

# Market Selection in Global Value Chains

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7th OEET Workshop - Emerging economies in Global Value Chains

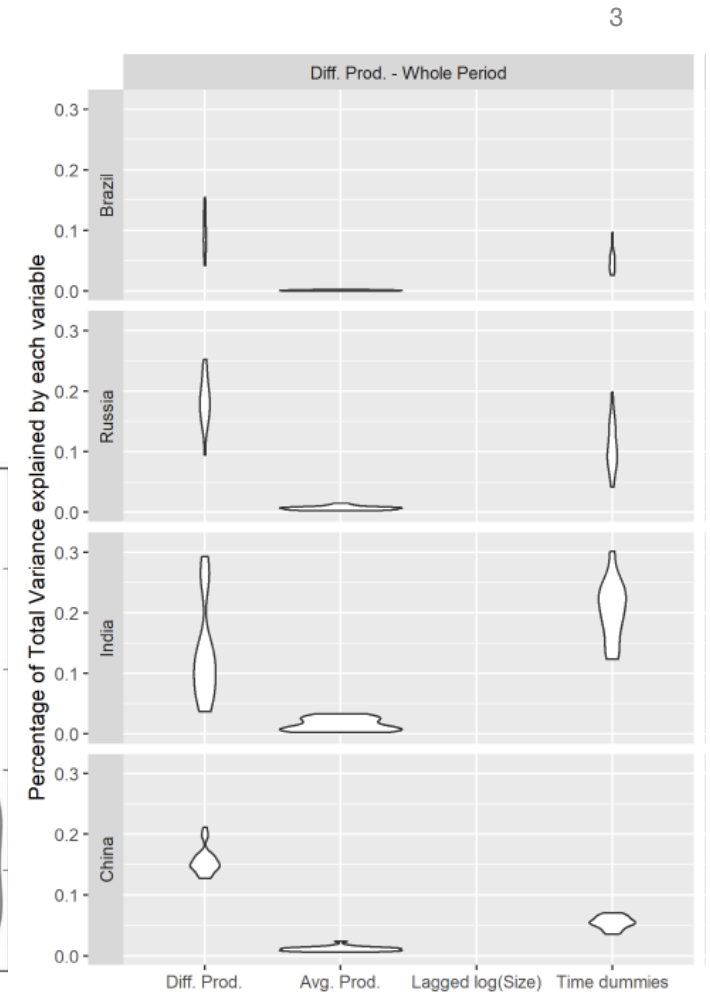
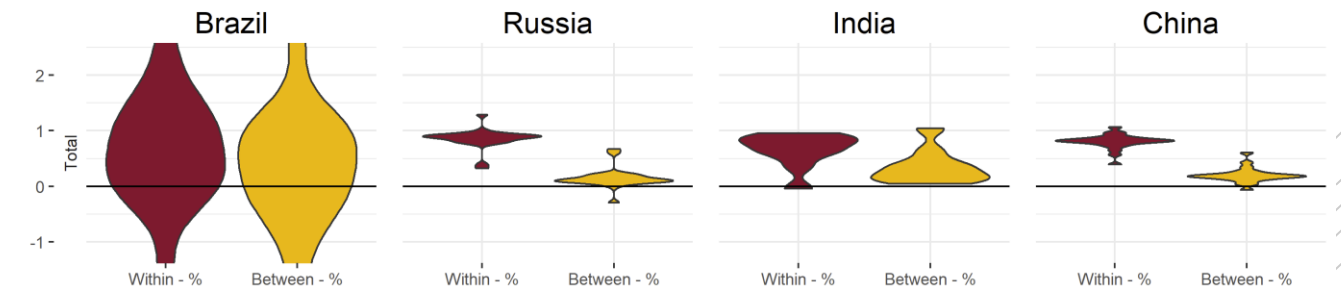
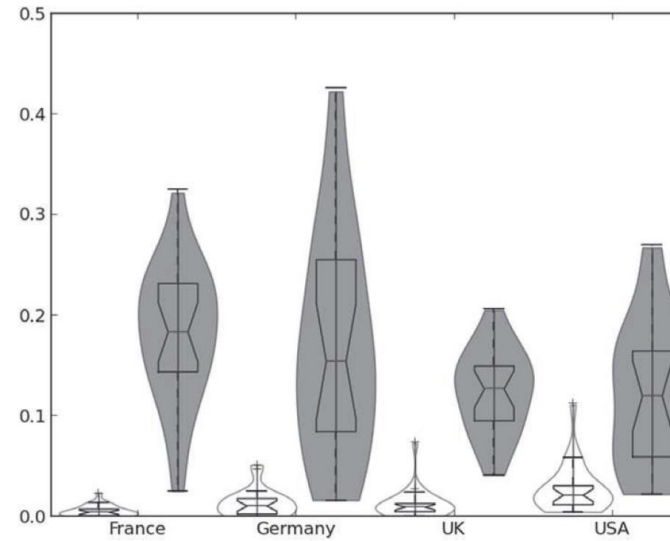
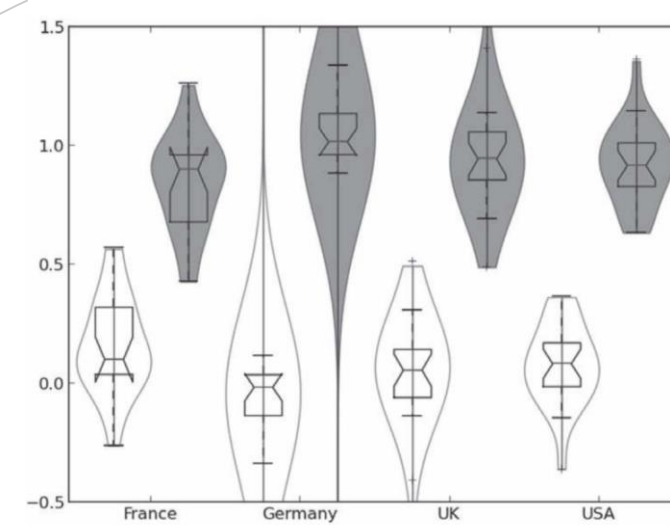
## Replicator model of competition

