CHAPTER 3

GROWING IN THE SHADOW

Challenges of Informality
The informal sector accounts for about a third of GDP and 70 percent of employment (of which self-employment is more than a half) in emerging market and developing economies. Informality is more widespread in lower-income countries with a large agricultural sector and a high share of unskilled workers. While offering the advantage of flexibility and employment in some economies, a larger informal sector is associated with lower productivity, reduced tax revenues, and greater poverty and inequality. Overcoming the challenges of informality requires a balanced mix of policies that carefully take into account country-specific drivers. A well-designed policy framework could complement lowering regulatory and tax burdens with increasing the efficiency of public revenue collection and regulatory frameworks. It could also include expanded access to finance, markets, and inputs to foster firm productivity and growth; better education to facilitate formal sector employment; improved public services to bolster tax morale; and enhanced safety nets to cushion household risks.

Introduction

The livelihoods of the poor in emerging market and developing economies (EMDEs) often depend on informal activity. In these economies, informal sector output on average accounts for about one-third of GDP and informal employment constitutes about 70 percent of employment (of which self-employment accounts for more than a half; Figure 3.1). In some countries in Sub-Saharan Africa, informal employment accounts for more than 90 percent of employment and informal output is as much as 62 percent of official GDP (ILO 2018a).

Informality is a multidimensional concept, differing in nature across workers and countries (Perry et al. 2007). Some workers and firms are “excluded” from the modern economy or critical state benefits by tax and regulatory burdens (de Soto 1989; Loayza, Oviedo, and Servén 2006). This type of informality is frequently associated with low productivity and poorly paid low-skilled employment (La Porta and Shleifer 2014; Loayza 2018). Other informal workers voluntarily “exit” the formal sector and choose informal activity for its flexibility and independence (Maloney 2004; Günther and Launov 2012). In lower-income countries, the informal sector is a major source of income to many low-skilled individuals whose income would otherwise fall below subsistence (Ducquier, Müller, and Naval 2017). These reasons for participating in the informal economy mean informal workers range from agricultural day laborers to self-employed lawyers with a few employees.2

Regardless of the reason why individual workers or firms choose between formal and informal activity, a large informal sector has been associated with unfavorable macroeconomic and development outcomes. On average, economies with larger informal sectors tend to have lower productivity, slower physical and human capital accumulation, higher poverty and inequality, and smaller fiscal resources.3 The informal sector itself has, on average, lower productivity than the

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1 Several studies find that some informal workers in EMDEs operate voluntarily in the informal sector. For instance, Falco et al. (2015) use survey data from Ghana and find little evidence for the overall inferiority of working in the informal sector compared with the formal sector. Falco and Haywood (2016) report that returns to productive characteristics in self-employment have increased significantly in Ghana between 2004 and 2011 whilst self-employment has attracted increasingly skilled workers. Blanchflower, Oswald, and Stutzer (2001) note that many workers in advanced economies, such as the United States and Portugal, report preferring to be self-employed.

2 Research suggests the coexistence of both “excluded” and “existing” types of informality (e.g., Perry et al. 2007; Hazans 2011; Bosch and Maloney 2008, 2010; Lehmann and Pignatti 2007; Fiess, Fugazza, and Maloney 2010; Nordman, Rakotomanana, and Roubaud 2016).

3 La Porta and Shleifer (2014) provide evidence that informality is associated with lower productivity, less access to financing, and less-educated managers. Some studies show that informality is associated with higher income inequality and poverty (Rosser, Rosser, and Ahmed 2000; Perry et al. 2007; Chong and Gradstein 2007; Loayza, Servén, and Sugawara 2010). Lower physical investment in the informal sector could reflect an unwillingness of informal firms to adopt technologies or scale up that would make them visible to tax and other authorities (Dabla-Norris and Inchauste 2008; Gandelman and Rasteletti 2017). Ducquier, Müller, and Naval (2017) develop a model that predicts that the informal sector would lead to slower human capital formation. Less educated managers partially explain lower labor productivity observed in informal firms (Cirera and Maloney 2017). Benjamin et al. (2014) show that informality is associated with weaker international competitiveness.
formal sector because it tends to employ less-skilled workers, have restricted access to funding, services and markets, and lack economies of scale.\footnote{For details, see Jovanovic (1982), Amaral and Quintin (2006), Galiani and Weinschelbaum (2012), Loayza (2018).} Employment in the informal sector can provide a safety net by keeping or creating employment during periods when the formal sector is shedding jobs (Loayza and Rigolini 2011). However, workers in the informal economy are largely excluded from the social security system and less protected against negative shocks than workers in the formal sector (Box 3.1).

Against this backdrop, this chapter examines the main features of informal economies and possible policies to address the challenges associated with informality. Specifically, it addresses the following questions:

- What are the main features of the informal economy?
- What are the empirical linkages between informality and development outcomes?
- Which policies can mitigate the adverse effects of informality?

The chapter makes the following contributions to the literature on informality:

- **Broad database on informality.** The chapter compiles a new database from a wide range of informality measures. It employs these measures to provide a rich set of stylized facts on informality that are robust to the choice of measure.

- **Informality, poverty, and income (wage) inequality.** The chapter documents that higher informality is associated with greater poverty. This may, in part, reflect lower wages for informal workers than formal workers. While many survey-based studies have documented the existence of such wage differentials (especially at the country-level), this chapter distills broader lessons from a large number of studies.

- **Informality and fiscal indicators.** The chapter is the first to document the empirical link between higher informality and unfavorable aggregate fiscal outcomes, including revenues and expenditures. This goes beyond previous studies that have focused on the implications for specific tax categories, such as value-added taxes (Keen 2008).

- **Informal competition and formal firm productivity.** The chapter presents the first cross-country study that quantifies the lower productivity of formal firms that face competition from informal firms. This adds to the rich literature that documents the sizable productivity differential between formal and informal firms.

- **Policy implications.** The chapter analyzes the implications of country-specific policy changes for the informal sector and synthesizes the lessons from these changes to offer a menu of policy options that takes into account the importance of complementarities.

The chapter reports the following main findings:

- **Main features of the informal economy.** In EMDEs, the informal economy in 2016 on average accounts for 32 percent of GDP and, 70 percent of employment, with self-employment accounting for 43 percent of employment (Figure 3.1). Informality tends to be higher in lower-income economies that are less open to international trade, have larger agricultural sectors, and have larger pools of young and unskilled workers. Both informal output and employment have declined since 1990. Informality declined faster in countries with higher output growth, rapid physical capital accumulation, and stronger improvements in governance and business climates.

- **Prevalence of informality.** One-half of the world’s informal output and 95 percent of its informal employment is in EMDEs. Three EMDE regions (East Asia and Pacific (EAP), Latin America and the Caribbean (LAC), and Europe and Central Asia (ECA)) accounted for more than one-third of the world’s informal output, but only one-quarter of its
formal output. Meanwhile, South Asia (SAR) hosts almost half of the world’s informal workers, although the region accounts for less than one-tenth of the world’s formal employment and less than one-twentieth of the world’s formal output. Another 14 percent of the world’s informally employed are in Sub-Saharan Africa (SSA), two to five times the region’s share of the world’s formal output or formal employment.

- **Informality and development outcomes.** Higher informality is associated with lower output growth, lower productivity, and higher poverty and income inequality. Potential reasons for greater poverty in economies with higher informality may include a lack of fiscal resources to fund public services or wage differentials between informal and formal workers. Workers in the formal economy earn, on average, about 19 percent more than workers in the informal economy. These wage differentials largely reflect the characteristics of informal workers, who tend to be lower-skilled than formal workers.

- **Informality and firm productivity.** The average informal firm in EMDEs is only one-quarter as productive as the average firm operating in the formal sector. Moreover, firms in the formal sector that face informal competition are, on average, only three-quarters as productive as those that do not. Better business climates can mitigate some of these productivity differentials.

- **Informality and fiscal indicators.** In EMDEs with the most pervasive informality, government revenues are lower by 5-10 percentage points of GDP (and expenditures lower by 4-10 percentage points of GDP) than in those with the lowest levels of informality. In developing economies, pervasive informality further limits governments’ limited ability to implement redistributive measures, invest in public infrastructure, or carry out other growth-enhancing policies.

- **Policy implications.** A review of studies of policy measures that have had repercussions

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**FIGURE 3.1 Informality: Magnitude and correlates**

The informal sector accounts for about a third of GDP and 70 percent of employment (of which self-employment is more than a half) in emerging market and developing economies (EMDEs). A large informal sector is associated with slower GDP growth and weaker governance as well as greater poverty and income inequality. Widespread informality is also seen in economies with lower government expenditures and revenues, and a skew towards trade-based taxation.

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Source: Elgin et al. (forthcoming a); International Monetary Fund, World Economic Outlook; Maloney (2004); International Labour Organization; World Bank (Doing Business, World Development Indicators, World Governance Indicators); World Economic Forum; World Value Survey.

A. Unweighted averages. Informal employment (in red) uses self-employment shares (with additional informal employment shares in shaded red) in the closest (latest) available year around 1990 and 2016. World averages between 1990-2016 are in orange. EMDEs = Emerging market and developing economies.

B. Unweighted average for each informality measure for latest available year (with the corresponding +/-1 standard deviation shown in vertical bars). See Annex 3.1 for details.

C. Group averages of DGE-based informal output in percent of official GDP in year 2016 are shown in diamonds, with bars showing 95 percent confidence intervals. The dashed line shows the world average. “High” ("Low") indicates countries with above- (below-) median values in the following two measures: Doing Business distance-to-frontier and governance effectiveness (WGI).

D. The shares of informal workers preferring informal over formal employment (Maloney 2004).

E. Data are for 1990-2016. Group means (diamonds) and 95 percent confidence intervals (bars) are shown for poverty headcount ratio at $1.90 a day (2011 PPP, percent of population) and Gini coefficients. “High informality” ("Low informality") indicates countries with above- (below-) median informal output (DGE-based estimates).

F. Differences in fiscal indicators between the lowest and highest output informality in EMDEs

Click here to download data and charts.
BOX 3.1 Linkages between formal and informal sectors

Empirical evidence on the degree of cyclicality of the informal economy with the formal economy is mixed. The cyclicality and sensitivity of informal employment to formal business cycles depend on the sources of shocks driving business cycles, the presence of rigidities in the formal sector, the initial extent of informality, and the availability of informal jobs.

While there is broad consensus that the informal economy is sizable in emerging market and developing economies (EMDEs), evidence for its behavior over the business cycles remains inconclusive. An informal economy that expands while the formal economy contracts may support household incomes during economic downturns and could serve as a safety net (Loayza and Rigolini 2011). An informal economy that behaves procyclically could function as a “growth engine” by providing more services and intermediate inputs to the formal economy during economic expansions but, conversely, could also amplify the adverse effect of recessions (Dell’Anno 2008; Chen 2005; Meagher 2013). Earlier work suggests that the degree of cyclicity of the informal economy depends on the measure of informality, the types of shocks causing business cycles, and country characteristics.

Against this backdrop, this box reviews the literature and presents results from a set of empirical exercises to address the following questions:

- What conclusions does the literature offer about the cyclical behavior of the informal economy?
- How synchronized have been movements in informal and formal economies?
- What are the policy implications of cyclicality?

Literature review

The literature on the cyclical behavior of the informal economy offers mixed conclusions. Studies focusing on the share of the informal economy in total output or employment tend to find counter-cyclical behavior whereas studies focusing on output or employment levels tend to find procyclical behavior. The theoretical literature suggests that the degree of procyclicity depends on the source of shocks causing business cycle fluctuations and on the presence of labor market rigidities. This section summarizes this literature.²

Note: This box was prepared by Sergiy Kasyanenko and Shu Yu.

1 See Meagher (2013) for a literature review on studies concerning the linkage between formal and informal economy.

2 Several recent studies also argue that pervasive informality may influence the measured cyclicity of the formal economy. For example, Restrepo-Echavarría (2014) and Horvath (2018) show that models with a large and poorly measured informal sector can generate excess volatility of formal consumption relative to formal output—a common feature of business cycles in many EMDEs.

Informal economy as a countercyclical safety net

The informal sector can serve as buffers and safety nets for the poor if it absorbs labor during recessions.³ This can facilitate an economic recovery provided that re-entry into the formal sector is possible when the formal economy returns to expansion (Colombo, Onnis, and Tirelli 2016; IMF 2017; Loayza and Rigolini 2011).

Macroeconomic evidence. Macroeconomic studies suggest that the informal economy can behave “countercyclically” in the sense that the share of informal employment indeed rises during business cycle downturns.⁴ Using data from 54 countries for 1984-2008, Loayza and Rigolini (2011) show that, on average, a one standard deviation slowdown in GDP per capita growth (i.e., 3 percentage points) is linked with a short-run increase in the share of self-employment in the total labor force by 1.2 percentage points. However, they also find considerable heterogeneity across countries—the counter-cyclicity of informal employment is much weaker in economies with more pervasive informality.⁵

Using quarterly data for Mexico, Fernández and Meza (2015) find that the correlation between informal employment and official GDP is modest (about -0.3), whereas the correlation between formal employment and formal output is strongly positive. The authors argue that this lowers cyclicity of total employment. Colombo, Onnis, and Tirelli (2016) use electricity consumption as a proxy for total economic activity to study cyclical properties of informality in 48 countries over the period.

3 Due to its flexibility, the informal sector is able to adjust in wages rather than employment during recessions, which explains the informal employment’s lack of responses to economic downturns (Maloney 2004; Guriev, Speciale and Tuccio 2016).

4 Remittances, as a buffer against shocks to formal economy, may also influence the cyclicity of the informal sector. Remittances appear to be largely absorbed by the informal sector as Ivlevs (2016) finds that high level of remittances tends to be associated with more informality. Shapiro and Mandelman (2016) and Chatterjee and Turnovsky (2018) show that countercyclical remittances are associated with higher informal employment during recessions as formal employment declines.

5 The extent of countercyclicity drops as the share of informal employment in total employment increases and disappears when informal employment accounts for more than 42-43 percent of total employment. Theoretically, Shapiro (2014) suggest that while the share of self-employment tends to decline during economic upturns, the ease of entry into self-employment explains the differences in cyclical behavior across countries.
1984-2005 and illustrate that the informal economy expands following a banking crisis. Finally, Kaufmann and Kaliberda (1996), Busato and Chiarini (2004) and Elgin (2012) present empirical evidence that the informal economy acts as a buffer, increasing its share of official GDP during economic downturns.6

More procyclical fiscal policy in less developed economies with weaker institutions may contribute to counter-cyclicality of informal activity. Fiscal policy tends to be more procyclical in countries with higher informality (Çiçek and Elgin 2011). In particular, procyclical fiscal consolidation during recessions, including through higher taxes, may encourage more informal employment and strengthen the counter-cyclicality of informal activity.

**Microeconomic evidence.** In work flow data for Brazilian metropolitan labor markets between 1983 and 2002, Bosch, Goni, and Maloney (2007) find that the informal sector is able to absorb more labor during economic downturns as jobs became scarce in the formal sectors. Bosch and Esteban-Pretel (2012) use the same data and find that the share of formal employment falls as formal-economy output contracts, in part because the rate at which workers find formal jobs plummets while that at which they find informal jobs remains broadly stable.7

**Informal economy as an engine of growth**

Since informal firms provide services, as well as final and intermediate goods to the formal sector, one would expect a positive correlation between formal and informal sector activity (Lubell 1991; Arvin-Rad, Basu, and Willumsen 2010; Moreno-Monroy, Pieters, and Erumban 2014). In addition, informal-economy income can support formal-economy demand.8

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6This empirical relationship between informal and formal activities appears to be present in both advanced economies and EMDEs. For example, Kaufmann and Kaliberda (1996) cover a panel of 16 Central and Eastern European countries in 1989-1994; Busato and Chiarini (2004) used data on the share of informal output in total GDP from the United States, Italy, the United Kingdom, and New Zealand over the period 1960-1997; Elgin (2012) utilizes a panel of 152 countries from 1999 to 2007.

7Job separation rates are countercyclical (i.e rise during recessions) for both sectors, with a much higher probability of losing an informal job during recessions.

8See Schneider (1998), Gibson (2005), Docquier, Müller, and Naval (2017), Kanbur (2017), Eliat and Zitmes (2002), and World Bank (2014). Although the relationship between formal and informal sectors may be symbiotic in the short run especially when policymakers are concerned about the welfare of low-skilled working poor, argue that in the long-run pervasive informality may create poverty traps and stymie economic development.

**Macroeconomic evidence.** Using informal output levels (as opposed to the share of the informal economy), Bajada (2003), Giles (1997), Tedds and Giles (2000), and Dell’Anno (2008) find that informal-economy output movements correlate positively (i.e., move pro-cyclically) with formal-economy output movements in Australia, New Zealand, Canada, and a group of 19 Latin American countries. In a group of developing countries, Fiess, Fugazza, and Maloney (2010) identify episodes where relative demand or productivity shocks to the non-tradables sector (as opposed to the tradables sector) are associated with higher informal employment (hence, procyclicality). In Brazil and Mexico, higher separation rates from informal jobs and a large drop of the formal job finding rate may induce labor outflows from the informal sector during recessions (Bosch and Maloney 2008). Arvin-Rad, Basu, and Willumsen (2010) develop a theoretical model that establishes procyclical informal-formal sector linkages, particularly when formal firms sub-contract labor-intensive stages of production to the informal sector.

**Microeconomic evidence.** Schneider (1998) reports that in Germany and Austria at least two-thirds of the income earned in the informal economy is immediately spent in the official economy resulting in considerable (positive) stimulating effects on the official economy. In firm-level data for India, Moreno-Monroy, Pieters, and Erumban (2014) find that formal and informal sector employment are positively correlated, in part because subcontracting by formal-sector firms to informal firms contributes to job creation in the informal sector. Data from Indian manufacturing firms show that the gross value added for several predominantly informal industries is positively correlated with that in the formal sector and FDI. This may be indicative of technological spillovers contributing to both formal and informal sectors (Beladi, Dutta, and Kar 2016).

**Factors determining the degree of procyclicality of the informal economy**

**Cross-country heterogeneity.** There is considerable cross-country heterogeneity in the degree of pro-cyclical of informal employment. It tends to be higher when informality is greater (Loayza and Rigolini 2011), when informal employment is more common (Shapiro 2014), when there are stronger informal-formal sector linkages such as through subcontracting (e.g., Moreno-Monroy, Pieters, and Erumban 2014; Mbaye, Benjamin, and Gueye 2017).

**Source of shocks causing business cycles.** The informal economy can move procyclically or countercyclically,
BOX 3.1 Linkages between formal and informal sectors (continued)

depending on the sectoral origin of the shocks that generate business cycles in the presence of wage rigidities, especially in the formal sector (Fiess, Fugazza, and Maloney 2010). Positive relative demand or productivity shocks to the non-tradable (largely informal) sector could increase informal employment, i.e. generate pro-cyclicality in informal employment, especially when combined with wage rigidities in the formal sector. For instance, in Colombia, capital account liberalization in the context of broader reforms during 1991-1996 raised permanent income and constituted a positive demand shock to the non-tradeable sector. This upturn resulted in an expanding non-tradable informal sector. Conversely, in the presence of wage rigidities, a negative shock to the tradables sector would expand informal (nontradables) employment and thus appear as countercyclicality.

Synchronization in formal and informal-economy movements

As in other studies that examine levels of employment and output, the data set used in this chapter suggests that, at the macroeconomic level, formal employment levels and informal output levels comove with formal output levels but informal employment levels do not. Several methodologies point to this finding, including analyses of volatility, business cycle turning points, correlations and factor models.

