incentives. In relational GVCs, subsidies can help overcome a market failure, where investment in specific goods is too low because of incomplete contracts.

- The two sides of a subsidy

715. The first order of business is to identify and define the spillovers of concern. Subsidies used by a given country to support local firms may have adverse effects on firms producing similar goods or services. Therefore, the potential for welfare-reducing subsidy competition between jurisdictions is significant. U.S. states “spend” some US\$80 billion a year on tax incentives and subsidies to investment, reflecting vigorous competition to attract investment (citation?). This competition increases state-level welfare (by attracting firms, increasing employment, and raising wages) but generates beggar-thy-neighbor effects. While there are large potential gains at the state level from subsidizing investment, this distorts resource allocation by making intermediate inputs too cheap and generating excessive entry. The cost to the United States as a whole is significant—if states were to refrain from subsidy competition, manufacturing real income in the United States would be 3.9 percent higher.

716. Although investment subsidies may have negative welfare spillovers, they can also achieve outcomes sought by governments, such as generating local employment. A UK program that offers investment subsidies to firms in depressed areas—on the condition they create or safeguard manufacturing jobs in these areas—has positive effects on employment, investment, and net entry. A 10 percent investment subsidy generates about a 7 percent increase in manufacturing employment. The “cost per job” was estimated at US\$6,300, suggesting that investment subsidies can be cost-effective.

717. These examples illustrate the tradeoffs associated with subsidies. Several questions arise from a trading system perspective. How large are any spillovers? What types of subsidies generate the greatest potential adverse effects for other countries and for the trading system? Are subsidies achieving government objectives? Or are they likely to be captured by special interests? All these questions require better information and further analysis.

718. As discussed in the previous chapter, about half of all trade-related policy measures imposed by governments since 2009 take the form of subsidies or some type of support for exports. These subsidies are only partially covered by WTO disciplines.

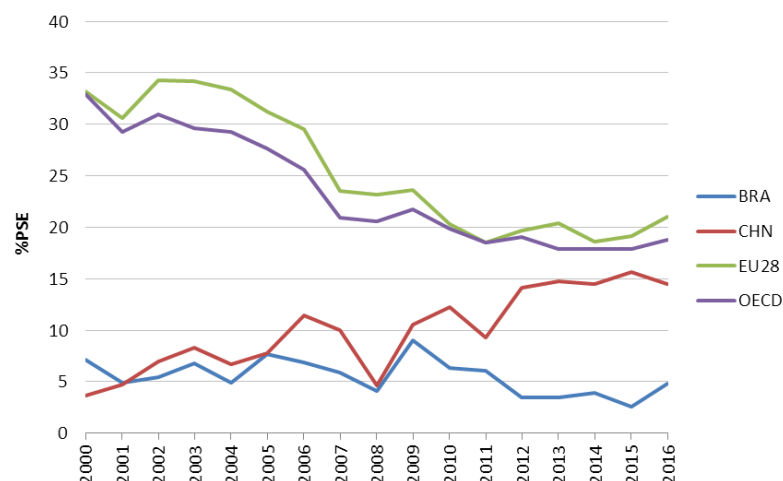
- WTO subsidy rules

719. The WTO subsidy rules have significant gaps—they do not cover investment incentives or support given to services activities, and only partially do they discipline the behavior of state-owned enterprises (SOEs). Most PTAs do little more than the WTO on subsidies, with the EU the major exception. For SOEs, however, several recent deep PTAs, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the United States–Mexico–Canada Agreement (USMCA), do go beyond the WTO.

720. Much of the focus of WTO members has been on agricultural subsidies, but their pattern has changed in recent years. Many high income countries have long supported their agricultural sectors through a variety of policy instruments, including border barriers and production subsidies. A WTO Agreement on Agriculture negotiated during the Uruguay Round significantly reduced the ability of members to use agricultural subsidies and encouraged governments to decouple support from production. In 2015, WTO

members agreed to ban agricultural export subsidies. Although other agricultural support continues to be trade-distorting, it is much less than in the 1980s and 1990s because of the shift to decoupled support and linking support to achievement of equity, environmental, and sustainability goals as opposed to increasing output. Since the early 2000s, there has been a remarkable reduction in production support in the OECD (figure 9.9) and an increase in large emerging economies such as China. These trends illustrate the value and feasibility of cooperation to reduce the negative spillovers created by subsidies. But further cooperation is needed to address the increase in farm support not decoupled from production in countries like the United States and China.⁴

Figure 9.9 Producer support is converging across some industrial and developing countries



Source: Producer and Consumer Support Estimates database, OECD.

<https://www.oecd.org/countries/ukraine/producerandconsumersupportestimatesdatabase.htm>.

721. Non-distorting forms of support are positively associated with agro-food GVC participation and the generation of domestic value added.⁵ Conversely, subsidies linked to output and market price support measures lower the benefits from GVC participation. Distortionary payments increase forward GVC participation in OECD member countries but decrease the domestic returns to participation in agro-food GVCs because the subsidy acts as a tax on other contributing sectors. Cooperation to limit subsidies and distortions in agro-food sectors may thus enhance the domestic value added captured through participation in GVCs.⁶

722. A separate WTO Agreement on Subsidies and Countervailing Measures (ASCM) pertaining to non-agricultural goods subsidies seeks to limit their use while granting flexibility to developing countries. The ASCM has a twofold objective: to prevent the use of subsidies to circumvent market access (tariff) concessions, and to regulate countervailing duties (CVDs) used to offset the injurious effects of foreign subsidization of goods on domestic producers.⁷ Export subsidies are prohibited. All other subsidies can be used but could lead to the imposition of countervailing duties in destination markets.⁸ De minimis provisions allow developing countries to use subsidies subject to certain thresholds.⁹ The WTO rules are not concerned with why a government has implemented a subsidy, such as whether it can be justified by a market failure.¹⁰

723. WTO disciplines on SOEs are limited, with only a provision for state-trading enterprises requiring firms granted exclusive or special privileges in trading to abide by the nondiscrimination rules. The growth of the Chinese economy has resulted in a substantial increase in the relative weight of SOEs in the global economy. In 2018, Chinese firms accounted for 22 percent of the list of the 500 largest firms globally compiled by Forbes magazine.¹¹ An estimated 22 percent of the world's 100 largest firms are effectively under state control—including companies from other emerging economies as well as the OECD.¹² SOEs are often active in cross-border mergers and acquisitions, engaging in outward FDI. Concerns are frequently

expressed about the potential for SOEs to distort competition, reflecting views that SOEs are effectively subsidized (through soft loans, guarantees, direct subsidies, and so on) and may benefit from indirect subsidies for factor inputs such as energy and land, as well from protection from foreign competition (reflected, for example, in FDI restrictions, joint venture requirements, and preferential access to public procurement).¹³ Many SOEs operate in GVC-intensive sectors, both upstream in energy and downstream in transport.

724. Disciplines on SOEs are included in recent PTAs such as the CPTPP and USMCA, and the relevant provisions are enforceable through dispute settlement procedures. These disciplines require that SOEs make purchases and sales on the basis of commercial considerations, and specify that subsidies granted to SOEs, both direct fiscal transfers and indirect subsidies, are actionable and that signatories may not discriminate in favor of SOEs (i.e., they must apply the national treatment principle). The agreements also include provisions requiring signatories to list their SOEs and publish data on measures used to assist them.

725. As noted above, incentives to attract investment are not covered by WTO rules. The focus of WTO subsidy rules is on whether interventions are export subsidies or cause adverse effects for other exporters in third markets or for domestic import-competing producers. In a GVC context, too, incentives to attract or retain FDI can give rise to inefficient (welfare-reducing) competition between jurisdictions for investment, which can end up as rent transfers to investors. Incentives may be granted independent of nationality of ownership to investors who operate plants that generate local employment. Such “non-discriminatory” investment incentive policies may nevertheless create negative spillovers for other countries. That said, efforts to discipline the use of FDI policies need to recognize that some interventions may be appropriate in addressing GVC-related market failures—such as coordination problems associated with cross-border infrastructure projects.

726. Current WTO rules on countervailing action focus on the domestic industry: if a sufficiently large share of the industry agrees that they are being injured by a foreign subsidy, action can be initiated. In a GVC setting, the high import content of total value added embodied in a final good means subsidies will benefit foreign interests as well as local ones. The current concept of injury may need to be revisited—given that any GVC spans firms in different countries, it may be more appropriate to focus on the effects of subsidies on GVCs as a whole.

- Strengthening subsidy rules

727. Concerns and conflicts regarding the effects of subsidies and the potential competition-distorting role of SOEs in the international economy call for revisiting the WTO rules of the game in this area. Such efforts can take different forms, ranging from “soft law”—agreement on guidelines—to enforceable treaty commitments. In 2018, the European Union, Japan, and the United States launched a trilateral process to identify ways to strengthen disciplines on subsidies, suggesting expansion of the list of prohibited subsidies in the WTO to include SOEs, open-ended financial guarantees, subsidies to insolvent or failing companies with no credible restructuring plan, and preferential pricing for inputs. A necessary condition for meaningful outcomes is that developing countries, especially the larger emerging economies, participate in such deliberations.

- Transparency, transparency, transparency

728. A first step—and a core part of any revision—is data and transparency. Cooperation to ensure transparency and allow assessments of the effects of subsidies can benefit both the subsidizing country and the trading system. The WTO requires members to regularly notify (announce) subsidy programs, but in many cases compliance is neither timely nor comprehensive. In part this may reflect capacity constraints; in part it may reflect decisions to not notify subsidies.

729. New rules could build on EU experience. EU member states must comply with transparency obligations for state aid allocations over €500,000, including the name of the beneficiary and the amount

of aid granted. This data compilation is complemented by evaluation of selected large state aid schemes to assess their impact and guide possible improvements in the design of programs as well as the subsidy rules. Learning from experience and practice on the processes used by EU member states and the Commission to report data on subsidies could inform what the WTO might emulate.

730. A first step would be to bolster transparency through a collective effort to compile information on subsidies, going beyond reliance on notifications by countries, and to launch a process of dialogue and deliberation in the WTO to define a negotiating agenda. This may be more effective if undertaken plurilaterally, centered on the major trading powers, but any initiative in this area should be open to all countries and be informed by economic analysis of the (spillover) effects of different types of subsidies. An important challenge in defining possible rules and related cooperation is to agree on what in principle constitutes desirable (globally welfare-enhancing) policies and what types of subsidies are more likely to generate undesirable spillover effects, based on empirical analysis and evidence. In the WTO working group on investment (one of the Singapore issues), it became clear early on that many governments were not willing to discuss and consider disciplines to address the spillover effects of investment incentives and subsidies, removing much of the potential rationale for a multilateral agreement.

- Substantive disciplines

731. A precondition for considering how and where to revisit WTO rules is agreement on what types of support are a problem and where there should be a presumption that a measure is not trade-distorting or not large enough to matter. It is desirable to move toward an approach that devotes more attention to the aims and effects of subsidies and prioritizes rule-making for subsidies that are more likely to have adverse spillovers on low-income developing countries, while enabling the use of subsidy instruments to address market failures.

732. There may also be lessons from the EU given that it is the only international integration effort that has a focus on ensuring a level playing field for firms on the integrated market. Subsidies are covered by EU competition policy disciplines, and four criteria apply for state aid to be illegal: (i) state resources (a subsidy or tax expenditure) lead to (ii) a selective advantage for a firm or activity that (iii) distorts competition and (iv) affects trade between member states. This also applies to undertakings to which member states have granted special or exclusive rights (SOEs). Subsidies falling under a General Block Exemption Regulation are deemed to raise few or no concerns in distorting competition on the EU market. These include regional aid (including for ports and airports), aid for SMEs, aid for R&D and innovation, broadband infrastructures, energy and the environment, employment and training, natural disasters, sports, and culture.

