Exporting and Productivity
The Cross Country Dimension

The Trade-Productivity Nexus in the European Economy

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15th FIW Workshop - Vienna

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  - provided you agree on the indicator to use, each one has certain drawbacks, as it might contain some measurement error (REER - ULC) or, in a world characterized by global value chains, it might be unrelated to the 'competitiveness' of domestic factors of production (export shares)

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4. briefly point out some shortcomings of the currently employed indicators of competitiveness
5. derive some policy prescriptions: which are the characteristics of 'competitive' firms and how policies should support / foster them ?

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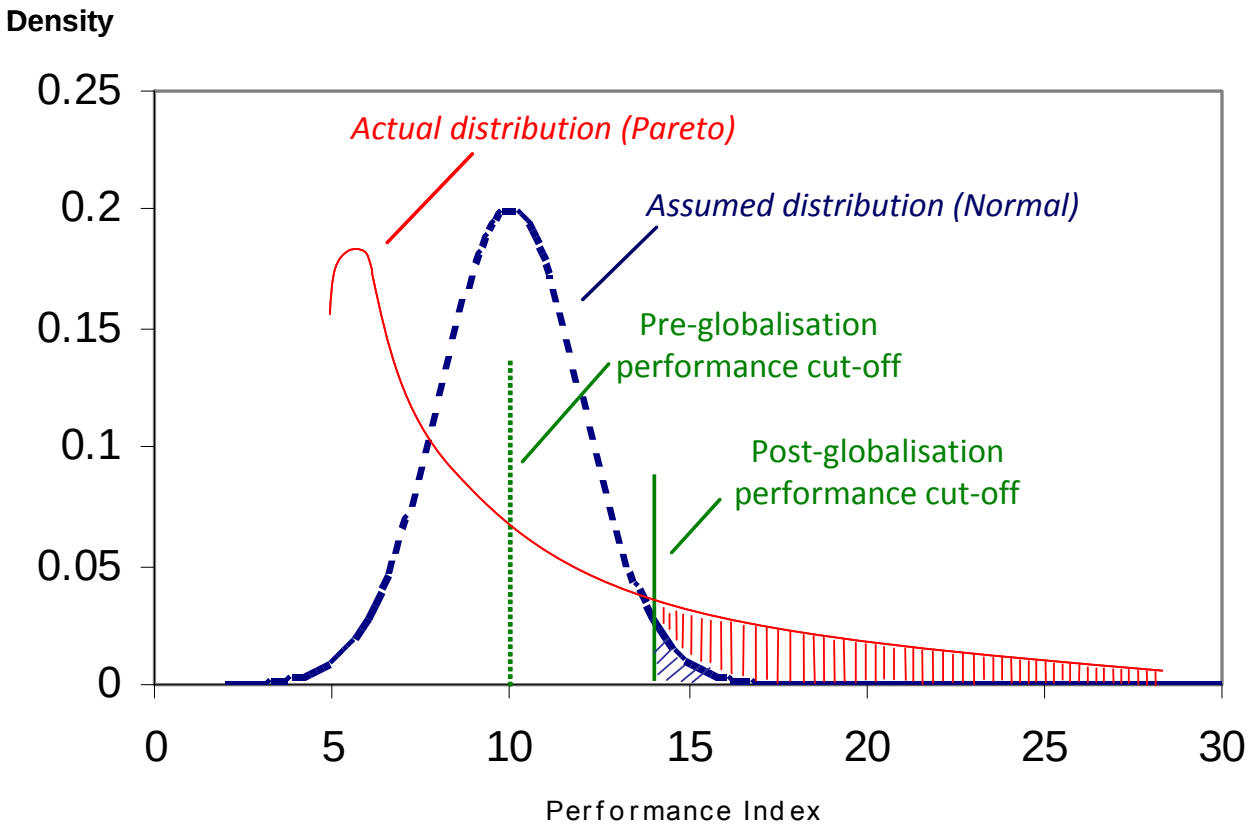
- Clearly the factors affecting productivity range from the firm-specific (such as the sector of activity, size, technology and so on) to the macro/institutional (eg price/cost structure, investment environment, etc.)
- But individual firms' characteristics have often been neglected in studies of competitiveness analysis in favor of macro variables, also due to a lack of proper (micro) indicators

A micro foundation of competitiveness

- Almost any measure of firm-level performance (e.g. productivity) within an industry or country is typically distributed as in the graph below: there are not few very bad and very good firms (normal distribution, dotted blue), but many relatively 'bad' firms, and a number of (less numerous) particularly good ones (Pareto distribution, cont. red)



