Chains on the City: Can Global Value Chains Unleash the Demand for Secondary Cities?

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Secondary Towns, Jobs and Poverty Reduction: Refocusing the Urbanization Agenda

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Motivation (1)

- Stability and persistence in the size distribution of cities

Motivation (2)

- City size distribution is “still”, but the “fast” churning of industries can trigger a “slow” movement of cities

Motivation (3)

- Global value chains (GVCs) fundamentally alter the industrial composition of cities / regions

- Singapore
- Malaysia
  (Johar Baru)
- Indonesia
  (Bintan Batam)

Question

- Can participation in GVCs activate secondary cities?

- Transmission mechanism for Participation in GVCs to the size distribution of cities
    - Quantity Effect
    - Quality Effect (knowledge)

Estimation Strategy

- Stage 1:

$$lnR_{i,c,t} = A_{c,t} - \gamma_{c,t}\, lnP_{i,c,t} + \varepsilon_{i,c,t}$$

$R_{i,c,t}$ is the rank of city i in country c at time t and $P_{i,c,t}$ is the population of the given city i in country c at time t .$\gamma_{c,t}$ is the Zipf's coefficient

Estimation Strategy

- Stage 2:

$$\gamma_{c,t} = \varphi_{c,t} + \beta\ lnX_{c,t} + e_{c,t}$$

where $\varphi_{c,t}$ is a vector of time and/or country specific fixed effect, as appropriate. $X_{c,t}$ is a vector of country specific characteristics at time t , β measures the effect of changes in these variables on city size distribution.

Data

- Demographic Data: Thomas Brinkhoff (2004): http://www.citypopulation.de/.

- GVCs data: OECD TiVA

  Indicators:

  - DVA in exports of intermediate products, % gross exports
  - Re-imported domestic value added, % gross exports
  - DVA embodied in foreign exports, % gross exports