733. In 2017, member states spent €116.2 billion, or 0.76 percent of EU GDP, on state aid. More than 90 percent of total state aid was allocated to horizontal objectives of common interest, such as environmental protection, regional development, and research, development, and innovation. Agreeing to a set of subsidies deemed not to cause spillover concerns along the lines of the European Union could help differentiate between subsidies that are not considered to have harmful trade spillover effects and those that may have such consequences and should be actionable.

734. The elements for making progress are already embodied in different WTO agreements, including the green box approach used in the Agreement on Agriculture, which exempts subsidies that cause minimal distortion to trade and includes social and environmental programs. The Agreement also allows developing countries additional flexibilities in providing domestic support. The green box approach was also incorporated on a provisional basis in the WTO agreement on subsidies and countervailing measures that expired in 1999. Revisiting it is one potential element of balancing stronger disciplines on subsidies with a recognition that many types of subsidies fulfill an important function in addressing market failures. Moreover, the various de minimis provisions included in these WTO agreements for developing countries

are a way of recognizing that the spillover effects created by subsidies used by low income countries are likely to be small from a systemic perspective.

735. All this suggests that any new subsidy rules should consider, in a way that current WTO rules do not, the motivation for a policy that may give rise to negative spillovers. Such rules should cover all subsidy-like policies to encompass services and investment incentives, as well as the agricultural domestic support policies that have long been a focus of the WTO membership—and that matter most for many developing countries.

Deep integration agreements and GVCs

736. Trade cooperation can be characterized as either “shallow” or “deep.”¹⁴ Shallow cooperation is limited to commitments to enhance the transparency and visibility of extant trade policies and reduce or eliminate trade barriers such as tariffs and quotas. It allows countries discretion in setting nontariff measures that can potentially affect trade. Its basic requirement is “national treatment,” specified in the WTO (GATT Article III) as well as in most PTAs, which require that imported products should be treated no less favorably than “like domestic products.”

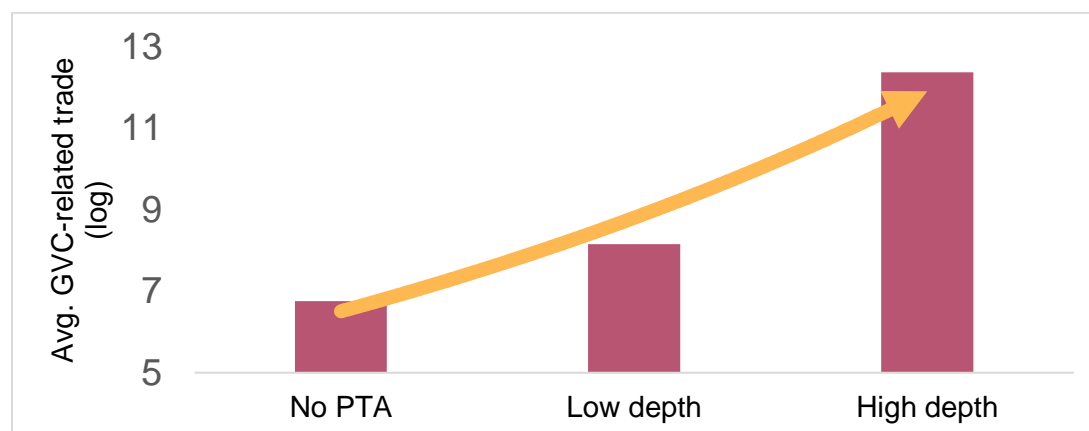
737. Deep agreements go beyond national treatment by including commitments on the substance of non-tariff measures. Examples include agreements to protect certain types of intellectual property, to adopt common approaches to regulate services sectors, or to implement a competition law that embodies criteria that mirror those of trading partners. A feature of deep trade agreements is that many provisions are enforceable: they specify precise legally binding obligations, and trading partners can raise objections and take action if a signatory does not live up to its commitments.¹⁵

738. In some situations, cooperation may not require binding disciplines. If the problem is a coordination failure, all that may be required is the provision of information and agreement to apply a given norm at the national level. An example is agreement on technical standards to allow interconnections of equipment, vessels, or network infrastructure. In many circumstances, soft law cooperation will center around international monitoring and mechanisms that elicit dialogue and analysis to allow learning and identification of good practices. This is an important role of institutions such as the OECD and the Asia-Pacific Economic Cooperation.

739. Deep integration agreements can fill some of the gaps in the WTO pertaining to investment-related policies, SOEs, and services. Insofar as this is the case, they do so on a preferential basis: market access benefits are limited to partners. They may also offer a way of bundling disciplines on a range of GVC-relevant issues. There is evidence to suggest that these bundles affect the joint evolution of GVCs and FDI.

Deep trade agreements boost global value chain participation

740. There is a strong correlation between GVC-related trade and the depth of preferential trade agreements (figure 9.10). Adding a provision to a PTA boosts domestic value added of intermediate goods and services exports (forward GVC linkages) by 0.48 percent, while an additional provision in a PTA increases foreign value added of intermediate goods and services exports (i.e. backward GVC linkages) by 0.38 percent.¹⁶ While deep PTAs boost trade between members,¹⁷ this effect is stronger for GVC trade, consistent with the view that policy spillovers are more relevant for GVCs relative to standard trade. Indeed, deep trade agreements improve forward linkages particularly for more complex GVCs, which export intermediates across borders two or more times.¹⁸ Conversely, the unraveling of deep trade agreements can have an adverse effect on GVCs (box 9.3).

Figure 9.10 Deep trade agreements are associated with GVC integration

Source: Laget, Osnago, Rocha, and Ruta 2018.

Note: The estimator is PPML. GVC-related trade is defined as trade in parts and components.

Deep PTAs have an indirect effect on third-countries' trade along the value chain

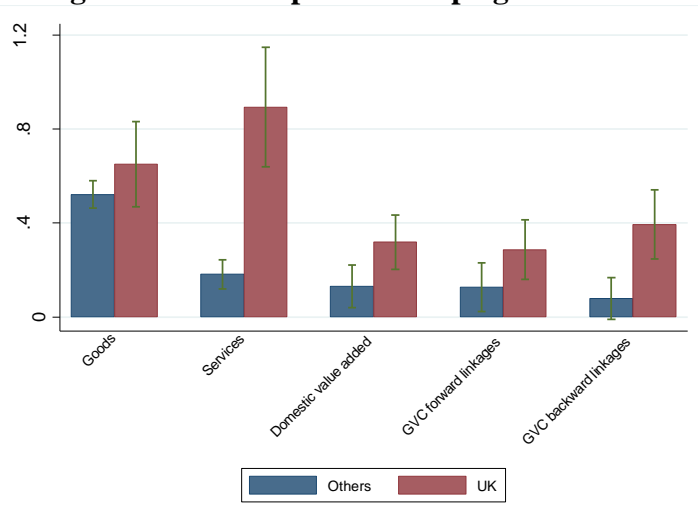
741. In a world where production is fragmented across countries, the depth of preferential trade agreements affects members as well as GVC-trade with nonmembers. Intuitively, deeper trade agreements in third countries lower trade costs along the entire value chain, thus also encouraging trade in intermediates among countries that are not part of the agreement. The estimated impact from augmented gravity regressions are larger than those of a standard gravity model, suggesting the existence of indirect effects of signing deep PTAs through third-country trade.¹⁹

Deep PTAs affect the structure of international production

742. Deep trade agreements also affect foreign direct investment and, more generally, the way in which goods are traded internationally (within firms or arm's length). The underlying idea is that deep PTAs affect firms' make-or-buy decisions—that is, whether producers outsource to trading partners' suppliers or vertically integrate production processes with affiliates in foreign economies. Consistent with a model of contractual frictions and global sourcing,²⁰ the depth of PTAs is correlated with vertical foreign direct investment.²¹ This relationship is driven by areas in trade agreements (such as regulatory cooperation) that improve contracting inputs provided by suppliers.

Box 9.3 The impact of Brexit on GVC trade

How will Brexit impact UK-EU trade? A difficulty in addressing this question lies in the lack of systematic information on the content of trade agreements, which makes it difficult to precisely assess the impact that a set of common rules have on trade flows.¹ A recent study uses information on the content of trade agreements to assess the impact of Brexit on goods, services and value-added trade.² Specifically, it augments a standard gravity model of trade to quantify the effect that “depth” of the EU agreements had on UK trade and then use the estimates from this analysis to evaluate the future of UK-EU trade relations under different post-Brexit scenarios. In a first step, the study examines the extent to which EU membership contributed to boost UK trade, notably GVC trade.³ EU membership is found to increase goods, services and value-added trade for member countries -this impact has been even stronger for the UK (Figure 1). In particular, following its EU membership: (i) UK services trade more than doubled; (ii) UK's intermediates value added in gross exports (forward linkages) increased by 31 percent; and (iii) foreign value added in UK exports (backward linkages) increased by 37 percent.

Box figure 1 Trade impacts of deep agreements

Source: Mulabdic et al. 2017.

Note: The estimator is Poisson Pseudo Maximum Likelihood (PPML). All specifications include bilateral fixed effects and country-time fixed effects. 90% Confidence intervals are constructed using robust standard errors, clustered by country-pair.

In a second step, the study examines the impact that Brexit can have on UK-EU trade relations going forward. Three distinct scenarios are considered, with decreasing depth of the post-Brexit agreement between the UK and the rest of the EU. The first scenario is a “soft” Brexit, assuming that the post-Brexit arrangement between the UK and the EU will be as deep as the agreement the EU has with Norway. In the second scenario, the UK and the EU will sign an agreement as deep as the average agreement the EU currently has with third countries. Finally, the third scenario has no agreement.

Bilateral UK-EU trade declines under all scenarios and that this drop is sharper the lower the depth of the post-Brexit arrangement relative to the depth of the EU agreement. In terms of value added trade, the decline ranges from 6 percent of the “softer” scenario to 28 percent of the “harder” Brexit scenario. The largest declines are for UK services and GVC trade (backward and forward linkages).

Box table 1 offers a summary of results. These predictions should be seen as average effects, as it takes time for trade flows to respond to changes in trade costs, the impact in the short-run is expected to be smaller than in the longer term.

Box table 1 Changes in UK’s bilateral trade with the EU under different scenarios

	"Norway" scenario	"average PTA" scenario	"no-agreement" scenario
Goods	-12%	-38%	-50%
Services	-16%	-48%	-62%
Domestic Value Added	-6%	-20%	-28%
GVC forward linkages	-5%	-18%	-26%
GVC backward linkages	-7%	-25%	-34%

Note: Depth decreases from 44 to 36 in the “Norway” scenario, to 14 in the “average PTA”, and to 0 in the “no-agreement” scenario.

¹ A way around this problem is to make assumptions on how different scenarios will lower trade costs (Dinghra et al. 2016) or to identify trade agreements that have diverse content (Baier et al. 2008).

² Mulabdic et al. 2017

³ The analysis uses data from the World Input Output Database (WIOD) on goods, services and value-added trade and the World Bank data on the content of deep agreements (Hofmann et al., 2017) to estimate a gravity equation augmented with a measure of depth for the period 1995-2011. The effect of common trade rules on UK imports and exports of goods, services and value added is quantified by interacting the depth of trade agreements with dummies identifying the UK.

Addressing traditional trade barriers still matters for South–South GVC trade

743. The impact of deep agreements on GVC trade may be heterogeneous across countries at different levels of development. South–South GVCs tend to be impeded by traditional barriers, such as high tariffs and long delays at the border, more than GVC-trade between North–South economies. Evidence suggests that deep PTAs boost South–South GVC integration by going further in policy areas under the current WTO mandate (tariffs, customs, services), while North–South GVCs are primarily affected by commitments in areas such as investment, competition, and intellectual property rights (IPR) protection not covered by the WTO.²²

744. These findings provide useful guidance for South–South integration initiatives, such as the African Continental Free Trade Area (AfCFTA). Its ambition is enormous relative to existing PTAs in Africa table 9.2). Bilateral trade protection among African countries affects backward and forward participation in agriculture and food GVCs.²³ So, the immediate challenge for AfCFTA negotiations for GVC integration will be to address the distortions created by traditional barriers to trade within Africa.