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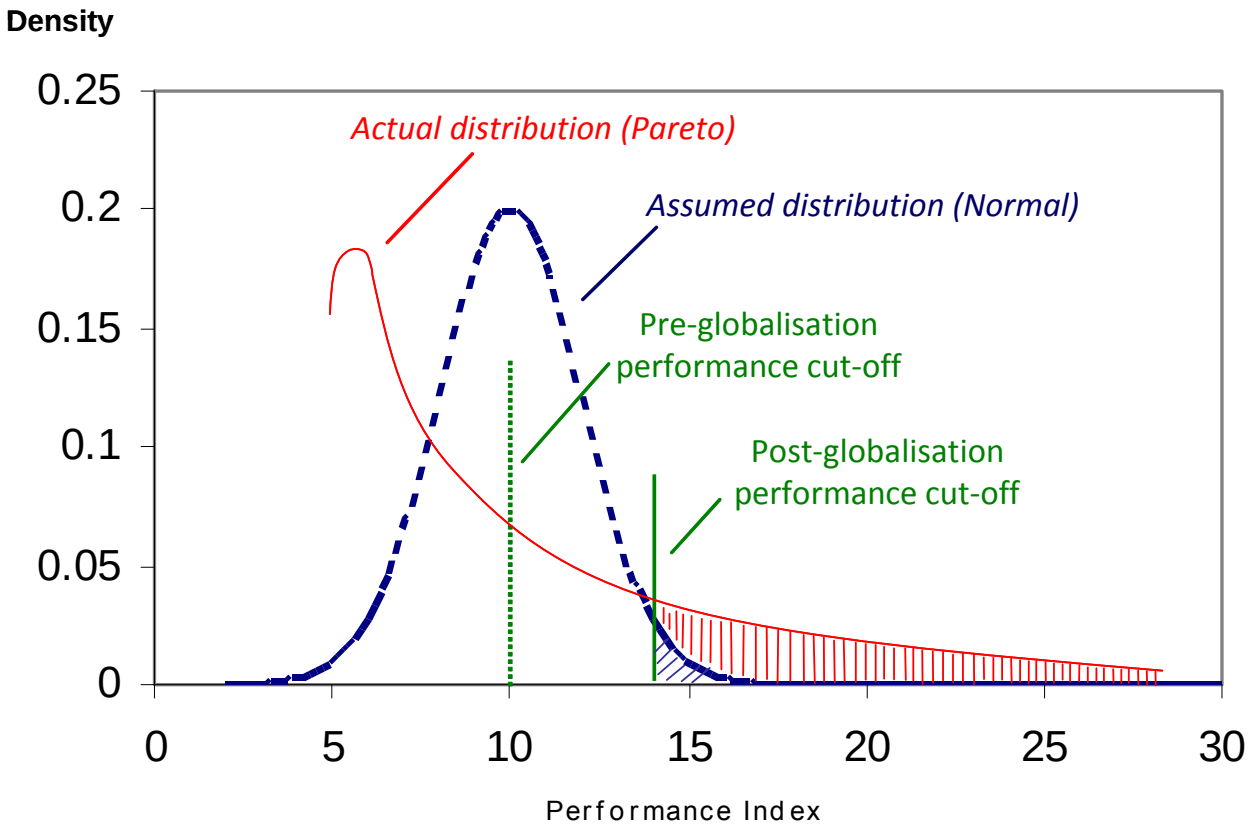