$$\Delta s_{i,t} = f(\pi_{i,t} - \bar{\Pi}_t) s_{i,t-1}$$

- Market share of firm  $i$  is changing proportional to the difference of its fitness (productivity, quality or cost) and the market average productivity of its competitors

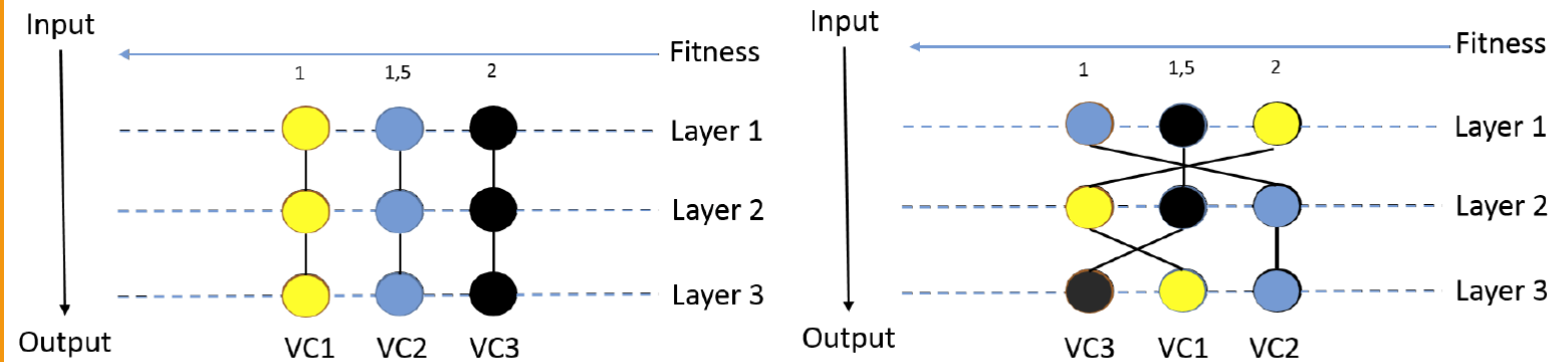
However, empirical support is at best moderate

Dosi et al. (2015) SBE  
Dosi et al. (2017) CONCORDi



## VC nature of competition

- Cantner, Savin and Vannuccini (2019) suggested that evidence would be stronger if we take upstream and downstream VC partners into account



## Attempt with Japanese data

- Tokyo Shoko Research (TSR)
- up to 24 suppliers of material and intermediates and up to 24 clients of products
- 2006-2012
- From year to year between 803,531 and 5,106,081 observations

### But:

- Not possible to differentiate between bigger and smaller partners
- Measure of value added (sales – costs) very imprecise

