

# FDI vs. GVC characteristics and local development

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- **Economic activity is very concentrated in 'top' BGs:** in our data some 2,000 groups worldwide account for around 20 US\$ trillion of value added in year 2010.
- **BGs (in particular their foreign affiliates) are likely to be key players in shaping GVCs -> organizational modes of supply chains**

## Motivation - Microfoundation of GVCs

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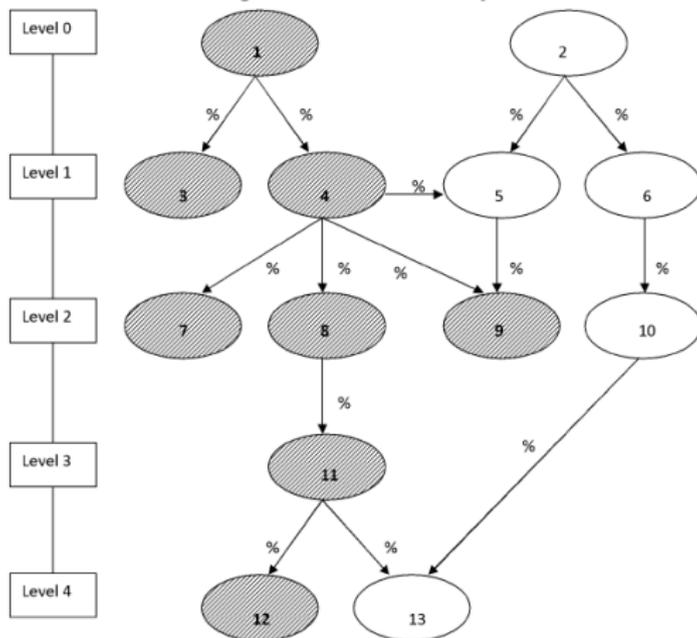
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- Understand whether and to what extent this link is 'mediated' by the **characteristics (organization) of Business Groups** that are currently hosted in a country
- What is the role of FDI in shaping GVCs? Is this link able to impact local economic development? At what conditions, if any?

# Business Groups as Hierarchies of Firms

Figure 3: A Hierarchical Group



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- Mitsubishi is also relatively less complex in terms of organization (with no more than 3 levels of hierarchy within the group), while GM is characterized by a deeper (up to 8 levels) and more complex hierarchy of cross-participations in its affiliates.

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- Two thirds of Business Groups are originated in OECD economies, and those groups own around 76% of affiliates worldwide.
- The European Union is in charge of 48% of affiliates, of which one third is located abroad. More than 50% of affiliates are located outside the home country in groups originating from OECD countries, especially in the US (85%), while the proportion is lower in developing countries (around 30%), where groups tend to be domestic.

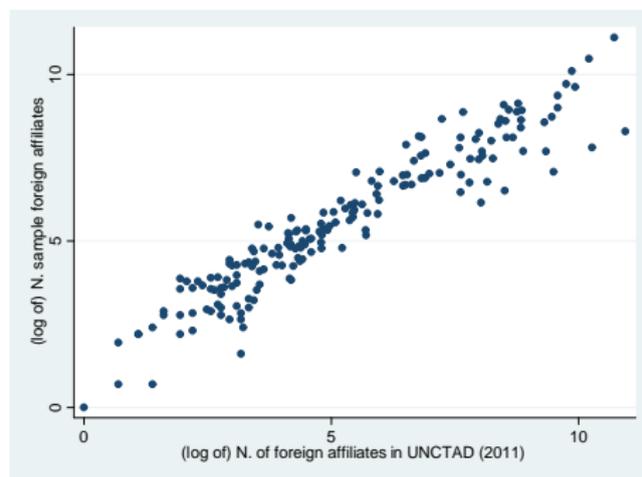
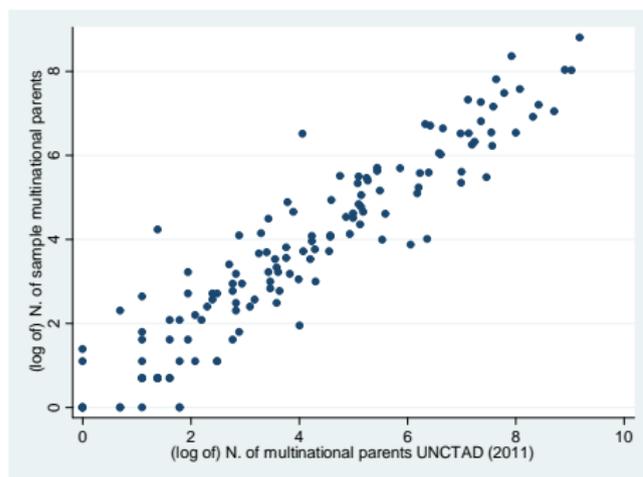
# Business groups across countries