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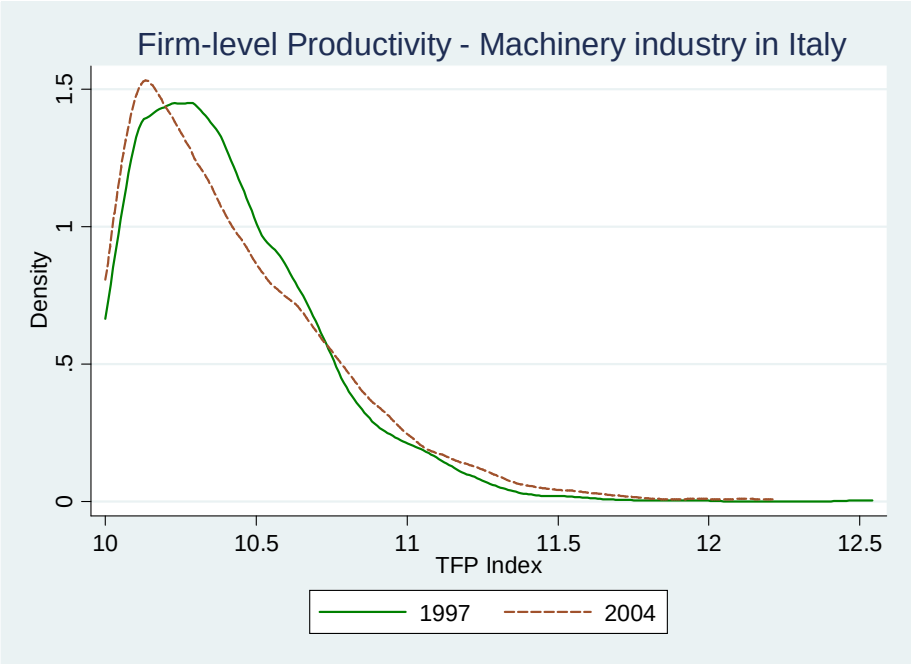
- What it matters for competitiveness is thus the ability to *select and reallocate* resources, so that proportionally more (or relatively more relevant) firms move from below to above the relevant cutoff

An example

- The aggregate average productivity of this industry is decreasing, but Italian market shares are not falling, rather, they are increasing in value. A paradox? No. As firm level data show, the 'relevant' competitiveness of the industry (the right tail of firms) is actually improving
- Growth-related policies should promote the 'thickening' of the right hand tail of firms via selection and reallocation of resources; policies aimed at social cohesion should deal with the exiting firms => two objectives = two distinct policies: there is no 'average' policy for the industry



The role of internationalization

- The latter effects are well known to the economic literature: trade liberalization has a positive impact on aggregate productivity through the selection of the most productive firms and the subsequent reallocation of market shares
- After the trade shock (e.g. the euro or the entry of China into the WTO), initially active domestic firms end up being partitioned into three groups:
  - the least productive firms start making losses in their home markets without gaining access to foreign markets and have to exit;
  - the most productive firms compensate lost profits on domestic sales with new profits on foreign sales, thus being able to survive and expand their market shares domestically and abroad;
  - firms with intermediate productivity also survive but are not productive enough to gain access to foreign markets: their (domestic) market shares also shrinks

The role of internationalization - data

- Evidence from a new dataset built within the 7th RFP of the European Commission: Bruegel/Unicredit EFIGE dataset.
- Representative samples (see Navaretti *et al*, 2011) of manufacturing firms >10 employees across countries: the first comparable dataset in Europe assessing (among others) all the dimensions of internationalization of firms (export, imports, outsourcing, FDI) together with other structural characteristics not observable from balance sheet data. Stratification by industry and firm size

Table 1: The EFIGE dataset by country

Country	Number of firms
Austria	443
France	2,973
Germany	2,935
Hungary	488
Italy	3,021
Spain	2,832
UK	2,067
Total	14,759

Source:EFIGE Survey dataset.

Validation of EFIGE data

- We can check the representativeness of the samples by linking EFIGE samples to AMADEUS balance sheet data, and then compute the correlation over time between some measures of firm performance aggregated from our samples (with proper weights) at the country level vs. official statistics provided by Eurostat (Structural Business Statistics for manufacturing firms >10 employees).

Correlations between AMADEUS and Eurostat variables

Number of Employees	0.61***
Revenues/Production value	0.52***
Cost of Employees/Wages	0.71***
Labour Productivity	0.84***

NOTE: Observations are country-year-specific averages (weighted in AMADEUS sample). Eurostat data are derived from Structural Business Statistics, Manifacturing, over 10 employees.

- Correlations for countries with particularly good quality in balance sheet data (ES, FR, IT) is >.9

EFIGE: The Internationalization Dimension - 1

- Clear ranking of firm characteristics with respect to the degree of involvement in international activities:

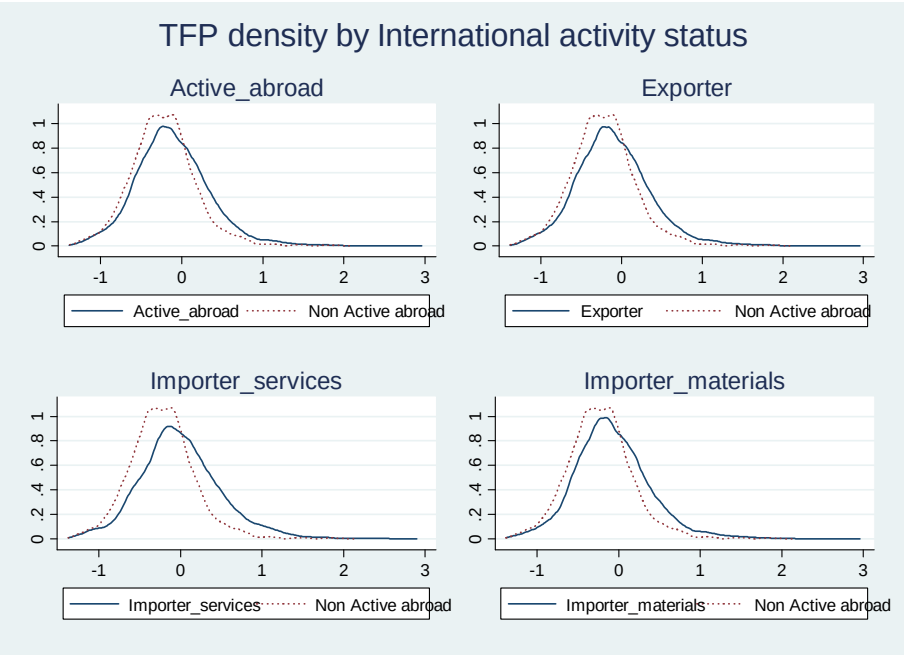
Table 2: International categories of firms – Descriptive statistics (full sample), 2008

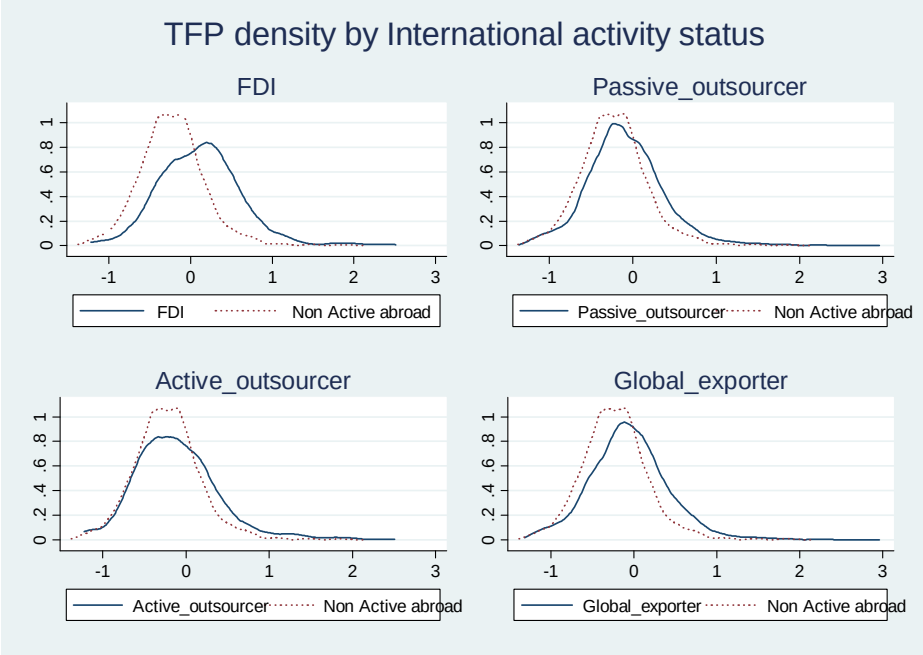
	N. of firms	Avg. turnover per firm (in 1,000 EUR)	Avg. n. of employees	Avg. Capital stock per employee (in 1,000 EUR)
Non Active_abroad	3,402	4,443.33	31.44	152.16
Active_abroad	11,357	19,273.46	139.85	196.4
of which				
Exporter	9,849	20,494.21	151.42	199.03
Importer_services	3,449	38,659.98	332.12	223.57
Importer_materials	7,298	24,976.44	191.17	200.36
FDI	719	77,637.20	334.13	239.55
Passive_outsourcer	5,799	17,052.42	83.96	204.98
Active_outsourcer	590	24,657.11	119.55	225.28
Global_exporter	4,016	24,777.71	103.43	222.93
Whole sample	14,759	15,589.29	114.52	186.59

- Internationally active firms tend to be larger, have higher sales and are more capital intensive. Ranking tends to increase with the degree of complexity of international activities, from exporter, to importer of material / active outsourcing, to importer of services and FDI. Local firms involved in international value chains ('passive outsourcers') are somewhat smaller than the average of all internationally active firms, but larger than purely local firms.