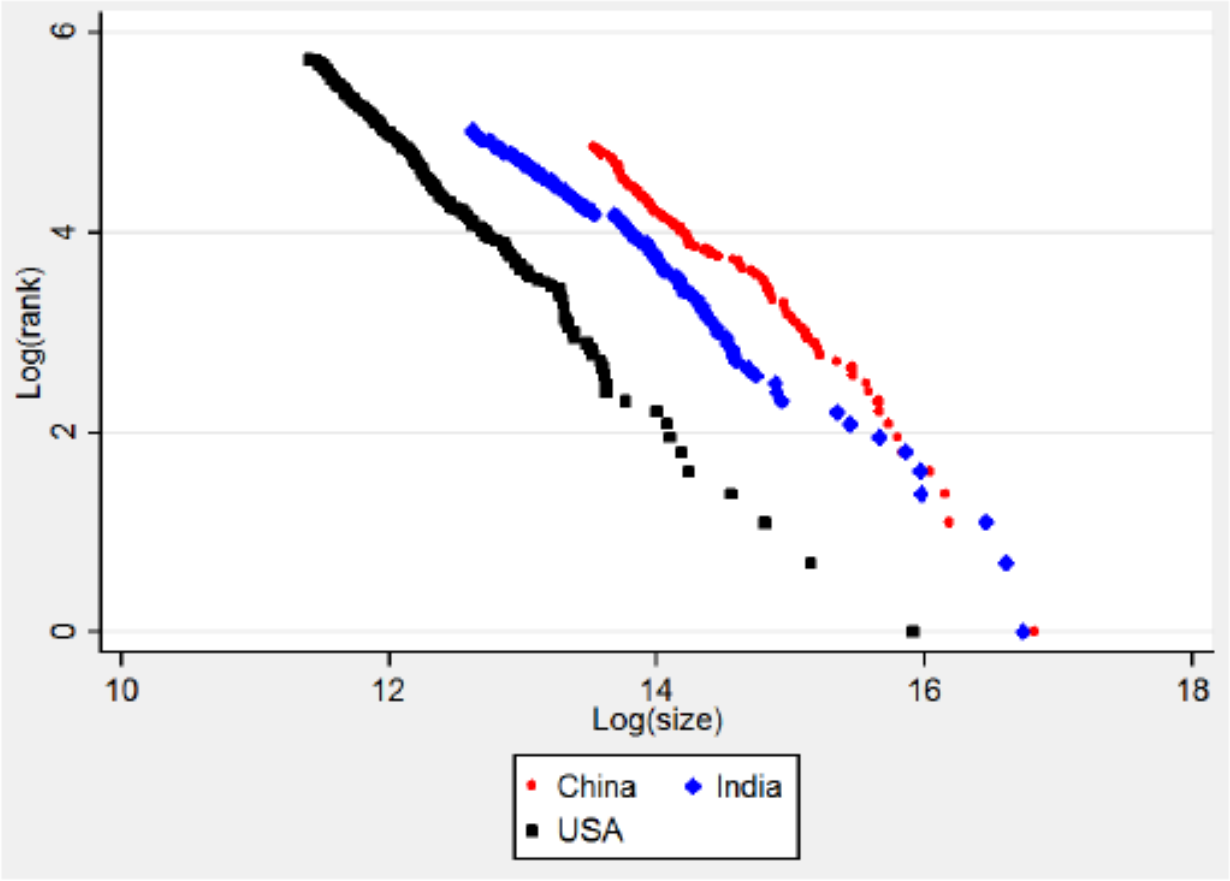
Country coverage TiVA database

Table A.2: Country coverage in OECD TiVA Database

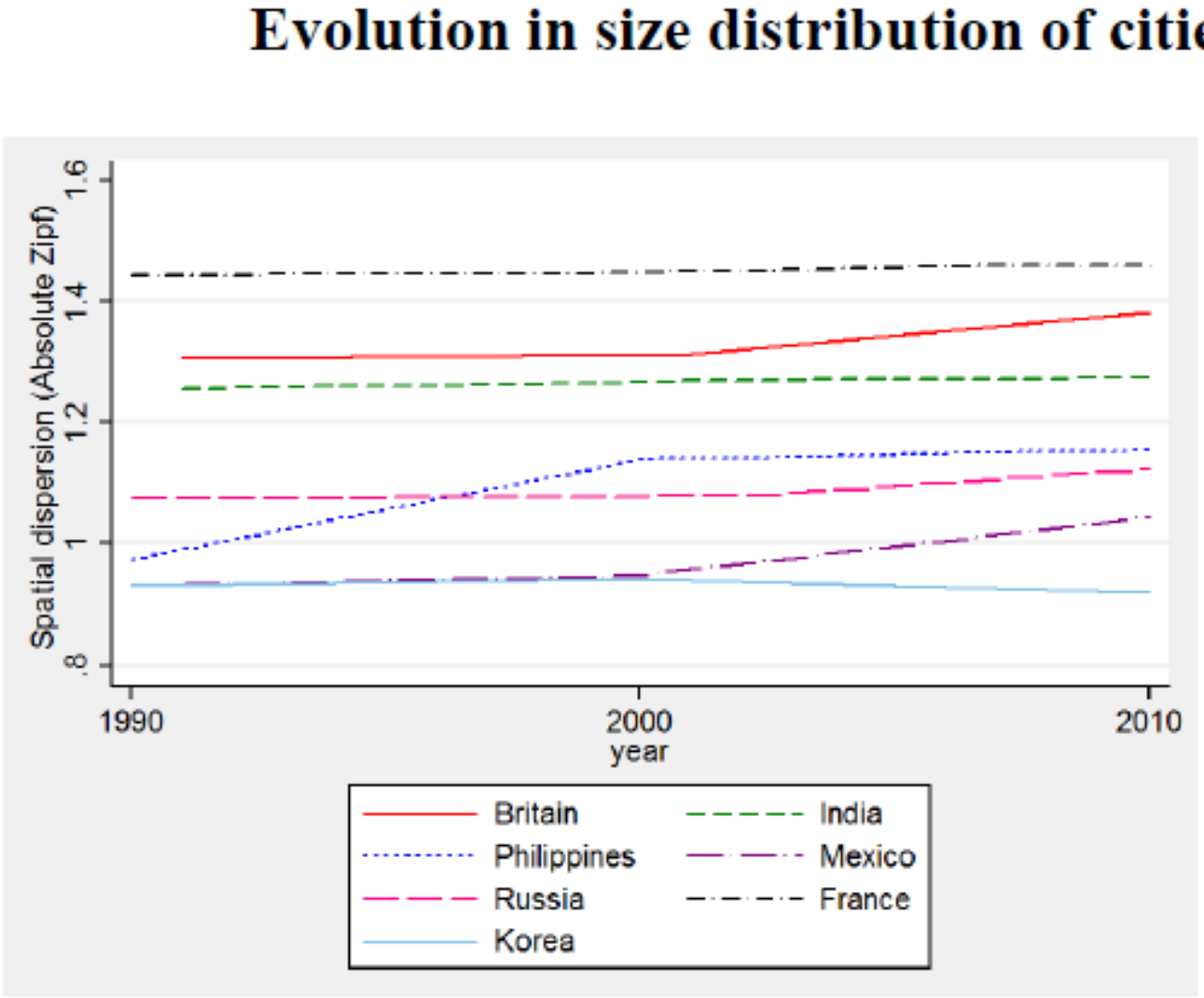
Continent	No. Countries covered	Names of the covered countries
Africa	2	South Africa,Tunisia
America	3	Canada, Mexico, United States
Asia	15	Cambodia, China, Hong Kong, India, Indonesia, Israel, Japan, Malaysia, Philippines, Saudi Arabia, Singapore, South Korea, Taiwan, Thailand, Viet Nam
Europe	33	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherland, Norway, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey
Latin America	5	Argentina, Brazil, Chile, Colombia, Costa Rica
Oceania	2	Australia, New Zealand