Table 9.2 Existing trade agreements in Africa are relatively shallow

	East African Community (EAC)	Common Market for Eastern and Southern Africa (COMESA)	Southern African Development Community	Economic Community of West African States (ECOWAS)	West African Economic and Monetary Union (WAEMU)	Southern African Customs Union (SACU)	African Continental Free Trade Agreement (AfCFTA)
Tariffs on manufacturing goods	✓	✓	✓	✓	✓	✓	✓
Tariffs on agricultural goods	✓	✓	✓	✓	✓	✓	✓
Export taxes	✓	✓	✓	✗	✓	✗	✓
Customs	✓	✓	✓	✓	✗	✓	✓
Competition policy	✓	✓	✗	✗	✓	✗	✓
State aid	✓	✓	✗	✗	✗	✗	?
Anti-dumping	✓	✓	✓	✓	✗	✗	✓
Countervailing measures	✓	✗	✓	✗	✗	✗	✓
TRIPS	✗	✗	✓	✗	✗	✗	✓
STE	✗	✗	✗	✗	✗	✗	✓
TBT	✓	✗	✓	✗	✗	✓	✓
GATS	✗	✗	✓	✓	✗	✗	✓
SPS	✓	✓	✓	✗	✗	✗	✓
Movement of capital	✓	✓	✗	✓	✓	✗	✓
Public procurement	✗	✗	✗	✗	✗	✗	?
IPR	✗	✗	✗	✗	✗	✗	✓
Investment	✗	✓	✗	✗	✗	✗	✓
Environmental laws	✗	✗	✗	✗	✗	✗	?
Labour market regulation	✗	✗	✗	✗	✗	✗	?
TRIMS	✗	✗	✗	✗	✗	✗	?

Source: World Bank Deep Agreements Database (Hofmann, Osnago and Ruta, 2017).

Note: The depth of the AfCFTA is based on the text of the Agreement Establishing the African Continental Free Trade Area -the “Kigali Draft Text” (March 2018).

C. Widening cooperation beyond trade

745. As discussed above, to sustain trade openness, it may be necessary to widen cooperation beyond trade policy. Tax cooperation can help governments in both industrial and developing countries mobilize

the resources needed to compensate losers and create the public goods necessary to produce winners. Regulatory cooperation can reassure consumers that greater openness need not imply vulnerability to fraud or exploitation. Infrastructural cooperation and assistance can help the poorer countries remedy the energy and connectivity gaps that have limited their participation in trade and GVCs.

Taxes

746. GVCs are not the cause of tax avoidance by firms and tax competition by governments, but they magnify the challenges facing the international tax system (see chapter 3). International factor mobility combined with the fragmentation of production processes across countries makes firms even more sensitive to tax differences. In GVCs that involve affiliates of the same firm, fragmentation of production leads to greater intrafirm trade and greater opportunities for tax avoidance by manipulating where value is recognized for tax purposes. Exacerbating the problems are the growth of intangibles in global business and the digital delivery of services. The current system of international taxation, in its reliance on identifying the physical place where value is created by firms in order to collect tax, no longer holds. This section examines how international tax cooperation may support country efforts to tackle taxation challenges associated with GVCs.²⁴

The global response

747. International efforts are underway to address tax avoidance by large multinational firms. The Base Erosion and Profit Shifting (BEPS) project, launched by the OECD and G20 in 2013, delivered measures to reduce profit shifting and base erosion, improve the coherence of international tax rules, and ensure a more transparent tax environment.²⁵ As of April 2019, more than 125 jurisdictions had joined the Inclusive Framework on BEPS by committing to four BEPS “minimum” standards.²⁶ Enhanced international tax transparency, guided by the Global Forum for Exchange of Information for Tax Purposes, complements the BEPS project because it promotes the exchange of data between tax administrations around the world.

748. The BEPS project has made significant progress, but implementation of BEPS measures in developing countries is still lagging.²⁷ Tax coordination has been improved through the Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting, and through updated international tax guidance for related party transactions. However, guidance on when and how to apply transfer pricing methods, such as the profit split method, is incomplete.²⁸ The complexity of many BEPS rules and lack of key data, particularly on parts of GVCs located in other jurisdictions, pose further obstacles. As a result, developing countries find it difficult to implement other key parts of the BEPS package, such as anti–treaty shopping rules²⁹ and recommendations for valuation of intangibles.³⁰

749. Nor has the BEPS process addressed tax competition. The OECD has suggested that the revenue losses from tax competition likely outweigh those of tax avoidance.³¹ Indeed, it is possible that decreasing the opportunities for tax avoidance will only increase tax competition.³² Preliminary analysis of the 2017 United States federal corporate income tax reform, which combined a cut in the headline rate and tighter rules to prevent profit shifting, suggests rate reductions elsewhere of around 4 points.³³ Regional coordination can be helpful to align policy makers’ incentives, though such efforts (such as that by the West African Economic and Monetary Union) remain incomplete.³⁴ Transparency and data collection are key for countries to engage in credible commitments on tax competition at the regional level.

750. International organizations, such as the IMF, OECD, UN, and World Bank, as well as bilateral providers of technical assistance, support developing countries in implementing international tax measures. The World Bank provides assistance on international tax issues and transparency to client countries as well as support to regional groupings such as the Asia-Pacific Economic Cooperation (APEC) and the Economic Community of West African States (ECOWAS). The Platform for Collaboration on Tax (PCT), a joint initiative of the IMF, OECD, UN, and World Bank,³⁵ produces toolkits for developing countries on international tax issues, including on tax incentives³⁶ and transfer pricing in contexts where pricing

information on comparable transactions is limited.³⁷ PCT advice goes some way in filling the gaps in the BEPS package for developing countries, but does not replace the key role of standard-setting bodies for countries in the Inclusive Framework and at the UN.

Systemic reform

751. A global consensus is emerging that greater reform of the international corporate tax architecture is needed to combat continuing tax avoidance opportunities and tax competition. Countries have taken on this agenda through the Inclusive Framework, and its March 2019 consultation document outlines various reforms that seek to address the challenges of both digitization and ongoing base erosion.³⁸ To further advance the agenda, other proposals have been developed by the IMF³⁹, at the World Bank,⁴⁰ and in academia.⁴¹ Reform options present different costs and benefits for developing countries.⁴²

752. In the short term, countries should consider better rules for combating abuse and tax avoidance. Examples of such rules are the Inclusive Framework reform proposals on the income inclusion rule and base-eroding payment rule. The income inclusion rule provides taxing rights to countries where MNCs are headquartered over the income of their subsidiaries in low-taxed jurisdictions. This is unlikely to benefit capita-importing developing countries but would have the advantage of reducing the incentive for tax competition. A reallocation of low taxed profits to only resident countries is questionable, however, in light of evidence that substantial profits are diverted from market/source economies. Imposing taxing rights on low taxed profits, but allocating these profits more fairly across GVCs would provide a more direct benefit to many developing countries. Such a general rule on diverted profits could be enforced by both resident and source countries. Where a country triggers the rule, it would result in a direct benefit to all other countries of the relevant value chain, receiving a share of the low taxed income based on the agreed allocation key.⁴³ The base-eroding payment rule targets payment to related parties that give rise to a high risk of base erosion (such as interest, or royalties); it would be fairly simple to implement and directly raise tax revenues in developing countries.

753. A more ambitious reform is residual profit allocation (RPA) by formulary apportionment, which could raise substantial additional revenues for developing countries. Much depends on its design.⁴⁴ The outcome depends on whether the formula for apportioning residual profits prioritizes assets, sales, or labor—a large weight for labor would be most beneficial for most developing countries. As the formula selected will have clear winners and losers, securing agreement between countries on this proposal would be challenging. The impact would vary by country and securing agreement is a concern.

754. Three of the Inclusive Framework proposals (user value, marketing intangibles, and significant economic presence) grant greater tax powers to destination countries via narrowly targeted RPA. These proposals put more emphasis on the value of the market in allocating profits by giving jurisdictions the right to tax businesses that interact with their economies even if they have no physical presence there. The degree to which these options would benefit developing countries depends on the specific design. For example, by focusing on where consumption takes place, the three proposals may disadvantage countries with production or resource-based economies. Requiring delineation of their scope, these options are also highly complex, creating implementation challenges for low-capacity tax administrations.

755. A full-fledged destination-based cash flow tax (DBCFT) is a compelling reform option for eliminating tax competition and avoidance more completely.⁴⁵ Because taxes are collected in the destination country, there is no incentive for firms to shift profits between affiliates and for governments to competitively lower tax rates to attract investment. And since governments would not need to agree on a minimum tax rate, countries would retain sovereignty in this area. The DBCFT is equivalent to a VAT with a subsidy for labor cost. Like the VAT, it is a domestic tax that has no impact on competitive position between countries. But by exempting the labor element of value added from taxation, the DBCFT provides an incentive for job creation.

756. The DBCFT taxes cash inflows (sale of products, services and real assets, borrowing, and the receipt of interest, but excluding injections of equity) with deduction of all cash outflows (purchase of materials, products, labor and other services, real assets, lending, repayment of borrowing, and interest payments, but excluding equity repurchases and dividends).⁴⁶ To eliminate the incentive for tax competition between countries, receipts from exports would not be included, but imports would be taxed at the domestic rate, just like a VAT. The DBCFT would ensure that the tax is based on the location of sales to consumers (the “destination” of the product) rather than on the location of profits, production, or corporate residence.⁴⁷ This removes incentives for tax competition and tax avoidance by MNCs.⁴⁸

757. Based on prevailing tax rates, global adoption of a DBCFT system could have significant redistributive effects on revenues across countries, though revenues would not increase overall.⁴⁹ Countries with trade deficits, limited revenues from natural resources, and low per capita income would be more likely to benefit under such a tax, at least initially.⁵⁰ Importantly, countries that lose from a switch to a destination-based system can raise tax rates to compensate, since pressures from profit shifting and tax competition are removed.⁵¹

758. Skepticism about the feasibility of a destination-based system is valid. MNCs that currently engage in aggressive tax planning would lose and are likely to resist it.⁵² Unilateral border adjustment for direct taxes may also raise questions about WTO consistency, compared with indirect taxes such as VAT where it is explicitly allowed. But since the DBCFT is economically equivalent to a VAT plus a wage subsidy, both of which are WTO compatible, technical adjustments to the form of the tax could be made to achieve compliance.⁵³ Furthermore, a cooperative switch to a DBCFT may be more generally acceptable. Another concern is that administering and enforcing such a tax could be complex, but perhaps not much more so than current rules or those experienced under a VAT.⁵⁴

759. International tax reform to address issues related to GVCs for developing countries will have three dimensions.

- Developing countries can *move to strengthen anti-abuse rules*. The focus should be on mechanical, simple, and transparent rules. Countries can greatly benefit from the application of mechanical rules for transfer pricing (safe harbors) that firms can contest on the basis of evidence (arm’s length let out) for straightforward elements of GVCs such as contract manufacturing and routine distribution.⁵⁵ Countries also need to revise their tax treaty networks to renegotiate or cancel cost-ineffective tax treaties.⁵⁶ Depending on how the ongoing efforts to reach consensus on rule design by 2020 unfolds, as well as the specific capacity and economic structure and priorities, developing countries should also consider adopting tax-base-eroding payment rules or a diverted profit rule.
- The Inclusive Framework has set a deadline of 2020 to reach consensus on proposals to move toward *greater taxing rights for jurisdictions where users and markets are located and formulary apportionment of residual profits*. Such proposals are a step in the right direction for developing countries—as long as they are simple for low-capacity countries to implement and allocation rules do not compromise taxing ability of producer and resource countries.
- A general *allocation of all residual profits by formulary apportionment* or the *destination-based cash flow tax is a more comprehensive solution* for curbing tax competition and avoidance, with large potential benefits for developing countries. Such a radical solution will likely not materialize in the short term but deserves further consideration as a longer-term option.