- **Macroeconomic volatility.** Since formal and informal employment move marginally (but statistically significantly) in opposite directions, the volatility of total (formal and informal) employment is somewhat lower than the volatility of each type of employment in isolation (Figure 3.1.1, Elgin et al. forthcoming a; Loayza and Rigolini 2011; Fernández and Meza 2015). Self-employment (as a proxy for informal employment) is somewhat less volatile than formal employment. In contrast, informal output is somewhat less volatile than formal output, possibly reflecting flexible adjustments in hours worked in the informal economy (Meghir, Narita, and Robin 2015; Guriev, Speciale, and Tuccio 2016).

- **Business cycle turning points.** About three fourths of business cycle troughs in formal output coincide with a trough in the informal output; seven out of ten formal output peaks coincide with informal output peaks (Elgin et al. forthcoming b). In contrast, turning points in self-employment, as a proxy for informal employment, rarely coincide with turning points in formal employment or formal output.

- **Correlations.** Lead, lag, and contemporaneous correlations of formal-economy output with informal-economy output are highly and statistically significant whereas those between formal output and informal employment are statistically insignificant (Figure 3.1.1; Elgin et al. forthcoming b). This is consistent with studies that find countercyclicality in the share of the informal economy and those show that informal firms are flexible enough to adjust in wages rather than employment during economic downturns (Maloney 2004; Loayza and Rigolini 2011; Guriev, Speciale and Tuccio 2016).

- **Common factors.** A dynamic factor model applied to formal and informal output and employment finds that a single common factor accounts for 38 and 40 percent of the output variance of the informal and formal economies, respectively (Kose, Prasad, and Terrones 2003; Elgin et al. forthcoming b). This common factor explains only a negligible share of the variance in informal employment.

Policy implications

A large degree of comovement of informal employment and formal output and of itself may not warrant policy action for two reasons. First, the direction of comovement can change over time if business cycle fluctuations are caused by changing sources of sectoral shocks. Second, the appropriate policy response would depend on the source of the shock that generates comovement. If a procyclical expansion in informal employment is largely the reflection of shocks in the nontradable sector, such as in construction, no policy response specifically related to informality may be needed. In contrast, if a countercyclical expansion in informal employment reflects a downturn in the tradable sector, such as in manufacturing, in the presence of labor market rigidities, measures to ease labor market rigidities may be the appropriate response (Fiess, Fugazza, and Maloney 2010).

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9 The correlation between formal and informal employment growth rates is above 0.2 and significant at 1 percent level.

10 This lack of comovement between formal output and informal employment is particularly pronounced in EMDEs, possibly reflecting data challenges in EMDEs, genuinely lesser synchronicity between formal economic output and formal employment in advanced economies, or higher labor market rigidities in EMDEs (Neumeyer and Perri 2005; Botero et al. 2004; Campos and Nugent 2012).
In addition to measures taken explicitly to address informality, many measures undertaken for other reasons, such as tax measures, may have implications for informality. The discussion in this box highlights that these implications warrant a carefully calibrated policy mix.

The resilience of informal employment to business cycle swings, juxtaposed with the weaker development outcomes associated with informality (discussed in the main text), suggests a trade-off. In the short run, informal activity can provide a safety net during business cycle swings and labor dislocations caused by major structural changes such as trade liberalizations; in the long term, however, the informal sector can be a source of poverty and stymie development (Docquier, Müller, and Naval 2017; Dix-Carniero, Goldberg and Meghir 2018). Policy measures that—deliberately or inadvertently—reduce informality can therefore protect vulnerable population groups better if they are accompanied by strengthened social safety nets that can fulfill some of the roles of the informal sector.

Similarly, if comovement between formal and informal output reflects synergies, such as through subcontracting, policy measures aimed at curtailing informal activity can disrupt formal activity.

These effects could be mitigated if measures that reduce informality were accompanied by greater labor and product market flexibility in the formal sector that facilitates a reallocation of informal workers and firms.

for informality highlights the need for a comprehensive policy package that takes into account country-specific features that lead to informality and determine its consequences. First, strategies to reduce informality outright may hurt vulnerable groups and disrupt formal activity that relies on informal-economy inputs. These effects can be mitigated by stronger safety nets, greater labor and product market flexibility, and better access to resources for informal firms. Second, policies to spur development, as a collateral benefit, can help reduce informality. Specific measures discussed in this chapter include simplification of tax codes and enhanced enforcement of revenue collection, which can reduce the incentive to operate informally depending on country-specific circumstances;
easing of labor market regulations to lower the relative cost of employing formal workers and create a level playing field for formal and informal firms and workers; as well as greater access to finance and public services to help increase productivity in the informal sector and encourage a shift of activity to the formal sector.

**Informality: Conceptual considerations and measurement**

**Definition of informality**

Informality is often defined as market-based legal production of goods and services that are hidden from public authorities for monetary, regulatory, and institutional reasons (Schneider, Buehn, and Montenegro 2010). This general definition encompasses many types of informal activity among workers and firms. Some studies distinguish different types of informality by the motives of participating in the informal economy. For example, some classify informal workers and firms into those that are “excluded” and those that “voluntarily exit” from the formal sector (Perry et al. 2007). Others focus on “subsistence informality,” which is pervasive in lower-income countries and characterized by low-skill technology. In the absence of such an informal economy, the income of low-skilled workers would fall below subsistence levels (Docquier, Müller, and Naval 2017).

Some others classify informal workers and firms into evaders, avoiders, and outsiders depending on their compliance with regulations and regulations’ applicability (Kanbur and Keen 2015; Kanbur 2009). Evaders are firms that are covered by the regulation but do not comply; avoiders are firms that adjust to be outside the remit of the regulation; outsiders are firms that are simply not covered by the regulation. More recent studies distinguish different types of informality by the entities engaged in informal activity, separate from their motivation: within firms, formal and informal workers or activities (“interfirm margin”) and, within sectors, informal and formal firms or workers (“intersectoral margin,” Maloney 2006; Ulyssea 2018). Individual country practices vary widely but typically adhere to these broad principles.

- **Informal workers.** Informal employment covers all workers of the informal sector and informal workers outside the informal sector (ILO 2018a). The former comprises all persons who were employed in at least one informal firm. The latter group includes both self-employed and workers that are not employed in formal contractual arrangements or not subject to social protection or employment benefits. Some have defined informal employment more specifically as that of workers without pension coverage, which is a part of social protection (Loayza, Servén, and Sugawara 2010).

- **Informal firms.** An informal firm satisfies the following criteria (ILO 2018a). First, it is not

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1. Monetary reasons include avoiding taxes and social security contributions; regulatory reasons include avoiding government bureaucracy or regulatory burdens, while institutional reasons include corruption, the quality of political institutions and weak rule of law. For the purposes of this chapter, the informal economy reflects activities that, if recorded, would contribute to GDP, and does not cover illegal activities or household production (Schneider, Buehn, and Montenegro 2010; Medina and Schneider 2018). The difference between informal production and household production is that the latter does not encounter monetary transactions.

2. The definition and classification of informality is deeply context specific. Similarly, the choice of informality measures largely depends on the research question (see Elgin et al. forthcoming a, for details).

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7 See Perry et al. (2007, p.27) for a more detailed description of informal employment and different types of informal employment.

8 The most frequently used informal employment measure is the share of self-employment in total employment, which is a lower bound of informal employment (e.g., La Porta and Shleifer 2014). As defined by the 1993 International Classification of Status in Employment (ICSE-93), self-employed workers are those workers who, working on their own account or with one or a few partners or in a cooperative, hold the type of jobs defined as "self-employment jobs." The other measure, informal employment, comprises all workers of the informal sector and informal workers outside the informal sector. The former covers all persons who, during a given reference period, were employed in at least one informal sector enterprise, irrespective of their status in employment and whether it was their main or a secondary job. The latter covers self-employment and employees holding informal jobs. See Annex 3.1 for details. For the remainder of the chapter, informal employment will be proxied by self-employment since data on informal employment is not available for advanced economies. The numbers here refer to the latest available years.

9 Benjamin and Mbaye (2012) and Mbaye, Benjamin, and Guaye (2017) provide an alternative definition of informal firms as a continuum depending on size, registration, honest accounting, tax payments, mobility of work-place and access to bank credit.
an incorporated enterprise that is a legal entity separate from its owners, has its own complete set of accounts, but is not owned nor controlled by one or a few household members. Second, it is a market enterprise that sells its goods or services. Third, it falls into one of the following categories: it keeps the number of workers employed on a continuous basis and below a threshold determined by the country; it is not registered; or its workers are not registered.

Measurement of informality

Reflecting the difficulty of measuring informality, the literature has developed a wide range of estimation methods to capture its extent. In this chapter, a database of all commonly used measures of informality is compiled (summarized in Annex Table 3.1.1), ranging from model-based estimates of the share of informality in official GDP (MIMIC and DGE estimates), to survey-based measures of the share of informality in total employment (share of self-employed and share of workers covered by pension schemes), and public perceptions of the extent of informality (World Economic Forum index, World Value Survey index, and Enterprise Surveys). The database includes up to 196 economies (36 advanced and 160 emerging market and developing economies) over the 1990-2016 period. Both cross-country rankings and time trends are consistent for most countries. That said, the chapter relies mainly on the two model-based (DGE and MIMIC) estimates of the share of informal output and the share of self-employed (from International Labour Organization, World Development Indicators, and national statistical offices’ databases), which stand out in their time and country coverage.11

Main features of the informal economy

Informality: Lower in advanced economies than in EMDEs. On average, the size of the informal economy is about 32 percent of official GDP and, in EMDEs, 71 percent of total employment in 2016, of which self-employment accounts for 43 percent of total employment (based on latest available data for each country). A higher level of development, e.g., as measured by per capita income, is associated with lower informality, regardless of the measure of informality or the year chosen (La Porta and Shleifer 2014; Figure 3.2). As a result, informality tends to be considerably more pervasive in EMDEs than in advanced economies: in advanced economies, informal output accounts for about 17 percent of output and self-employment accounts for 14 percent of employment. Perceptions from business owners and managers about the pervasiveness of informality also suggest greater informal activity in EMDEs than in advanced economies.

Cross-country heterogeneity: Pronounced in EMDEs. The size of the informal economy varies widely across countries (Figure 3.2). In EMDEs, the informal economy ranged from around 10 (in China) to 69 (in Equatorial Guinea) percent of GDP—depending on the measure used—and self-employment ranged from near-zero (Qatar) to around 90 (Burundi) percent of employment. Among advanced economies, the share of informal output in GDP has varied from less than 12 percent, in Switzerland and Singapore, to about 32 percent in Estonia. During 2006-16, Greece registered the highest share of informal employment (37 percent) among advanced economies.

10 For the compiled data set, see Elgin et al. (forthcoming-a). In the data set, the Multiple Indicators Multiple Causes (MIMIC) model is a model of structural equations that use observable causes and indicators to capture the latent level of informal output. Elgin et al. (forthcoming a) follow Schneider, Buehn, and Montenegro (2010) closely when estimating the MIMIC model for 160 countries over the period 1993-2015. The dynamic general equilibrium (DGE) model of Elgin and Oztunali (2014) provides an alternative estimate of the size of the informal sector for 158 countries (36 AEs and 122 EMDEs) over the period 1950-2016. To make the measures comparable with those in the literature, both measures are reported in percent of official GDP. In the following sections, “in percent of GDP or output” is used as the equivalent of “in percent of official GDP” in the context of the share of informal output (both DGE-based and MIMIC-based estimates), while “in percent of employment” is used as the equivalent of “in percent of total employment.”

11 For presentational simplicity, throughout this chapter, the output share of informality refers to the share of informal output based on DGE model estimates, unless otherwise noted. The main results for features of informality, correlates of informality, and developmental implications are robust to the use of MIMIC-based estimates.
Regional informality: Common in all EMDE regions. Informality is common in all EMDE regions but takes different forms (World Bank 2012). On average, the informal economy's share of output is highest in Sub-Saharan Africa (SSA), Europe and Central Asia (ECA), and Latin America and the Caribbean (LAC). The share of self-employment, however, is highest in Sub-Saharan Africa (SSA), South Asia (SAR), and East Asia and the Pacific (EAP; Figure 3.3).

Two country examples illustrate differences across regions. In Brazil, the informal sector employs one-third of total employment and produces one-third of GDP. In Pakistan, the informal sector provides two-thirds of total employment but produces only about one-third of GDP. This difference points to considerably lower informal labor productivity relative to total labor productivity in Pakistan than in Brazil, in part reflecting lower educational attainment of informal workers (La Porta and Shleifer 2014; Loayza 2018).

Three EMDE regions (EAP, LAC and ECA) alone accounted for more than one-third of the world’s informal output in 2016, but only one-quarter of the world’s formal output. Almost half (42 percent) of the world’s informal workers can be found in South Asia (SAR), although the region only accounts for 9 percent of the world’s formal output and 3 percent of the world’s formal output (Box 3.2). Another 14 percent of the world’s informally employed are in Sub-Saharan Africa (SSA), well above SSA’s share of the world’s formal output (2 percent) or formal employment (5 percent).

Informality over time: Downward trend. The shares of both informal output and self-employment have declined since 1990, especially in EMDEs (Figure 3.2 and 3.4). Between 1990-16, on average, the share of informal output fell by about 7 percentage points of GDP in EMDEs (to 32 percent of GDP) and by about 4 percentage points (to 17 percent of GDP) in advanced economies. Over the same period, the average share of self-employment declined by about 4 percentage points (to 14 percent of total employment) in advanced economies and by
about 4.5 percentage points (to 43 percent of total employment) in EMDEs. These declines were broad-based: the share of informal output declined by 5 percentage points of output or more between 1990 and 2016 in all advanced economies and 86 percent of EMDEs.\footnote{The DGE-based measure of informal output shows that between 1990 and 2016, the share of informal output over official GDP fell in 140 (36 AEs and 104 EMDEs) out of 158 countries where data are available. Similar results are found in MIMIC-based measure on informal output. During the same period, 84 (18 AEs and 66 EMDEs) out of 127 countries experienced a drop in the share of self-employment.}

In EMDEs, the largest declines in the shares of informal output and employment occurred from the mid-2000s onwards in a reversal of a decade of rising informal employment and barely shrinking informal output.\footnote{The small-scale decline in the beginning of the 1990s is also driven by the expanding informal sector in countries in Eastern and Central Europe during their economic transition (Kaufmann and Kaliberda 1996).} In advanced economies, the largest declines in the share of informal employment occurred between the late 1990s and the global financial crisis; they have since partly reversed, amid anemic post-crisis growth (Figure 3.2).\footnote{A country-specific regression of the share of the informal economy in GDP and employment on a time trend over the period 1990-2016 captures this secular decline. In 50 (WEF)-100 (DGE) percent of advanced economies (depending on the measure) and 48 (WEF)-81 (MIMIC) percent of EMDEs, there has been a significant downward trend in the share of the informal economy in GDP and employment.} Among EMDE regions, the informal economy’s share of output dropped most in EAP, LAC, and SAR, while the share of self-employment dropped most in EAP, ECA, and the Middle East and North Africa (MENA; Box 3.2).

Characteristics of informal sector business cycles. The main features of recessions and recoveries in the formal economy, defined as in Harding and Pagan (2002) and Claessens, Kose, and Terrones (2012), do not differ statistically significantly from those in the formal economy (Figure 3.5; Elgin et al. forthcoming a). On average, both formal and informal recessions last about 1.5 years, which are about 0.5 years shorter than formal and informal recoveries. The speeds of adjustment in recessions (about 4 percentage points decline per year) and of recoveries do not differ statistically significantly between formal and informal sector.

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\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig3.3.jpg}
\caption{Informality by EMDE region}
Informality is common in all EMDE regions but takes different forms. On average, the share of informal output is highest in Sub-Saharan Africa, Europe and Central Asia, and Latin America and the Caribbean. The share of self-employment is highest in Sub-Saharan Africa, South Asia, and East Asia and the Pacific.
\end{figure}

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A. DGE-based informal activity
B. MIMIC-based informal activity
C. Informal employment
D. Labor force without pension
E. Perceived informal activity
F. Share of EMDE regions of world output and employment

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Source: Elgin et al. (forthcoming a); International Labour Organization; World Bank, World Development Indicators; World Economic Forum.

Note: See Annex 3.1 for data definitions. Blue and red bars indicate group means for 2006-16, with orange vertical bars indicating +/-1 standard deviation. EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MNA = Middle East and North Africa, SAR = South Asia, and SSA = Sub-Saharan Africa. EMDEs = Emerging market and development economies. C. Self-employment shares are used here.

E. Informality index provided by World Economic Forum (a higher value indicates more informality).

F. DGE-based estimates of informal output in each region as a proportion of total estimated informal GDP. Shares of self-employment are used as proxies for shares of informal employment. Formal output is equivalent to official GDP. Estimates are based on their respective average shares of output and employment during 2010-16.

Click here to download data and charts.
The informal economy accounts for a significant proportion of both employment and output across EMDEs. Around three-quarters of EMDE employment is estimated to be in the informal sector. Self-employment, which is relatively easy to measure and provides a lower bound estimate of informality, is 43 percent of total employment in the average EMDE, although this proportion ranges from 22 percent in the Middle East and North Africa (MENA), to 62 percent in Sub-Saharan Africa (SSA).

Informality has both costs and benefits. It can provide an important source of income in EMDEs, often to those with few available alternatives. That said, informal employment is often associated with lower and more uncertain incomes for workers and lower revenues available for governments to fund their development objectives.

The regional disparities in the scale of informality depend on a wide range of factors. To summarize these regional distinctions, this box addresses the following questions:

- Where is global informality concentrated?
- What have been the correlates of informality across EMDE regions?
- What policy options are available?

Where is global informality concentrated?

Regional composition of EMDE informal sectors. One-half of the world’s informal output and 95 percent of informal employment is located in EMDEs. Three EMDE regions alone accounted for one-third of the world’s informal output in 2016: East Asia and Pacific (EAP), Latin America and the Caribbean (LAC), and Europe and Central Asia (ECA). They are also the largest EMDE regions by formal GDP, accounting for one-quarter of the world’s formal output.

In terms of employment, almost half (42 percent) of the world’s informal workers can be found in South Asia (SAR), although the region accounts for just 9 percent of the world’s formal employment and 3 percent of the world’s formal output (Figure 3.2.1). Sub-Saharan Africa (SSA) is also over-represented in its share of informal employment, accounting for 14 percent of the world’s total, well above its share of the world’s formal output (2 percent) or formal employment (5 percent).

Informal-sector productivity in EMDE regions. In all EMDE regions, the proportion of informal employment exceeded the share of informal output, reflecting a tendency for the informal sector to be less productive than the formal sector (La Porta and Shleifer 2014; Fajnzylber, Maloney, and Montes-Rojas 2011). This difference is particularly pronounced for SAR and SSA, where the informal employment share is approximately double the informal output share.

Trend decline in informality. In all EMDE regions, the informal sector has steadily declined in relative importance since the 1990s. On average, informality has fallen by 5 percentage points of GDP since the 1990s, partially driven by economic development and improvement in governance. The decline in relative importance was largest in EAP and SAR with informality falling by 8 percentage points in both regions. Faster-than-average formalization of the economy in these two regions is likely to in part reflect faster-than-average per capita GDP growth since the 1990s. Conversely, informality in the Middle East and North Africa (MENA) decreased only modestly amid persistently weak growth and entrenched weak governance.