Descriptive Results

Rank-size relationship for China, India and USA (2010/11)

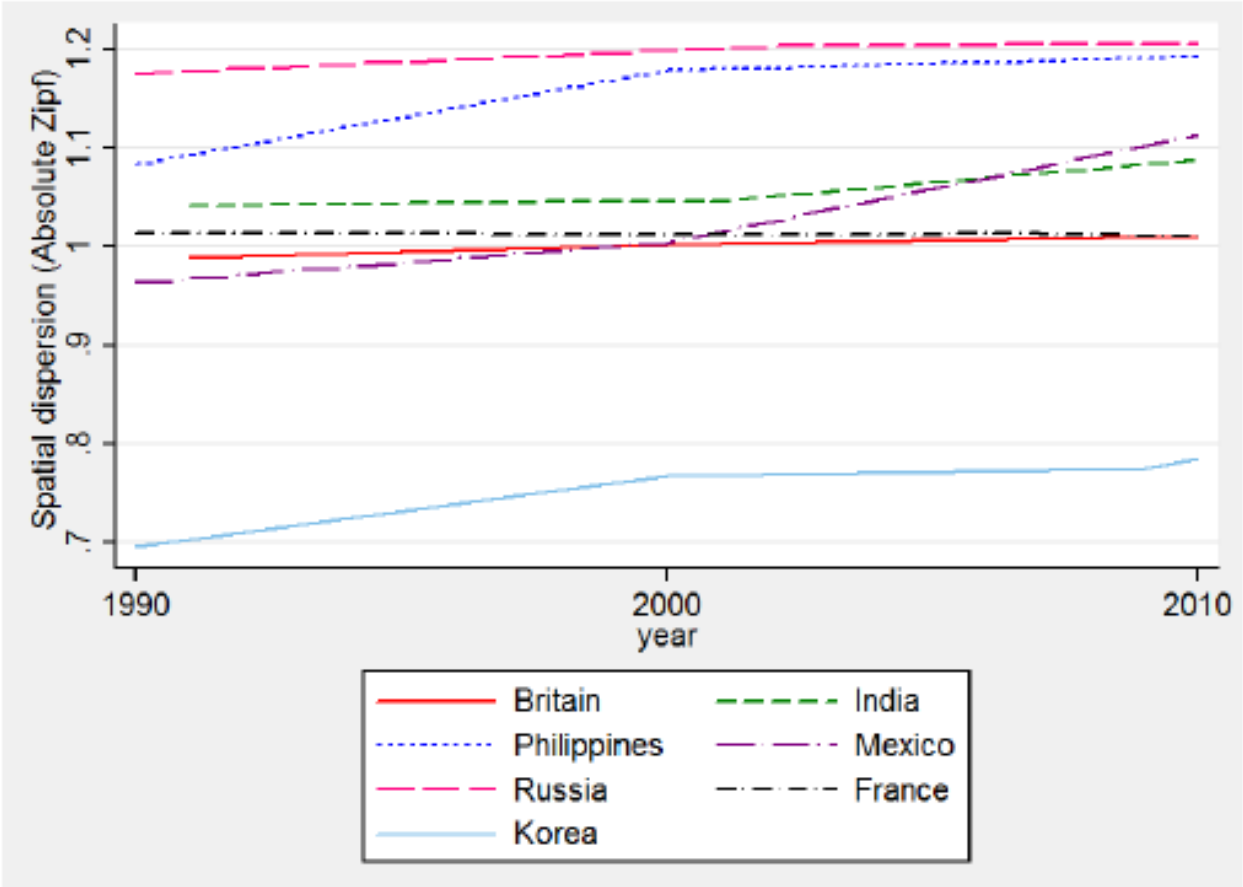


Descriptive Results



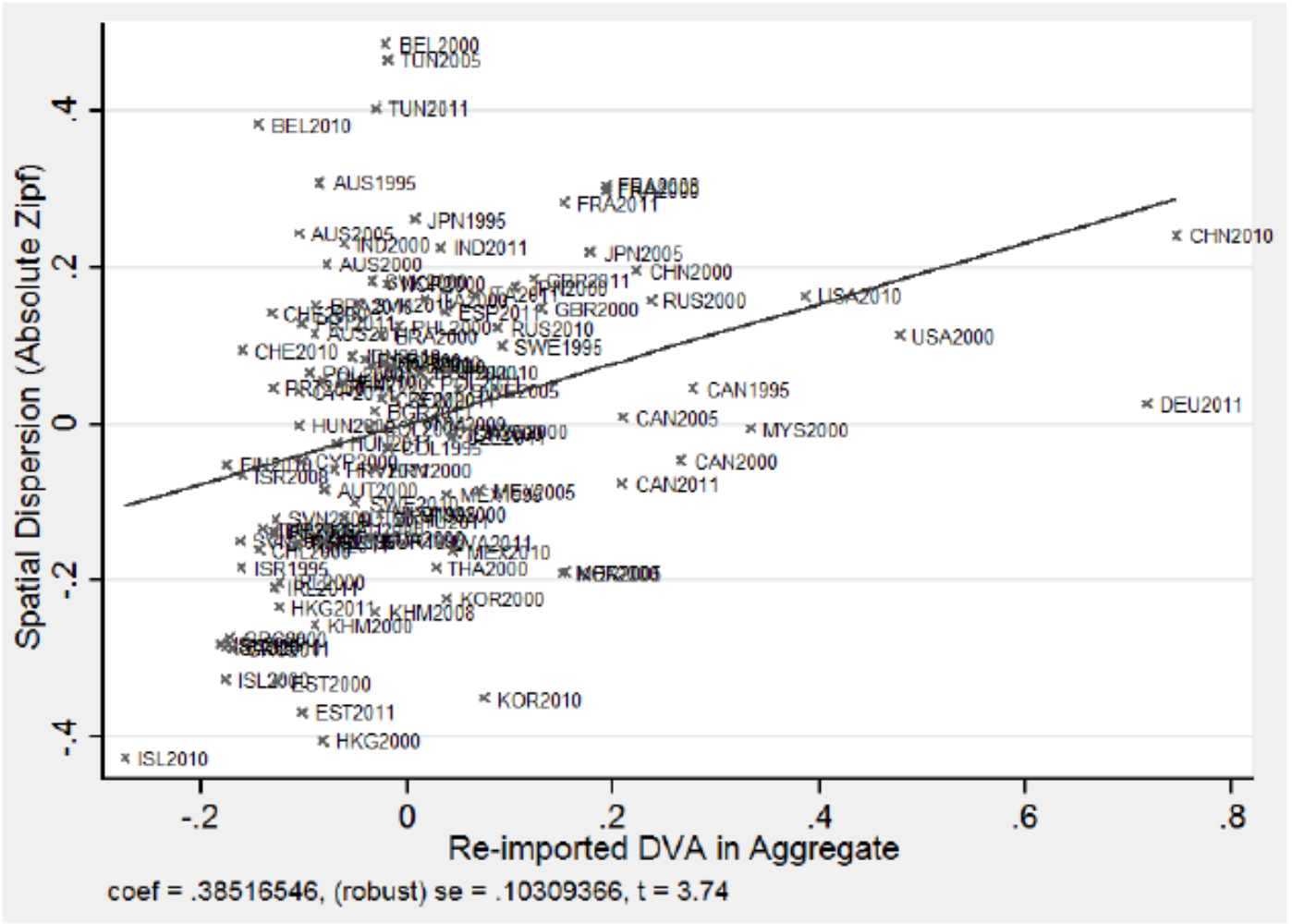
Descriptive Results

Evolution in size distribution of urban agglomerations



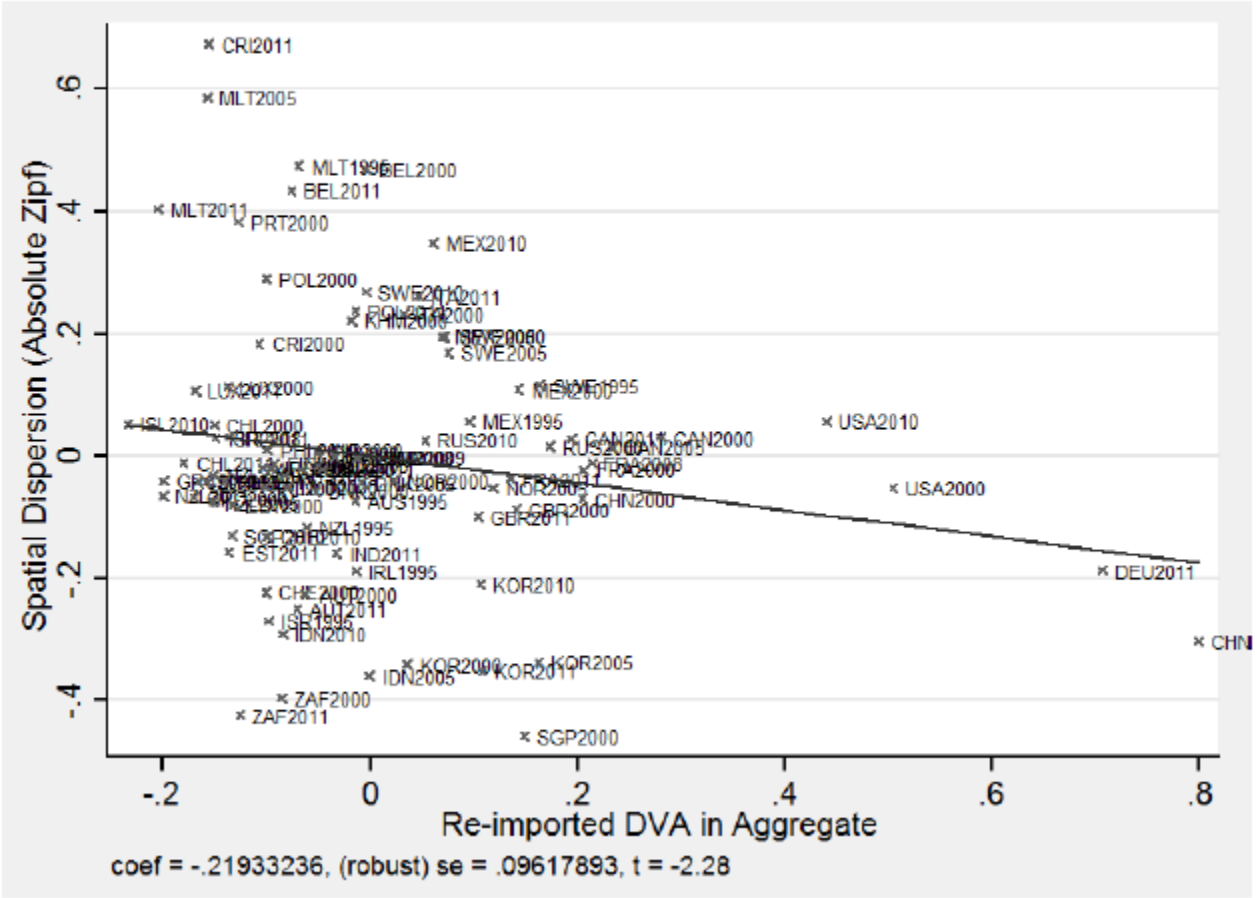
Descriptive Results

Participation in GVCs and size distribution in cities



Descriptive Results

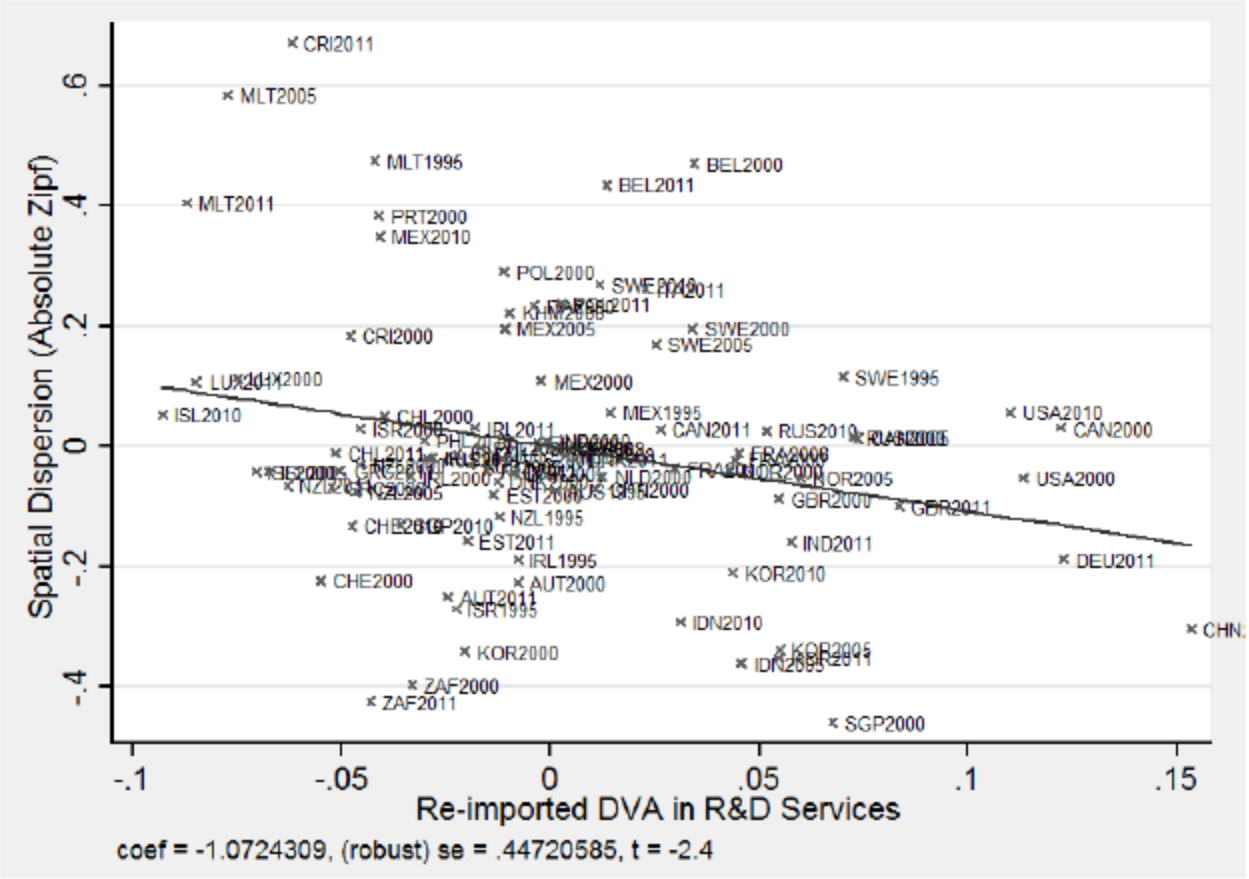
Participation in GVCs and size distribution in urban agglomerations



coef = -.21933236, (robust) se = .09617893, t = -2.28

Descriptive Results

Participation in R&D services GVCs and size distribution in urban agglomerations



Base Results

: Participation in GVCs and Size Distribution of Urban Agglomerations