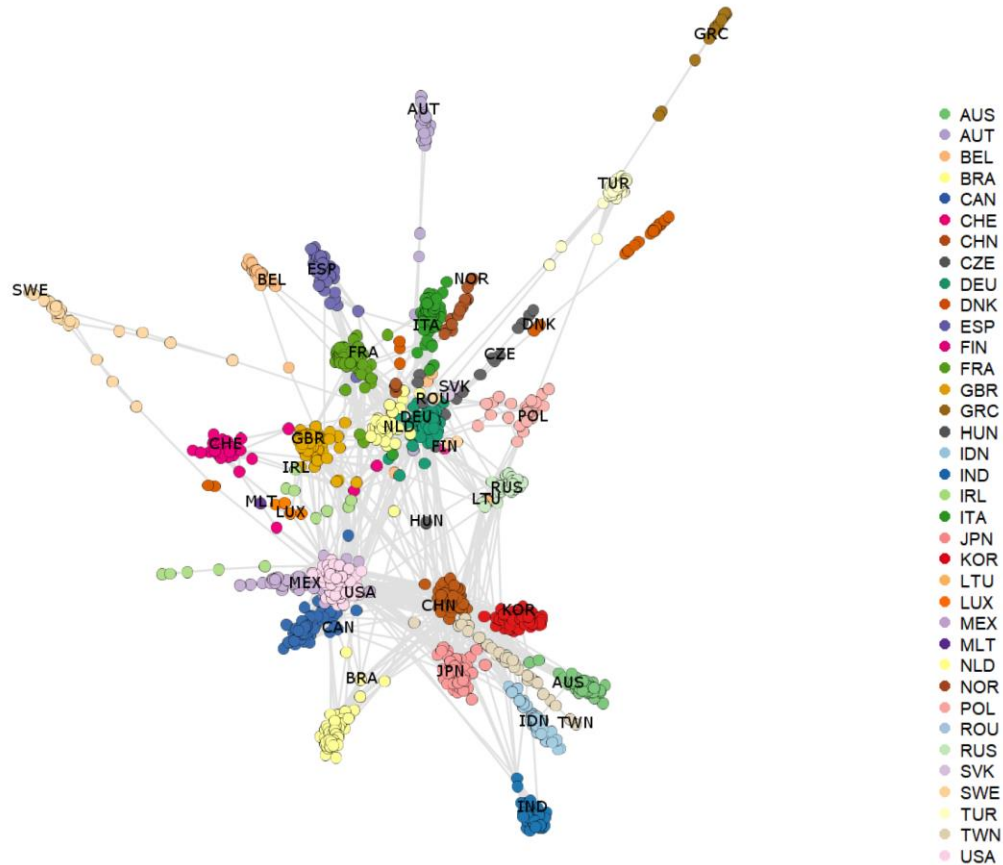
## Global Value Chains in WIOD

Data on global value chains (GVC) from the World Input Output Database (WIOD)

- Country  $i$  in industry  $j$  is our new “firm” observation
- 43 countries (28 EU + 15 large economies) that account for 85% of world GDP in 2014
- 2016 release that reports trade flows in intermediate goods between 56 industries

## Global Value Chains in WIOD (cont)

- 2408 country-sectors such as manufacture of pharmaceutical products in Spain
- In addition, WIOD provides information on total gross output, value added, and employment via the supplementary Socio-Economic Accounts
- Converted into USD and adjusted for inflation using national price indices with base year 2010



- From 2000 to 2014 the number of production linkages rises by 69% to 625,937, implying an increase in IO network density from 6% in 2000 to 11% in 2014
- The share of output that is sold NOT to end consumers but to downstream partners within a value chain in 2000 (2014) amounts to 52% (58%), suggesting a rise in value chain activity around the world over time
- In 2000 and 2014 the most central industry in GVC in terms of eigenvector centrality was manufacturing of motor vehicles, trailers and semi-trailers in Germany



## Measurement

Our measure of productivity is **value added per hour of labor**:

- **Value-chain productivity**: ratio of the sum of value added across all layers of the VC to the sum of both direct and indirect labor demand for producing a particular good
  - Sales to end consumers as final demand
  - Total labor demand following Leontief (1936), Pasinetti (1973) and Timmer and Ye (2017)
- **Idiosyncratic** labor productivity of the focal sector as the ratio of the industry's gross output minus its intermediate use to the total hours worked in this industry

## Some descriptive stats

Growth			Productivity					
			Idiosyncratic			Value-chain		
Obs.	Mean	Median	Obs.	Mean	Median	Obs.	Mean	Median
30,764	0.03681	0.04193	32,979	62.39	35.76	32,619	49.04	40.91

- presence of a negatively skewed growth rate distribution
- Higher value added in end-consumer market

## Some descriptive stats (cont)

Sector	Growth	Productivity	
		Idiosyncratic	Value-chain
Crop and animal production	0.12	1.12	0.95
Forestry and logging	0.19	1.19	1.04
Fishing and aquaculture	0.17	1.20	1.05
Mining and quarrying	0.15	1.30	0.97
Manufacture of food products	0.10	0.84	0.77
Manufacture of textiles	0.13	1.06	0.86
Manufacture of wood	0.14	0.95	0.83
Manufacture of paper	0.14	0.85	0.73
Printing and reproduction of recorded media	0.14	0.80	0.69
Manufacture of coke and refined petroleum products	0.24	1.33	0.95
Manufacture of chemicals and chemical products	0.19	0.98	0.74
Manufacture of basic pharmaceutical products	0.13	1.04	0.74
Manufacture of rubber and plastic products	0.14	0.89	0.70
Manufacture of other non-metallic mineral products	0.15	0.90	0.75
Manufacture of basic metals	0.18	0.93	0.69
Manufacture of fabricated metal products	0.16	0.86	0.66
Manufacture of computer	0.19	1.07	0.79
Manufacture of electrical equipment	0.18	0.92	0.71
Manufacture of machinery and equipment n.e.c.	0.17	0.91	0.69
Manufacture of motor vehicles	0.21	0.84	0.64
Manufacture of other transport equipment	0.21	0.98	0.71
Manufacture of furniture	0.16	1.03	0.82
Repair and installation of machinery and equipment	0.17	0.75	0.64
Other service activities	0.11	0.79	0.74
Activities of households as employers	0.14	1.05	1.01
<b>Weighted mean</b>	0.13	0.93	0.80
<b>Median</b>	0.15	0.90	0.75

*Note:* Weights for the weighted mean have been computed as the (relative) size of each sector in terms of direct (idiosyncratic productivity) or the sum of direct and indirect labor (value chain productivity), respectively.