Within-region heterogeneity. The regions with the widest per capita income heterogeneity were also those with the widest range of informality as a share of output or employment. Informality is significantly more prevalent in lower-income economies within EAP despite the relatively low share of informal output for the region as a whole. In MENA, the non-Gulf Cooperation Council (GCC) economies have elevated levels of informality while the share for MENA as a whole is the lowest of all EMDE regions (Box 2.4). In contrast, in SSA, where the variation

Note: This box was prepared by Gene Kindberg-Hanlon with research assistance from Jinxin Wu and Zhuo Chen. It summarizes six boxes on the regional dimensions of informality featured in Chapter 2.

1 For the purposes of this box, informal employment is proxied by self-employment because of good data coverage, and the regional disparities identified in this box are robust to other measures.
of per capita incomes is one-fifth that of MENA (the EMDE region with the largest per capita income heterogeneity), informality amounted to over 30 percent of output and 39 percent of employment in three-quarters of countries.

What have been the correlates of informality across regions?

Informality is concentrated in countries which are less developed and suffer from a range of institutional weaknesses. Poverty and low human capital are strongly associated with those regions with the highest incidence of informality. In contrast, in wealthier regions such as LAC and ECA, institutional weaknesses and tax policy have contributed to elevated levels of informality.

Economic development. Informality is most prevalent in EMDE regions with low income per capita, reflecting the role of informality as both a driver and consequence of poverty (La Porta and Shleifer 2014). None of the regional shares of informal output or employment deviates statistically significantly from what might have been expected based on average per capita incomes alone (Figure 3.2.1).

Low human capital. Informality is also more prevalent where educational attainment is weak. In SSA, where...
educational attainment is the lowest on average among EMDEs, informal sector workers are much less likely to have completed primary education than those in the formal sector (Figure 3.2.2; Adams, de Silva, and Razmara 2013). Education levels have also been found to be an important correlate of informality in SAR, where attainment is also below the EMDE average.

High regulatory and tax burdens. In LAC, several studies have found a strong relationship between the region’s above-average tax rates and ease of tax avoidance, and the level of informality (Figure 3.2.2; Loayza 1996; Vuletin 2008; Ordóñez 2014). For ECA, labor market regulations that are more restrictive than elsewhere have been identified as drivers of informal employment (Fialová and Schneider 2011).

Weak institutions. Some economies in ECA have below-average institution quality, which may explain the region’s slightly above-average degree of output informality despite ECA’s relatively high per capita income. In non-GCC MENA economies, corruption has been cited among the biggest hindrances to firms which may increase incentives to operate informally (World Bank 2016).

Region-specific factors. A number of region-specific factors have contributed to informality.

- In ECA, a high share of informal output is partly a legacy of the collapse of the Soviet Union in the late 1980s and early 1990s as well large remittance inflows that have financed informal sector activity (Box 2.2).
- In some LAC economies, the trade liberalizations of the 1990s have been identified as contributors to growing informality, as formal firms that were unable to compete in a liberalized formal economy retreated into informality (Box 2.3).
- In MENA, although informality is particularly pronounced in non-GCC economies, in the GCC informality is low partly because of its heavy reliance on documented foreign workers and government employment (Box 2.4; World Bank 2018c).
- In SSA, large agricultural sectors help explain widespread informal employment as does the conflict and violence that have afflicted the region and forced people to earn their livelihoods in the informal economy (Box 2.6).

What policy options are available?

To mitigate the damaging effects associated with informality, policy responses can be tailored to the circumstances and drivers of informality in that economy. Policy options can be broadly split into several categories:

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Causes and implications of informality

Causes of informality. Theoretical models present two major reasons for the emergence of informal activity: lack of development (Harris and Todaro 1970; Loayza 2016), and poor governance including burdensome regulations, corruption, or poor public services (de Soto 1989).

- Lack of development. Informality has often been attributed to under-development. This reflects an inability of an urban modern formal sector to absorb rural migrants during the urbanization process (Harris and Todaro 1970; Fields 1975; Loayza 2016). Development can further shrink the informal sector because households tend to shift away from agricultural and informal sector goods as their incomes grow (Saracoglu 2008). Finally, limited access to credit, often associated with less development, constrains informal firms' ability to overcome barriers to entry into the formal sector.15

Improving human capital. By investing in education and social services to improve human capital, policy makers can improve the productive capacity of workers that are currently uncompetitive in the formal sector. Training has been found to boost worker income and firm revenue in studies in the informal sectors of SSA and SAR (Verner and Verner 2005; Burki and Abbas 1991).

Improving access to public services and finance. Efforts to facilitate informal sector business can benefit informal sector workers and make them more competitive (Box 2.6; Sonobe, Akoten, and Otsuka 2011). For example, in SSA, providing informal traders public goods, such as a market to trade in or access to water and sanitation, has helped increase informal firm profitability and product quality. In SAR, a lack of access to financial resources is common for the self-employed (Ghani, Kerr, and O'Connell 2013; Box 2.5). Enabling access to microfinance has been found to increase investment and productivity in the informal sector (Likhi 2013; Donou-Adonsou and Sylwester 2017; Imai and Azam 2012).

Easing tax and regulatory burdens. Several studies in LAC have found that policies to reduce tax rates and simplify tax systems have incentivized firms to transition to the formal sector. Payroll or business tax cuts in Colombia, Brazil and Uruguay have been associated with higher formal employment and firm registration.4 However, in regions where tax rates or tax compliance costs are not elevated, cutting taxes can be counterproductive in reducing informality. In ECA, where corporate tax rates are lower than the EMDE average, higher taxation was associated with increased formalization in some studies because of the lack of public goods provided in regions with insufficient tax revenue (Fialová and Schneider 2011; Friedman et al. 2000). Separately, less restrictive employment protection has been associated with a smaller informal economy (both in employment and output) in ECA countries (Fialová and Schneider 2011; Lehmann and Muravyev 2009).

Tightening enforcement. Enforcement that is economically and socially sensible can help reduce the presence of the informal sector (Loayza 2018). In LAC, policies such as labor inspections have been found to induce informal workers and firms to formalize (De Andrade, Bruhn, and McKenzie 2013; and Almeida and Carneiro 2012). Studies in ECA, SAR and EAP have also found that lower levels of enforcement are associated with higher rates of informality (Box 3.4). Regulatory and tax compliance rates increase more if increased labor or tax inspections are accompanied by other measures such as awareness campaigns (Rani et al. 2013).

Reducing corruption. In ECA, where informality rose considerably following the disruptions associated with the collapse of the Soviet Union, higher corruption has been linked with higher informality (Friedman et al. 2000). Economies in ECA that were slower to implement structural reforms and control corruption in the 1990s saw a smaller-than-average decline in informality (Kauffman and Kaliberda 1996). Corruption is also a key disincentive to enter the formal sector in MENA according to firm surveys.

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Implications of informality. A sizeable informal sector could impede growth, encourage poor governance, and limit a government’s ability to reduce income inequality.

- **Slower growth.** A sizeable informal sector that competes with the formal sector for low-skilled workers reduces the incentives to invest in human and physical capital and new technologies and slows growth in the long run (Docquier, Müller, and Naval 2017; Loayza 1996; Sarte 2000).

- **Poor governance.** Several theoretical models attribute corruption and excessive regulations to the presence of an informal economy. Government officials are incentivized to impose excessive regulations and permits to have the power to collect bribes in return for providing permits (Shleifer and Vishny 1993). Others have argued that the government strategically designs a system of poor governance to promote informality for the poor, which acts as an alternative redistributive strategy (Marjit, Mukherjee, and Kolmar 2006).

**Correlates of informality**

The causes and implications of informality predicted by theoretical models are also confirmed by empirical studies as many correlates of informality are symptoms of under-development. A large informal economy is associated with weaker economic outcomes, such as under-development, less access to credit, limited trade openness, less skilled labor force, as well as weaker output, investment and productivity growth (Box 3.3). Informality is also associated with less effective institutions, such as weak governance and excessive tax and regulatory burdens (Loayza, Oviedo, and Servén 2006; Enste and Schneider 1998).

**Under-development.** A lower level of development, as measured by per capita income, is associated with higher informality (Figure 3.6).17

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16 Also see Busato and Chiariini (2004), Charlot, Malherbet, and Terra (2015), Saracoğlu (2008), and Ordóñez (2014).

17 See also Loayza, Servén, and Sugawara (2006) and La Porta and Shleifer (2014).
In the case of both output and employment informality, GDP per capita in countries with below-median (“low”) informality is about 2-3 times of those in countries with above-median (“high”) informality (Figure 3.6). The lower productivity and resource misallocation associated with higher informality may also be reflected in slower output growth.

Slower accumulation of physical and human capital. A larger informal economy is associated with a lower rate of output growth. This may reflect slower accumulation of physical or human capital (Ovedio, Thomas, and Karakurum-Ozdemir 2009). At the firm level, informality can limit access to conventional bank credit, because of a lack of documentation for assets and inadequate financial statements. Investment activity in the informal sector may also be subdued because informal firms may be unwilling to adopt technologies that would make them more visible to tax and other authorities (Dabla-Norris and Inchauste 2008; Gandelman and Rasteletti 2017). For example, about 11,600 firms that participated in Enterprise Surveys in 18 countries during 2007-2014, the fraction of firms that invested in any given year in the formal sector was significantly higher than that in the informal sector. In the long run, the tendency to hire less skilled workers in the informal sector may slow human capital accumulation. Indeed, countries with below-median informality tend to have significantly higher levels of human capital (Maloney, 2004; Docquier, Müller, and Naval 2017; Figure 3.6).

Slower productivity growth. At the macroeconomic level, the evidence for a correlation between productivity growth and informality has been mixed (Perry et al. 2007; D’Erasmo and Moscoso Boedo 2012). At the firm level, in contrast, many studies have shown that informal firms tend to be less productive than their formal counterparts; although this productivity differential in part reflects the characteristics of informal firms. On average, informal labor productivity is lower than total labor productivity in EMDEs, although not in advanced economies (Figure 3.6; Loayza 2018). In addition, competition from informal firms has been associated with lower productivity of formal firms. The presence of informal competitors, which do not shoulder regulatory and tax burdens, can reduce formal firms’ profitability, thus eroding their ability to invest in productivity-enhancing technologies or human capital (Perry et al. 2007; Box 3.3).

Less trade openness. A smaller informal sector is associated with greater economic openness, especially to trade. On average, the trade-to-GDP ratio is lower by 17 percentage points in

18 Median informality amounts to about 32 percent of GDP for DGE-based informal output and 34 percent of total employment for self-employment.


20 See Koeda and Dabla-Norris (2008) for details. Empirically, greater access to credit has been associated with lower informality (Maloney 2004; Straub 2005; La Porta and Shleifer 2014).


22 Empirical studies, such as Goldberg and Pavcnik (2004, 2007), Sharma (2009), Boly (2018), and McCaig and Pavcnik (2018), show that informality declined following some trade liberalization episodes. Conversely, a short-term increase in informality has been attributed to trade liberalization amid inflexible labor markets in studies such as Goldberg and Pavcnik (2005), Attanasio, Goldberg and Pavcnik (2002), and Bosch, Goñi-Pacchioni, and Maloney (2012).
BOX 3.3 Casting a shadow: Productivity in formal and informal firms

The average informal firm in emerging market and developing economies (EMDEs) is only one-quarter as productive as the average firm operating in the formal sector. Moreover, firms in the formal sector that face informal competition are, on average, only three-quarters as productive as those that do not. This suggests that competition from the informal sector can erode formal firms’ market share and resources available to boost productivity where formal firms shoulder the additional cost of regulatory compliance. More effective governance and stronger control of corruption can help mitigate these effects.

The productivity differential between formal and informal firms is well established in the literature (Loayza and Rigolini 2006; Oviedo 2009). However, there is mixed evidence on the impact of a large informal sector on formal firms’ productivity. Some studies suggest that the informal and formal sectors operate independently so that there are no productivity spillovers (La Porta and Shleifer 2008). Others report that competition from the informal sector may erode the profitability of firms that operate in the formal sector, which leads to limited resources to enhance firm productivity.\(^1\) The aggregate effect depends on country characteristics.

Against this backdrop, this box documents the productivity gap between formal and informal firms and their interactions. Specifically, it addresses the following questions:

- How large is the productivity differential between formal and informal firms?
- To what extent are formal firms exposed to informal competition?
- How does informal competition affect the productivity of formal firms?

Productivity differential between formal and informal firms

Literature review. The literature documents that informal firms in EMDEs are less productive than formal firms, with a productivity gap ranging between 30 to 216 percent (Perry et al. 2007; La Porta and Shleifer 2008). This productivity gap between informal and formal firms is attributed to modest technological improvements, reliance on unskilled labor, limited economies of scale, and restricted access to services, markets, and funding.\(^2\) Moreover, labor productivity varies within the informal sector along different dimensions such as firm size and type of activity (Amin and Huang 2014; Amin and Islam 2015).

Methodology. In this box, the productivity gap between formal and informal firms is estimated using World Bank’s Enterprise Survey data collected over a period spanning 2007 to 2014 for a cross-section of 4,036 informal firms and 7,558 formal firms in 18 EMDEs (Annex Table 3.1). Formal firms are those that comply with tax, customs, labor, and licensing regulations and register with the relevant authorities; unregistered firms belong to the informal sector. To estimate the productivity gap, a measure of labor productivity—log annual sales in 2009 U.S. dollars per worker—is regressed on a dummy variable that takes the value 1 for informal firms and 0 otherwise and a set of control variables capturing additional firm characteristics (employment size, time in business, location, sector, country).\(^3\)

Lower productivity in informal than formal firms. Virtually across the board, firm-level labor productivity is much lower in the informal sector than in the formal sector (Annex Table 3.1).\(^4\) The productivity differentials vary widely in this sample, from 48 (Côte-d’Ivoire) to 93 percent (Argentina). On average across the whole sample, the productivity of informal firms is only one-quarter of the productivity of formal firms (Figure 3.3.1).

Drivers of productivity gap between informal and formal firms. Firm size, age, location in the capital city and manager experience are associated with significantly larger productivity gaps between informal and formal sectors (Figure 3.3.1, Annex Table 3.2).\(^5\) Formal firms appear to be better equipped to reap the productivity benefits from size, age, and location than informal firms.

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\(^1\) Commonly used revenue-based measures of productivity may confound efficiency and price effects. Disentangling efficiency and price effects, by relying on physical productivity measures, may shed new light on productivity patterns, especially at the firm level (Jones and Nordhaus 2008; Cusolito and Maloney 2018).

\(^2\) Exceptions are Democratic Republic of Congo and Cabo Verde possibly due to a low productivity of formal firms.

\(^3\) The results are robust to comparing the coefficient estimates for the informal-firm dummy between a baseline regression including all controls and an alternative regression dropping each dummy one at a time (Annex Table 3.2).

Note: This box was prepared by Mohammad Amin and Cedric Okou.

\(^1\) Gonzalez and Lamanna (2007), Heredia et al. (2017), Mendi and Costamagna (2017).

Firm age. As firms grow older, they are either sufficiently productive to survive or they disappear ("selection effect"; Brandt, Van Biesenbroeck, and Zhang 2012). In addition, learning from experience may have taught older firms productivity gains ("learning effect"; Luttmer 2007). These effects appear to be much more pronounced among formal firms than among informal firms. As a result, the productivity differential between formal and informal firms widens as the age of firms increases. Among one-year-old firms, informal firms have about half the productivity of formal firms. Among ten-year-old firms, informal firms have less than one-quarter the productivity of formal firms.

Firm size. Larger firms can reap economies of scale that raise their productivity compared to smaller firms. Again, in this sample, this effect appears to be stronger among formal firms than among informal firms. Among firms with one employee, informal firms have just under one-third the productivity of formal firms; among firms with ten employees, informal firms have less than one-quarter the productivity of formal firms.

Firm location. Capital cities are typically among countries’ largest economic centers and so can offer agglomeration benefits: larger markets, better infrastructure to access markets and operate, a larger pool of workers, greater technology spillovers (Rosenthal and Strange 2004; Duranton and Puga 2004). Again, formal firms appear to be better able to benefit from these locational advantages, but the effect is economically modest (although statistically significant). Among firms operating inside the capital city, informal firms’ productivity is 31 percent that of similar formal firms; outside the capital city, informal firms’ productivity is 30 percent that of similar formal firms.

Manager experience. Managerial ability has been associated with higher productivity, through a variety of channels including hiring decisions and input choices (Fernandes 2008). Again, managerial experience appears to benefit formal firms’ productivity more than informal firms’ productivity. Among firms managed by managers with one year of experience, informal firms’ productivity is just over one-third that of formal firms; among firms with...
Informality as a survival strategy of unproductive firms.

Productivity differentials across informal firms. Labor productivity also differs across different types of informal firms, although the characteristics that are associated with higher labor productivity of informal firms differ across countries. In two-fifths of countries, informal firms managed by a manager with higher education or without any employees other than the owner are significantly more productive than other informal firms (column (1) in Annex Table 3.2). Other informal firm characteristics, such as operating in the services sector or being a startup, are accompanied by higher productivity in some countries but lower productivity in other countries.

Productivity of formal firms amid high informality

Impact of informal competition on formal firms: Theory.

The extent of competition between formal and informal firms depends on the underlying reasons for the existence of informal firms. Informality as a survival strategy of unproductive firms. Low-productivity firms may be forced into informal operations or, even if they operate formally, employing informal workers because this may reduce their costs (Ulyssea 2018; Boly 2018). Operating in the informal sector and employing informal labor may, therefore, be a survival strategy for less-productive firms that belong to fundamentally different markets (La Porta and Shleifer 2014). “Surviving” informal firms are likely to operate in very different markets and sell different products than formal firms (La Porta and Shleifer 2014). In such circumstances, competition between informal and formal firms and its impact on formal firms may be limited.

Informality as an evasion strategy of productive firms. Some informal firms may be sufficiently productive to survive in the formal sector yet choose to remain informal to benefit from the cost advantage of noncompliance with (possibly excessive) taxes and regulations (Maloney 2004; de Mel, McKenzie, and Woodruff 2011). Such informal firms could constitute an untapped potential for a productivity boost (de Soto 1989). On the other hand, they can create aggressive competition with formal firms that do shoulder the additional cost of tax and regulatory compliance. Such informal competition can reduce the profitability necessary for formal firms to invest in productivity-enhancing new technologies or to innovate, especially in a context of weak property rights enforcement. Alternatively, this very competition could force formal firms to increase productivity or, for the lowest-productivity ones, to exit.

Extent of informal-firm competition for formal firms. In the World Bank’s nationally representative survey data for 75,137 formal (registered) firms in 135 countries between 2008 and 2018, about 55 percent of formal firms reported facing competition from informal firms. The share of informal firms competing against formal firms was about 60 percent in EMDEs, 13 percentage points higher than in advanced economies. The level of competition varied widely across countries, ranging from about 7 percent in Bhutan to 95 percent in Uganda. Smaller firms were significantly more likely to be exposed to informal competition than larger firms but there is little evidence of any other systematic difference between firms that were exposed and those that were not (Figure 3.3.2).

Impact of informal competition on the productivity of formal firms

Methodology. OLS regressions are used to estimate the difference in labor productivity between formal firms that compete against informal firms and those that do not. In the baseline specification, the dependent variable is again productivity.