DV: Spatial Dispersion (Absolute value of Zipf's coefficient) in Aggregate	Re-imported DVA, % gross exports				DVA in exports of Intermediates, % gross exports			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participation in GVCs	-0.033++	-0.058++	-0.049+++	-0.042++	-0.093+++	-0.063	-0.102+++	-0.100++
	(0.016)	(0.025)	(0.017)	(0.020)	(0.033)	(0.040)	(0.037)	(0.041)
Logged Population density	0.135+++	0.072	0.134+	0.130	0.101+++	0.044	0.163+++	0.152++
	(0.023)	(0.071)	(0.071)	(0.085)	(0.024)	(0.074)	(0.049)	(0.067)
Logged GDP per capita PPP	0.628	0.549	1.054	0.850	0.876++	0.690	1.314++	0.971
	(0.440)	(0.840)	(0.685)	(0.717)	(0.434)	(0.807)	(0.621)	(0.638)
Square Logged GDP per capita	-0.506	-0.511	-1.057	-0.892	-0.740+	-0.654	-1.333++	-1.044
	(0.433)	(0.774)	(0.673)	(0.698)	(0.425)	(0.754)	(0.604)	(0.619)
OECD	-0.512+++	-0.533+++	-0.698+++	-0.677+++	-0.568+++	-0.548+++	-0.723+++	-0.694+++
	(0.123)	(0.156)	(0.161)	(0.158)	(0.124)	(0.160)	(0.144)	(0.139)
Government expenditure (% GDP)	0.069++	0.074++	0.096+++	0.083+	0.068++	0.074++	0.098+++	0.080++
	(0.030)	(0.036)	(0.034)	(0.044)	(0.030)	(0.035)	(0.027)	(0.032)
Logged road density		0.057	-0.018	-0.011		0.061	-0.084	-0.070
		(0.076)	(0.081)	(0.098)		(0.082)	(0.064)	(0.086)
Final products exports DVA (% exports)		0.014	-0.017	-0.011		-0.013	-0.061	-0.046
		(0.044)	(0.044)	(0.041)		(0.044)	(0.051)	(0.047)
Non-agricultural Value Added (% GDP)		0.197	0.404+++	0.388+++		0.148	0.382+++	0.369+++
		(0.175)	(0.095)	(0.099)		(0.134)	(0.086)	(0.089)
Mobile subscriptions (per 100 people)		-0.122+	-0.161++	-0.128		-0.072	-0.130+	-0.089
		(0.070)	(0.076)	(0.077)		(0.064)	(0.065)	(0.059)
Voice and accountability			0.037	0.038			0.086	0.078
			(0.067)	(0.068)			(0.067)	(0.069)
Tariff rate (mean)			-0.005	-0.006			-0.051	-0.049
			(0.063)	(0.063)			(0.065)	(0.069)
Urban population (% total)				0.040				0.060
				(0.066)				(0.052)
Constant	1.516+++	1.373+++	1.465+++	1.221+++	1.534+++	1.388+++	1.498+++	1.163+++
	(0.146)	(0.136)	(0.116)	(0.147)	(0.141)	(0.146)	(0.126)	(0.128)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91	70	56	56	91	70	56	56
R-squared	0.606	0.619	0.744	0.747	0.629	0.601	0.762	0.772
Adjusted R-squared	0.545	0.513	0.629	0.624	0.572	0.490	0.656	0.661