Regulation

760. In the conventional producer-centric view, regulatory cooperation is a complement to liberalization. There is also an alternative consumer-centric case for regulatory cooperation as a precondition for liberalization. Both are important in facilitating the operation of GVCs.⁵⁷

Producer-centric regulatory cooperation to address regulatory heterogeneity

761. Regulatory heterogeneity can impede the intercompatibility of parts that is vital for GVCs. It arises when requirements differ across countries because of differences either in institutions (leading typically to “horizontal” differentiation, as in plugs and legal services) or in social preferences (leading to “vertical” differentiation, as in the stringency of food, paint, or financial regulation). The traditional case for regulatory cooperation arises from the fact that regulatory heterogeneity segments international markets in a way that prevents the exploitation of economies of scale in production. For example, since each East African country has its own regulatory requirements for services professionals, compliance costs cannot be spread out over the provision of professional services in other East African countries but must be incurred separately in each market. On one estimate, EU stock of FDI could increase by 20–35 percent if regulatory heterogeneity was reduced as a result of a common services regulation directive.⁵⁸

762. Such regulatory heterogeneity cannot be addressed by imposing traditional trade disciplines because the problem is not due to protectionist or anticompetitive intent. But there is an economic cost of such heterogeneity because each country is independently choosing its regulations without considering the negative impact on foreign producers and thus on competition. There are thus potential gains from international cooperation where each country trades off the benefits of maintaining different nationally optimal regulations against the benefits of integrating markets through some form of regulatory convergence.

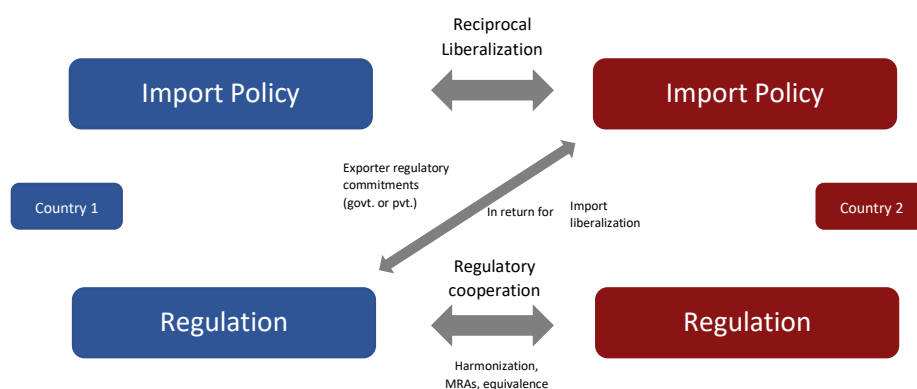
763. In some cases, regulatory cooperation could be far reaching and lead to harmonization or mutual recognition, which would eliminate the costs of regulatory heterogeneity for firms and liberate them from the uncertainty of discretionary licensing.⁵⁹ In other cases, regulatory cooperation could be valuable even if it only involves greater mutual understanding of how regulatory discretion in each jurisdiction will be exercised, because that too would lend predictability to commitments.

Consumer-centric regulatory cooperation to address international externalities

764. The alternative case for regulatory cooperation arises because regulators in the jurisdiction of the exporter do not consider the consequences of market failure for consumers in the jurisdiction of the importer. For example, weak data protection in a country that exports data-processing services can compromise the privacy of citizens of other countries. Increasing concentration and anticompetitive practices by producers in one market can lead to exploitation of downstream consumers in another market. Poor regulation of medicines, hospitals, and universities in one country can hurt the health and human capital of foreign citizens who receive or visit for treatment or education.

765. Conventional trade negotiations and rule-making are primarily concerned with reciprocal liberalization of import policy (figure 9.11). Accordingly, rules and commitments focus on tying the hands of importers: tariffs are bound; quotas are prohibited or restrained; discrimination against imports and trading partners is prohibited or restrained; and there may be further disciplines on importing country product standards—such as the requirement in goods that they must be “necessary” to achieve a legitimate objective. For the most part, trade rules do not concern themselves with exporter disciplines or commitments. The rare examples in goods include prohibitions or restraints on export subsidies, quotas, and agricultural assistance.

Figure 9.11 Regulatory commitments by exporters can be exchanged for market access commitments



766. This asymmetric structure of trade rules, which focus rules and commitments entirely on importing countries and none (or very few) on exporting countries, does not create a natural home for consumer-centric regulatory cooperation. The result is an unwillingness of importing countries to give up protection, or regulatory discretion, or both. The solution may be mutually binding commitments by exporting and importing countries.⁶⁰ The former would make regulatory commitments to look after the interests of consumers in importing countries, and in return, the latter would make commitments to allow access to their markets (represented by the diagonal line in figure 9.11).

Data flows

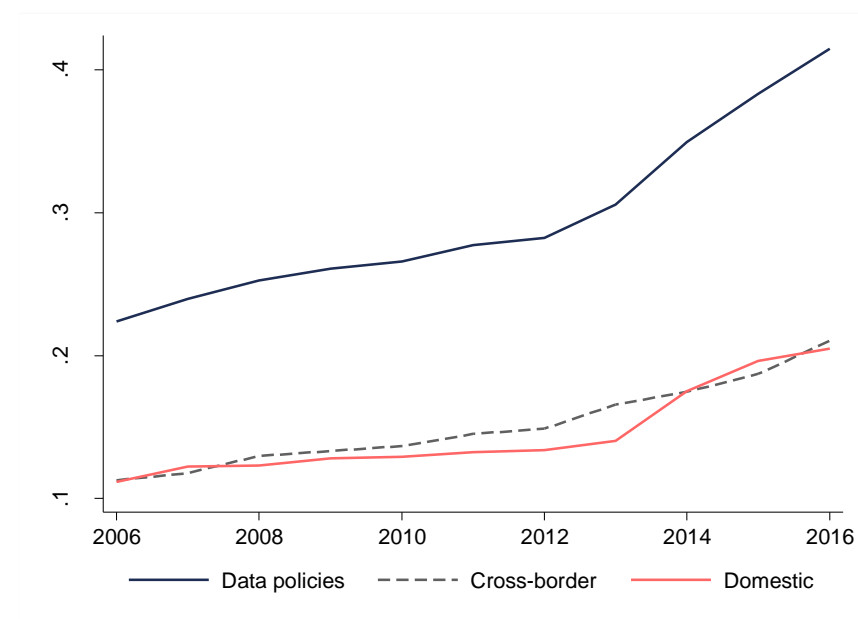
767. The ability to move data freely across borders underpins a growing range of economic activity and international trade. McKinsey estimated that cross-border data flows were 45 times larger in 2015 than in 2014, and around 12 percent of international trade in goods is over global e-commerce platforms such as Alibaba and Amazon.⁶¹ The US International Trade Commission estimates that in 2014, global digital trade, including data-processing and other data-based services, led to a more than 3.4 percent increase in US GDP, by increasing productivity and lowering the costs of trade.⁶² Recent empirical research finds that restrictions on data flows have significant negative consequences on the productivity of local companies using digital technologies and, in particular, on trade in services. These estimates underscore the importance of cross-border data flows for the diffusion of knowledge and technology and for enabling the fragmentation of production of goods and services across countries.

768. But international data flows also raise concerns. The provision online of search, communication, health, education, retail, and financial services relies on, or could lead to, the collection of personal data. The global nature of the internet means that such data can be quickly and easily transferred to third parties in other jurisdictions. This transfer can undermine domestic privacy goals when the personal data of citizens flows to jurisdictions that do not offer comparable levels of privacy protection, prompting domestic regulators to limit the free flow of data across borders.

769. These concerns are prompting governments to apply new regulatory policies on digital trade and data flows, severely dampening the positive impact that digital trade brings to the economy.⁶³ One area that has received particular attention from policy makers relates to cross-border data flows. Restrictions applied to data flows have seen an upward trend in recent years (figure 9.12). Burdensome data policies can be split into two types: those affecting the cross-border mobility of data, such as data localization or local storage requirements, and those affecting how data are treated domestically. In both cases, the pattern across a wide set of countries points to increasing policy restrictiveness.

770. Restrictions on data flows have significant negative consequences on the productivity of local companies using digital technologies and particularly on trade in services. Studies show that countries would gain on average about 4.5 percent in productivity if they removed their restrictive data policies, while the benefits from reducing data restrictions on trade in services would on average be around 5 percent.⁶⁴

Figure 9.12 Restrictions on data flows have increased, 2006–17



Source: ECPIPE Digital Trade Restrictiveness Index (DTRI), Ferracane et al. 2018b.

Note: The index varies between 0 (completely open) and 1 (virtually restricted) with higher levels indicating increasing data restrictiveness. The index covers 64 countries around the world representing more than 95 percent of value-added content of gross exports.

771. In May 2018, the EU implemented the world’s most comprehensive data protection regime, the General Data Protection Regulation (GDPR), replacing the 1995 Data Protection Directive. Under the GDPR, personal data are only allowed out of the EU under strict conditions. One option is for the non-EU country to adopt a privacy regime whose level of protection is “essentially equivalent” to that guaranteed within the EU.⁶⁵ Other options are for firms to accept Binding Corporate Rules (BCRs) or use Standard Contractual Clauses (SCCs), which are mechanisms, respectively, to authorize company-wide or transaction-specific data transfers.

772. These new regulations are likely to especially affect services GVCs that depend on data flows. Such data flows drive the most dynamic exports of developing countries: digitally delivered data processing and data-related business services. These services, ranging from financial accounting and tax returns to health transcriptions and diagnostics, contributed to more than \$50 billion worth of developing country exports to the EU in 2015—one-fifth from Africa.

773. Developing countries face a dilemma: either they must adopt EU-like national privacy regulation or their firms must incur the firm-specific or transaction-specific costs of using BCRs and SCCs. The GDPR reflects a specific balance between privacy and the economic and trade opportunities from data flows that may not be optimal for developing countries.⁶⁶ A GDPR-based national privacy law would impose the same high standard on all firms, even when they sell at home, leading to higher economy-wide costs of doing business. Adopting tough standards is likely to reduce the scope to use personal data to improve access to domestic services, such as through the creation of credit bureaus, and to reduce the competitiveness of digital exports in third markets, such as the United States, that do not require GDPR-like privacy standards. BCRs and SCCs have proved costly and time-consuming. A survey in India of the impact of the earlier,

less-stringent EU Data Protection Directive revealed that the process to ensure that firms complied took over six months, and 90 percent of the respondents used transaction-specific contracts that involved on average a more than three-month-long complex process.⁶⁷ As many as two-thirds of the surveyed services exporters claimed a significant loss of business opportunities because of the requirements.

774. Since privacy regulations affect the international data transfers that digital trade depends on, developing countries could in principle challenge the consistency of the GDPR with EU trade commitments in the WTO. But WTO litigation is unlikely to address the underlying challenge raised by the GDPR—how to preserve digital trade opportunities while maintaining nationally desired privacy standards. Even so, WTO litigation could induce the EU to be more flexible in its application of the GDPR and offer other countries the opportunity to negotiate arrangements like the one with the United States.

775. The EU–US Privacy Shield offers a way of resolving the conflict between regulatory heterogeneity and international data flows (more on this below). Whereas traditional trade agreements focus on an exchange of market access commitments, the Privacy Shield reflects an innovative bargain: the data-destination country promises to protect the privacy of foreign citizens consistent with their national standards; in return the source country commits not to restrict the flow of data. The rules on digital trade in the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) reflect a similar bargain in a multicountry context.⁶⁸ In conjunction with progress toward developing common privacy standards in the OECD and APEC, such cross-border commitments can help create a framework for global privacy protection that also supports digital trade.

776. However, the proposed approach creates a risk of exclusion because some developing countries may not be able to make credible regulatory commitments in the near term—leading to a pattern of trade based on existing mutual trust rather than comparative advantage. Fortunately, existing multilateral rules, notably provisions on recognition agreements in the WTO’s General Agreement on Trade in Services, can help protect the interests of excluded countries. Some developing countries participated in the CPTPP, where provisions on data flows were matched by provisions on protecting privacy and preventing fraud. Developing countries also need to take advantage of the US CLOUD Act, which has created the basis for new agreements to supplement older and slower mutual legal assistance treaties.