EFIGE: The Internationalization Dimension - 2

- International activities of firms are strongly correlated to productivity measures. Here we compare the performance (log TFP) across seven EU countries of firms active internationally vs. those with only a domestic exposure.





Internationalization status and productivity premia

- The 'productivity premium' indeed increases with the complexity of internationalization activities, controlling for country / industry charact.

Table 5: International status and TFP premium

Dep. variable: TFP	(1) OLS	(2) OLS	(3) O.Probit	N
Active abroad	0.0906***	0.0353***	0.261***	7,259
	(0.0132)	(0.0128)	(0.0290)	
Exporter	0.0999***	0.0399***	0.272***	6,563
	(0.0136)	(0.0131)	(0.0298)	
Importer of services	0.171***	0.0626***	0.620***	3,334
	(0.0171)	(0.0171)	(0.0531)	
Importer of materials	0.118***	0.0449***	0.394***	5,320
	(0.0142)	(0.0138)	(0.0332)	
FDI	0.257***	0.0980***	0.750***	1,862
	(0.0329)	(0.0357)	(0.0750)	
Passive outsourcer	0.122***	0.0558***	0.329***	4,372
	(0.0151)	(0.0150)	(0.0342)	
Active outsourcer	0.134***	0.0477	0.364***	1,777
	(0.0309)	(0.0306)	(0.0755)	
Global exporter	0.156***	0.0699***	0.425***	3,652
	(0.0168)	(0.0167)	(0.0368)	
Country fixed effects	Included	Included	Included	–
Industry fixed effects	Included	Included	Included	–
Firm size	Excluded	Included	Excluded	–

Notes: Standard errors in parentheses. *** denotes statistical significance at the 1-percent level. One cross-sectional regression for each internationalization characteristic, with sector and country dummies. Column 2 controls also for the size class of firms (10-19; 20-49; 50-249; >=250 employees). The number of observations is given by the number of inactive firms plus the number of firms active in the selected international activity. All regressions control for country and industry fixed effects.

Competitiveness and ULC - 1

- ULC are derived from sector or economy-wide data, in which aggregate labor productivity is calculated as the ratio of nominal value added to a deflator, and then this is divided by the number of workers. One problem is in the aggregation: because of unknown firm-specific weights, the average productivity so calculated does not represent the productivity of the average firm

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- Moreover, the recorded increase in ULC for some euro-area countries is due exclusively to an increase in the price deflator used to calculate labour productivity (Kumar and Felipe, 2011): the latter is not necessarily an adverse finding for 'competitiveness', as prices can increase due to changes in the product mix towards higher quality / value-added goods

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- This is reflected in our micro-data as well: ULC are a worse predictor of international status than TFP or labor productivity

Competitiveness and ULC - 2

- ULCs convey a slightly different message w.r. to productivity (TFP or labour prod): results are comparable (sending a message of overall consistency across measures of competitiveness) but magnitudes and rankings change, mainly due to the role of innovative firms (high labor costs, but also high productivity)