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7 This discussion assumes that firms are either formal or informal. In practice, the degree of informality can vary (Perry et al. 2007; Ulyssea 2018). At the extensive margin are firms that operate fully informally, in product markets and labor markets. They sell their output informally and employ informal labor. At the intensive margin are firms that operate semi-formally: they sell their output into formal product markets but employ, in part, informal labor, as observed in EMDEs and LICs.

8 Such circumstances are likely to be associated with an environment of weak regulatory and tax enforcement (Quintin 2008; Dabla-Norris, Gradstein, and Inchauste 2008; Ulyssea 2010; Benjamin and Mbaye 2012).

9 This has been documented for some Latin America countries, India, Poland, Portugal, Russia, and Turkey. For evidence, see Heredia et al. (2017), Perry et al. (2007), Farrell (2004), Capp, Elstrotz, and Jones (2005), Cunha (2006), Gonzalez and Lamanna (2007), Friesen and Wacker (2013), Allen and Schipper (2016), Iyemura, Kishore, and Tu-lukda (2016), and Distinguin, Rugemintwari, and Tacneng (2016).

10 This has been documented for Egypt, see Ali and Najman (2017); Melitz (2003); Schipper (2016).

11 In the World Bank’s Enterprise Surveys, formal firms are asked the following question: “Does this establishment compete against unregistered or informal firms?”
labor productivity measured by the (log of) annual sales in 2009 U.S. dollars per worker. The main explanatory variable is the informal competition indicator proxied by the proportion of formal firms in a cell that report facing competition from informal firms. A cell is defined as a group of firms of similar size and in the same region and sector.\footnote{As a caveat, the informal competition faced by a specific firm may also be driven by its productivity, thus generating endogeneity concerns. To address possible endogeneity issue, we use the proportion of formal firms facing informal competition in a group of firms of similar size in the same region and sector (a “cell”) rather than a firm dummy. A cell proportion should be much less correlated with the productivity of a specific firm, and therefore, should be more robust to endogeneity concerns.}

**Productivity gap between formal firms with and without informal competition.** Formal firms that face informal competition are, on average, 24 percent less productive than those that do not (Figure 3.3.3; Annex Table 3.3). After controlling for the informal competition, formal firms in the manufacturing and retail industries have higher productivity than those in other services. Older, exporting, and foreign-owned formal firms also have higher productivity even if they face competition from informal firms.

**Role of the business climate and development.** Economic development and the business climate may substantially shape the productivity gap between formal firms that face informal competition and those that do not. This is captured in interaction terms between the share of similar formal firms reporting informal competition and indicators of development (the logarithm of per capita GDP), the quality of business climate as proxied by the distance to the frontier in the Doing Business Index, the control of corruption of the World Governance Indicators, and the Business Freedom index of the Economic Freedom indicators (Annex Table 3.3). Higher GDP per capita, better control of corruption, and a business environment that is freer and closer to best-practices dampen the detrimental impact of informal competition on formal firm productivity.

- **Development.** The sample is split into those countries with per capita income in the highest quartile in the sample and those in the lowest quartile in the sample. Formal firms that face informal competition in the average country with the highest per capita incomes are only 14 percentage point less productive than formal firms that do not face such competition. In contrast, on average in countries in the lowest quartile of per capita incomes, formal firms facing informal competition are 30 percent less productive than those firms that do not face such competition.

- **Control of corruption.** Again, the sample is split into those countries in the quartile of countries with the
strongest control of corruption and those in the quartile with the weakest control of corruption. In countries with the strongest control of corruption, on average, formal firms that face informal competition are only 22 percentage point less productive than formal firms that do not face such competition, whereas in the countries with the weakest control of corruption, this differential grows to 35 percent.

- Ease of Doing Business. Similarly, the productivity differential between formal firms that face informal competition and those that do not might halve (to 21 percent) if a country like Angola (in the quartile of countries with the most difficult business climates) were to improve its business climate to the level of a country like the Former Yugoslav Republic of Macedonia (among the countries with the most conducive business climates).

**Conclusion**

The productivity gap between informal and formal firms is substantial in EMDEs, averaging 75 percent in a sample of 18 EMDEs between 2007-14. Competition from informal firms also appears to weigh on the productivity of exposed formal firms: the productivity of formal firms that compete with informal firms is only three-quarters that of formal firms that do not compete with informal firms, after controlling for other firm characteristics. Improvements in the business climate, and economic development more broadly, can mitigate some of these negative productivity spillovers from informal to formal firms.
countries with a greater share of self-employment than countries with a smaller share of self-employment (Figure 3.6). Similarly, higher capital account openness is associated with less output and employment informality. That said, the impact of major trade liberalization episodes on informality varies across countries and differs between the short and the long term (Box 3.4; Goldberg and Pavcnik 2003; Fugazza and Fies 2010; Dix-Carneiro and Kovak 2017).

Heavier regulatory burden. Both empirical and theoretical studies suggest that heavier regulatory (or administrative) burdens may encourage informality as workers and firms join the informal sector to avoid regulatory and administrative compliance costs. The Doing Business distance-to-frontier scores for countries with below-median informality (by DGE estimates) is 60 points—which is significantly higher (by about 6 points or three-fifths of a standard deviation) than in countries with high (above-median) output informality (Figure 3.6). Similarly, the Business Freedom index is 7.5 points (about half of a standard deviation) higher in countries with low (below-median) output informality than in countries with high (above-median) informality.

Weaker governance. Research points to the contribution of poor governance to the pervasive informality in some EMDEs, especially in Latin America and the Caribbean and Europe and Central Asia regions (Box 3.2). On average, countries with above-median informality over the period 1990-2016 have had weaker government compliance costs.

Higher informality is associated with lower levels of development, poorer access to credit, heavier regulatory burdens, and weaker governance.

A. Economic correlates in EMDEs with high and low output informality

B. Economic correlates in EMDEs with high and low employment informality

C. Informality and GDP growth

D. The ratio of informal labor productivity to total labor productivity

E. Regulatory burdens in EMDEs with high and low informality

F. Governance in EMDEs with high and low informality

Source: Barro and Lee (2013), Elgin et al. (forthcoming a), Heritage Foundation, World Bank (Doing Business, World Development Indicators, World Governance Indicators). Note: Data are between 1990 and 2016. The corresponding 90 percent confidence intervals are shown as bars (except in D).

A-B. The group means for the following correlates are calculated for EMDEs with “high informality” (i.e., above median DGE-based informal output measure, A; above median self-employment share, B) and those with “low informality” (i.e., below median DGE-based informal output measure, A; below median self-employment share, B) over the period 1990-2016: GDP per capita (in logs, PPP, constant 2011 international $, WDI), access to credit (i.e., private sector credit in percent of GDP); human capital (i.e., average years of schooling), trade openness (i.e. the sum of exports plus imports in percent of GDP). C-F. Unweighted group averages over the period 1990-2016 (shown as the orange diamonds) for EMDEs with high informality (above median DGE-based informal output measure) and those with low informality are shown in bars for advanced economies, EMDEs, and world, with corresponding 95 percent confidence intervals shown in orange vertical bars. The relative ratio is calculated using DGE-based estimates and the share of self-employment following the method in Loayza (2018).
informal output and employment shares. Since 2000, perceptions have shifted significantly (into a different quartile of informality) in only 14 percent of all EMDEs (Elgin et al. forthcoming a).

Informality, poverty, and income inequality

Many studies document that informal-sector wages are below those in the formal sector, for a variety of reasons. This raises concerns that, over the long term, informality may entrench earnings differentials and income inequality and may contribute to greater poverty in countries with high informality.

Worker earnings differentials

Causes of wage differentials. Lower wage in the informal sector could result from different worker characteristics in the formal and informal sectors, possibly in response to the comparative advantage that some workers might have in informal sector activities, or to non-wage benefits that might accrue to work in the informal sector (Maloney 2004; Heckman and Li 2003). Alternatively, wage differentials could stem from rigidities and other factors that create a wedge in wages between similar workers in informal and formal employment. These factors can include labor regulations or tax provisions that force workers into the informal sector (Harris and Todaro 1970). An alternative to measuring wage differentials could be an assessment of the subjective well-being or job satisfaction of workers in the formal and informal sectors where workers benefit from flexibility and independence (e.g., Blanchflower, Oswald, and Stutzer 2001; Sanfey and Teksoz 2007; Falco et al. 2015).

Correlates of the decline in informality since 1990. The decline in informality was larger in countries with the bigger improvements in governance and, for output informality, faster growth in GDP and investment, and better access to credit (Figure 3.7). Perceptions of informality appear to change much more slowly than actual effectiveness (by about 0.6 points, or three-quarters of a standard deviation) than countries with below-median informality (Figure 3.6). Similar differences are found in the case of control of corruption and rule of law. For example, in Georgia, during the period 1996-2016, the transition to a market economy brought significant improvements in government effectiveness, control of corruption, and rule of law. With output growth averaging about 6 percent per year, the share of informal output fell by 9 percentage points of GDP, and the share of informal employment in total employment fell by a similar magnitude.
Methodology: Meta-Regression Analysis. A meta-regression analysis is employed to aggregate estimates of the formal wage premium from a set of studies to obtain a quantitative assessment of the sources of cross-study variation. The analysis focuses on 18 studies that test for the presence of significant wage differentials between formal and informal jobs, and its main sources (a detailed review of literature and methodology are presented in Annex 3.3). As is common practice in such meta-regression analyses, no study is excluded ex ante based on its source or its results, but rather the selection of studies is constrained to those that present numerical estimates with confidence bands for country samples since 2000.

Empirical estimates of wage differentials. The estimates of the wage differential between informal and formal workers in the 18 studies selected here range from a formal sector wage penalty of 50 percent in Tajikistan (Huber and Rahimov 2014) to a premium of 113 percent in South Africa (El Badaoui, Strobl, and Walsh 2008). The average formal wage premium in the studies is 19 percent (Figure 3.8). This wage differential between formal and informal jobs is particularly wide in LAC and SSA but below-average in ECA and SAR. It is also larger for informally employed than self-employed workers. Self-employed and contributing family members (predominantly women) constitute the majority of informal workers in developing Asia and Africa, whereas informal employees dominate the informal sector in ECA and in LAC (ILO 2018b).\(^\text{29}\) Wage premia in the formal sector tend to be higher where informality is more widespread.\(^\text{30}\)

Sources of observed wage differentials. The formal wage premium largely disappears in studies that control for unobserved characteristics of workers. Informal employment tends to be associated with lower education and with workers that are, on average, either younger or older than in the formal sector. It is also more prevalent in rural areas, where there are fewer alternatives in the formal sector, and among women (Hazans 2011; Gasparini and Tornaroli 2007). The informal sector employs more low-skilled labor than the formal sector, which can slow human

\(^{29}\)In many EMDEs, informal employment is generally a more important source of employment for women than men and, for women, a more important source than formal employment (Chen, Vanek, and Heintz 2006; ILO 2017).

\(^{30}\) The association between the level of wage premia in the formal sector and the level of informality could be driven by the stricter labor regulations that raise both wages and informality (Rauch 1991; Loayza 2016).
Conversely, the decline in poverty rates across all EMDEs regions (and especially in SAR and SSA) during 2005-15 was accompanied by a contraction of informal activities (Figure 3.8). At the country-level, a larger informal economy is associated with a higher poverty headcount (Figure 3.9). However, the direction of causality between informality and poverty remains an open question.

Regression analysis. The relationship between pre-existing informality and changes in the share of the population living in extreme poverty (i.e., the poverty headcount ratio at $1.90 a day at 2011 PPP exchange rate in percent of the population) or the Gini coefficient (World Bank estimates) is estimated in an ordinary least squares regression. Specifically, the annual average change in the poverty headcount ratio (or Gini coefficient) between the latest (in the period 2011-16) and earliest available data (in the period 1990-2005) for up to 74 countries is regressed on 1990-2005 average informality. To mitigate concerns about endogeneity, time horizons considered for informality measures precede those for the change in the poverty rate or Gini coefficient (Loayza, Servén, and Sugawara 2010; Annex 3.4). The regression controls for the initial level of poverty (or Gini coefficient) and income per capita, using the earliest available income data.

Pre-existing informality and changes in poverty. The estimated impact of pre-existing informality on changes in the poverty rate (but in this sample not on inequality) is statistically significant (Figure 3.9).32 The association with changes in poverty is similar for employment and output informality. In the average EMDE, the share of extreme poor in the population (the headcount ratio) declined by about 0.8 percentage point between 2011 and 2016. These estimates imply that a country with a 10 percentage points higher share of informal output than its peers witnessed 0.1 percentage point slower poverty reduction per year.

31 Chong and Gradstein (2007), Amaral and Quintin (2006); Pratap and Quiten (2006), and Loayza, Servén, and Sugawara (2010).

32 This is in line with other studies that find an insignificant relationship between inequality and informality after controlling for institutional outcomes (Perry et al. 2007) or focus on causality running from inequality to informality (Chong and Gradstein 2007).
Cross-country studies have identified a range of policies associated with lowering informality. These policies have typically fallen into three categories: tax reform, regulatory reform, and trade liberalization.¹

- **Tax reform.** Lower tax rates, simplified tax systems, harmonized tax regulations, technology-based monitoring and consolidated electronic tax payment systems can encourage firms and workers in the informal sector to move to the formal sector.

- **Regulatory reform.** Lower minimum wages and lower barriers to worker recruitment and dismissal have been associated with lower informal activity. In addition, a wide range of institutional factors have been associated with reduced informality: more efficient legal systems, better property rights protection, lower regulatory burdens, less cumbersome registration processes, easier access to credit, and lower corruption.

- **Trade liberalization.** In Latin America, trade liberalization has often been followed by an increase in informal activity in the short run, unless accompanied by complementary measures to increase labor market flexibility. Trade liberalization raises real wages, by depressing prices, and thus encourages worker entry into the informal economy where entry cost is lower than in the formal economy (Arias et al. 2018).

Many EMDEs have implemented these types of reforms either with the explicit purpose of reducing informal activity, or for other purposes with collateral effects on informal activity. Many of these reforms were implemented as part of broad-based, multi-pronged reform packages. Against this backdrop, this box compiles a comprehensive review of single-country studies on the impact of policy changes on informal activity. Specifically, the box addresses the following questions:

- Which policy changes have been studied?
- What are the common lessons from these policy changes?
- What is the role of complementary policy measures?

### Studies of policy changes

#### Selection of studies.

19 studies are selected based on two criteria: (1) they examine specific policy changes in a single EMDE and (2) they measure an outcome that relates to informal activity, such as the share of informal workers or firms.² These studies cover 15 policy changes in Brazil (mid-1980s, 1990s, 2003), Colombia (1980s, 1990s), Egypt (1998, 2004), Georgia (2010), India (1988-2000, 2017), Indonesia (1996-2004), Mexico (2002-06), Pakistan (2009), Russia (2001), Turkey (2004-05), and Vietnam (1999-2013). Five of these country cases implemented tax changes, four implemented regulatory changes in labor markets, two implemented other regulatory changes, and four implemented trade liberalization measures (Annex Table 3.4).³

#### Tax reform.

The studies examined both tax rate changes and tax simplification. In 2017, India streamlined and...
BOX 3.4 Under the magnifying glass: How do policies affect informality? (continued)

lowered the average tax rate of goods and services (Government of India 2017). Georgia introduced a preferential tax regime for small businesses in 2010 (Bruhn and Loeprick 2014). Russia introduced a flat personal income tax and cut payroll taxes and social security contributions in 2001 (Slonimczyk 2012). Conversely, Pakistan raised income taxes on noncorporate partnership firms in 2009 (Waseem 2018). In addition to lowering the average tax rate for small firms, the SIMPLES reform in Brazil in 1996 simplified the tax and social security contributions regime for small firms (Fajnzylber, Maloney, and Montes-Rojas 2011; Maloney and Mendez 2004).4

Regulatory changes. A few episodes of labor market and other regulatory reforms have been studied. In 2001, as part of fiscal decentralization in Indonesia, minimum-wage setting responsibilities were transferred to provinces and local governments. The move was accompanied by a sharp increase in the average real minimum wage (Comola and Mello 2011). In 2004-05, Turkey implemented two employment subsidy schemes that strengthened incentives to register for the social security system (Betcherman, Daysal, and Pagés 2010). Mexico simplified business registration by introducing its Rapid Business Opening System (SARE) in various municipalities during 2002-06 (Fajnzylber, Maloney, and Montes-Rojas 2011).

Trade liberalization. Several studies have examined episodes of major trade liberalization. Comprehensive trade liberalizations with drastic tariff reductions were implemented in Colombia in the late 1980s and early 1990s. They followed Colombia’s GATT accession in 1981 (Goldberg and Pavcnik 2003; Attanasio, Goldberg and Pavcnik 2004). Egypt introduced gradual trade liberalization measures in 1998 and, more comprehensively, again in 2004 in the context of macroeconomic stabilization plans (Selwaness and Zaki 2015). In Vietnam, the U.S.-Vietnam bilateral trade agreement (BAT) came into effect in 2001 (McCaig and Pavcnik 2015, 2018) and, in the span of ten years, turned the United States from Vietnam’s fifth-largest to its largest export destination between 1998 and 2008. The trade agreement was followed by reforms in 2006 to increase labor market flexibility. In 1988, Brazil took initial steps to liberalize trade but at the same time restricted labor market flexibility in its Constitutional Reform. The 1988 reform included cuts in maximum work hours, higher vacation pays, longer maternity leave, higher dismissal cost, and limits on union power (Busch, Goni and Maloney 2007). In 1991, India liberalized trade, removed price controls, and removed license requirements in most industries (Sharma 2009).

Common lessons

Most studies have found the expected impact of these policy changes on informality (Figure 3.4.1). Tax simplification, tax cuts and regulatory easing tended to reduce informality. Trade liberalization tended to increase informality unless it was accompanied by increased labor market flexibility.

Tax simplification and tax cuts were associated with lower informality in India, Russia, Georgia and Mexico—in the form of greater formal firm registration (India, Brazil, Georgia), greater income reporting (Brazil, Russia), greater or a greater share of formal employment (Brazil, Russia). The reforms were followed by an increase in the number of registered firms by about 5 percent in Brazil and by 18-30 percent in Georgia (Bruhn and Loeprick 2014; Fajnzylber, Maloney, and Montes-Rojas 2011). In India, the introduction of the Goods and Services Tax has been accompanied by a 50 percent increase in the number of indirect taxpayers (Government of India 2017). Conversely, Pakistan’s corporate tax hike was followed by rising informality as firms switched business models and reported lower earning.

Regulatory changes to encourage reporting (Turkey) or simplify business registration (Mexico) were associated with greater formal employment and firm registration, whereas higher minimum wages were associated with greater informal employment. Employment subsidy schemes in Turkey were followed by an increase in the number of registered jobs in eligible provinces by up to 13 percent (Betcherman, Daysal and Pagés 2010). In India, following broad-based industrial liberalization measures, the number of informal establishments fell faster (by 25 percentage points) in states with more pro-employer labor laws than in states with less flexible labor laws (Sharma 2009). A 5 percent increase in the number of registered firms was attributed to simplified business registration procedures in Mexico (Bruhn 2011, 2013). Conversely, in Indonesia a 10 percentage point increase in the minimum

4Recent studies (e.g., Piza 2016) found mixed results regarding robustness of Fajnzylber, Maloney and Montes-Rojas (2011)’s finding.
wage over the mean wage was associated with a 0.9-1.1 percent increase in informal employment (Comola and Mello 2011).