Notes: The table shows the impact of participation in GVCs on size distribution of urban agglomerations in a panel of countries from 1995, 2000, 2005, 2008-2011. The indices for participation in GVCs considered in this table include Re-imported DVA (% gross exports) and intermediate exports DVA (% gross exports). All explanatory variables are in unit standard deviation format. The measure of spatial dispersion, that is, the absolute value of Zipf coefficient, is winsorized at the bottom 2% and top 98% percentile level. All estimations include an year fixed effect while country fixed effect model is rejected by the Hausman specification test. Estimations report standard errors in parantheses. +, ++, and +++ denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Base Results

Participation in GVCs and Size Distribution of Urban Agglomerations								
value of Zipf's coefficient) in Aggregate	DVA embodied in foreign exports % gross exports				Ratio of forward to backward international linkages			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Participation in GVCs	-0.087+++	-0.083+++	-0.108+++	-0.104+++	-0.165+++	-0.111+	-0.144++	-0.135++
	(0.027)	(0.031)	(0.027)	(0.030)	(0.051)	(0.057)	(0.053)	(0.062)
Logged Population density	0.119+++	0.051	0.168+++	0.159++	0.109+++	0.042	0.149++	0.140+
	(0.022)	(0.072)	(0.047)	(0.062)	(0.023)	(0.074)	(0.056)	(0.073)
Logged GDP per capita PPP	0.762+	0.765	1.139++	0.888	0.688+	0.672	1.259+	0.962
	(0.418)	(0.824)	(0.560)	(0.573)	(0.411)	(0.830)	(0.672)	(0.707)
Square Logged GDP per capita	-0.627	-0.716	-1.187++	-0.975+	-0.556	-0.632	-1.278+	-1.027
	(0.408)	(0.765)	(0.549)	(0.562)	(0.403)	(0.776)	(0.655)	(0.685)
OECD	-0.567+++	-0.560+++	-0.737+++	-0.713+++	-0.573+++	-0.562+++	-0.749+++	-0.720+++
	(0.122)	(0.157)	(0.144)	(0.141)	(0.129)	(0.164)	(0.158)	(0.153)
Government expenditure (% GDP)	0.086+++	0.091++	0.121+++	0.106+++	0.072++	0.073++	0.095+++	0.079++
	(0.030)	(0.036)	(0.029)	(0.034)	(0.029)	(0.036)	(0.030)	(0.037)
Logged road density		0.059	-0.073	-0.062		0.066	-0.058	-0.045
		(0.079)	(0.061)	(0.079)		(0.081)	(0.069)	(0.092)
Final products exports DVA (% exports)		-0.031	-0.069	-0.058		0.003	-0.035	-0.023
		(0.043)	(0.048)	(0.044)		(0.043)	(0.046)	(0.041)
Non-agricultural Value Added (% GDP)		0.127	0.380+++	0.369+++		0.140	0.369+++	0.357+++
		(0.136)	(0.077)	(0.082)		(0.138)	(0.091)	(0.094)
Mobile subscriptions (per 100 people)		-0.054	-0.103	-0.073		-0.064	-0.116+	-0.081
		(0.063)	(0.064)	(0.058)		(0.064)	(0.067)	(0.062)
Voice and accountability			0.094	0.087			0.084	0.076
			(0.064)	(0.066)			(0.068)	(0.069)
Tariff rate (mean)			-0.068	-0.066			-0.040	-0.038
			(0.058)	(0.063)			(0.062)	(0.065)
Urban population (% total)				0.045				0.052
				(0.052)				(0.059)
Constant	1.459+++	1.421+++	1.289+++	1.255+++	1.504+++	1.382+++	1.489+++	1.181+++
	(0.134)	(0.150)	(0.127)	(0.129)	(0.142)	(0.148)	(0.131)	(0.135)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91	70	56	56	91	70	56	56
R-squared	0.641	0.624	0.781	0.786	0.626	0.601	0.751	0.758
Adjusted R-squared	0.586	0.519	0.683	0.682	0.569	0.490	0.639	0.640