Approaches to reconciling data flows and privacy

777. Table 9.3 provides an overview of the different approaches to cross-border data flows of some of the major privacy arrangements in place. Each privacy mechanism relies on some convergence toward common privacy principles (whether in the European Union or among a set of countries).

Table 9.3 Regulation of international transfers of personal information under different privacy regimes

	EU Data Directive/GDPR	Privacy Shield	CPTPP/USMCA	APEC CBPR	OECD Privacy Principles
Privacy principles	Determined by the EU.	Determined by the EU, but recognition that US promise of privacy protection for EU citizens is equivalent to EU.	To be determined by each party, taking into account “principles and guidelines of relevant international bodies.”	Common APEC privacy principles based on OECD privacy floor, which domestic privacy regimes can go beyond.	Common OECD privacy principles.
Scope	Applies to all companies collecting EU citizen data no matter where they are located.	Applies to US companies participating in Privacy Shield and collecting data of EU citizens.	Requires each Party to “endeavor to adopt non-discriminatory practices in protecting users of electronic commerce from personal information protection violations occurring within its jurisdiction.”	Applies to APEC CBPR compliant ^a organizations. collecting personal information from APEC economies.	Applies to data controllers—entities who decide about the content and use of personal data, without regard to location of data.
Enforcement	National adequacy finding—data destination country enforces. BCR & SCC—data source EU country enforces against local entity.	US (data destination) country enforces; i.e. EU recognizes US enforcement procedures.	Unspecified. Depends on national privacy law.	Data source country by APEC Accountability Agent ^b and Privacy Enforcement Authority (PEA), ^c with crossborder enforcement cooperation facilitated by APEC Cross Border Privacy Arrangement. ^d	Data source country enforcement against data controller.

Source: Mattoo and Meltzer (2019)

Note: a. An entity is CBPR-compliant when its self-assessment of compliance with its own data privacy policies against the APEC Privacy Framework has been reviewed by an APEC-recognized Accountability Agent. b. An APEC Accountability Agent has met the APEC recognition criteria to the satisfaction of APEC economies. c. A Privacy Enforcement Authority is any public body responsible for enforcing privacy law that can conduct investigations or pursue enforcement proceeding. d. Endorsed by APEC Ministers in 2009, CPEA is a voluntary framework that aims to facilitate cooperation amongst PEAs in enforcing CBPR, such as parallel or joint investigations or enforcement actions. Information sharing and cooperation is also encouraged with privacy enforcement authorities outside of APEC.

778. In 2016, the United States and the EU concluded the Privacy Shield—an arrangement that the EU Commission has deemed “adequate” under the Data Directive—thereby enabling the transfer of personal information from the EU to businesses in the United States participating in the Privacy Shield.⁶⁹ Under the Privacy Shield, U.S. companies self-certify individually or through an industry body to the U.S. Department of Commerce that they will protect personal data consistent with the Privacy Framework, which largely reflect the key elements of the EU Data Directive.⁷⁰ U.S. businesses are required to publish their privacy policies, and the Privacy Shield gives the U.S. Federal Trade Commission jurisdiction over such businesses

if they breach their own policy. In addition, the United States provides various means of redress for people whose personal data has been compromised, including a direct complaint to the business or a complaint to the Department of Commerce.

779. Such an agreement with the EU would give participating US firms big advantages over existing options. First, unlike BCRs and SSCs, the firms would not be required to establish a costly presence in the European Union because domestic regulators would assess conformity with EU standards at home. Second, unlike national adequacy, firms would not be obliged to adopt more stringent and more costly standards for data involving transactions at home or with countries less demanding than the European Union.

780. The original TPP provision eventually became the Comprehensive and Progress Agreement for Trans-Pacific Partnership (CPTPP) provision on data flows. The CPTPP requires that “Each Party shall allow the cross-border transfer of information by electronic means, including personal information, when this activity is for the conduct of the business of a covered person.” And that “No Party shall require a covered person to use or locate computing facilities in that Party’s territory as a condition for conducting business in that territory.” At the same time, the CPTPP breaks new ground in creating obligations on data destination countries to prevent fraud and deception and protect personal information. In particular, “each Party shall adopt or maintain a legal framework that provides for the protection of the personal information of the users of electronic commerce.” And that “Each Party shall endeavor to adopt non-discriminatory practices in protecting users of electronic commerce from personal information protection violations occurring within its jurisdiction.”

781. Such reciprocal obligations on data source and destination countries are a perfect example of the type of regulatory cooperation that is needed to reassure data source countries that their commitments to openness will not place their consumers at the mercy of indifferent foreign regulators.

782. Countries can be expected to self-select into these arrangements, as they are already doing in APEC, the OECD, and the Privacy Shield, and gradually widen and deepen them. In the transitional phase, multilateral rules would need to fulfil two important roles. GATS Articles III on transparency and VII on recognition agreements can help ensure that the emerging arrangements between sets of countries are fully transparent. More important, GATS Article VII can help ensure that any such arrangements do not discriminate against and are open to participation by third countries.

Competition policy

783. Anticompetitive practices in international markets can affect the distribution of gains from participating in GVCs. Because GVCs span many markets, action against anticompetitive practices needs to consider behavior that reduces the availability or raises prices of the end-product (to the detriment of buyers) as well as intermediates (to the detriment of rivals). Suppliers of inputs into food value chains—such as fertilizers or seeds—may have market power or collude with competitors to raise prices. The price-raising effect of such behavior may foreclose the ability of producers to participate in a value chain or limit their profits and thus expansion opportunities.⁷¹

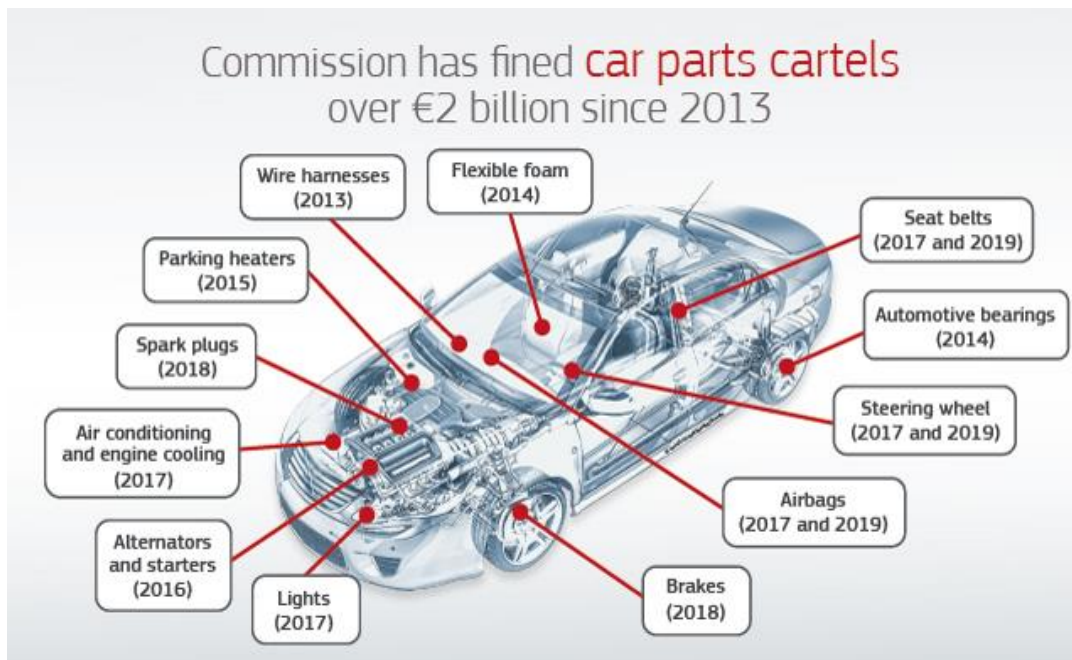
784. The effects of these practices can fall outside the jurisdiction of national competition authorities where the firms are based. And the firms can be outside the jurisdictions of the authorities where the effects are felt. One set of authorities is not mandated to address the effects, and the other set is not able to. Meaningful international cooperation on the enforcement of competition policy would reassure countries facing jurisdictional constraints or limited enforcement capacity that the gains from GVC participation will not be appropriated by firms behaving anticompetitively.⁷²

The negative spillovers of anticompetitive practices

785. Anticompetitive behavior by companies, whether abuse of a dominant position or restrictive business practices, at one stage of production can reduce the benefits accruing to participants at another

stage of production. The cross-border nature of GVCs means that restrictive practices will often also have a cross-border dimension. An example is a 2016 cartel case prosecuted against major European truck producers (all lead firms for specific value chains)⁷³ by the European Commission; the companies were found to have colluded on pricing and on when to introduce new emissions technologies—and to pass on the cost of such systems to buyers of trucks. Alternatively, intermediate input suppliers may collude to raise prices for parts needed by lead firms. An example is collusion by automotive parts makers, first investigated in 2010–12, that eventually identified more than a dozen specific cartels for a range of car parts. The European Union alone imposed more than €2 billion in fines in 15 separate rulings pertaining to various car part producers (figure 9.13).

Figure 9.13 The European Commission has imposed large fines on car parts cartels since 2013



Source: http://europa.eu/rapid/press-release_IP-19-1512_en.htm.

786. Anticompetitive practices have also been identified in services sectors central in global production networks, such as finance and transport, as well as in new digital services in search, advertising, communication, and distribution. For example, fines of around \$1 billion or more were imposed by the United Kingdom’s Financial Conduct Authority, the United States’ Commodity Futures Trading Commission, and Swiss regulators on the world’s biggest banks—Barclays, JPMorgan Chase, Royal Bank of Scotland, Citigroup, and Credit—for manipulating foreign exchange markets. The rigging apparently took place through information sharing and coordinated trading.

787. Digital companies are attracting more attention from national competition authorities. Large multisided markets created through the inherent network effects of individual platforms are vulnerable to monopolistic behavior, and platform firms can exploit user data to stifle competition. In early 2019, the United States launched a Technology Task Force that will monitor competition in US technology markets, particularly those where platforms compete.⁷⁴ The European Union has also taken an interest in policing anticompetitive behavior in digital markets. For example, following a complaint from the music streaming service Spotify in early 2019, the EU opened an investigation into potentially anticompetitive treatment of Apple’s competitors in Apple’s App Store. The European Commission is also pursuing a review of smartphone chargers that could have implications for Apple, since the iPhone’s charger departs from the micro-USB connectors used by the rest of the industry through voluntary agreement.⁷⁵ Abuse of dominance

was a recurring theme in three European investigations into Google between 2017 and 2019, resulting in fines totaling \$9.3 billion (European regulations permit fines up to 10 percent of a company’s annual global turnover).