Trade liberalizations in Brazil, Colombia, and Egypt were typically associated with greater informality in the short run—unless accompanied by measures to improve labor market flexibility. During Colombia’s trade liberalization in the 1980s and 1990s, a 10-percentage-point decline in tariffs in a given industry was associated with a 1 percentage point increase in the probability of informal employment—but only for the period preceding a major labor market reform that increased labor market flexibility (Goldberg and Pavcnik 2003; Attanasio, Goldberg, and Pavcnik 2004). In Egypt, the trade liberalization of 1998 was associated with increased informal employment whereas the trade liberalization measures of 2004—which were preceded by 2003 reforms to increase labor market flexibility—were not (Selwaness and Zaki 2015). Similarly, trade liberalization accompanied by measures to reduce labor market flexibility, such as in Brazil in the late 1980s and early 1990s was accompanied by rising informal employment (Bosch, Goni, and Maloney 2007). In Vietnam, rapid export growth was associated with a 5 percentage point higher share of formal manufacturing employment, a growing share of formal employment, and shrinking informal employment (McCaig and Pavcnik 2018; Boly 2008).

Role of complementary policy measures

Several of the policies discussed above were not primarily implemented with informality in mind. Yet, they had the unintended consequence of raising informality: tax increases in Pakistan, decentralization of minimum wage regulation in Indonesia, and trade liberalization in Egypt, Brazil and Colombia. Other reforms did not have as large an effect on informality as expected, such as the tax reform in Georgia. Three factors accounted for these: interactions between multiple reforms; scale of reform; and enforcement.

Interactions between multiple reforms. In Egypt, trade liberalization implemented in a supportive environment, with reforms to increase labor market flexibility, was associated with lower informality in 2004 but, in the absence of labor reforms, informality increased following the 1998 trade liberalization. Similarly, trade liberalization combined with increased labor market rigidities raised

BOX 3.4 Under the magnifying glass: How do policies affect informality? (continued)

FIGURE 3.4.1 Overview of policy changes

Most surveyed policy changes, including five tax reforms, six regulatory reforms, and four trade reforms were conducted in Latin America and the Caribbean, East Asia and Pacific, and Europe and Central Asia. The bulk of these reforms delivered the expected outcomes and were implemented post-2000.

Click here to download data and charts.
Informality and fiscal outcomes

A large informal economy erodes the tax base and constrains governments’ ability to provide public services, conduct countercyclical policies, serve debt, and implement redistributive measures (Chapter 4; Ordóñez 2014; Besley and Persson 2014). This puts a premium on designing tax and social security systems that avoid unintended incentives to shift activity from the formal to the informal sector and level the playing field for both formal and informal sectors (Perry et al. 2007; Djankov et al. 2010; Loayza 2018; Dabla-Norris et al. 2018).

Revenue outcomes. Regardless of the measure of informality, on average, government revenues in EMDEs with the most pervasive informality have been 5-10 percentage points of GDP below those with the least pervasive informality (Figure 3.10). The composition of tax revenues is tilted towards trade taxes in economies with more pronounced informality. Revenues from trade taxes have been 0.7-1.0 percentage points of GDP higher in EMDEs with greater informality compared with those with the lowest levels of informality. Income tax revenues, in contrast, tend to be lower in the EMDEs with the highest output informality. Greater reliance on indirect taxation makes the tax system less progressive and, hence, less redistributive than a system based on more progressive direct taxation.

Expenditure outcomes. Revenue weakness is also reflected in lower government expenditures. In EMDEs with the most pervasive informality, government expenditures were 4-10 percentage points of GDP lower than in those with the lowest informality (Figure 3.10). Insufficient resources for redistributive policies may contribute to the correlation between informality and poverty.

Policy options

Many EMDE governments implemented policies at the microeconomic level and found that the implications for informality were more benign when these reforms were implemented in a
supportive institutional and macroeconomic environment. For instance, trade liberalization programs that raised real wages and reduced firms’ profitability in the tradable sector were associated with greater informality in the short term—unless they were accompanied by higher labor market flexibility and more skilled labor force (Box 3.4; Goldberg and Pavcnik 2003; McCaig and Pavcnik 2015).

Country experiences suggest the need for a comprehensive development strategy that is informed by the drivers of and challenges posed by informality and carefully tailored to country circumstances. Policies that seek to improve fiscal accounts, such as strengthened tax administration or streamlined tax regulations, can be associated with lowering informality in some economies. Separately, policies that aim at invigorating private sector activity and productivity and leveling the playfield for all workers and firms, particularly measures to make the labor market more flexible, the regulatory framework more adaptable, and governance more effective, can lower informality and/or improve the working conditions in the informal sector. Finally, supportive macro-economic and social policies (such as enhancing public service and social protection) can ease the implementation of these reforms and facilitate a smoother transition from the informal sector to the formal sector.

These policy measures can help lower informality while also spurring growth more broadly. They should be accompanied by strengthening the basic social safety nets to preserve incomes of vulnerable groups. Disruptions to formal activity from interventions to lower informality could be mitigated by reforms to increase labor and product market flexibility.

Fiscal policy measures

Some countries have implemented reforms to address the fiscal challenges associated with informality, including, in the collection process, to reduce fiscal barriers or incentives for firms to operate informally.

- **Tax compliance** has been encouraged by simplifying tax codes, improving tax enforcement (e.g., via the use of information technology and communication tools), building tax administrations’ capacity, harmonizing tax regulations or forms (e.g., across firms of different sizes), limiting the use of cash transactions, and encouraging the use of bank-based tax payments (Morales and Medina 2016; Ulyssea 2018; Rocha, Ulyssea, and Rachter 2018; Awasthi and Engelschalk 2018).

- **Tax burdens** have been reduced for formal firms by offering tax relief for new employees or simplifying tax bases in industries with a high percentage of undeclared workers (e.g., domestic work). Reducing tax burdens has been among the most common policy reforms in EMDEs, especially in East Asia and Pacific (EAP) and Latin America and Caribbean (LAC; Figure 3.11).

- **Value-added taxation (VAT)** can help strengthen tax collection even in the presence of a sizable informal sector (World Bank 2018).

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**FIGURE 3.10 EMDEs: Informality and fiscal outcomes**

Widespread informality is associated with lower government revenues, a skew towards trade-based taxation, and lower government expenditures.

![Diagram showing EMDEs: Informality and fiscal outcomes](https://example.com/diagram.png)

Source: Elgin et al. (forthcoming a); International Monetary Fund, World Economic Outlook; World Bank, World Development Indicators.

Note: Fiscal indicators and informality measures are 2000-16 averages. Sample includes 70 non-energy exporting EMDEs with populations above 3 million people.

A.B. Difference (in percentage points of GDP) between the average fiscal indicators among the third of EMDEs with the highest and lowest informality by the share of informal output (as measured by the DGE methodology) in percent of official GDP (A) or by the share of self-employment in percent of total employment (B). Vertical bars indicate 90 percent confidence intervals of the differences.

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33In China, for example, the computerization of VAT invoices between 1998-2007 explained roughly 15 percent of cumulative VAT revenues and increased the effective average tax rate by approximately 5-14 percent paid by firms (Fan, et al. 2018).
An improved provision of public goods and services, such as better education or infrastructure, could help improve the productivity in both formal and informal sectors (Oviedo, Thomas, and Karakurum-Ozdemir 2009; Benjamin and Mbaye 2012; Kim, Loayza, and Meza-Cuadra 2016; World Bank 2018b).

• Social security systems can be reformed to reduce the incentives to hire informal workers. Measures include steps to shift the burden of payments of contributions from employers to employees (e.g., in Latvia, Poland, Slovenia), to reduce employers’ social security contributions (e.g., in Bulgaria), and to link social benefits to personal contributions (e.g., in most EU 27 countries; Oviedo, Thomas, and Karakurum-Ozdemir 2009). Transitions from an employment-based social security system to a well-designed model of risk sharing can provide a better safety net for informal workers and help protect both formal and informal workers during economic downturns (World Bank 2013, 2018a; Box 3.1).

Business climate and governance measures

Many reforms that are designed to invigorate private sector growth can also help reduce informality, such as reducing corruption, improving business climates and governance, strengthening enforcement, or liberalizing labor and product markets, including through trade liberalization. Policy measures that narrow the earnings gap between informal and formal workers or those that reduce the productivity gap between informal and formal firms (for example, through measures to improve education or expand access to conventional sources of credit) can also help lower the extent of informal activity. Trade

34 See Loayza (2018) for a detailed discussion on how to reform the social security system to reduce informality. See World Bank (2018b) for a discussion on how to provide better social security to informal workers. Levy (2008) and Maloney (2004) suggest that establishing parallel non-contributory systems in the presence of informality could further encourage informality.


36 Kuddo (2018) shows that about 60 percent of the reforms passed between 2007 and 2017 throughout the world aimed at improving labor market flexibility.
liberalization, however, may encourage informality in the short term unless complementary reforms are implemented (Box 3.4; Figure 3.11).

**Labor regulations.** Over the past decade, governments—especially in ECA, SSA and, more recently, LAC—have implemented reforms to increase labor market flexibility. These include less restrictive regulations with respect to hiring and firing, to working arrangements, and to wage rates. Other types of policy changes, such as providing incentives for worker registration (e.g., legalization of undocumented workers) and improved enforcement of existing labor laws, may also encourage workers to move to the formal sector (Anand and Khera 2016; Munkacsi and Saxegaard 2017). For example, Japan has allowed undeclared workers to claim certain social benefits, thereby improving the monitoring of their employment. In rapidly urbanizing countries with still-large rural populations, easing labor market regulation could play an important role in enabling workers to move into the urban, more productive and more modern sectors (Annex Figure 3.5.1; Annex 3.5; Loayza 2016).

**Firm regulations.** A variety of measures can encourage firms to participate in the formal sector. For example, formal entry of firms can be facilitated and encouraged by creating “one-stop-shop” registration to simplify the process (e.g., in Australia, Belgium, Ukraine), training and business services can be provided to firms that register (e.g., in Mexico and Malawi; Campos, Goldstein, and McKenzie 2018), and access to credit can be made easier for firms in the formal sector. EMDEs in the ECA and SSA regions have implemented an above-average number of reforms to reduce the costs of starting a business during the past decade (Figure 3.11). Easier firm registration and lower registration costs can also encourage the entry of young and productive firms, which can boost the productivity of the economy (Haltiwanger, Jarmin, and Miranda 2013; Nguimkeu 2015; Loayza 2018).

**Regulatory enforcement.** While other policy options increase the benefits of joining the formal economy, stricter enforcement can increase the cost of remaining in the informal economy. Policy options include increasing the frequency of inspections (in most EU15 countries and Bangladesh), creating a national-level firm or employee registry (in Poland), and launching public awareness campaigns regarding tax compliance (e.g., in China and Korea). However, these enforcement measures tend to be most effective when implemented in conjunction with steps to improve the governance and business climate (e.g., making the labor market flexible) and when they are applied even-handedly to both formal and informal firms (Loayza 2018).

**Education.** Informal workers tend to be less productive than formal workers. To the extent that workers remain in the informal sector for lack of human capital or skills, better and more accessible public education may help workers (or their dependents) to move into better paid formal employment (Maloney 2004; Perry et al. 2007; Andrews, Sánchez, and Johansson 2011). This can also have the benefit of reducing income inequality and poverty.

**Access to finance.** Firms in the informal sector have more limited access to credit from the banking sector and capital markets, which restricts their ability to invest in productivity-enhancing new technologies (Ferreira-Tiyaki 2008; D’Erasmo 2016; Capasso and Jappelli 2013). One of the options to have greater access to finance is to improve personal property registration, which makes loans more accessible for firms operating in the informal economy (e.g., Czech Republic; Doing Business 2012). Improving access to credit has been a common policy reform in EAP, MENA, SAR and, more recently, in SSA. Separately, digital payment systems can provide an

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37 Loayza (2016) develops a theoretical model that traces informality, government regulations, economic growth and urban migration through the process of development. The model highlights the potential effect of the minimum wage on labor misallocation and on capital accumulation. A higher minimum wage slows capital accumulation and pushes workers into the informal economy. See Annex 3.5 for details. Caballero et al. (2013) show that job security regulation hampers the creative-destruction process, which could impede growth.


challenges with its higher accessibility, more fluid labor arrangements, and greater reliance on digital technology than more traditional forms of informality. Since “gig” workers do not fully participate in the social security system, they are, by some definitions, informal workers (Loayza, Servén, and Sugawara 2010). Regulatory changes, especially in the context of social security systems, may be needed to ensure that “gig” workers’ economic risks are manageable and that they do not permanently lose access to the formal economy (World Bank 2014, 2016, 2018b). Since these workers will likely take on many different assignments over the course of their careers, the ability to learn and adapt will be essential. Policies can support this adaptability with more provision of education and (re)training programs (World Bank 2019; Card, Kluve, and Weber 2018).

Emphasis should also be given to the development of cognitive skills in primary and secondary education or via intentional instruction at earlier ages, and the improvement of the terms of employment (Almeida, Behrman and Robalino, 2012; World Bank, 2018a, 2018b).

Harnessing new technology. New technologies offer governments an opportunity to both reduce the incentives for and increase the cost of operating informally. For example, new technologies can also help strengthen tax administration and improve access to finance, including by improving the ability to broaden the tax net and assess credit worthiness (Gupta et al. 2017; Junquera-Varela et al. 2017; Awasthi and Engelschalk 2018; Capasso, Monferra, and Sampagnaro 2018). Digitalization can lower regulatory burdens, thus reducing the cost of operating in the formal economy. For example, Costa Rica reduced the time required to register a business by digitizing tax registration records and company books in 2009 (Doing Business 2009). This was followed by a drop in the share of informal employment by 4 percentage points of total employment and a fall in the share of informal output by about 2 percentage points of official GDP during 2009-16. Similar reforms have been carried out in Guyana (2010) and Kenya (2011) (Doing Business 2010, 2011).
ANNEX 3.1 Measures of informality

The database includes most informality measures employed by the literature. These measures cover up to 196 economies (36 advanced economies and 160 emerging market and developing economies) for as much as 1950-2016 (Annex Table 3.1.1). Measures can be divided into indirect (model-based) estimates and direct (survey-based) estimates.

Indirect estimates

Previous studies use various indirect approaches to estimate the size of the informal sector, including the currency-demand approach (e.g., Ardizzi et al. 2014), and the electricity-demand approach (e.g., Johnson, Kaufmann, and Shleifer 1997; Lackó 2000), the Multiple Indicators Multiple Causes (MIMIC) model (e.g., Schneider, Buehn, and Montenegro 2010), and the Dynamic General Equilibrium (DGE) model (e.g., Ihrig and Moe 2004; Elgin and Oztunali 2014; Orsi, Raggi, and Turino 2014). Among all indirect estimation methods, the MIMIC and DGE models stand out in their year and country coverage. The other two indirect approaches, that is, the electricity-demand approach and the currency-demand approach, suffer from limited data availability and theoretical caveats (see Ahumada, Alvaredo, and Canavesa 2007; Schneider and Buehn 2016 for details). Therefore, the MIMIC and DGE models are used here to estimate the size of the informal sector.

The multiple indicators multiple causes model (MIMIC). The Multiple Indicators Multiple Causes model is a model of structural equations that can be applied to estimate the size of informal economic activity. There are two features of MIMIC that make it a preferred estimation approach for some researchers. First, it explicitly considers multiple causes of informal activity and captures multiple outcome indicators of informal activity. Second, it estimates informal activity across country and over time. The data on causes and indicators of informal activity identified in the literature are largely based on macroeconomic series in a panel setting and updated annually.

To estimate the size of the informal sector (i.e., in percent of official GDP) with the MIMIC model, this study closely follows Schneider, Buehn, and Montenegro (2010). Six causes and three indicators are used in the estimation to capture the hypothesized relationships between the informal sector (the latent variable) and its causes and indicators. Once the relationships are identified and the parameters are estimated, the estimation results are used to calculate the MIMIC index, which gives the absolute values of the size of the informal sector after a benchmarking procedure. The MIMIC approach delivers a panel of estimates (labelled as MIMIC) for 160 economies over the period 1993-2015.

Six causes and three indicators are used in the estimation (as in Schneider, Buehn, and Montenegro 2010). The six cause variables used are: (1) size of government (general government final consumption expenditure, as a percent of GDP, obtained from UN, spliced with WDI) as proxy for indirect taxation; (2) share of direct taxation (direct taxes in percent of overall taxation, WDI); (3) Fiscal Freedom index obtained from Heritage Foundation as a tax burden variable in a wide sense; (4) Business Freedom index provided by Heritage Foundation; (5) the unemployment rate and GDP per capita to capture the state of the economy (obtained from WDI, the latter is spliced with IMF World Economic Outlook (WEO)); and (6) a measure on government effectiveness provided by Worldwide Governance Indicators. The three indicator variables include: (1) growth rate of GDP per capita (WDI, spliced with IMF WEO); (2) the labor force participation rate (people over 15 economically active as a

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1 The limitations of the standard MIMIC model of Schneider, Buehn, and Montenegro (2010) and others include (e.g., Medina and Schneider 2018; Feige 2016): (1) the use of GDP (GDP per capita and growth of GDP per capita) as both cause and indicator variables, (2) its reliance on another independent study's base-year estimates on the informal economy to calibrate the size of informal economy in percent of GDP, and (3) the estimated coefficients are sensitive to alternative model specifications and sample coverage.

2 Indirect approaches like the currency demand approach or the electricity approach condense the full range of informal activity across product and factor markets into just one indicator. However, the informal sector shows its effects in various markets (Schneider, Buehn, and Montenegro 2010), which would be captured better in a MIMIC model.
percentage of total population, WDI, spliced with Haver Analytics), and (3) currency as a ratio of M0 (currency outside the banks) over M1 (IMF International Financial Statistics).

The estimation results from the model specification that ensures maximum data coverage (Annex Table 3.1.2) are used to generate the MIMIC index of the share of informal output relative to official GDP ($\eta$). Then we conduct an additional benchmarking procedure where $\eta$ is converted into absolute values of the informal sector ($\hat{\eta}$) using the following equation:

$$\hat{\eta}_t = \frac{\eta_t}{\eta_{2000}},$$

(1)

where $t$ denotes year, $\eta_{2000}$ is the value of the estimated index in the base year 2000, and $\eta_{*2000}$ is the exogenous estimate (base value) of the informal economies in 2000. While the estimates ($\hat{\eta}$) determine the movement of the absolute values of the informal sector over time, the base values $\eta_{*2000}$ decide the rankings of the countries’ informal sector within the sample in year 2000. The base values $\eta_{*2000}$ are taken from Schneider (2007) or, for another 10 countries, from Schneider, Buehn, and Montenegro (2010).

The DGE model (DGE). A Dynamic General Equilibrium (DGE) model (e.g., Irijig and Moe 2004; Elgin and Oztunali 2014; Orsi et al. 2014; Loayza 2016) typically considers how households allocate labor between formal and informal economies within each period and how the allocation changes over time. In comparison to other methods, the DGE approach stands out in its comprehensive country-year coverage, clear economic reasoning, and its applicability in policy experiments and projection (e.g., Loayza 2016).

The deterministic DGE model of Elgin and Oztunali (2014) is used to estimate the size of the informal sector. The model captures the essence of labor allocation between the formal and informal sector and allows the estimation of 158 economies (36 AEs and 122 EMDEs) over the period 1950-2016. In the model, an infinitely lived representative household is endowed with certain units of productive capital and time. The household has access to two productive technologies, denoted formal and informal, and maximizes its lifetime utility by allocating labor between the informal and formal economies and allocating income between consumption and investment.