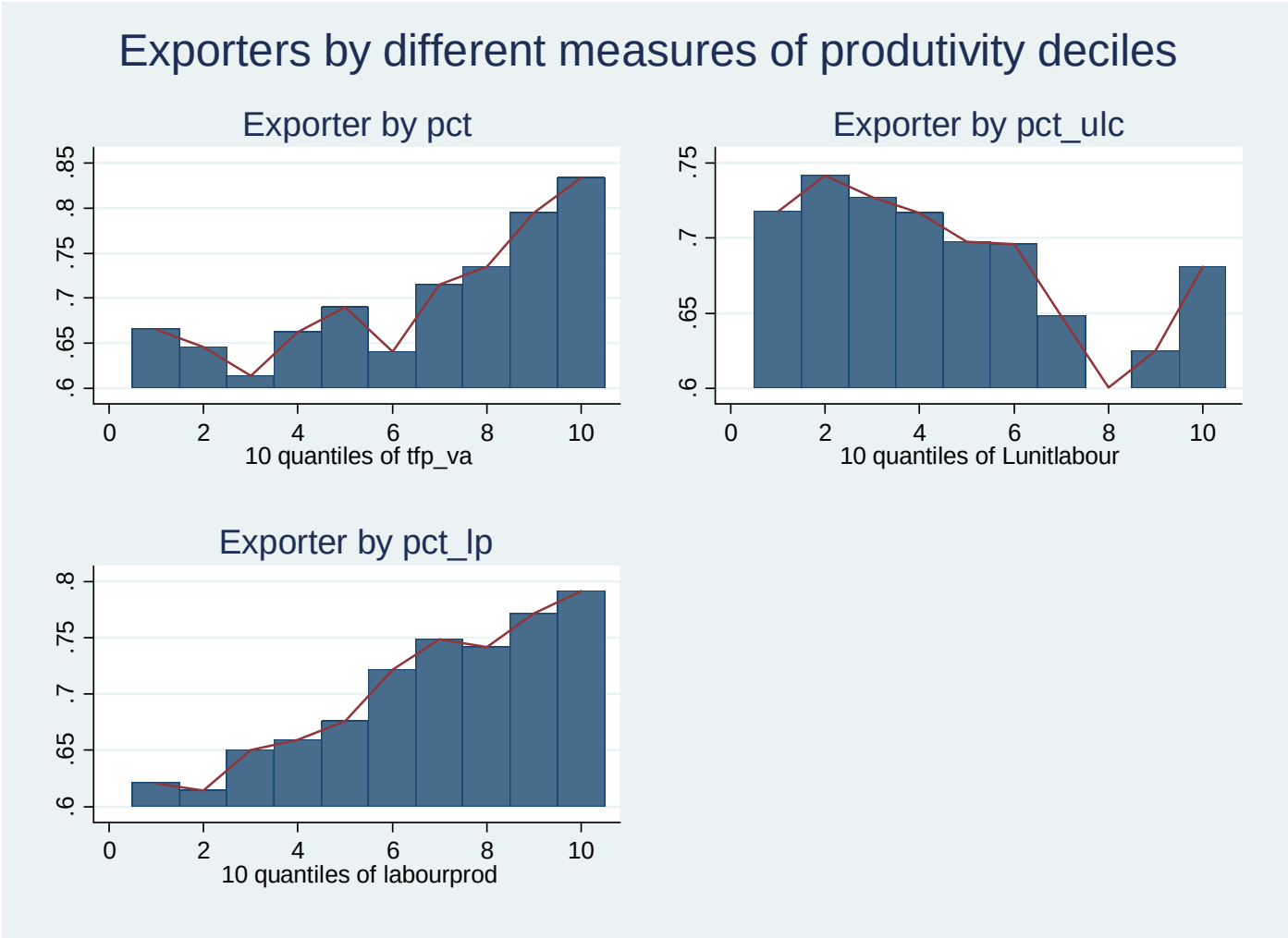
Table 8: International status and alternative competitiveness measures

	TFP		Labour productivity		Unit labour cost	
Variables	OLS	N	OLS	N	OLS	N
Active abroad	0.0906***	7,259	0.135***	7,260	-0.0570***	9,230
	(0.0132)		(0.0145)		(0.00960)	
Exporter	0.0999***	6,563	0.141***	6,564	-0.0545***	8,281
	(0.0136)		(0.0149)		(0.00991)	
Importer of services	0.171***	3,334	0.202***	3,334	-0.0682***	4,246
	(0.0171)		(0.0188)		(0.0121)	
Importer of materials	0.118***	5,320	0.162***	5,321	-0.0703***	6,800
	(0.0142)		(0.0155)		(0.0101)	
FDI	0.257***	1,862	0.226***	1,862	-0.0927***	2,392
	(0.0329)		(0.0373)		(0.0253)	
Passive outsourcer	0.122***	4,372	0.158***	4,372	-0.0630***	5,672
	(0.0151)		(0.0169)		(0.0111)	
Active outsourcer	0.134***	1,777	0.182***	1,777	-0.0666***	2,330
	(0.0309)		(0.0359)		(0.0212)	
Global exporter	0.156***	3,652	0.198***	3,652	-0.0631***	4,588
	(0.0168)		(0.0184)		(0.0122)	

Notes: Standard errors in parentheses. *** denotes statistical significance at the 1-percent level. One cross-sectional regression for each internationalization characteristic, with sector and country dummies. The number of observations is given by the number of inactive firms plus the number of