Country-industries  
less heterogenous in  
terms of growth but  
more in terms of  
productivity

- variance among country-industry units in terms of growth rates is considerably smaller than among companies (0.2-0.4). But for productivity, our results exceed those found on the firm level for developed economies (0.5-0.6)
- a country in a median industry being one SD above the mean is about 7 times more productive than a country one standard deviation below the mean
- taking value chain linkages into account allows to reduce the differences, but only marginally

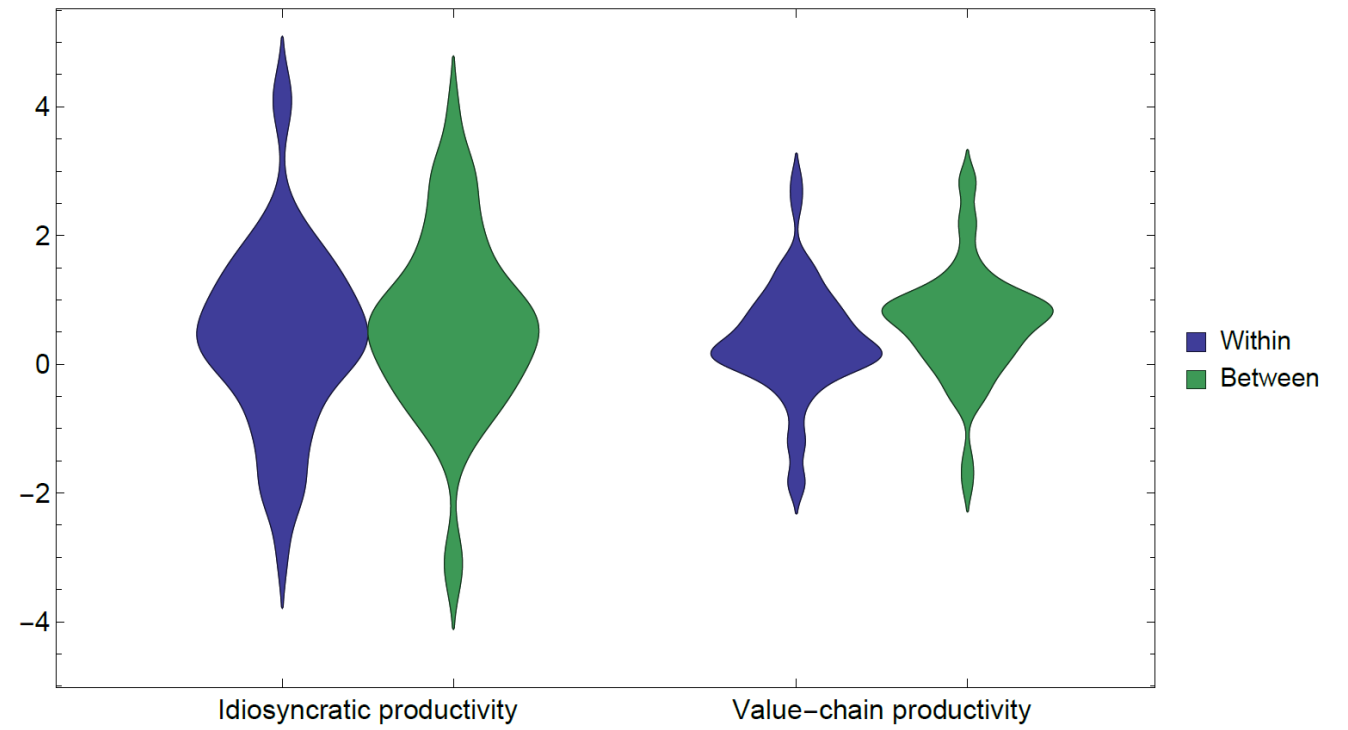
# Decompose global labor productivity

$$\Delta \tilde{\Pi}_{j,t} = \Delta \sum_{i \in j} s_{i,t} \pi_{i,t} = \underbrace{\sum_{i \in j} \bar{s}_i \Delta \pi_{i,t}}_{\text{within effect}} + \underbrace{\sum_{i \in j} \Delta s_{i,t} \bar{\pi}_i}_{\text{between effect}}$$

Sector	Idiosyncratic		Value-chain	
	Within	Between	Within	Between
Crop and animal production	0.09	0.91	0.06	0.94
Forestry and logging	0.13	0.87	0.11	0.89
Fishing and aquaculture	0.17	0.83	0.09	0.91
Mining and quarrying	1.17	-0.17	1.34	-0.34
Manufacture of food products	-12.01	13.01	-8.30	9.30
Manufacture of textiles	0.80	0.20	0.54	0.46
Manufacture of wood	1.27	-0.27	0.85	0.15
Manufacture of paper	-1.19	2.19	-0.05	1.05
Printing and reproduction of recorded media	19.73	-18.73	-1.81	2.81
Manufacture of coke and refined petroleum products	1.07	-0.07	1.04	-0.04
Manufacture of chemicals and chemical products	0.68	0.32	0.74	0.26
Manufacture of basic pharmaceutical products	0.58	0.42	0.54	0.46
Manufacture of rubber and plastic products	24.36	-23.36	-0.39	1.39
Manufacture of other non-metallic mineral products	1.01	-0.01	0.15	0.85
Manufacture of basic metals	0.16	0.84	1.03	-0.03
Manufacture of fabricated metal products	-6.58	7.58	-0.43	1.43
Manufacture of computer	-0.30	1.30	0.20	0.80
Manufacture of electrical equipment	-1.96	2.96	0.03	0.97
Manufacture of machinery and equipment n.e.c.	-1.91	2.91	-0.16	1.16
Manufacture of motor vehicles	-0.61	1.61	0.07	0.93
Manufacture of other transport equipment	-0.18	1.18	0.11	0.89
Manufacture of furniture	1.69	-0.69	1.46	-0.46
Repair and installation of machinery and equipment	2.12	-1.12	2.50	-1.50
Other service activities	-33.94	34.94	-1.25	2.25
Activities of households as employers	0.47	0.53	0.55	0.45
<b>Weighted mean</b>	-1.41	2.41	-1.49	2.49
<b>Median</b>	0.36	0.64	0.21	0.79

*Note:* Weights for the weighted mean have been computed as the (relative) size of each sector in terms of direct (idiosyncratic productivity) or the sum of direct and indirect labor (value-chain productivity), respectively.