In model, an infinitely lived representative household is endowed with units of productive capital and a total of $H_t > 0$ units of time. The household has access to two productive technologies, denoted formal and informal, and maximizes its lifetime utility by solving the following optimization problem:

$$\max \sum_{t=0}^{\infty} \beta^t U(C_t)$$

$$s.t. C_t = (1 - \tau_t)A_{kt}K_{kt}^{1-a}N_{kt}^{1-a} + A_{ht}N_{ht}^{1-a}$$

$$K_{t+1} = K_t + (1 - \delta)K_t$$

$$N_{ht} + N_{kt} = H_t$$

(2)

(3)

(4)

$\beta < 1$ is the discount factor and the instantaneous utility function $U(.)$ is strictly increasing and strictly concave. Eq(2) defines the household’s resource feasibility constraint: the sum of consumption $C_t$ and investment $I_t$ should equal the amount produced using the formal and informal technologies. The right-hand side of equation (2) shows that the formal technology follows a standard Cobb-Douglas specification, where $A_{kt}$ is the level of productivity exclusive to the formal sector. $K_t$ is the household’s capital stock while $N_{kt}$ is the number of hours the household devotes to the formal sector. $\tau_t$ captures the tax rate imposed on formal output. Informal economy depends on the number of hours the household devotes to the informal sector, $N_{ht}$ and its exclusive level of technology, $A_{ht}$. Assuming no cost for hiding and the government cannot enforce payment, the household will attempt to hide the income received from the informal sector.

The rest of the household problem is standard: equation (3) specifies the law of motion for capital, where $\delta \in [0; 1]$ is the depreciation rate.

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3 See the model specification in column (5) in Annex Table 3.1.2.
4 Calibration is performed separately for each country. Following Schneider, Buehn, and Montenegro (2010), the MIMIC index has been adjusted to the positive range by adding a positive constant.
equation (4) is the household’s time constraint. In this simple model, the government’s policy τ is assumed to be exogenously given and the tax revenue is assumed to be used to finance an exogenous stream of government spending, G. Then, given the government policy variable tax burden {τ}, a competitive equilibrium of the two-sector model is a set of sequences \( (C_t, I_t, K_{t+1}, N_r, N_h, G_t)_{t=0}^\infty \) that maximize expected utility from consumption (i.e., \( \sum_{t=0}^\infty \beta^t U(C_t) \)).

The model provides a reasonable mapping between formal economy and informal economy in a dynamic setting. The two key equilibrium conditions are the equilibrium condition that connects formal and informal economy through labor allocation, and the equilibrium condition that captures the intertemporal substitution. The calibration and data construction rely on these two conditions to estimate the ratio \( \frac{r_h}{r_c} \), which can be further expressed as \( \frac{A_h N_h}{A_c N_c} \).

The calibration takes parameter values suggested by the earlier literature (e.g., α is assumed to be equal to 0.36; and γ takes 0.425; Ihrig and Moe 2004) and uses data from PWT 9.0 for capital stock (Kt), private consumption (Ct), formal employment (Nt), depreciation rates (δ, country averages), and tax rates (τt). By matching the productivity in the informal sector to the informal economy size in 2007 of the series reported in Schneider, Buehn, and Montenegro (2010) and assuming that \( A_h \) grows at the average growth rate of \( K_t \) and \( A_h \), the DGE estimates are computed for 158 countries over the period 1950-2016.

**Survey-based estimates**

Labor force surveys (LFS) and household surveys (HS) on labor related measures. Four existing informality measures are labor related, out of which three are related to employment and one to pension coverage. These measures are mainly gathered from labor force surveys and sometimes covered by household surveys. Labor related measures have the advantages of not relying on strong assumptions, having no need for based-year estimates for calibration, and having sufficient time variation for time-series analysis.

The most frequently used measure is the share of self-employment in total employment, which is a lower bound of informal employment (e.g., La Porta and Shleifer 2014; Maloney 2004). As defined by the 1993 International Classification of Status in Employment (ICSE-93), self-employed workers are those workers who, working on their own account or with one or a few partners or in a cooperative, hold the type of jobs defined as “self-employment jobs.” These are jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced. WDI and ILO further classify them into the following four sub-categories: employers, own-account workers, members of producers’ cooperatives, and contributing family workers.

The two other measures are informal employment (Informal employment) and employment outside the formal sector (Employment (excl. formal sector)). These two measures are usually expressed in percent of total employment and refer to different aspects of informality. While employment in the informal sector is an enterprise-based concept, informal employment is a job-based concept and has a broader definition than self-employment. Informal employment comprises all workers of the informal sector and informal workers outside the informal sector. The former covers all persons who, during a given reference period, were employed in at least one informal sector enterprise, irrespective of their status in employment and whether it was their main or a secondary job a job-based concept. The latter

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5 The estimation results are qualitatively robust to different model specifications such as using alternative values for \( \delta, \alpha, \gamma \), adding leisure choice, tax enforcement parameter to informal sector income (for example, using revenue in percent of GDP rather than government spending in percent of GDP for \( \tau_t \), see Elgin and Ottonali (2014) for details.

6 This assumption implies that growth in the formal sector can spillover to the informal sector via capital accumulation and technological diffusion.

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7 They also have the following limitations: (1) the data are costly to gather, which results in limited country and year coverage; (2) survey methodologies may vary across time and countries, making the measures incomparable; (3) the typical drawbacks of survey-based estimates (such as sample bias) may make the data quality questionable; and (4) employment measures cannot reflect other changes in the informal sector, such as productivity.

8 Among all labor-related measures, self-employment stands out in its time and country coverage and sufficient level of time variation, making it suitable for time-series analysis and cross-country comparison.
covers self-employment and employees holding informal jobs. ILO presents a detailed definition of these two measures (http://www.ilo.org/ilostat-files/Documents/description_IFL_EN.pdf).

Combining various cross-country databases and additional data from the national statistical offices and other sources, the resulting data set on self-employment is a panel of 180 economies over the period 1955-2016. The data set on informal employment covers 53 countries/regions from various years during 2001-2016 while the data set on employment outside the formal sector contains 57 countries/regions from various years during 1999-2016.

Data on pension coverage (labeled as Pension coverage) are also gathered from various issues of the World Bank’s World Development Indicators (WDI book version, reported until 2012). The measure is defined as the fraction of the labor force that contributes to a retirement pension scheme (Loayza, Oviedo, Servén 2010; WDI). It yields a panel that covers 135 countries from 1990 to 2010.

**Firm surveys.** Two data sets of firm surveys have comprehensive coverage: World Bank Enterprise Surveys, and Executive Opinion Surveys conducted by World Economic Forum. World Bank Enterprise Surveys cover 139 economies over the period 2006-2016 while Executive Opinion Surveys cover 151 countries over the period 2006-2016.

Both surveys are answered by top managers and business owners, who are business experts and should be familiar with the business climate in a country. The surveys could reflect some dimensions of informality (e.g., the extent of competition from the informal sector) that are not captured in the other informality measures. Similar to labor-related measures, measures from firm surveys also have the advantages of being free of strong assumptions and base-year estimates for calibration.\(^9\)

World Bank Enterprise Surveys compile responses on various topics (including informality) from face-to-face interviews with top managers and business owners in over 130,000 companies in 146 countries. The surveys yield the following measures of informality (e.g., used in Amin and Islam 2015; La Porta and Shleifer 2014): percent of firms competing against unregistered or informal firms (\(WB1\)), percent of firms formally registered when they started operations in the country (\(WB2\)), (average) number of years firms operating without formal registration (\(WB3\)), and percent of firms identifying practices of competitors in the informal sector as a major constraint (\(WB4\)). A higher value of \(WB1\), \(WB3\) and \(WB4\) indicates a higher level of informality, while the reverse holds for \(WB2\).

In comparison to Enterprise Surveys, Executive Opinion Surveys provide a more balanced panel data set, making them more suitable for business cycle analysis. World Economic Forum has been conducting the Executive Opinion Survey every year since 1979. As reported in the 2014 edition, over 13,000 executives in 144 economies were surveyed. From year 2006, when conducting the survey, the following question is asked, “In your country, how much economic activity do you estimate to be undeclared or unregistered? (1 = Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered).” The average responses at the country-year level constitute a series of informality measures, labeled as WEF. A lower average at the country level indicates a larger informal economy.

**Household surveys (HS).** Household surveys either report the extent of informality in an economy or report people’s opinions on informal economic activities. Among all, World Value Surveys (WVS) stand out in their country and year coverage with others focusing on European countries. It asks whether respondents can justify this type of measures do not have much time variation. Both drawbacks limit their application in time-series analysis. However, they shed light on the perceived extent of informality in a country and provide guidance for constructing and validating indirect model estimates.

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\(^9\) There are two drawbacks of informality measures from firm surveys. First, firm surveys tend to have limited year coverage. Second, since people’s perception does not move much over time,
cheating on taxes in five waves from 1981-1984 to 2010-2014. The responses range from 1 (never justifiable) to 10 (always justifiable). In total, 94 economies participated in the survey. The average responses at the country-year level are used as a measure for attitudes towards informality (or tax morality; Oviedo, Thomas, and Karakurum-Özdemir 2009), labeled as WVS. A higher average at the country level implies that people find cheating on taxes more justifiable. Former studies show that the lack of tax morality is associated with a higher level of informality.

ANNEX 3.2 Characteristics of informal-economy business cycles

Harding and Pagan (2002)’s approach is used to identify business cycle turning points in formal and informal sectors in annual data: Peaks (troughs) are identified in years when output is higher (lower) than the two subsequent and two preceding years. A recession is defined as the period from a business cycle peak to a trough. An expansion is the converse, the period from a business cycle trough to its peak. A recovery is the early part of an expansion and is defined as the period from the business cycle trough to the year in which the output level recovers to that of the most recent business cycle peak (Claessens, Kose, and Terrones 2012). The main characteristics of recessions and recoveries include duration and speed of adjustment (often termed as “slope”) are defined as in Claessens, Kose, and Terrones (2012).

- **Duration** captures, for a recession, the period from peak to trough, for a recovery, the period it takes for output to return to its pre-trough peak, and for an expansion the period from trough to peak.

- **Speed of adjustment (“slope”)** measures the speed of a cyclical phase and is defined as the ratio of amplitude over duration for a recession and the ratio of the change from the trough to the last peak divided by the duration for a recovery (Claessens, Kose, and Terrones 2012).

ANNEX 3.3 Informality and earnings inequality: A meta-analysis approach

Selection of studies. The collection of the representative sample of studies on informality and wage inequality follows selection guidelines outlined in Stanley et al. (2013) and is broadly similar to criteria applied by van der Sluis, van Praag, and Vijverberg (2005). An initial search was conducted in the major English language repositories of academic articles and working papers. A study was included in the database if it: (1) provided a quantitative estimate of the informal-formal wage gap and a corresponding standard error or a t-statistic; (2) used data from micro-level household or labor surveys to obtain these estimates; (3) analyzed a developing country or a group of developing economies as defined by the World Bank classification; and (4) was published after 1990. The resulting database included 18 studies with a total of 83 individual coefficient estimates covering 20 emerging market and developing economies (Annex Table 3.3.1).

Definitions matter. Differences in estimates of the incidence of informal employment and the wage differentials between formal and informal workers in part reflect differences in data coverage and definitions of informal workers. Self-employed workers constitute the core of informal employment since they typically lack registration at the national level, do not contribute to social security and are not entitled to paid annual and sick leave. However, not all informal workers are self-employed, while the informal sector itself may be divided into several tiers such as informal self-
employed entrepreneurs or professional workers and informal non-professional employees. In developing economies, about half of informal workers are non-professional self-employed workers—who migrate to formal employment as per capita incomes grow—and the majority of the remainder are informal employees (Gindling, Mossaad, and Newhouse 2016). Studies typically find that self-employed informal workers earn the same or more than formal workers, but employed informal workers earn less than formal workers, especially in the lower tail of the wage distribution (Figure 3.8). Given data constraints, most studies on wage differentials between formal and informal sectors look at gross reported earnings. Several studies use imputed net wages calculated based on the national income tax tables. Their conclusions are broadly in line with the rest of the literature (El Badaoui, Strobl, and Walsh 2008, 2010).

**Methodology matters.** Empirical research of the wage differential between informal and formal workers has largely relied on estimating “Mincerian” wage regressions conditional on the observed characteristics of workers, although more recent studies have used quantile regressions to assess sector wage gaps along the wage distribution. Such cross-sectional wage regressions are biased when workers’ unobserved characteristics affect both their choice of sector and their wage. For example, several studies find workers transitioning from the formal sector into the informal sector after spending several years accumulating experience and knowledge in the formal sector (Maloney 2004; Gong et al. 2004). Hence, studies that rely on panel data to control for time-invariant unobserved worker characteristics find much smaller informal-formal wage differentials (El Badaoui, Strobl, and Walsh, 2008; Cho and Cho 2011; Botelho and Ponczek 2011). Similarly, semiparametric matching methods, such as propensity score matching and difference-in-difference estimators that are immune to the misspecification of the wage regressions, find modest or insignificant wage differentials between formal and informal jobs (Pratap and Quintin 2006).

**Meta Regression Analysis of informal-formal wage gap.** A random-effects model assumes that there is a distribution of true effects rather than a common fixed effect across the studies (DerSimonian and Laird 1986). In particular, a study-specific estimate of the informal-formal wage gap has a sampling distribution \( \hat{\theta}_i \sim N(\theta_i, \sigma^2) \), where \( \sigma^2 \) is the within study variance of the estimate due to a sampling error; while the true effect has the following distribution \( \hat{\theta}_i \sim N(\mu, \tau^2) \). Meta-analysis pools information across many studies to estimate \( \mu \) and \( \tau^2 \), where \( \tau^2 \) measure the degree of across-study variations. The proportion of total variation in study estimates is equal to \( F=\tau^2/(\tau^2+\sigma^2) \) and reflects the impact of across-study heterogeneity (Higgins and Thompson 2002). The meta-regression analysis (MRA) can be performed to associate this variation with any characteristics of the study or sample.

The MRA of estimated wage differentials between formal and informal jobs uses estimates of the wage gap drawn from each study as the dependent variable. The set of regressors, or moderator variables, includes study characteristics that are deemed consequential for the reported results, for example, identification and estimation methods, study design and data sources. This, in particular, helps clarify the diversity of research outcomes on the size of the informal-formal wage gap and identify the sensitivity of reported wage gaps to study-specific methods and data. A random-effects MRA is performed by estimating the following regression:

\[
\hat{\theta}_i = \mu + \sum_j \alpha_j X_{ij} + \epsilon_i + \theta_i
\]

where \( \hat{\theta}_i \) is a study-specific estimate of the informal-formal wage gap, \( \epsilon_i \) is a sampling error estimate.

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17The random-effects meta-analysis estimate is a special case of a generalized method of moments estimator, where each estimate is weighted proportionally to its sampling error. Thus, it can only be applied to studies that reported standard errors of their informal-formal wage gap estimates.
with a standard deviation that may vary across studies, \( \theta_i \) is an error term reflecting across-study variation of true effects with a constant across-study variance \( \tau^2 \); finally, the set of moderator variables, \( X_{ij} \), includes:

- A dummy variable accounts for differences in methodology; \( FE_i \) is 1 if fixed effects were used to correct for unobserved workers’ characteristics and 0 otherwise.
- Two dummy variables reflect the gender composition of the sample; \( FEMALE_i \) is 1 if estimates were obtained for female workers only and 0 otherwise, \( MALE_i \) is 1 if estimates were obtained for male workers only and 0 otherwise, the reference category for this set of dummy variables are estimates obtained with samples containing both female and male workers.
- Regional dummy variables are included to account for regional heterogeneity.
- \( Self-employed_i \) is a dummy variable indicating that a study measured the wage gap between self-employed and formal employees.

The sample coverage is reported in Annex Table 3.3.1, while the regression results are reported in Annex Table 3.3.2.

### ANNEX 3.4 Pre-existing informality and changes in poverty and income inequality

Following Loayza, Servén, and Sugawara (2010), the following OLS model is estimated to gauge the impact of informality on changes in poverty and income inequality:

\[
\Delta y_i = \alpha + \theta_1 \bar{x}_{i,1990-2005} + \theta_2 \text{Initial } y_i + \epsilon_i
\]

The results are reported in Annex Table 3.4.1. Dependent variable (\( \Delta y_i \)) in column [1]-[3] is annual change in poverty headcount ratio (i.e. Poverty headcount ratio at $1.90 a day (2011 PPP), percent of population) over the earliest year and the latest year, in percentage points, in country \( i \) (over the period 2011-2016). In column [4]-[6], the dependent variable (\( \Delta y_i \)) is annual change in Gini index over the earliest year and the latest year, in percentage points, (over the period 2011-2016). The average measure for pre-existing informality in country \( i \) (i.e. \( \bar{x}_{i,1990-2005} \) ) over the period 1990-2005—including the share of DGE/MIMIC-based estimates of informal output in official GDP, the share of self-employed in employed, — is the variable of interest. The initial condition of poverty or income inequality (\( \text{Initial } y_i \), i.e., the level of poverty / income inequality in the earliest available year between 1990 and 2005) is controlled for. The results do not change when controlling for the initial level of GDP per capita (i.e. the level of real GDP per capita in the earliest available year between 1990 and 2005).

The proxies for poverty and income inequality (Gini coefficient) are taken from World Development Indicators (WDI). The former is Poverty headcount ratio at $1.90 a day (2011 PPP), percent of population.

### ANNEX 3.5 Labor legislation and informality

The implications of labor market deregulation for informality can be traced out in the theoretical model of Loayza (2016). It is shown that minimum wage restraint will speed up formalization of economies in Europe and Central Asia and Middle East and North Africa and modernization—whether informal or formal—of economies in South Asia and Sub-Saharan Africa.

#### Theoretical mechanism for empirical link

Loayza (2016) develops a theoretical model that traces informality, government regulations, economic growth and urban migration through the process of development. The model highlights the doubly distortionary effect of the minimum wage on labor misallocation and on capital accumulation. A higher minimum wage slows capital accumulation and pushes workers into the informal economy.

A developing economy can be interpreted as consisting of two coexisting economies: a modern economy that is organized in firms using a high-productivity technology and employing both capital and labor and a rudimentary, informal economy that represents the self-employed using
only labor with a low-productivity technology. The *modern* economy, itself, consists of two sectors: a capital-intensive *modern formal* sector that complies with government-mandated labor costs including the minimum wage; and a *modern informal* sector that is less capital intensive, pays low labor costs and high capital costs and produces with lower productivity by contravening labor regulations.

A developing economy passes through three stages of development as it becomes richer. In the first phase, *modern informal* employment expands as falling relative cost of urban living encourage rural workers (in the rudimentary informal sector) to migrate to cities. In the second phase, rural-urban migration slows, the relative shares of the modern informal and formal sectors stabilize, but the relative size of the rudimentary informal sector shrinks. In the third phase, *modern informal* employment declines as rural-urban migration stalls and a rising capital-labor ratio reduces the relative (and absolute) size of the modern informal sector.

**Theoretical impact of changes in minimum wages on informality**

The model provides a framework for tracing out the implications for growth and informality of changes to labor market regulations, here represented by the minimum wage. When the minimum wage is higher than the unregulated market wage, it creates a distortion in the labor market, which moves labor to the modern informal sector where the minimum wage is not binding. For 127 economies, of which 28 are advanced and 99 are EMDEs, the evolution of the relative size of informal output and employment over 2015-2035 is considered for two scenarios.