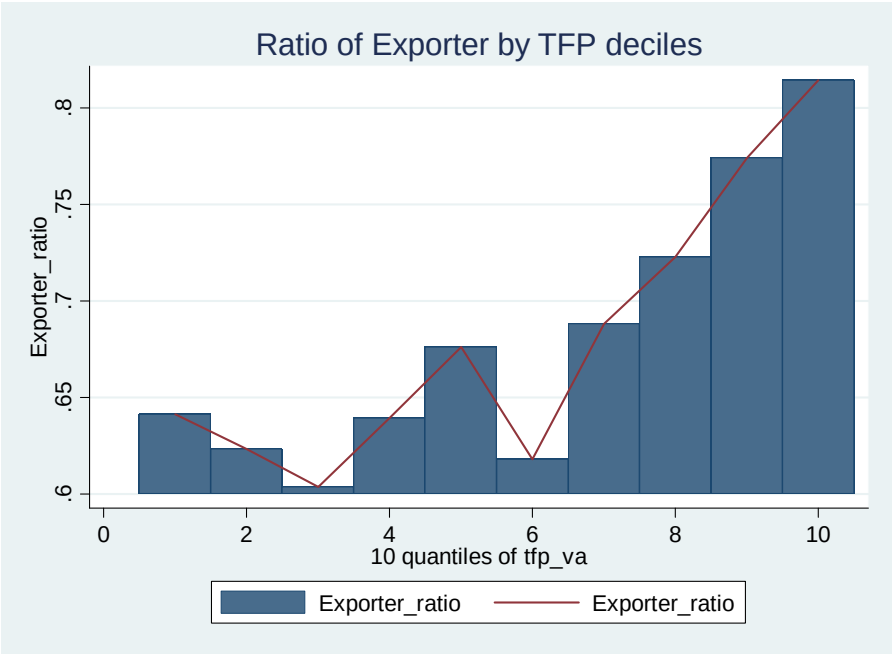
Competitiveness and ULC - 3

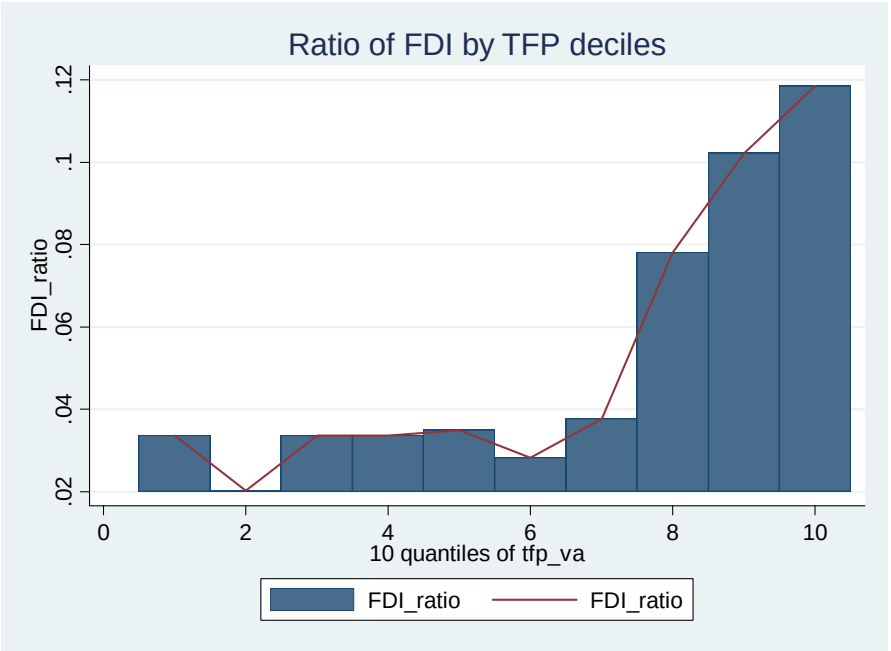
- ULCs less able to identify 'winners' above a critical performance threshold => more imperfect measure of firm-level based competitiveness



Causality links and policy implications

- Watch out for the causality link: from productivity to international status and then (possibly) to productivity, not the other way round => promoting the export activities of lemons does not turn them into winners