Role of the  
between effect  
becomes more  
dominant with VC



Directly regress  
growth of  
country-industry  
on their  
productivity terms

$$g_{i,t} = a + b_t + \beta_{\Delta} \Delta \pi_{i,t} + \beta_m \bar{\pi}_{i,t} + c_i + \epsilon_{i,t}$$

$$S^2 = \frac{\text{Variance}(\beta_{\Delta} \Delta \pi_{i,t} + \beta_m \bar{\pi}_{i,t})}{\text{Variance}(g_{i,t})}$$

Sector	Idiosyncratic		Value-chain	
	$\beta_{\Delta}$	$\beta_m$	$\beta_{\Delta}$	$\beta_m$
Crop and animal production	0.42***	0	0.66***	0.01***
Forestry and logging	0.46***	0	0.66***	0
Fishing and aquaculture	0.29***	0	0.51***	0
Mining and quarrying	0.38***	0	0.52***	0.01*
Manufacture of food products	0.41***	0	0.63***	0.01***
Manufacture of textiles	0.38***	-0.01**	0.66***	0
Manufacture of wood	0.42***	-0.01	0.65***	0
Manufacture of paper	0.24***	-0.02**	0.63***	-0.01
Printing and reproduction of recorded media	0.34***	-0.03***	0.62***	-0.02**
Manufacture of coke and refined petroleum products	0.16***	0	0.54***	0.02
Manufacture of chemicals and chemical products	0.45***	-0.01	0.5***	0
Manufacture of basic pharmaceutical products	0.31***	0.01	0.44***	0.01*
Manufacture of rubber and plastic products	0.32***	-0.02***	0.74***	-0.01***
Manufacture of other non-metallic mineral products	0.44***	-0.01*	0.71***	0
Manufacture of basic metals	0.26***	0	0.31***	0.01
Manufacture of fabricated metal products	0.46***	-0.01**	0.81***	0
Manufacture of computer	0.45***	-0.04***	0.91***	-0.01
Manufacture of electrical equipment	0.43***	-0.03***	0.8***	-0.02*
Manufacture of machinery and equipment n.e.c.	0.45***	-0.01*	0.72***	0
Manufacture of motor vehicles	0.46***	-0.03***	0.73***	-0.01
Manufacture of other transport equipment	0.37***	-0.01	0.49***	0
Manufacture of furniture	0.57***	-0.02***	0.76***	-0.02**
Repair and installation of machinery and equipment	0.53***	-0.01	0.85***	0
Other service activities	0.44***	0	0.64***	0
Activities of households as employers	0.15***	-0.01	0.22***	-0.01*

*Note:* Entry 0 stands for values  $< 5 \times 10^{-3}$ . \*\*\*, \*\*, and \* indicate statistical significance at the 0.1%, 1%, and 5% level, respectively.



Directly regress  
growth of  
country-industry  
on their  
productivity terms

$$g_{i,t} = a + b_t + \beta_{\Delta} \Delta \pi_{i,t} + \beta_m \bar{\pi}_{i,t} + c_i + \epsilon_{i,t}$$