Notes: See Table 2a. The indices for participation in GVCs considered in this table include ratio of forward to backward linkages and the DVA emodied in foreign exports (% gross exports)

Results: By Sector

Knowledge content of GVCs and Size Distribution of Urban Agglomerations (DVA in exports of intermediates)

DV: Spatial Dispersion (Absolute value of Zipf's coefficient) in Aggregate services	Services				Low-tech Manufacturing			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DVA in exports of intermediate products, % gross exports	-0.077+++	-0.068++	-0.082+++	-0.079+++	-0.046	-0.010	-0.060	-0.060
	(0.024)	(0.029)	(0.026)	(0.028)	(0.029)	(0.033)	(0.037)	(0.042)
Logged Population density	0.127+++	0.054	0.154+++	0.143++	0.112+++	0.053	0.163+++	0.151+
	(0.022)	(0.073)	(0.053)	(0.070)	(0.024)	(0.075)	(0.056)	(0.076)
Logged GDP per capita PPP	0.818+	0.671	1.148+	0.839	0.785+	0.829	1.370+	1.002
	(0.422)	(0.806)	(0.604)	(0.608)	(0.451)	(0.835)	(0.716)	(0.739)
Square Logged GDP per capita	-0.699+	-0.651	-1.193++	-0.932	-0.667	-0.798	-1.407+	-1.097
	(0.414)	(0.748)	(0.584)	(0.589)	(0.444)	(0.784)	(0.698)	(0.720)
OECD	-0.498+++	-0.499+++	-0.667+++	-0.641+++	-0.538+++	-0.531+++	-0.710+++	-0.679+++
	(0.116)	(0.156)	(0.144)	(0.140)	(0.129)	(0.164)	(0.164)	(0.159)
Government expenditure (% GDP)	0.083+++	0.081++	0.104+++	0.087++	0.067++	0.076++	0.098+++	0.078++
	(0.031)	(0.036)	(0.030)	(0.036)	(0.030)	(0.036)	(0.030)	(0.038)
Logged road density		0.071	-0.044	-0.032		0.072	-0.073	-0.060
		(0.079)	(0.065)	(0.084)		(0.086)	(0.070)	(0.098)
Final products exports DVA (% exports)		-0.027	-0.064	-0.050		0.000	-0.056	-0.041
		(0.043)	(0.047)	(0.044)		(0.044)	(0.051)	(0.049)
Non-agricultural Value Added (% GDP)		0.150	0.405+++	0.391+++		0.142	0.390+++	0.376+++
		(0.142)	(0.083)	(0.085)		(0.141)	(0.096)	(0.096)
Mobile subscriptions (per 100 people)		-0.071	-0.118+	-0.081		-0.072	-0.133+	-0.089
		(0.064)	(0.065)	(0.058)		(0.062)	(0.069)	(0.065)
Voice and accountability			0.076	0.068			0.086	0.077
			(0.063)	(0.066)			(0.069)	(0.070)
Tariff rate (mean)			-0.028	-0.027			-0.028	-0.027
			(0.061)	(0.063)			(0.066)	(0.068)
Urban population (% total)				0.055				0.065
				(0.056)				(0.055)
Constant	1.467+++	1.367+++	1.456+++	1.192+++	1.533+++	1.346+++	1.478+++	1.127+++
	(0.131)	(0.142)	(0.119)	(0.126)	(0.146)	(0.139)	(0.134)	(0.144)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91	70	56	56	91	70	56	56
R-squared	0.633	0.612	0.766	0.774	0.605	0.586	0.738	0.748
Adjusted R-squared	0.577	0.504	0.661	0.664	0.545	0.471	0.620	0.626

Notes: See Table 4a. This table presents the association between the knowledge content of participation in GVCs and spatial dispersion using DVA in exports of intermediates (% gross exports) for services and low-tech manufacturing. Estimations report standard errors in parantheses. +, ++, and +++ denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Conclusions

- GVCs are changing the process of industrialization
- Policies aiming to integrate into GVCs can offer hope for activating secondary cities
- However, data on urban agglomerations suggest that participation in GVCs is not effective in increasing demand for secondary cities.
  - A higher knowledge content of participation in GVCs is associated with higher clustering of economic activity in urban agglomerations.
- Issues to sort out – measuring cities and urban agglomerations