788. The ability of platform companies to use data collected through the platform to stifle competition is also a concern. In 2018, the European Union opened a preliminary investigation into how Amazon uses data on third-party vendors operating on its platform, due to concerns that the data allow Amazon to identify product trends early and promote its own brands.⁷⁶ The acquisition of the song recognition app Shazam by Apple, Inc. was also scrutinized by the European Commission due to concerns that it would grant Apple, Inc. access to important data on its competitors.⁷⁷ In the United States, Amazon’s acquisition of the supermarket chain Whole Foods in 2017 raised similar concerns about consumer data.⁷⁸

789. A number of these anticompetitive practices could affect developing country participation in or benefits from GVCs. Sometimes these are regional. Overcharges resulting from cartels investigated by South Africa range up to 50 percent for some construction products.⁷⁹ In 2010, the European Commission fined 11 air cargo carriers a total of nearly €1 billion for operating a worldwide cartel that affected cargo services within the European Economic area (EEA). The carriers coordinated their action on surcharges for fuel and security without discounts over a six-year period. A notable aspect of the European Commission’s fines on the air cargo carriers was that all carriers were granted a 50 percent reduction on sales between the EEA and third countries because part of the harm of the cartel fell outside the EEA.⁸⁰ International maritime transport has also regularly been a focus of enforcement: in 2018 the EU imposed \$458 million in fines against four maritime car carriers for customer allocation and price fixing for deep sea transport of vehicles.⁸¹

790. It is not known how much cartels have cost consumers in developing countries, but spillover effects of foreign cartels clearly can be significant, as suggested by the European Union finding that part of the effect of air carrier collusion occurred outside the EEA. Cartels investigated by South Africa for cement, scrap metal, pipes, pilings, steel products, and industrial gases have been argued to also affect other African nations.⁸²

The empowered are not very concerned

791. In principle, many countries today have competition authorities. Over 130 jurisdictions had a competition law in place in 2018, up from fewer than 50 in the early 1990s.⁸³ Growth in the number of competition agencies has been associated with an increase in the number of cartels prosecuted annually. Between 1989 and 2016, 953 cartel investigations led to fines by at least one competition agency, adding up to US\$112 billion in total. While large, the number is much less than total overcharges to buyers, which are estimated to exceed US\$1 trillion.⁸⁴

792. But a central feature of competition law is that the focus is on effects on *national* consumers and markets. Addressing the effects of behavior by national firms on a foreign market is not part of the mandate of competition agencies. For example, Section 3 of South Africa’s Competition Act states that it “applies to all economic activity, within, or having an effect within, the Republic.” It does allow South Africa’s agencies to help to a limited extent: foreign agencies investigate behavior that has a South African as well as regional impact and share information but only if the companies concerned agree to this. For the most part, however, countries must rely on self-defense to combat anticompetitive behavior, whether this involves locally established firms or companies headquartered in foreign countries or MNCs.

The concerned are not fully empowered

793. Competition laws generally permit action against anticompetitive practices that have effects on the domestic market, but developing countries may not have adequate capacity. The effectiveness of this “effects doctrine” depends on the capacity of authorities to identify, investigate, and if necessary fine foreign firms for anticompetitive behavior. Small or low income countries may not be able to do so. Cartel

enforcement in Africa, for example, is quite limited. In 2017–18, only Egypt and South Africa imposed significant cartel fines.⁸⁵ Differences in capacity to act imply that many developing countries are less able than more advanced countries to defend the interests of their consumers from anticompetitive behavior.

794. There have been few if any complementary investigations in other Southern African countries of firms that have been found to engage in anticompetitive behavior in South Africa, nor claims for damages, even though in many of these cases the firms operate in neighboring countries.⁸⁶ For example, the Zambian Competition Commission is not able to deal effectively with accusations against South African companies of anticompetitive behavior in Zambia because it often does not have the jurisdiction to deal with companies that operate in Zambia but are not locally incorporated, or whose actions do not fall under Zambian competition law for some other reason; it does not have the ability to enforce its decisions, even where it does have jurisdiction to issue judgments; it is unable to obtain the information necessary to investigate the activities of a foreign company from the home jurisdiction of that company; or despite its competent and motivated staff, it lacks the resources to conduct the detailed empirical investigations required to effectively address allegations of anticompetitive behavior.

The limited scope of existing multilateral and plurilateral cooperation

795. Efforts to launch negotiations on a potential multilateral agreement on competition policy in the WTO failed to attain the needed consensus in 2003. The WTO services agreement does contain a provision on anticompetitive practices (GATS Article IX), but it provides only for information exchange and consultation. Since then, extensive voluntary cooperation has occurred through the International Competition Network, a collaboration involving most competition authorities around the globe. This has been complemented with bilateral agreements between agencies to cooperate in different areas. Moreover, PTAs increasingly include chapters on competition policy. In free trade agreements, these generally establish a basic framework of principles such as transparency, due process, assistance (such as exchange of nonconfidential information), and nondiscrimination. Competition chapters in PTAs are generally not binding and cannot be challenged through dispute settlement provisions of the PTAs. In common markets, secretariats may play an active role in investigating cases. An example is the COMESA Competition Commission, which has the mandate to investigate cases that affect two or more COMESA members. It has been active in vetting merger cases.

796. Since the failed effort in the early 2000s to negotiate competition policy provisions in the WTO, the International Competition Network, in conjunction with deliberations in OECD and UNCTAD, has established a basis for international cooperation between agencies. Cooperation can increase the effectiveness of enforcement through sharing information and enhancing the joint capacity to investigate and act. The car parts cartel cases noted above involved cooperation by 13 jurisdictions, including Brazil, Canada, China, the European Union, India, Japan, Republic of Korea, South Africa, and the United States, with some 70 companies investigated for price-fixing and bid-rigging for more than 100 products.⁸⁷ The same is true of large or complex merger cases. The acquisition of Lafarge (France) by Holcim (Swiss), two large cement and concrete producers with global operations, involved seven non-European Economic Area competition agencies: Brazil, Canada, India, Mauritius, the Philippines, South Africa, and the United States.⁸⁸ However, Holcim-Lafarge operates in some 80 countries, but most did not investigate the merger or require remedies, and many may be negatively affected.⁸⁹

International agreements on cross-border regulatory cooperation

797. Despite the efforts to cooperate, what has not changed is the explicit nationalist focus of competition laws. Competition policy is premised on self-help. There are no examples of international cooperation between countries committing to enforce competition rules to protect interests of foreign consumers.

798. One step would be to provide foreign jurisdictions with information on the foreign effects of anticompetitive practices under investigation when such effects are identified. Agreeing to explicitly assess

such effects could also be an element of a plurilateral agreement to assist developing countries in addressing restrictive business practices that harm their consumers or firms. A further step would be for countries to end existing exemptions for export cartels from the scope of their national competition laws.⁹⁰ For example, the United States and the European Union, which are home to many services multinationals, could begin by ending exemptions from the scope of their competition law for collusive practices whose effects are felt outside their jurisdiction. This could be pursued through a plurilateral agreement—in the WTO, OECD, or UNCTAD—among the largest jurisdictions. More ambitious would be to change national legislation to require nationals not to harm foreigners abroad by conduct that is illegal at home.⁹¹ Such a change could be accompanied by creating the right for foreign consumers to challenge anti-competitive practices by services firms in the national courts of countries whose citizens own or control these firms.

799. Such a deal could be part of a broader trade agreement creating simultaneous obligations on importing countries to liberalize and exporting countries to regulate. For example, Zambia could condition opening its market to South African firms on a commitment by South African authorities to investigate anticompetitive behavior by South African companies in Zambia, or to assist the local authorities in doing so. In principle, it would be in South Africa’s interest to provide such reassurance.

Regional cooperation between developing countries

800. In parallel, deepening regional cooperation on competition policy enforcement offers a mechanism for many developing countries to protect their consumers and firms from foreign anticompetitive behavior. An option is to form a regional competition agency to which national competition agencies could forbear jurisdiction in specific circumstances, as with the European Commission within Europe. For example, to save costs, St. Lucia, Dominica, Grenada, St. Vincent and the Grenadines, and St. Kitts and Nevis set up in May 2000, with World Bank support, the Eastern Caribbean Telecommunications Authority (ECTEL), the world’s first regional telecommunications authority. Although the member countries retained their sovereign power over licensing and regulation, ECTEL provides technical expertise, advice, and support for national regulations. Apart from the economies of scale in establishing a common regulator, there are at least three other advantages. It promotes the development of harmonized and transparent regulation in the region, allows for greater independence (and hence credibility) in regulatory advice, and enhances bargaining power in negotiations with incumbents and potential entrants. In fact, there is evidence that the creation of ECTEL, along with other reforms, prompted a decline in the price of a daytime call to the United States of between 24 and 42 percent in these countries.

Infrastructure

801. International coordination failures for infrastructure impede GVC investment, expansion, and upgrading. But coordinated efforts to harness infrastructure make economic sense. Each individual country does not fully internalize the benefits to foreign traders of reductions in domestic trade costs, and gains are larger when governments on both sides of the border invest in expediting trade simultaneously. Lessons come from the WTO Trade Facilitation Agreement, which encourages countries to coordinate improvements in trade facilitation. The agreement addresses the coordination problem and provided low-income countries with financial assistance for the necessary investments.

Infrastructure coordination across countries

802. Coordinated efforts to develop infrastructure can enhance international connectivity (box 9.4). For any country, building a railway or a road has some value, but it also has value to the countries around it since improvements in one part of the transport network reduce shipping times for all countries in the network. If each country alone decided how to invest in infrastructure, spillovers to other countries would not be taken into account. This is even more true when transport infrastructure crosses one or more borders. For any country, the timing of investments in neighboring countries is relevant since the value of one’s investment depends on the investment decisions of others. The ultimate impact of a country’s investments

also depends on the policy choices of other countries, such as the standards they use when building infrastructure or the procedures that countries use to clear goods at the border.

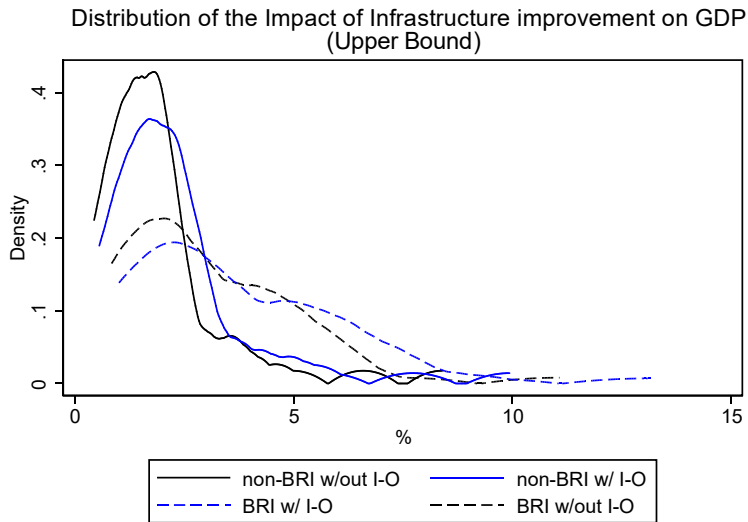
803. But common transport infrastructure also creates challenges. One is that it has significant implications for public finances and may have asymmetric effects on the trade and GDP of individual countries. This raises the possibility that the countries that build—and bear the cost—of large sections of the project may not be the ones that will gain the most from it.⁹² Another challenge is the need to ensure mutual compatibility in standards. An example of how slight differences in infrastructure standards can disrupt trade comes from the rail gauge, the distance between the two tracks of a railway. Trains cannot easily cross borders if the rail gauge standards differ across countries. Russia used broad-gauge track (1,520 millimeters, or roughly 5 feet) in the 19th century to protect it from the entry of western trains, which ran on standard-gauge track (1,435 millimeters). For Russia, the 85-millimeter (or 3 inch) difference served a strategic military purpose because troops and materiel could not easily enter the country by rail. But in more tranquil times, the same 85 millimeters have become a high trade barrier, preventing goods from seamlessly crossing borders. Partly because of the extensive delays of changing cargo at borders, only about 5 percent of goods transported between Asia and Europe move by rail.

Box 9.4 International cooperation on transport infrastructure

There are multiple examples of international cooperation on transport infrastructure. The two most well-known are the European Union’s Trans-European Transport Network (TEN-T) and China’s Belt and Road Initiative (BRI). TEN-T is directed toward implementing and developing a Europe-wide network of roads, railway lines, inland waterways, maritime shipping routes, ports, airports, and railroad terminals. The policy encompasses building new physical infrastructure; adopting innovative digital technologies, alternative fuels, and universal standards; and modernizing and upgrading existing infrastructure and platforms. While the scope of the BRI is still taking shape, it is structured around two main components, underpinned by significant infrastructure investments: the Silk Road Economic Belt (the “Belt”) and the New Maritime Silk Road (the “Road”). The overland Belt links China to Central and South Asia and onward to Europe, while the maritime Road links China to the nations of South East Asia, the Gulf countries, East and North Africa, and on to Europe.