- **Baseline scenario.** The minimum wage rises at the rate of labor productivity.
- **Reformist scenario.** The minimum wage rises one percentage point more slowly than labor productivity growth.

The outcomes of both scenarios depend on the initial conditions of the country, future population and TFP growth rates, and the rate of change of the minimum wage. In the baseline scenario, the minimum wage is assumed to grow in line with labor productivity growth, such that informal rudimentary employment shrinks while the formal and informal modern employment expand at a similar rate. In the reformist scenario, slower minimum wage growth will speed up capital accumulation, increase rural-urban migration, raise capital-labor ratio, reduce the wage distortion created by the minimum wage, and result in an expanding modern and formal sector.

**Global implications in theory: Employment in the modern economy.** On average, in both the baseline and reformist scenarios, the employment share of the modern economy is predicted to expand, by, respectively, 18 (more than one-quarter) and 23 (more than one-third) percentage points (Annex Figure 3.5.1). In both scenarios, capital accumulation attracts rural workers from the rudimentary informal sector, reduces the wage distortion created by the minimum wage, and results in allocating more labor in the modern formal sector. In the baseline scenario, capital accumulation encourages rural-urban migration and modern employment. Employment in both formal and informal modern sectors grow at similar rates. As a result, share of informal modern employment in modern employment remains steady but its share in total (modern and rudimentary) employment increases by 9 percentage points.

In the reformist scenario, the slower growth in the minimum wage encourages faster capital accumu-

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18 The relative shares of modern informal sector remain stable due to the constant urban capital-labor ratio during the second phase.
19 The size of the modern informal sector diminishes when the rate of natural increase in urban population is not too large and when the minimum legal wage is no longer binding.
20 The relative sizes of different sectors are projected using the parameter values, population projections and total factor productivity growth from Loayza and Meza-Suadra (2016). 2015 is taken as the starting year and the relative sizes of the three sectors are projected for year 2015-2035. The real cost of capital are assumed to match labor productivity growth.
21 The country classification is listed in Annex 3.5.1. See Loayza (2016) for the list of countries.
ANNEX FIGURE 3.5.1 Implications of relaxing the minimum wage restraint

Over the next two decades, according to the model, the employment share of the modern economy is expected to expand. In the baseline scenario, the informal economy would grow faster than the formal economy, whereas the informal economy would shrink in the minimum wage restraint scenario. The theoretical model suggests that lowering the minimum wage would speed up formalization in regions like Europe and Central Asia and Middle East and North Africa and accelerate economic modernization in South Asia and Sub-Saharan Africa.

A. Employment composition, 2015

B. Employment composition, 2035

C. Employment composition, 2015

D. Employment composition, 2035: Baseline scenario

E. Employment composition, 2035: Reformist scenario

F. Average output growth, 2015-35: Baseline and reformist scenario


Click here to download data and charts.
share of rural employment in SSA below the current EMDE regional median and would virtually eliminate rural employment in ECA and MNA (under reformist policies, also in East Asia and Pacific, EAP, Latin America and the Caribbean, LAC, and South Asia, SAR). The reformist scenario would speed up this formalization process, especially in MNA and LAC, where the migration to the modern economy is almost coming to a halt and further capital accumulation will raise the unregulated market wage, making minimum wage no longer binding in the formal modern sector and allocating more labor in the formal modern sector. The reformist scenario could raise growth by 0.1-1.2 percentage point per year over the baseline scenario. In SAR and SSA, the reformist scenario could generate the largest boosts to output growth because of their initially large rural sectors increase the potential for rural-urban migration.

ANNEX TABLE 3.1 Labor productivity differential between types of firms (percent)

<table>
<thead>
<tr>
<th>Informal versus formal firms</th>
<th>Informal firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Manager has higher education</td>
</tr>
<tr>
<td>Angola</td>
<td>45.8</td>
</tr>
<tr>
<td>Argentina</td>
<td>25.0</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>-6.2</td>
</tr>
<tr>
<td>Botswana</td>
<td>89.4*</td>
</tr>
<tr>
<td>Côte d'Ivoire</td>
<td>0.0</td>
</tr>
<tr>
<td>Cameroon</td>
<td>-41.7*</td>
</tr>
<tr>
<td>Congo, Dem. Rep.</td>
<td>33.3</td>
</tr>
<tr>
<td>Cabo Verde</td>
<td>133.3</td>
</tr>
<tr>
<td>Ghana</td>
<td>0.0</td>
</tr>
<tr>
<td>Guatemala</td>
<td>25.0</td>
</tr>
<tr>
<td>Kenya</td>
<td>50.0***</td>
</tr>
<tr>
<td>Madagascar</td>
<td>40.0</td>
</tr>
<tr>
<td>Mali</td>
<td>13.2</td>
</tr>
<tr>
<td>Myanmar</td>
<td>80.0*</td>
</tr>
<tr>
<td>Mauritius</td>
<td>66.7*</td>
</tr>
<tr>
<td>Nepal</td>
<td>11.1</td>
</tr>
<tr>
<td>Peru</td>
<td>28.6*</td>
</tr>
<tr>
<td>Rwanda</td>
<td>50.0***</td>
</tr>
<tr>
<td>All countries</td>
<td>48.1***</td>
</tr>
</tbody>
</table>

Note: Productivity differential between the median informal and the median formal firm (last column) or between median informal firms among different groups of firms (all other columns). For example, "Manager has higher education" shows the difference in the median productivity among informal firms with managers with higher education and the median productivity among informal firms with managers without higher education. Other firm characteristics are not controlled for, hence results are similar but not identical to column (1) in Annex Table 3.2. Productivity is defined as annual sales (in 2009 U.S. dollars) relative to the number of workers. "All countries" is the unweighted average across each column. ***, **, * indicates statistical significance at the 1, 5, and 10 percent level.
### ANNEX TABLE 3.2 Labor productivity of formal and informal firms

<table>
<thead>
<tr>
<th>Source</th>
<th>World Bank.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: Standard errors in brackets. Significance is denoted by *** (1 percent), ** (5 percent), * (10 percent). OLS regression with labor productivity as dependent variable, as proxied by annual sales (in 2009 U.S. dollars, in thousands, in logs) per worker, based on a sample using World Bank’s Enterprise Survey data collected during 2007-14 for 4,036 informal firms and 7,558 formal firms in 18 countries. “Informal firm” is a dummy variable taking the value of 1 if a firm is unregistered and 0 otherwise. “Manufacturing” is a dummy variable taking the value of 1 if a firm operates in the manufacturing sector and 0 otherwise. “Capital city” is a dummy variable taking the value of 1 if a firm is located in the capital city and 0 otherwise.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal firm Y:1 N:0</td>
<td>-1.400***</td>
<td>-0.648***</td>
<td>-1.131***</td>
<td>-1.200***</td>
<td>-1.008***</td>
</tr>
<tr>
<td></td>
<td>(0.091)</td>
<td>(0.184)</td>
<td>(0.131)</td>
<td>(0.121)</td>
<td>(0.160)</td>
</tr>
<tr>
<td>Firm age (logs)</td>
<td>0.120***</td>
<td>0.285***</td>
<td>0.118***</td>
<td>0.116**</td>
<td>0.137***</td>
</tr>
<tr>
<td></td>
<td>(0.045)</td>
<td>(0.053)</td>
<td>(0.045)</td>
<td>(0.045)</td>
<td>(0.045)</td>
</tr>
<tr>
<td>Firm size (logs, workers)</td>
<td>-0.102***</td>
<td>-0.119***</td>
<td>-0.056*</td>
<td>-0.104***</td>
<td>-0.108***</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.027)</td>
<td>(0.032)</td>
<td>(0.028)</td>
<td>(0.028)</td>
</tr>
<tr>
<td>Manufacturing Y:1 N:0</td>
<td>-0.402***</td>
<td>-0.407***</td>
<td>-0.401***</td>
<td>-0.401***</td>
<td>-0.399***</td>
</tr>
<tr>
<td></td>
<td>(0.056)</td>
<td>(0.056)</td>
<td>(0.056)</td>
<td>(0.056)</td>
<td>(0.056)</td>
</tr>
<tr>
<td>Capital city Y:1 N:0</td>
<td>0.201***</td>
<td>0.190***</td>
<td>0.187***</td>
<td>0.394***</td>
<td>0.201***</td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td>(0.061)</td>
<td>(0.061)</td>
<td>(0.087)</td>
<td>(0.061)</td>
</tr>
<tr>
<td>Manager experience (logs, years)</td>
<td>0.094**</td>
<td>0.141***</td>
<td>0.107***</td>
<td>0.091**</td>
<td>0.190***</td>
</tr>
<tr>
<td></td>
<td>(0.040)</td>
<td>(0.041)</td>
<td>(0.040)</td>
<td>(0.040)</td>
<td>(0.055)</td>
</tr>
<tr>
<td>Informal firm * Firm age (logs)</td>
<td>-0.353***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.069)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal firm * Firm size (logs, workers)</td>
<td></td>
<td>-0.208***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.066)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal firm * Capital city Y:1 N:0</td>
<td></td>
<td></td>
<td>-0.360***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.114)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal firm * Manager experience (logs, years)</td>
<td></td>
<td></td>
<td></td>
<td>-0.176***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.060)</td>
<td></td>
</tr>
<tr>
<td>Country fixed effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Constant</td>
<td>9.013***</td>
<td>8.552***</td>
<td>8.859***</td>
<td>8.909***</td>
<td>8.748***</td>
</tr>
<tr>
<td></td>
<td>(0.131)</td>
<td>(0.164)</td>
<td>(0.149)</td>
<td>(0.139)</td>
<td>(0.162)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>10,527</td>
<td>10,527</td>
<td>10,527</td>
<td>10,527</td>
<td>10,527</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.291</td>
<td>0.296</td>
<td>0.293</td>
<td>0.293</td>
<td>0.292</td>
</tr>
</tbody>
</table>
### ANNEX TABLE 3.3 Labor productivity of formal firms facing informal competition

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Informal Competition</td>
<td>-0.268***</td>
<td>-1.642***</td>
<td>-1.919***</td>
<td>-0.574***</td>
<td>-1.657***</td>
</tr>
<tr>
<td>(Proportion of firms in the cell that report competing with informal firms)</td>
<td>(0.067)</td>
<td>(0.602)</td>
<td>(0.618)</td>
<td>(0.059)</td>
<td>(0.307)</td>
</tr>
<tr>
<td>Number of workers (logs)</td>
<td>-0.197***</td>
<td>-0.150***</td>
<td>-0.175***</td>
<td>-0.166***</td>
<td>-0.179***</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.019)</td>
<td>(0.019)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>Firm's age (logs)</td>
<td>0.208***</td>
<td>0.215***</td>
<td>0.296***</td>
<td>0.286***</td>
<td>0.356***</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.026)</td>
<td>(0.032)</td>
<td>(0.029)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>Firm belongs to manufacturing sector: Yes 1 No 0</td>
<td>0.137***</td>
<td>0.077*</td>
<td>0.164***</td>
<td>0.157***</td>
<td>0.139***</td>
</tr>
<tr>
<td></td>
<td>(0.044)</td>
<td>(0.046)</td>
<td>(0.052)</td>
<td>(0.048)</td>
<td>(0.053)</td>
</tr>
<tr>
<td>Firm belongs to retail sector: Yes 1 No 0</td>
<td>0.695***</td>
<td>0.747***</td>
<td>0.896***</td>
<td>0.862***</td>
<td>0.879***</td>
</tr>
<tr>
<td></td>
<td>(0.045)</td>
<td>(0.047)</td>
<td>(0.053)</td>
<td>(0.049)</td>
<td>(0.054)</td>
</tr>
<tr>
<td>Top manager is female: Yes 1 No 0</td>
<td>-0.051</td>
<td>-0.125**</td>
<td>-0.128*</td>
<td>-0.086</td>
<td>-0.063</td>
</tr>
<tr>
<td></td>
<td>(0.048)</td>
<td>(0.058)</td>
<td>(0.073)</td>
<td>(0.067)</td>
<td>(0.070)</td>
</tr>
<tr>
<td>Exports (proportion of sales)</td>
<td>0.288**</td>
<td>0.403***</td>
<td>0.431***</td>
<td>0.385***</td>
<td>0.397***</td>
</tr>
<tr>
<td></td>
<td>(0.114)</td>
<td>(0.117)</td>
<td>(0.145)</td>
<td>(0.133)</td>
<td>(0.148)</td>
</tr>
<tr>
<td>Firm has foreign owners: Yes 1 No 0</td>
<td>0.638***</td>
<td>0.836***</td>
<td>0.821***</td>
<td>0.658***</td>
<td>0.781***</td>
</tr>
<tr>
<td></td>
<td>(0.063)</td>
<td>(0.062)</td>
<td>(0.070)</td>
<td>(0.086)</td>
<td>(0.074)</td>
</tr>
<tr>
<td>Log GDP per capita (PPP, 2009 Int'l Dollars)</td>
<td>0.631***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.043)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal Competition * Log GDP per capita</td>
<td>0.138**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.067)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance to Frontier (Doing Business)</td>
<td>0.031***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Higher values imply better regulatory practices)</td>
<td>(0.006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal Competition * DTF</td>
<td>0.022**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corruption (Governance Indicators)</td>
<td>0.574***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Higher values imply less corruption)</td>
<td>(0.048)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal Competition * Corruption</td>
<td>0.177**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.085)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Freedom index (Economic Freedom of the World)</td>
<td>0.015***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Higher values imply less regulation and more freedom for businesses)</td>
<td>(0.003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal Competition * Business Freedom index (Economic Freedom of the World)</td>
<td>0.016**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>8.771***</td>
<td>3.818***</td>
<td>7.469***</td>
<td>9.410***</td>
<td>8.163***</td>
</tr>
<tr>
<td></td>
<td>(0.178)</td>
<td>(0.390)</td>
<td>(0.381)</td>
<td>(0.088)</td>
<td>(0.224)</td>
</tr>
<tr>
<td>Country fixed effects</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Number of observations</td>
<td>45,996</td>
<td>45,996</td>
<td>44,770</td>
<td>45,996</td>
<td>43,760</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.404</td>
<td>0.259</td>
<td>0.184</td>
<td>0.191</td>
<td>0.154</td>
</tr>
</tbody>
</table>


Note: Standard errors in brackets. Significance is denoted by *** (1 percent), ** (5 percent), * (10 percent). OLS regression with labor productivity as dependent variable, as proxied by annual sales (in 2009 U.S. dollars, in thousands, in logs) per worker, based on a sample of formal firms only using World Bank’s Enterprise Survey data collected during 2007-14 for 4,036 informal firms and 7,558 formal firms in 18 countries. “Informal competition” is the share of firms in a cell (a group of firms of similar size in the same region and sector) that report competition from informal firms. It is worth mentioning that one could use a firm-level dummy rather than the proportion of formal firms in a cell to proxy informal competition. However, endogeneity concerns may arise because the informal competition faced by a specific firm may also be driven by its productivity. Therefore, the proportion of formal firms facing informal competition in a cell, which would be uncorrelated with the productivity of a specific firm, should be more robust to endogeneity concerns. “Manufacturing” is a dummy variable taking the value of 1 if a firm operates in the manufacturing sector and 0 otherwise. “Capital city” is a dummy variable taking the value of 1 if a firm is located in the capital city and 0 otherwise.
### ANNEX TABLE 3.4 Survey of policy changes