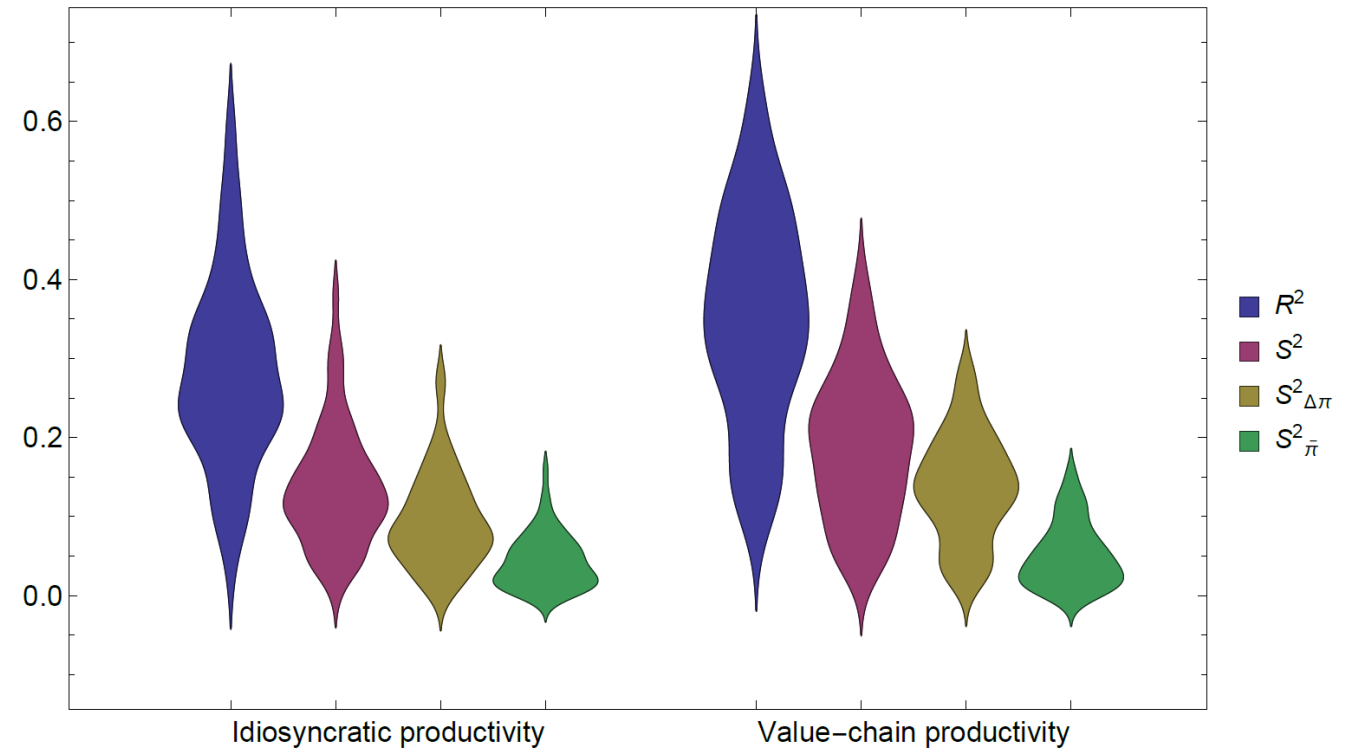
$$S^2 = \frac{\text{Variance}(\beta_{\Delta} \Delta \pi_{i,t} + \beta_m \bar{\pi}_{i,t})}{\text{Variance}(g_{i,t})}$$

Sector	Idiosyncratic			Value-chain		
	$R^2$	$S^2_{\Delta \pi}$	$S^2_{\bar{\pi}}$	$R^2$	$S^2_{\Delta \pi}$	$S^2_{\bar{\pi}}$
Crop and animal production	0.38	0.15	0.07	0.52	0.24	0.06
Forestry and logging	0.36	0.13	0.06	0.50	0.27	0.01
Fishing and aquaculture	0.21	0.06	0.05	0.32	0.14	0.00
Mining and quarrying	0.28	0.07	0.06	0.49	0.17	0.08
Manufacture of food products	0.32	0.10	0.05	0.47	0.14	0.12
Manufacture of textiles	0.23	0.05	0.07	0.34	0.08	0.10
Manufacture of wood	0.34	0.11	0.04	0.37	0.13	0.06
Manufacture of paper	0.17	0.04	0.01	0.34	0.11	0.08
Printing and reproduction of recorded media	0.24	0.07	0.04	0.31	0.14	0.02
Manufacture of coke and refined petroleum products	0.10	0.02	0.01	0.30	0.11	0.01
Manufacture of chemicals and chemical products	0.24	0.08	0.03	0.12	0.03	0.01
Manufacture of basic pharmaceutical products	0.23	0.09	0.02	0.25	0.10	0.04
Manufacture of rubber and plastic products	0.22	0.03	0.07	0.43	0.12	0.12
Manufacture of other non-metallic mineral products	0.28	0.10	0.01	0.39	0.13	0.08
Manufacture of basic metals	0.15	0.04	0.01	0.15	0.02	0.03
Manufacture of fabricated metal products	0.31	0.08	0.05	0.48	0.21	0.06
Manufacture of computer	0.32	0.07	0.09	0.46	0.19	0.05
Manufacture of electrical equipment	0.36	0.13	0.04	0.44	0.17	0.06
Manufacture of machinery and equipment n.e.c.	0.32	0.08	0.08	0.40	0.13	0.08
Manufacture of motor vehicles	0.32	0.13	0.01	0.31	0.13	0.01
Manufacture of other transport equipment	0.21	0.07	0.03	0.15	0.06	0.00
Manufacture of furniture	0.36	0.12	0.09	0.35	0.16	0.07
Repair and installation of machinery and equipment	0.25	0.06	0.06	0.41	0.21	0.04
Other service activities	0.29	0.07	0.07	0.42	0.14	0.09
Activities of households as employers	0.09	0.01	0.03	0.17	0.02	0.06
<b>Weighted mean</b>	0.38	0.14	0.07	0.45	0.17	0.08
<b>Median</b>	0.27	0.08	0.04	0.35	0.14	0.04

*Note:* Weights for the weighted mean have been computed as the (relative) size of each sector in terms of direct (idiosyncratic productivity) or the sum of direct and indirect labor (value-chain productivity), respectively.