**Table:** Geographic sample coverage of business groups, headquarters and affiliates

<b>Economy</b>	<b>N. of parents (Business Groups)</b>	<b>N. of affiliates (A + B)</b>	<b>Domestic affiliates (A)</b>	<b>Affiliates abroad (B)</b>	<b>Foreign affiliates located in economy</b>
OECD	177,306	1,148,011	757,778	390,233	324,255
non-OECD	93,068	371,577	295,882	75,695	141,673
European Union	144,562	735,487	496,209	239,278	258,060
US	9,935	211,265	114,364	96,901	40,404
Rest of the world	115,877	572,836	421,441	151,395	167,464
<i>of which:</i>					
Japan	14,236	119,374	102,306	17,068	4,351
Latin America	3,972	11,480	7,106	4,374	18,656
Middle East	3,130	18,008	7,675	10,333	9,147
China	1,922	24,868	18,146	6,722	17,494
Africa	1,095	10,733	5,961	4,772	12,298
ASEAN	1,870	26,333	15,272	11,061	15,578
<b>Total</b>	<b>270,374</b>	<b>1,519,588</b>	<b>1,053,660</b>	<b>465,928</b>	<b>465,928</b>

# Validation against UNCTAD data

**Figure:** Sample validation: (Logs of) numbers of multinational parents and foreign affiliates by host country in the sample and in UNCTAD (2011)



● Correlations are  $.94^{***}$  and  $.93^{***}$  respectively

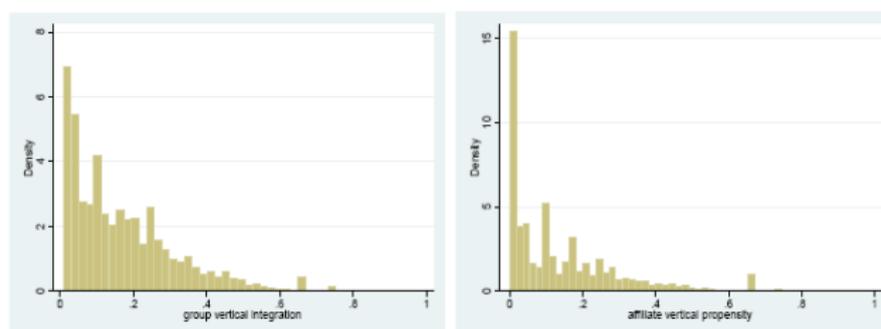
# Metrics of BGs: vertical integration

- Build **an index of vertical integration** based on primary and secondary NAICS 4-digit industries (Acemoglu et al. 2009), **BUT considering the whole network** developed by affiliates and parent company.
- Two VI indexes: at the group and affiliate-level. **Backward and forward linkages** are assumed from US BEA detailed input-output tables.

Table: A group-specific input-output table

		Outputs - headquarter's activities					Intermediate demand by input
		$j_1$	$j_2$	$j_3$	...	$j_{E1}$	
Inputs - affiliates' activities	$i_1$	$i_{1j_1}$	$i_{1j_2}$	$i_{1j_3}$	...	$i_{1j_{E1}}$	$\sum VI$ from input $i_1$
	$i_2$	$i_{2j_1}$	$i_{2j_2}$	$i_{2j_3}$	...	$i_{2j_{E1}}$	$\sum VI$ from input $i_2$
	$i_3$	$i_{3j_1}$	$i_{3j_2}$	$i_{3j_3}$	...	$i_{3j_{E1}}$	$\sum VI$ from input $i_3$
	...	...	...	...	...	...	...
	$i_{E1}$	$i_{E1j_1}$	$i_{E1j_2}$	$i_{E1j_3}$	...	$i_{E1j_{E1}}$	$\sum VI$ from input $i_{E1}$
Intermediate usage by output	$\sum VI$ for output $j_1$	$\sum VI$ for output $j_2$	$\sum VI$ for output $j_3$	...	$\sum VI$ for output $j_{E1}$		

Figure: Group and Affiliate Vertical Integration indexes



Density calculated on a sample of 228,927 groups of firms. Mean: .062; standard deviation: .122; skewness: 2.723.