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Years</th>
<th>Methodology</th>
<th>Policy change</th>
<th>Estimated Impact as expected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tax reforms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruhn and Loeprick (2014)</td>
<td>Georgia</td>
<td>2010</td>
<td>Regression Discontinuity Design (RDD) regression</td>
<td>Introduction of preferential tax regimes for micro and small businesses in 2010.</td>
<td>YES. The introduction of preferential tax regimes for micro and small businesses in 2010 increased the number of newly registered formal firms by 18-30 percent below the eligibility threshold during the first year of the reform. No significant effect was seen in subsequent years.</td>
</tr>
<tr>
<td>Fajnzylber, Maloney, and Montes-Rojas (2011); Maloney and Mendez (2004)</td>
<td>Brazil</td>
<td>1996</td>
<td>OLS regression on firm-level survey data</td>
<td>The SIMPLES program introduced in November 1996 consolidated multiple taxes and social security contributions into a single payment and reduced tax burdens (on average 8 percent) for eligible small firms.</td>
<td>YES. SIMPLES raised the proportion of firms that have a license to operate by 4.5 percent (20.8 to 25.3 percent), are registered as a legal entity, pay taxes and make social security contributions. Newly created firms (with employees) that opted for operating formally achieved higher levels of revenue and profits, employed more workers and were more capital intensive. This occurred, not through greater access to credit or contracts with larger firms, but through lower cost of contracting labor that allowed the adoption of more productive technologies.</td>
</tr>
<tr>
<td>Keats (2017)</td>
<td>India</td>
<td>2017</td>
<td>descriptive</td>
<td>The GST reform introduced in 2017 simplified the taxation of goods and services and reduced the incidence of taxation from 26.5 percent to 15-20 percent.</td>
<td>YES. The GST reform reduced the percentage of informal firms by 50 percent.</td>
</tr>
<tr>
<td>Slonimczyk (2012)</td>
<td>Russia</td>
<td>2001</td>
<td>Difference-In-Differences (DID) estimation</td>
<td>The fiscal reform implemented in 2001 reduced payroll and social taxes. The reform lowered the average personal income tax (PIT) to a flat rate of 13 percent.</td>
<td>YES. The tax reform reduced the share of informal labor. The decline was sharpest among individuals with the largest gains from the tax reform.</td>
</tr>
<tr>
<td>Waseem (2018)</td>
<td>Pakistan</td>
<td>2009</td>
<td>Difference-In-Differences (DID) estimation</td>
<td>The tax reform implemented in 2009 raised the income tax rate on earnings for noncorporate partnership firms from 5 to 25 percent.</td>
<td>YES. In a context of weak enforcement and widespread informality, an increase in the tax rate (from 5 to 25 percent) on noncorporate partnership income led firms to report significantly lower earnings (roughly half), migrate into informality, and switch business form to avoid the additional tax burden.</td>
</tr>
</tbody>
</table>
### ANNEX TABLE 3.4 Survey of policy changes (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Years</th>
<th>Methodology</th>
<th>Policy change</th>
<th>Estimated impact as expected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulatory (labor and business) reforms</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bosch, Goni, and Maloney (2007)</td>
<td>Brazil</td>
<td>Mid 1980s and 1990s</td>
<td>Cross-section weighted least squares</td>
<td>The constitutional reform in 1988 cut maximum work hours, raised vacation pay, extended maternity leave, and raised dismissal cost.</td>
<td>YES. A large fraction of the 10 percentage point rise in informal employment in Brazil during 1990-2000 was driven by rising labor costs and reduced flexibility.</td>
</tr>
<tr>
<td>Betcherman, Daysal, and Pagés (2010)</td>
<td>Turkey</td>
<td>2004 and 2005</td>
<td>Difference-In-Differences (DID) estimation</td>
<td>Two employment subsidy schemes were introduced in 2004 and 2005.</td>
<td>YES. Employment subsidies significantly raised the number of registered jobs in eligible provinces (5-13 percent for the first program and 11-15 percent for the second).</td>
</tr>
<tr>
<td>Comola and Mello (2011)</td>
<td>Indonesia</td>
<td>1996 to 2004</td>
<td>seemingly unrelated regression (SUR)</td>
<td>As part of fiscal decentralization, the central government transferred minimum-wage setting responsibilities to provinces and local governments after 2001.</td>
<td>YES. The fiscal decentralization led to a sharp increase in the real value of the minimum wage. District-level survey data suggests that an increase in the ratio of the minimum wage to the mean wage by 10 percentage point was associated with a rise in informal sector employment by 0.9-1.1 percentage point and a drop in formal sector employment by 0.5-0.7 percentage point.</td>
</tr>
<tr>
<td>McCaig and Pavcnik (2015); and Boly (2018)</td>
<td>Vietnam</td>
<td>1999 to 2009 and 2005 to 2013</td>
<td>Linear probability model</td>
<td>Labor market reforms in 2006 established a new flexible system in which minimum wages vary according to location and sector of employment.</td>
<td>YES. From 1999 to 2009, the labor force surged (up by 35 percent) in a fast-growing Vietnamese economy (with 78 percent increase in GDP per capita). This economic upturn led to a contraction of the informal employment (from 86 to 79 percent). Younger and more educated male workers were more likely to migrate from informal to formal activities, in sharp contrast to older and poorly educated females. Firms opting out of informality achieved higher profit and greater value added.</td>
</tr>
<tr>
<td>Sharma (2009)</td>
<td>India</td>
<td>1988 to 2000</td>
<td>OLS regression on firm-level survey data</td>
<td>The major deregulation in 1991 in India removed license requirements on the setup and expansion of factories in nearly half of all industries.</td>
<td>YES. Informality dropped, and the reduction in informality was greatest in states with more pro-employer labor laws. In states with pro-employer labor laws, the number of informal establishments declined by 25 percent more than in states with less flexible labor laws.</td>
</tr>
<tr>
<td>Bruhn (2011, 2013)</td>
<td>Mexico</td>
<td>2002 to 2006</td>
<td>OLS regression on firm-level survey data</td>
<td>The business registration reform established a Rapid Business Opening System (SARE) in various municipalities in Mexico from 2002 to 2006.</td>
<td>YES. SARE was exclusively implemented for eligible low-risk industries such as commerce and restaurants, excluding high-risk industries (e.g., chemical plants, transportation). The reform induced a 5 percent increase in the number of registered businesses. This increase was mainly driven by former wage earners switching from ineligible industries to launch eligible businesses, rather than the registration of existing informal businesses.</td>
</tr>
</tbody>
</table>
### ANNEX TABLE 3.4. Survey of policy changes (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Years</th>
<th>Methodology</th>
<th>Policy change</th>
<th>Estimated impact as expected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trade liberalization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bosch, Goni, and Maloney (2007)</td>
<td>Brazil</td>
<td>Mid 1980s and 1990s</td>
<td>Cross-section weighted least squares</td>
<td>In addition to major changes in labor legislation, the constitutional reform in 1988 introduced trade liberalization policies.</td>
<td>YES. A small fraction of the 10 percentage point rise in informal employment in Brazil during 1990-2000 was driven by trade liberalization in the mid 1980s and 1990s.</td>
</tr>
<tr>
<td>Goldberg and Pavcnik (2003); Attanasio, Goldberg, and Pavcnik (2004)</td>
<td>Colombia</td>
<td>1980s and 1990s</td>
<td>Two-step restricted least squares estimation</td>
<td>Trade liberalization measures were implemented in the 1980s and 1990s.</td>
<td>YES. Employment informality expanded (i.e. a 1-percentage point decline in a tariff in a given industry is associated with a 0.1 percentage point increase in the probability of informal employment), but only for the period preceding a major labor market reform that increased labor market flexibility.</td>
</tr>
<tr>
<td>Selwaness and Zaki (2015)</td>
<td>Egypt</td>
<td>1998 and 2004</td>
<td>OLS regression on individual-level survey data</td>
<td>Waves of trade liberalization in 1998 and 2004 reduced tariffs nearly by 70 percentage points, from 110 percent at the end of the 1980s to reach 40 percent by the end of 1990’s.</td>
<td>MIXED (YES in 1998, NO in 2004). The impact depended on the observation period and the degree of labor market rigidity. Trade liberalization reforms increased informality among workers in 1998, but lowered the likelihood of informal employment post-2004. This difference may be attributed to labor reforms implemented in 2003 that added flexibility to the market during the second wave liberalization.</td>
</tr>
<tr>
<td>McCaig and Pavcnik (2018)</td>
<td>Vietnam</td>
<td>2001/2002 and 2003/2004</td>
<td>on household survey data</td>
<td>US-Vietnam bilateral trade agreement (BAT) went into effect in 2001.</td>
<td>NO. Evidence from household surveys in 2001/2002 and 2003/2004 shows that US tariffs reduction (20.9 percent average annual drop) induced a sharp increase in exports to the US, which grew from 3.6 to 10.4 percent of Vietnam’s GDP. This positive export shock generated 5 percentage point increase in the share of manufacturing workers in the formal sector. In addition, the prevailing labor productivity gap of 3.7 (when heterogeneity and measurement errors are accounted for) between the informal and the formal sector induced a reallocation of labor towards the formal sector, and increased the aggregate labor productivity within manufacturing by 2.6 percent per year.</td>
</tr>
</tbody>
</table>


YES (NO) means that the outcome of a policy intervention is (not) consistent with the expected impact. MIXED means that the outcome of a policy intervention varies over time. The expected impacts of reforms are: (i) reduced tax burden would reduce informality; (ii) increased labor market flexibility would reduce informality; (iii) lowered entry and exit barriers in formal sector would reduce informality; (iv) trade liberalization would increase informality due to intense foreign competition that disrupts existing formal firms.
**ANNEX TABLE 3.1.1 Data coverage**

<table>
<thead>
<tr>
<th>Estimation method</th>
<th>Aspect</th>
<th>Measures</th>
<th># of AE</th>
<th># of EMDE</th>
<th>Time period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect</td>
<td>Output</td>
<td>DGE (percent of GDP)</td>
<td>36</td>
<td>122</td>
<td>1950-2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIMIC (percent of GDP)</td>
<td>36</td>
<td>124</td>
<td>1993-2015</td>
</tr>
<tr>
<td>Direct (survey-based)</td>
<td>Employment</td>
<td>Pension coverage (percent of labor force)</td>
<td>31</td>
<td>104</td>
<td>1990-2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-employment (percent of total employment)</td>
<td>36</td>
<td>144</td>
<td>1955-2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Informal employment (percent of total employment)</td>
<td>0</td>
<td>53</td>
<td>2001-2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employment outside the formal sector (percent of total employment)</td>
<td>0</td>
<td>57</td>
<td>1999-2016</td>
</tr>
<tr>
<td>Firm surveys</td>
<td>Perception</td>
<td>WEF(1-7=Most informal)</td>
<td>36</td>
<td>115</td>
<td>2006-2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WB: percent Competing against informal firms</td>
<td>8</td>
<td>131</td>
<td>2006-2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WB: percent firms formally registered when founded</td>
<td>7</td>
<td>129</td>
<td>2006-2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WB: Number of years operated without registration</td>
<td>7</td>
<td>129</td>
<td>2006-2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WB: percent firms that found competitors in the informal sector as a constraint</td>
<td>7</td>
<td>131</td>
<td>2006-2016</td>
</tr>
<tr>
<td>HS</td>
<td></td>
<td>WVS: Justifiable (Cheating on taxes)</td>
<td>26</td>
<td>68</td>
<td>1981-2010</td>
</tr>
</tbody>
</table>

Note: DGE is benchmarked to Schneider, Buehn, and Montenegro (2010). World Value Survey (WVS) asks whether cheating on taxes is justifiable (1 is “never justifiable” and 10 is “always justifiable”) and reports average responses at the country-year level, with a higher level suggesting that the country is more tolerant towards the informal sector. World Economic Forum (WEF) asks “In your country, how much economic activity do you estimate to be undeclared or unregistered? (1= Most economic activity is undeclared or unregistered; 7= Most economic activity is declared or registered)” and reports average responses at the country-year level. Here the average responses have been reordered to make it so that "7= Most economic activity is undeclared or unregistered; 1= Most economic activity is declared or registered” where a higher level suggesting a larger informal sector in the country. The WEF data for year 2004 and 2005 are dropped since different ordering were used before 2006, which makes the numbers incomparable over time. WB shows the results for World Bank Enterprise Surveys. “HS” stands for “Household surveys”. "(a)" stands for “Output, and "(b)" stands for “Opinions/Tax Morality”. See Elgin et al (forthcoming a) for detailed information.
### ANNEX TABLE 3.1.2. MIMIC model estimation results (1993-2015)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Size of government</td>
<td>0.133***</td>
<td>0.143***</td>
<td>0.157***</td>
<td>0.152***</td>
<td>0.145***</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.021)</td>
<td>(0.024)</td>
<td>(0.019)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Share of direct taxation</td>
<td>0.035</td>
<td>0.009</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.022)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Freedom</td>
<td>0.035</td>
<td>0.040**</td>
<td>0.058**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.020)</td>
<td>(0.024)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiscal Freedom</td>
<td>0.002</td>
<td>-0.010</td>
<td>-0.038</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.020)</td>
<td>(0.025)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.078***</td>
<td>0.105***</td>
<td>0.055**</td>
<td>0.067***</td>
<td>0.066***</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.021)</td>
<td>(0.022)</td>
<td>(0.019)</td>
<td>(0.019)</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>-0.342***</td>
<td>-0.324***</td>
<td>-0.393***</td>
<td>-0.381***</td>
<td>-0.385***</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.027)</td>
<td>(0.029)</td>
<td>(0.022)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Government effectiveness</td>
<td>-0.069***</td>
<td>-0.043**</td>
<td>-0.042**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.018)</td>
<td>(0.018)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth rate of GDP per capita</td>
<td>-0.835***</td>
<td>-0.618***</td>
<td>-0.362***</td>
<td>-0.310***</td>
<td>-0.306***</td>
</tr>
<tr>
<td></td>
<td>(0.119)</td>
<td>(0.085)</td>
<td>(0.079)</td>
<td>(0.064)</td>
<td>(0.064)</td>
</tr>
<tr>
<td>Labor force participation rate</td>
<td>-0.321***</td>
<td>-0.219***</td>
<td>-0.167***</td>
<td>-0.155***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.091)</td>
<td>(0.073)</td>
<td>(0.053)</td>
<td>(0.052)</td>
<td></td>
</tr>
<tr>
<td>Growth rate of labor force</td>
<td>-0.091</td>
<td></td>
<td></td>
<td></td>
<td>-0.091</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.064)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currency (M0/M1)</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
</tbody>
</table>

**Statistical tests**

- RMSEA: 0.061 (0.057) 0.070 0.087 0.089
- p(RMSEA<=0.05): 0.097 (0.190) 0.002 0.000
- Chi-squared (p): 63.922 (0.00) 60.646 (0.000) 124.517 (0.000) 153.29 (0.000) 160.63 (0.000)
- AIC: 27388.448 27388.448 41436.305 43231.405 44080.904
- BIC: 27464.278 33602.241 41522.616 44306.446 44156.205
- CFI: 0.820 0.852 0.761 0.771 0.764
- TLI: 0.685 0.734 0.590 0.571 0.558
- SRMR: 0.033 0.030 0.041 0.046 0.047
- CD: 0.846 1 1 1 1
- Number of observations: 1,159 1,570 1,627 2,374 2,422

**Note:** Absolute z-statistics in parentheses. ***, **, * denote significance at the 1, 5, and 10 percent significance levels. All variables are used as their standardized deviations from the mean. Data sources for variables used in the model are listed in Section II footnote 6. Following the MIMIC models' identification rule, the currency (M0/M1) variable is fixed to an a priori value. The currency variable shows the level of money (cash) in circulation. “AIC" stands for "Akaike’s information criterion" and “BIC" stands for "Bayesian information criterion. “RMSEA" stands for “Root Mean Square Error of Approximation." “TLI" stands for "Tucker Lewis Index." “CFI" stands for "Comparative Fit Index." “SRMR" stands for "Standardized Root Mean Square Residual" and “CD" shows the coefficient of determination. These are goodness-of-fit statistics.
## ANNEX TABLE 3.3.1 Database of studies for meta regressions analysis

<table>
<thead>
<tr>
<th>Study</th>
<th>Countries / Estimates</th>
<th>Sample period</th>
<th>Methodology</th>
<th>Mean wage gap*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baskaya and Hulagu (2011)</td>
<td>1/2</td>
<td>2005-2009</td>
<td>OLS, PSM</td>
<td>15.45</td>
</tr>
<tr>
<td>Botelho and Poncze (2011)</td>
<td>1/2</td>
<td>1995-2001</td>
<td>OLS, FE</td>
<td>11.76</td>
</tr>
<tr>
<td>El Badaoui, Strobl, and Walsh (2010)</td>
<td>1/6</td>
<td>1994</td>
<td>OLS, PSM</td>
<td>25.65</td>
</tr>
<tr>
<td>Gindling (1991)</td>
<td>1/1</td>
<td>1982</td>
<td>OLS</td>
<td>28.50</td>
</tr>
<tr>
<td>Huber and Rahimov (2014)</td>
<td>1/2</td>
<td>2007</td>
<td>OLS</td>
<td>-34.98</td>
</tr>
<tr>
<td>Lehmann and Pignatti (2007)</td>
<td>1/2</td>
<td>2004</td>
<td>OLS</td>
<td>-6.80</td>
</tr>
<tr>
<td>Lehmann and Zaiceva (2013)</td>
<td>1/5</td>
<td>2003-2011</td>
<td>OLS, QR, FE</td>
<td>6.90</td>
</tr>
<tr>
<td>Magnac (1991)</td>
<td>1/1</td>
<td>1980</td>
<td>OLS</td>
<td>30.30</td>
</tr>
<tr>
<td>Nordman, Rakotomanana, and Roubaud (2016)</td>
<td>1/6</td>
<td>2000-2004</td>
<td>OLS, FE</td>
<td>15.33</td>
</tr>
<tr>
<td>Tansel and Kan (2012)</td>
<td>1/6</td>
<td>2006-2009</td>
<td>OLS, FE</td>
<td>11.56</td>
</tr>
</tbody>
</table>


Note: OLS=pooled ordinary least squares, FE=fixed effects regression, ML logit=multinomial logit regression, PSM=propensity score matching, DID=difference-in-difference estimators, QR=quantile regression. The sample covers these EMDE countries: Argentina, Brazil, Columbia, Costa Rica, Czech Republic, Ecuador, El Salvador, Hungary, Madagascar, Mexico, Peru, Poland, Russia, Slovakia, South Africa, Tajikistan, Turkey, Ukraine and Vietnam.

*Average formal sector premium across all estimates, percent; a negative number indicates a wage penalty for formal sector workers.
ANNEX TABLE 3.3.2 Meta regression analysis summary

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>µ</td>
<td>0.195***</td>
<td>0.11**</td>
<td>0.23***</td>
<td>0.21***</td>
<td>0.14***</td>
<td>0.24***</td>
<td>0.17***</td>
<td>0.18***</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.04)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.05)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Female</td>
<td>0.16*</td>
<td>0.15*</td>
<td>0.12</td>
<td>0.12</td>
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<td></td>
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<tr>
<td></td>
<td>(0.08)</td>
<td>(0.08)</td>
<td>(0.08)</td>
<td>(0.08)</td>
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<tr>
<td>Male</td>
<td>0.14**</td>
<td>0.13**</td>
<td>0.11*</td>
<td>0.10</td>
<td></td>
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<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
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<tr>
<td>Fixed Effects</td>
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<td>-0.13**</td>
<td>-0.14**</td>
<td>-0.13**</td>
<td>-0.13**</td>
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<td></td>
<td>(0.07)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.07)</td>
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<tr>
<td>Self-employed</td>
<td>-0.34*</td>
<td>-0.32**</td>
<td>-0.25*</td>
<td>-0.26*</td>
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<td></td>
<td>(0.14)</td>
<td>(0.13)</td>
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<tr>
<td>Latin America and the Caribbean</td>
<td>0.00</td>
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<tr>
<td>Europe and Central Asia</td>
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<td></td>
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<td>(0.07)</td>
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<td></td>
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<tr>
<td>Adjusted R-squared</td>
<td>7.8</td>
<td>5.8</td>
<td>6.4</td>
<td>12.0</td>
<td>11.4</td>
<td>14.8</td>
<td>12.4</td>
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<tr>
<td>Number of observations</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td></td>
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<tr>
<td>τ²</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
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</tr>
<tr>
<td>I²</td>
<td>99.6</td>
<td>99.5</td>
<td>99.4</td>
<td>99.5</td>
<td>99.4</td>
<td>99.4</td>
<td>99.1</td>
<td></td>
</tr>
</tbody>
</table>

Note: *** p<0.01, ** p<0.05, * p<0.1; standard errors are in parenthesis. Within study standard errors of the estimates are used as weights to correct for the heterodasticity. The dependent variable is the informal-formal wage gap estimates by former studies (listed in Annex Table 3.3.1). τ² captures the degree of across-study variations, and I² reflects the impact of across-study heterogeneity.
### ANNEX TABLE 3.4.1 Pre-existing informality and changes in poverty and income inequality: OLS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual change in poverty</td>
<td>-0.024</td>
<td>-0.025</td>
<td>-0.029</td>
<td>Initial Gini index</td>
<td>-0.020</td>
<td>-0.020</td>
</tr>
<tr>
<td>Initial poverty rate</td>
<td>(7.90)***</td>
<td>(7.94)***</td>
<td>(7.31)***</td>
<td>Initial Gini index</td>
<td>[-5.58]***</td>
<td>[-5.51]***</td>
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<td>DGE</td>
<td>0.010</td>
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<td>0.011</td>
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<tr>
<td>(1.84)*</td>
<td>(1.84)*</td>
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<tr>
<td>MIMIC</td>
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<td>0.000</td>
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<tr>
<td>(1.83)*</td>
<td>[-0.04]</td>
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<tr>
<td>Self-employment</td>
<td>0.010</td>
<td>0.001</td>
<td></td>
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<tr>
<td>(2.23)**</td>
<td></td>
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<tr>
<td>Constant</td>
<td>-0.507</td>
<td>-0.533</td>
<td>-0.466</td>
<td>Constant</td>
<td>0.671</td>
<td>0.705</td>
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<tr>
<td>(2.13)**</td>
<td>(2.13)**</td>
<td>(2.81)***</td>
<td></td>
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<tr>
<td>R-squared</td>
<td>0.48</td>
<td>0.47</td>
<td>0.45</td>
<td>R-squared</td>
<td>0.28</td>
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<td>Number of observations</td>
<td>72</td>
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Note: Estimated by ordinary least squares method. Dependent variable in column [1]-[3]: Annual change in poverty headcount ratio (i.e., Poverty headcount ratio at $1.90 a day (2011 PPP), percent of population) over the earliest year and the latest year, in percentage points. Dependent variable in column [4]-[6]: Annual change in Gini index over the earliest year and the latest year, in percentage points. Annual change in poverty headcount ratio (i.e., Poverty headcount ratio at $1.90 a day (2011 PPP), percent of population) over the earliest year and the latest year, in percentage points. Initial poverty rate (or Gini index for column [4]-[6]) is the earliest available year between 1990-2005. Informality indicators are averages over 1990-2005. *, **, and *** denote that the coefficients are statistically significant at the 10 percent, 5 percent, and 1 percent levels, respectively. Heteroskedasticity-robust standard errors are estimated with t-statistics presented below the corresponding coefficients.
## Annex Table 3.5.1 Sample

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<th>Advanced Economies (27)</th>
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</table>

Note: The country sample and classification are taken from Loayza (2016).
References