Transport infrastructure that improves international connectivity can have a significant impact on international trade and GVC integration. Intuitively, time delays are a barrier to international trade. This is even more true for goods and services that are produced in GVCs, since their production relies on the timely delivery of time-sensitive inputs.⁹³ The importance of time as a trade barrier is well established in the literature.⁹⁴ By one estimate for a sample of 126 countries, a one-day delay in shipping time reduces trade by at least 1 percent.⁹⁵ The WTO finds that delays and border costs can be equivalent to a 134 percent ad valorem tariff on a product in high-income countries and a 219 percent tariff equivalent in developing countries.⁹⁶

An analysis of the impact of transport projects linked to the Belt and Road Initiative shows the potential relevance of international cooperation in infrastructure for global value chains (box figure 1). For economies along the Belt and Road, as well for non-Belt and Road countries, the effects of infrastructure investment on GDP are larger when the model accounts for cross-border input-output linkages. Intuitively, when a sector experiences a decrease in the price of its imported inputs as shipping times/trade costs fall, it passes on the associated reduction in production costs to downstream industries, propagating the benefits across the world. These input-output linkages lead to potentially complex reallocation of comparative advantage, production, and trade, thus increasing welfare.

Box figure 1 Impact of BRI transport projects with and without input–output linkages

Source: De Soyres, Mulabdic, and Ruta 2019.

Note: De Soyres, Mulabdic, and Ruta (2019) build on Caliendo and Parro (2015)—a Ricardian model with sectoral linkages, trade in intermediate goods, and sectoral heterogeneity—to allow for changes in trade costs due to improvements in transportation infrastructure connecting multiple countries that are financed through domestic taxation. The model highlights the impact on trade and GDP of infrastructure investments linked to the BRI through cross-border input–output linkages.

International cooperation on infrastructure also creates challenges. Large, cross-border infrastructure projects have large implications for public finances and generally have asymmetric effects on the trade and GDP of individual countries. Countries that build and pay for large sections of a project may not gain from it the most. Indeed, analysis suggests that the BRI transport project increases overall welfare for the economies along the Belt and Road by up to 2.8 percent, but three countries (Azerbaijan, Mongolia, and Tajikistan) experience welfare losses as infrastructure costs outweigh gains through trade.⁹⁷ This points to the difficult question of equitable financing of common infrastructure projects. Furthermore, the model finds that the welfare effects of BRI transport projects would increase by a factor of 4 if participating countries would reduce by half the delays at the border and tariffs, stressing the importance of complementary policy reforms. Put differently, the lack of complementary policy reforms severely limits the gains from international cooperation on infrastructure.

804. Synergies can also arise across different types of infrastructure. For example, it is much cheaper to bundle the laying of fiber optic cable with the building of electric or gas lines, roads, or railways than to create communications, transport, and energy connectivity separately (figure 9.14). Such bundling has the further advantage that it does not prejudge the future importance of different types of international flows. It also does not presume the evolution of comparative advantage in any specific direction: a country is equipped to export goods by road or rail and digital services by cable.

Figure 9.14 Synergies across countries and types of infrastructure can improve connectivity

The Thai electricity provider offers cross-border telecommunications services, and the Congo Ocean Railway (CFCO) is leveraged to connect the country to Gabon with fiber



805. Seamless travel across borders requires cooperation not just on physical infrastructure, but also soft infrastructure. When people cross borders, there are two sets of checks: one for exit and one for entry. The same is true for goods, but the delays tend to be even longer because of complex regulations and taxes that differ across products and countries. But there is little a government can do to ensure short customs transit times for its firms' exports when they reach their destination.

806. Cooperation on policy and trade facilitation can together go a long way toward eliminating delays at the border. For example, for many years, Guatemala and Honduras required identical paperwork and duplicate processes on both sides of the border, but the red tape was still expensive and time-consuming for businesses. Truck drivers were known to bring hammocks to the border to wait out the lengthy process in comfort. When both countries moved from a free trade area to a customs union, eliminating the need for complex rules of origin, transit times decreased from 10 hours to just 15 minutes and increased trade by 7 percent.⁹⁸ Now paperwork is handled by a single online instrument. At the border, a digital reader device instantly scans a Quick Response Code (QR code) and quickly certifies—online—whether an importer has already paid the value-added tax on the goods in the destination country.⁹⁹

807. Trade facilitation has become an increasingly common feature of trade agreements. It encourages coordination and cooperation among customs authorities, raising the benefits from improvements on both sides of the border. For example, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership includes commitments on predictable and transparent procedures and the advance electronic submission of import requirements among members. A problem, however, is that the reform requires capacity, both technical and monetary, that many developing countries lack.

808. The WTO Trade Facilitation Agreement (TFA), ratified in 2017, allows developing countries to reform at their own pace and with assistance provided by advanced countries. The TFA serves as an example for other areas where cooperation and capacity are constraints on trade. As of October 2018, more than 60 percent of WTO members implemented the TFA, including 100 percent of developed members, 60 percent of developing members, and 22 percent of least developed countries.

Quality infrastructure boosts GVC participation

809. GVC participation is tied to increasing compliance with a variety of technical requirements, contained in both voluntary standards and technical regulations, covering products and processes.¹⁰⁰ The lead firms in GVCs make key decisions over how production is organized and who participates and sets the

conditions for participation, such as quantity, price, quality, and other requirements. The lead company enforces these conditions through standards and ensures compliance through audits and conformity assessments. It demands this not only from its first-tier suppliers but also from the second and lower tier suppliers, to ensure compliance throughout the value chain.

810. Demonstrating compliance with product and process standards signals to lead firms and their buyers the capability of suppliers down the value chain. Without compliance, the opportunities of getting involved in such GVCs are limited. Compliance can be verified through inspection, testing, and certification supported by accreditation and metrology. Effective and efficient quality infrastructure, appropriately recognized internationally, is a precondition for delivering such demonstrable compliance (box 9.5).

811. Many countries reform their national infrastructure ecosystem in line with their trade, competitiveness, and regional integration frameworks. Efficient and effective quality infrastructure services and mutual recognition by trading partners are essential enablers for trade facilitation. Some countries find it more feasible to share quality infrastructure services within a regional construct. For example, a laboratory for mass and volume in the Republic of Trinidad and Tobago serves as a reference laboratory for 12 standards bodies in the Caribbean region.

Box 9.5 Improving infrastructure quality in Pakistan

Over the past decade, the World Bank Group lending and advisory interventions, as well as UNIDO and USAID infrastructure projects, in Pakistan have resulted in the establishment of the Pakistan National Accreditation Council, now fully recognized by the International Laboratory Accreditation Cooperation and the International Accreditation Forum. In addition, the National Physical and Standards Laboratory was renovated and its equipment upgraded, leading to internationally recognized services that can be traced to the International Bureau of Weights and Measures. Pakistan now has nearly 50 laboratories that have been accredited to ISO/IEC 17025, which specifies the general requirements for laboratories to carry out testing and calibration.¹⁰¹

As a result, following a six-year restriction on Pakistan fish exports to the European Union after EU inspectors found systemic enforcement failure and serious deficiencies in the sanitary quality of the fish, the ban was lifted in March 2013 and the first consignments of seafood exported. When the ban was imposed, Pakistan was exporting some \$50 million seafood products annually to the European Union. During 2012–13 after the ban was lifted, the country’s seafood export stood at \$317 million.

Mango and mandarin exports are destined for more than 50 countries including the EU market. Pakistan now exports mandarins with full traceability, estimated to reach 400,00 tons in 2019, up from 10,000 tons in 2009.

812. The World Bank works with governments and regional groupings to improve infrastructure quality and capacity. It has been supporting the Accelerated Program for Economic Integration (APEI) among Mauritius, Seychelles, Madagascar, Malawi, Mozambique, and Zambia to quicken the pace of regional economic integration, particularly through agricultural trade. To date, there have been very few agriculture exports from the mainland APEI countries to Mauritius or Seychelles, except for cotton to Mauritius. Malawi, Mozambique, and Zambia, however, each export a range of bulk commodities and higher-value niche products on the world market that the island nations import from elsewhere. There are many factors that shape these trade patterns, but the absence of sufficient sanitary and phytosanitary (SPS) risk assessments between the island nations and their mainland APEI trade partners is central to the lack of agricultural trade. Pest-risk analysis by Mauritius in Madagascar in the early 2000s has allowed for more than US\$25 million of annual agri-food exports to Mauritius, most of which comes from smallholder farmers. Similar cooperation and investment in SPS risk assessment across other APEI countries could drive new areas of agriculture trade, including trade in pulses, seafood, honey, and chili peppers, among others.

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WTO, 2011

¹ Tang and Wei 2006.

² Corden 1971.

³ Crawford and Kotschwar 2019.

⁴ OECD 2018.

⁵ Greenville, Kawasaki, and Beaujeu 2017.

⁶ Greenville, Kawasaki, and Beaujeu 2017.

⁷ Adverse effects include injury to a domestic industry, nullification or impairment of tariff concessions, or serious prejudice to the country’s interests. Serious prejudice arises if subsidies are used to cover operating losses of a firm or industry or debt relief is granted for government-held liabilities. Serious prejudice may arise if the subsidy reduces exports of other WTO members, results in significant price undercutting, or increases the world market share of the subsidizing country in a primary product. The focus of WTO disciplines is on the amount of the assistance given, not on the extent to which a subsidy harms trading partners. Subsidies below 5 percent ad valorem are not actionable. See Hoekman and Kostecki (2009).

⁸ In response to subsidies, other countries can impose countervailing duties on subsidized imports that injure a domestic industry, with duties up to the amount of the subsidy paid, or request a government to withdraw a prohibited subsidy or withdraw/modify an actionable subsidy. In case of non-compliance, the injured WTO member can take countermeasures against the subsidizing state up to the amount of the subsidy paid (in case of prohibited subsidy) or up to the amount of the injury suffered by the domestic industry (in case of an actionable subsidy).

⁹ If the subsidy is less than 2 percent of the per unit value of products exported, developing countries are exempt from CVDs (for LDCs the threshold is 3 percent). De minimis also applies if the import market share of a developing country is below 4 percent, and the aggregate share of all developing countries is below 9 percent of total imports. The ASCM also exempts nations with per capita incomes below US\$1,000 from the WTO prohibition on the use of export subsidies and precludes CVDs on associated exports if global market shares are less than 3.5 percent for a product. De minimis provisions are also included in the WTO Agreement on Agriculture, permitting support up to 10 percent of output in developing countries.

¹⁰ In the Uruguay Round a third category, non-actionable subsidies, was included in the ASCM spanning environmental, R&D, and regional subsidies. This provision was time bound and lapsed at the end of 1999 because consensus could not be obtained to extend it.

¹¹ See <http://fortune.com/global500/list/filtered?hqcountry=China>.

¹² OECD 2016.

¹³ See for example USTR (2018) for arguments to this effect. Empirical evidence suggests that SOEs are less profitable and less productive than private firms in their respective sectors, European Commission (2016) for EU; Harrison et. al. (2019) for China; Kowalski et al. (2013) and OECD (2016) for a broad sample of countries.

¹⁴ Lawrence and Ito 1996.

¹⁵ Ederington and Ruta 2016. [2017?]

¹⁶ Laget et al. 2018. Other research on the relationship between deep PTAs and GVCs includes Orefice and Rocha (2014), Johnson and Noguera (2016[2017?]), and Dhingra, Freeman and Mavroeidi (2018).

¹⁷ Mattoo, Mulabdic, and Ruta 2017.

¹⁸ Laget et al. 2018.

¹⁹ Laget et al. (2018) build on the approach by Noguera (2012) to investigate this mechanism through a gravity model augmented to account for third-country effects.

²⁰ Antras and Helpman 2008.

²¹ Osnago et al. 2017 and 2019.

²² Laget et al. 2018.

²³ Balié et al. 2017.

²⁴ The focus of this section is on direct taxation. GVCs also pose challenges for indirect taxes, such as the VAT, although these are more tractable (see Clavey et al (forthcoming), International Tax Reform, Digitization and Developing Economies World Bank Policy Research Paper.

²⁵ See <http://www.oecd.org/tax/beps/>.