Density calculated on a sample of 1,056,806 affiliates; Mean: .049; standard deviation: .114; skewness: 3.189.

- We retrieve an average vertical integration across groups of .062, while the same figure across individual affiliates is .049; Alfaro et al. (2011) have it for manufacturing industries on a different dataset (D&B) with a threshold  $>20$  employees: average vertical integration of .063; AJM(2009) retrieve an average measure of .0487

# Metrics of BGs: hierarchical complexity

- Measure of complexity applicable to any hierarchical organization retrieved as a variation of the node entropy of a hierarchical graph

$$GIC = \sum_l^L l \frac{n_l}{N} \log \left( \frac{N}{n_l} \right) \quad (1)$$

$n_l$  is the n. of affiliates on a given hierarchical level  $l$ , and  $N$ ,  $L$  are the tot n. of affiliates / levels.

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- The index is continuous and can range within the  $[0, +\infty)$  interval, with zero indicating a simple BG in which an headquarter controls one or more affiliates located one level of control below ( $l = 1$ ). The index is (logarithmically) increasing in both the number of hierarchical levels and the total number of affiliates. Pareto-distributed in our sample.

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- Contrary to standard hierarchical entropy measures, the index allows to take into account the marginal increase in complexity brought about by affiliates added to lower hierarchical levels.

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- **Non-linearities** in the relationship between organizational complexity and productivity: above a certain threshold of complexity evidence of marginally decreasing returns; this '**optimal**' **organizational threshold** is well within the current organizational span of the largest groups in our sample.



Table: Participation in GVCs vs. BGs average VI and institutions

VARIABLES	(1) GVC_growth	(3) GVC_growth	(2) GVC_growth	(4) GVC_growth
avg_VI_tot_aff	-0.00946*** (0.00322)	-0.0126*** (0.00379)		
avg_VI_for_aff			-0.00602** (0.00302)	-0.00677* (0.00355)
lcontract_costs		-0.120*** (0.0257)		-0.134*** (0.0260)
lfin_dev		0.0190** (0.00859)		0.0241*** (0.00873)
lgdp_per_cap	0.00322 (0.00336)	-0.0165** (0.00656)	0.00529 (0.00365)	-0.0185*** (0.00696)
Constant	-0.261*** (0.0368)	0.255** (0.126)	-0.275*** (0.0395)	0.310** (0.130)
Observations	955	708	857	643
R-squared	0.286	0.295	0.300	0.330

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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VARIABLES	(1) GVC_growth_k	(3) GVC_growth_k	(2) GVC_growth_k	(4) GVC_growth_k
avg_VI_tot_aff	-0.00279 (0.00549)	-0.00497 (0.00677)		
avg_VI_for_aff			-0.00934* (0.00519)	-0.0109* (0.00653)
lcontract_costs		-0.185*** (0.0456)		-0.189*** (0.0470)
lfin_dev		-0.0522*** (0.0152)		-0.0468*** (0.0158)
lgdp_per_cap	0.00556 (0.00573)	0.0136 (0.0116)	0.00299 (0.00622)	0.00509 (0.0126)
Constant	-0.0758 (0.0625)	0.700*** (0.225)	-0.0694 (0.0672)	0.752*** (0.236)
Observations	928	687	834	626
R-squared	0.071	0.104	0.076	0.108

Standard errors in parentheses

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# Location choices of BGs and participation to GVCs

Dependent variable :	All	greenfield investment
<b>investment choice</b>		
GVC index	.013*** (.005)	.0150 (.040)
market access	.120*** (.040)	.126*** (.046)
distance	.054 (.059)	.054 (.073)
common language	.055 (.061)	.041 (.033)
colony	.545* (.275)	.538 (.348)
GDP per capita	.302*** (.037)	.311*** (.042)
FDI inward	.355*** (.073)	.334*** (.087)
multinational group presence	2.783*** (.087)	2.556*** (.094)
contract enforcement	.228** (.107)	.296** (.127)
financial development	.175* (.095)	.244** (.102)
Errors clustered by headquarter	Yes	Yes
Pseudo R-squared	.323	.300
Observations	153,195	95,259
Firms	5,293	2,587

- Conditional logit (McFadden, 1974) for FDI choices in 2010 (brownfield and greenfield). Covariates as at the end of 2009
- GVC income is national value added for the production of globally sold manufacturing production

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