Again,  
competition  
(growth-  
productivity link)  
is much clearer



Cross-sectional  
dependence  
(common shocks  
or regressors  
correlated across  
producers due to  
IO network)

=> common correlated effects mean group  
estimator proposed by Pesaran (2006)

Sector	Idiosyncratic			Value-chain		
	$R^2$	$S^2_{\Delta\pi}$	$S^2_{\pi}$	$R^2$	$S^2_{\Delta\pi}$	$S^2_{\pi}$
Crop and animal production	0.63	0.24	0.11	0.73	0.35	0.09
Forestry and logging	0.65	0.23	0.10	0.73	0.41	0.01
Fishing and aquaculture	0.45	0.12	0.11	0.52	0.24	0.00
Mining and quarrying	0.56	0.14	0.12	0.67	0.24	0.11
Manufacture of food products	0.69	0.23	0.12	0.77	0.23	0.19
Manufacture of textiles	0.67	0.14	0.20	0.72	0.18	0.22
Manufacture of wood	0.72	0.25	0.09	0.71	0.26	0.11
Manufacture of paper	0.59	0.16	0.04	0.66	0.22	0.16
Printing and reproduction of recorded media	0.59	0.18	0.09	0.59	0.27	0.05
Manufacture of coke and refined petroleum products	0.32	0.08	0.05	0.62	0.24	0.01
Manufacture of chemicals and chemical products	0.55	0.19	0.07	0.56	0.15	0.06
Manufacture of basic pharmaceutical products	0.50	0.20	0.04	0.50	0.19	0.09
Manufacture of rubber and plastic products	0.70	0.09	0.22	0.75	0.21	0.21
Manufacture of other non-metallic mineral products	0.73	0.27	0.04	0.76	0.26	0.16
Manufacture of basic metals	0.63	0.15	0.02	0.64	0.11	0.11
Manufacture of fabricated metal products	0.76	0.21	0.13	0.80	0.35	0.09
Manufacture of computer	0.64	0.15	0.17	0.70	0.31	0.07
Manufacture of electrical equipment	0.68	0.25	0.07	0.71	0.28	0.10
Manufacture of machinery and equipment n.e.c.	0.75	0.17	0.18	0.77	0.25	0.16
Manufacture of motor vehicles	0.70	0.28	0.03	0.67	0.29	0.01
Manufacture of other transport equipment	0.49	0.16	0.08	0.49	0.18	0.01
Manufacture of furniture	0.61	0.20	0.15	0.59	0.26	0.11
Repair and installation of machinery and equipment	0.46	0.12	0.12	0.60	0.32	0.05

Other service activities	0.70	0.16	0.16	0.76	0.25	0.16
Activities of households as employers	0.43	0.04	0.13	0.53	0.07	0.17
<b>Weighted mean</b>	0.70	0.24	0.13	0.74	0.29	0.14
<b>Median</b>	0.63	0.20	0.10	0.66	0.26	0.08

*Note:* Weights for the weighted mean have been computed as the (relative) size of each sector in terms of direct (idiosyncratic productivity) or the sum of direct and indirect labor (value-chain productivity), respectively.

Model that  
incorporates the  
spatial lags of the  
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terms