²⁶ The four minimum standards are:

- Action 5 on Countering Harmful Tax Practices More Effectively, Taking into Account Transparency and Substance.
- Action 6 on Preventing the Granting of Treaty Benefits in Inappropriate Circumstances.
- Action 13 on Transfer Pricing Documentation and Country-by-Country Reporting.
- Action 14: Making Dispute Resolution Mechanisms More Effective.

<http://www.oecd.org/tax/beps/beps-about.htm#monitoring>.

²⁷ Beer and Loeprick (2015) suggest that the most relevant indicator of transfer pricing rules adoption are effective documentation requirements. During the period 1994–2014, the number of countries with “effective” transfer pricing documentation rules increased from four to more than 80 (Cooper et al. 2016)—a substantial increase, but not resulting in comprehensive coverage of countries. Similarly, as of 2012, only 34 developing countries had formal transfer pricing rules (De Mooij and Liu 2018).

²⁸ The split profit method is particularly useful in the GVC context where comparable market-based pricing is not available for benchmarking transfer pricing. It is recognized as one of the methods for transfer pricing in the BEPS package, but the OECD guidance did not stipulate how and when practitioners should perform a “value chain analysis” to understand if the profit split method is the most appropriate method to price a related party transaction. Also, during consultations transfer pricing experts disagreed over what constitutes a value chain analysis, and ultimately the 2018 guidance did not cover the topic.

²⁹ Findings from Balabushko, Beer, Loeprick, Pinto Vallada (2017) and Beer and Loeprick (2018) for Ukraine and Sub-Saharan Africa, respectively, suggest that bilateral tax treaties with investment hubs result in substantial losses from tax avoidance through treaty networks.

³⁰ The BEPS guidelines proposed a new approach to hard-to-value intangibles based on the principle that in order for the legal owner of an intangible to be entitled to the returns from the intangible, it must perform important functions for their development, enhancement, maintenance, protection, and exploitation (the so-called DEMPE functions). However, the methodology, with its emphasis on accurate delineation of the transaction and a detailed functional analysis, is technically demanding and factually intensive.

³¹ OECD 2015.

³² IMF 2019.

³³ Beer, Klemm, and Matheson 2018.

³⁴ Quak 2018.

³⁵ See <http://www.worldbank.org/en/programs/platform-for-tax-collaboration>.

³⁶ Platform for Collaboration on Tax 2015.

³⁷ Platform for Collaboration on Tax 2017. Other PCT toolkits on offshore indirect transfers of assets, tax treaty negotiation, and transfer pricing documentation are under preparation, with toolkits on base-eroding payments and supply chain restructuring forthcoming. The toolkit on transfer pricing also advises low-capacity countries to consider carefully constructed safe harbors that simplify application of the arms-length principle for tax administrations and taxpaying MNEs, as well as the use of anti-avoidance measures when there is a heightened risk of transfer pricing-related base erosion or profit shifting

³⁸ OECD 2019.

³⁹ IMF 2019.

⁴⁰ Pemberton and Loeprick 2019.

⁴¹ Auerbach, Devereux, Keen, and Vella 2017.

⁴² Clavey et al. forthcoming.

⁴³ Pemberton and Loeprick 2019.

⁴⁴ IMF 2019.

⁴⁵ Auerbach, Devereux, Keen, and Vella 2017.

⁴⁶ Auerbach, Devereux, Keen, and Vella 2017.

⁴⁷ Auerbach 2017. See also <https://voxeu.org/article/understanding-destination-based-approach-business-taxation>.

⁴⁸ IMF 2019.

⁴⁹ Hebous, Klemm, and Stausholm 2019.

⁵⁰ Hebous, Klemm, and Stausholm 2019.

⁵¹ Auerbach 2017.

⁵² This includes highly-leveraged firms, since debt-financed investments would no longer be subsidized. Avi-Yonah and Clausing 2019.

⁵³ Grinberg 2017; Schön 2016.

⁵⁴ Auerbach and Holtz-Eakin 2016; Auerbach, Devereux, Keen, and Vella 2017.

⁵⁵ Platform for Collaboration on Tax 2017.

⁵⁶ Beer and Loeprick 2018.

⁵⁷ Although the focus here is on mandatory regulation, note that similar factors arise in the context of private standard-setting by lead firms in GVCs (including large retailers), or collaborative efforts by firms and NGOs to set standards for products or production processes used by firms that participate in the supply chain, such as the GFSI and GlobalGap.

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- ⁵⁸ De Bruijn, Kox, and Lejour. 2008.
- ⁵⁹ Trachtman 2014.
- ⁶⁰ Mattoo 2018.
- ⁶¹ Manyika et al. 2016.
- ⁶² USITC 2014.
- ⁶³ Ferracane, Kren, and van der Marel 2018; Ferracane, Makiyama, and van der Marel 2018.
- ⁶⁴ Ferracane, Kren, and van der Marel 2018; Ferracane, Makiyama, and van der Marel 2018.
- ⁶⁵ Schrems v. Data Prot. Comm’r [2014] I.E.H.C. 310, para. 73.
- ⁶⁶ Members of the Fortune 500 would need to spend on average \$16 million each to avoid falling foul of the EU’s General Data Protection Regulation, according to estimates by the International Association of Privacy Professionals and EU, a professional services reform, reported in the Financial Times (Khan 2017). Each company is expected to hire on average five dedicated privacy employees (such as data protection officers) and another five employees to deal partially with the new rules. Financial services and technology companies face the biggest compliance costs.
- ⁶⁷ NASSCOM-DSCI 2013.
- ⁶⁸ The recent United States–Mexico–Canada trade Agreement (USMCA) follows the example of the CPTPP.
- ⁶⁹ European Commission 2017.
- ⁷⁰ U.S. Department of Commerce 2016.
- ⁷¹ Issues that may be of concern to firms participating in GVCs or to end consumers—such as the governance of GVCs and the allocation of total profits associated with the operation of a GVC as a whole—are not matters that can be addressed through competition law.
- ⁷² Francois and Wooton 2001.
- ⁷³ The companies involved were Daimler, DAF, Iveco, MAN, Scania, and Volvo/Renault. See http://ec.europa.eu/competition/elojade/iseef/case_details.cfm?proc_code=1_39824.
- ⁷⁴ <https://www.ftc.gov/news-events/press-releases/2019/02/ftcs-bureau-competition-launches-task-force-monitor-technology>.
- ⁷⁵ In 2009, ten leading mobile phone manufacturers signed a Memorandum of Understanding committing to use micro-USB connectors for chargers. As an exception, manufacturers could continue to use their own connector if they offered an adapter, which allowed Apple to continue using its own connector. The MoU expired in 2012. http://ec.europa.eu/growth/sectors/electrical-engineering/red-directive/common-charger_en.
- ⁷⁶ <https://www.reuters.com/article/us-eu-amazon-com-antitrust/amazons-use-of-merchant-data-under-eu-microscope-idUSKCN1LZ1UV>.
- ⁷⁷ http://europa.eu/rapid/press-release_IP-18-5662_en.htm.
- ⁷⁸ <https://www.forbes.com/sites/gregpetro/2017/08/02/amazons-acquisition-of-whole-foods-is-about-two-things-data-and-product/#12062f86a808>.
- ⁷⁹ Roberts, Vilakazi, and Simbanegavi 2017.
- ⁸⁰ [source?]
- ⁸¹ https://www.stblaw.com/docs/default-source/Publications/globalcartelenforcementreport_january2019.pdf.
- ⁸² Roberts, Vilakazi, and Simbanegavi 2017. Between 2014 and 2016 South Africa investigated 69 cartel cases (Burke, Paremoer, Vilakazi, and Zegeni 2017).
- ⁸³ Anderson et al. 2018.
- ⁸⁴ Connor 2016.
- ⁸⁵ Morgan Lewis 2019.
- ⁸⁶ Roberts, Vilakazi, and Simbanegavi 2017.
- ⁸⁷ See Connor (2012) and Linklaters (2018).
- ⁸⁸ The merged entity was required to divest some operations in many of the countries concerned. See https://www.lafargeholcim.com/sites/lafargeholcim.com/files/atoms/files/05042015-press_finance-lafargeholcim_usa_canada_clearance_merger-uk.pdf. A noteworthy feature of this case was the recognition of the value chain nature of activities. The US Federal Trade Commission and the Canadian Competition Bureau cooperated in order to ensure remedies would not disrupt cross-border supply chains. Thus, Holcim was required to divest all its operations in Canada but also to sell several US plants deemed to be critical to the Canadian operation as part of an integrated package to a single buyer. See <http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/03919.html>.
- ⁸⁹ Fox 2015.
- ⁹⁰ Behavior that only has an effect on foreign markets cannot be addressed by national competition agencies.
- ⁹¹ Fox 2015; Hoekman and Sabel (2019).
- ⁹² De Soyres, Mulabdic, and Ruta 2019.
- ⁹³ Baniya, Rocha, and Ruta 2018.
- ⁹⁴ Hummels 2001; Djankov, Freund, and Pham 2010; Hummels and Schaur 2013.
- ⁹⁵ Djankov, Freund, and Pham 2010.

⁹⁶ Baniya, Rocha, and Ruta 2018.

⁹⁷ De Soyres, Mulabdic, and Ruta 2019.

⁹⁸ CITE.

⁹⁹ Adapted from Gain and Moran 2019.

¹⁰⁰ <http://pubdocs.worldbank.org/en/217841553265331288/Part-1-Module-2-The-Importance-of-QI-Reform-and-Demand-Assessment.pdf>.

¹⁰¹ ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.

Glossary of terms

Advanced manufacturing and services GVC participation characterizes countries that export a high share of manufacturing and business services and have high backward GVC integration.

Agribusiness or agrifood is the business of agricultural production and food processing.

Backward GVC participation is importing foreign inputs to produce goods and services for export.

Commodities GVC participation characterizes countries that export agriculture and mining. Countries in the commodities group show a small share of manufacturing exports and limited backward GVC integration.

Forward GVC participation is exporting domestically produced inputs to partners who produce the goods and services for export.

Global fragmentation of production is the organization and distribution of the production process across countries located in different regions.

Global production network is the organizational arrangement comprising interconnected economic and noneconomic actors coordinated by a global lead firm and producing goods or services across multiple geographic locations for markets around the world.

Global value chain is a series of stages involved in producing a good or service that is sold to consumers, with each stage adding value, and with at least two stages produced in different countries.

GVC activities (or stages) are the activities needed to produce a good or service in the context of a global value chain. These activities are spread across several locations. They span from the conception of the good or service to its end use and include for example design, production, marketing, distribution.

GVC intensification is an increase in participation by a country, sector or firm.

GVC participation (or integration) a country, sector, or firm participates in a GVC if it produces (at least) one stage in a global value chain. Overall participation may be of two broad types, backwards or forwards participation.

GVC upgrading: An increase in the benefits from participating in global value chains, usually from moving into higher value-added stages of production.

Innovative activities GVC participation characterizes countries that spend a large share of GDP on research and development, receive a large share of GDP from intellectual property and show high backward GVC integration.

Limited manufacturing GVC participation characterizes countries that export some manufacturing products, often alongside commodities exports, and show medium backward GVC integration.

Production fragmentation is the distribution of the production process across different countries and regions. Because of the fragmentation of production, traded products increasingly contain parts and components.

Regional fragmentation of production is the organization and distribution of the production process across different countries pertaining to the same region.

Sticky or rigid GVC relationship is a business relationship that is not easily changed. For example, it can correspond to a trade flow involving a supplier trading a product that is precisely customized for the buyer and for which the buyer cannot find another supplier easily. One way to measure the degree of “stickiness” in trade flow has been developed by Martin, Méjean and Parenti (2019) and is defined as the duration of supplier-buyer relationship.

Trade diversion occurs when trade is diverted from a more efficient exporter towards a less efficient one by the formation of a free trade agreement or a customs union. For example, in some cases, when two countries sign a trade agreement, they could reduce their import from the rest of the world and source their imported goods from each other. To the extent that this strategy of import re-allocation has been triggered by the trade agreement, then it can be considered a trade diversion.

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