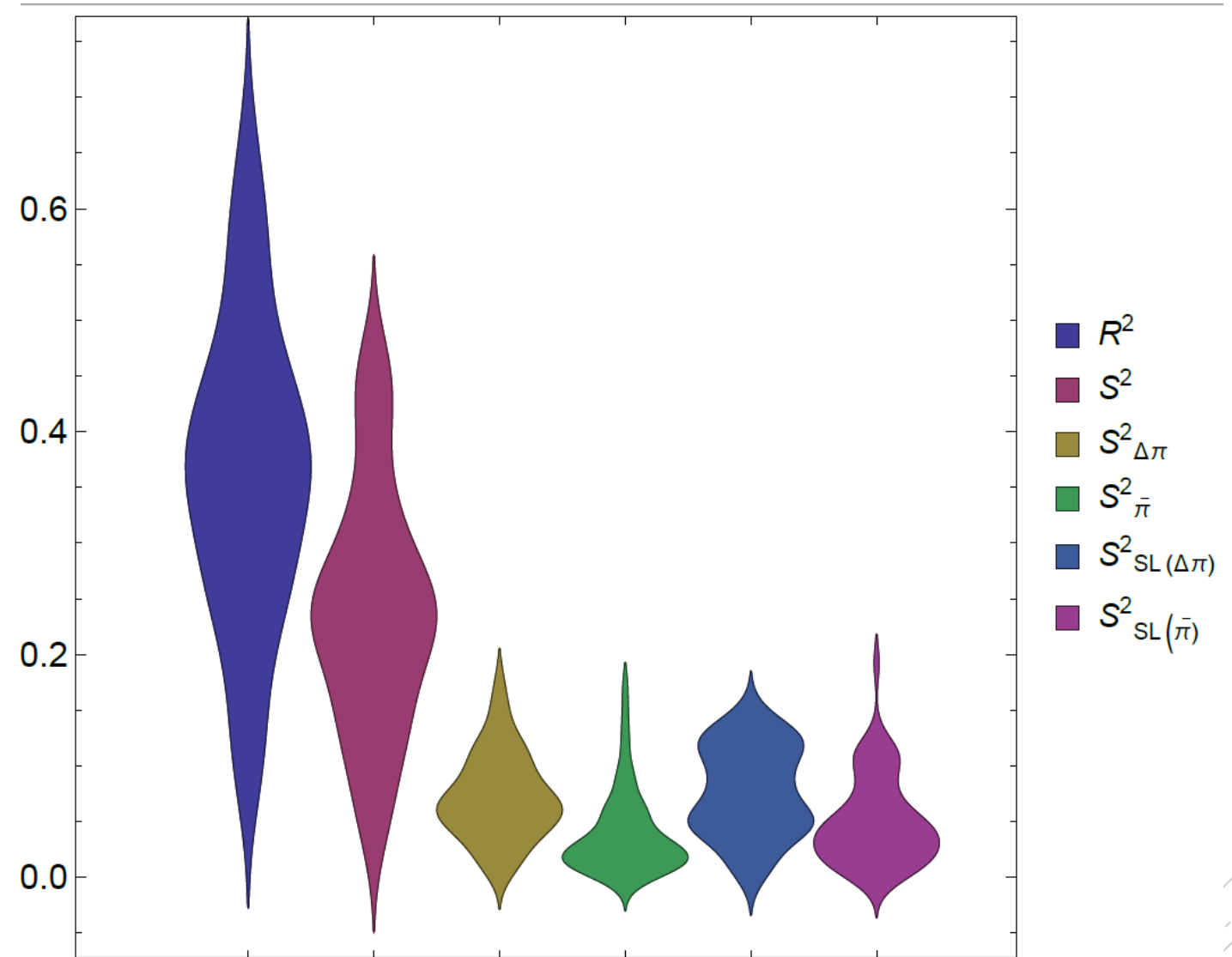
Sector	$R^2$	$S^2_{\Delta\pi}$	$S^2_{\bar{\pi}}$	$S^2_{SL(\Delta\pi_{i,t})}$	$S^2_{SL(\bar{\pi}_{i,t})}$
Crop and animal production	0.46	0.16	0.00	0.11	0.05
Forestry and logging	0.39	0.09	0.02	0.05	0.10
Fishing and aquaculture	0.26	0.06	0.04	0.05	0.02
Mining and quarrying	0.35	0.08	0.03	0.08	0.03
Manufacture of food products	0.50	0.08	0.02	0.13	0.11
Manufacture of textiles	0.34	0.05	0.06	0.07	0.02
Manufacture of wood	0.42	0.11	0.01	0.10	0.04
Manufacture of paper	0.34	0.05	0.01	0.12	0.03
Printing and reproduction of recorded media	0.35	0.08	0.00	0.12	0.00
Manufacture of coke and refined petroleum products	0.10	0.02	0.01	0.01	0.02
Manufacture of chemicals and chemical products	0.25	0.07	0.01	0.02	0.04
Manufacture of basic pharmaceutical products	0.31	0.06	0.02	0.06	0.07
Manufacture of rubber and plastic products	0.46	0.03	0.02	0.14	0.12
Manufacture of other non-metallic mineral products	0.43	0.06	0.06	0.13	0.03
Manufacture of basic metals	0.21	0.03	0.02	0.05	0.01
Manufacture of fabricated metal products	0.44	0.06	0.06	0.12	0.05
Manufacture of computer	0.36	0.06	0.05	0.05	0.05
Manufacture of electrical equipment	0.40	0.09	0.03	0.04	0.11
Manufacture of machinery and equipment n.e.c.	0.38	0.07	0.09	0.05	0.03
Manufacture of motor vehicles	0.39	0.10	0.01	0.09	0.03
Manufacture of other transport equipment	0.28	0.04	0.02	0.05	0.07
Manufacture of furniture	0.38	0.10	0.09	0.05	0.04
Repair and installation of machinery and equipment	0.25	0.06	0.07	0.01	0.01

Other service activities	0.47	0.04	0.09	0.11	0.11
Activities of households as employers	0.09	0.01	0.02	0.00	0.01
<b>Weighted Mean</b>	0.48	0.09	0.07	0.11	0.07
<b>Median</b>	0.36	0.07	0.02	0.08	0.04

*Note:* Weights for the weighted mean have been computed as the size of each sector in terms of direct (idiosyncratic productivity) and the sum of direct and indirect labor (value-chain productivity), respectively.

$$g_{i,t} = a + b_t + \beta_{\Delta}\Delta\pi_{i,t} + \beta_m\bar{\pi}_{i,t} + \gamma_{\Delta}SL(\Delta\pi_{i,t}) + \gamma_mSL(\bar{\pi}_{i,t}) + c_i + \epsilon_{i,t}$$

Model that  
incorporates the  
spatial lags of the  
two productivity  
terms



$$g_{i,t} = a + b_t + \beta_{\Delta}\Delta\pi_{i,t} + \beta_m\bar{\pi}_{i,t} + \gamma_{\Delta}SL(\Delta\pi_{i,t}) + \gamma_mSL(\bar{\pi}_{i,t}) + c_i + \epsilon_{i,t}$$

## Conclusion & Outlook

### Main finding:

- Market selection might be a work, if 'correctly' captured (Cantner et al., 2019)
- Effective supply-chain management, selection of suppliers and joint efforts to improve productivity, has a crucial influence on the market success

### Further research:

- Firm-level micro data
- Generalize the approach and assess the relative influence of supply- and demand-driven network effects

Discussion  
Questions?

Also per *[ivan.savini@uab.cat](mailto:ivan.savini@uab.cat)*

WP version available at

<https://www.econstor.eu/handle/10419/234123>

# Annex