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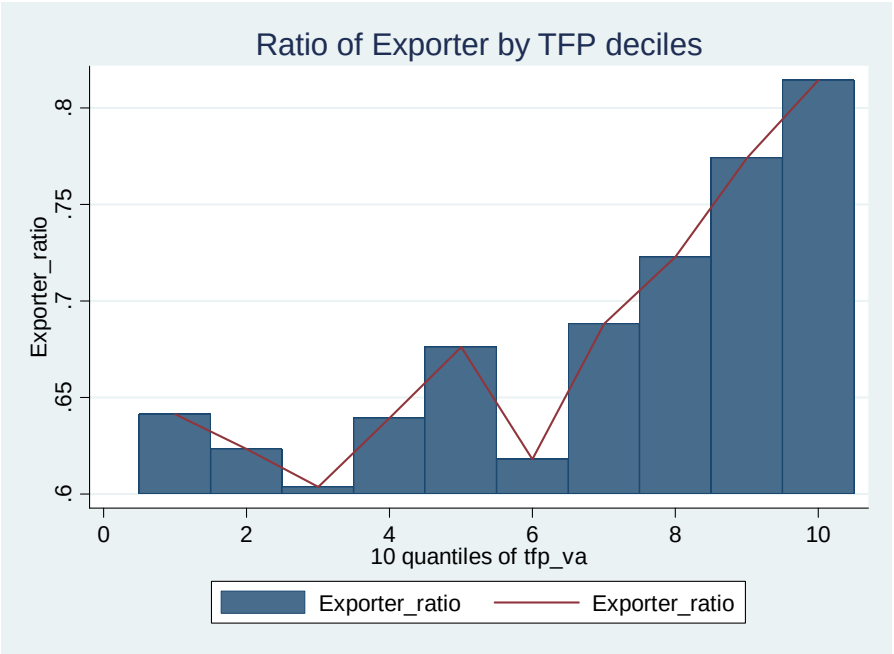

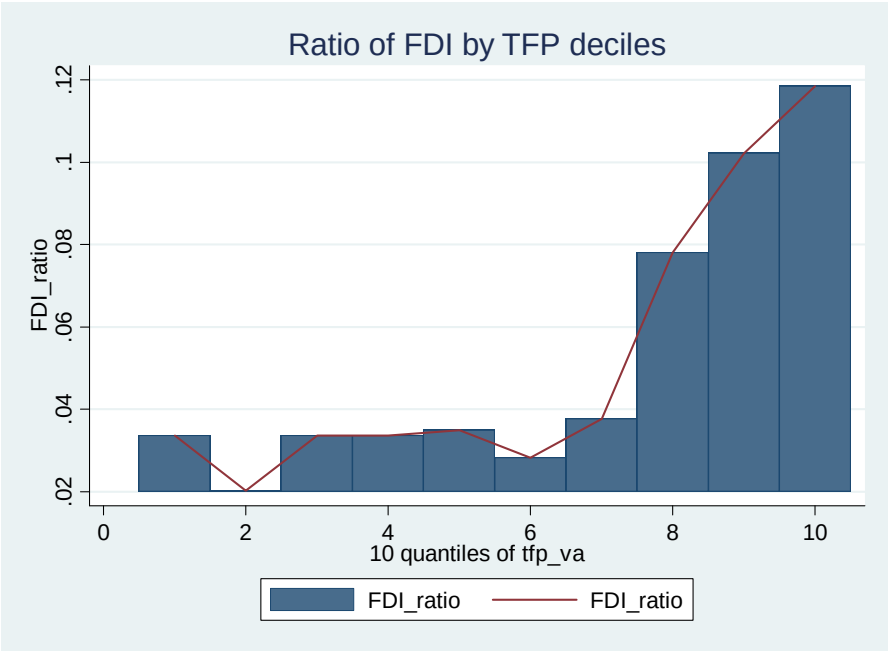

- But internationalization is a powerful tool for the reallocation of firms around and above the performance cut-off (ALL forms of international exposure, including imports)

Which firms' characteristics drive reallocation ?

- We have assessed the strong relationship between productivity and internationalization, and we have argued that selection and reallocation of firms above a given productivity cutoff is crucial for competitiveness. But what is driving these effects ?

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2. identify those firms that between 2001-7 and 2008-09 switch from below to above such a decile of productivity: firms experiencing reallocation around the cutoff
3. test for the firms' characteristics associated with the probability of being a 'switching' firm vs. other firms in the sample

Switching firms: identifying the relevant cutoff

- We test the joint probability that deciles of TFP above a random one are significantly associated to a given international status, controlling for industry, country (1) as well as firm-size (2) fixed effects

Critical threshold of TFP

Ho: Pct_7=0, Pct_8=0, Pct_9=0, Pct_10=0				
	Active abroad		Exporter	
	(1)	(2)	(1)	(2)
chi2(4)	75.39	22.97	57.37	11.38
Prob > chi2	0.0000	0.0001	0.0000	0.0226

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- We find this critical threshold to be the 7th decile of TFP across EU countries (consistently with prev. figures): below this threshold, the probability of being internationally active is not significant in the overall EU distribution

Switchers' Characteristics - 1 (Structural Features)

- We then identify 942 firms that between 2001-07 and 2008-09 switch above the 7th decile of TFP: these firms tend to be relatively small but are more capitalized and with lower ULC with respect to the average firm in the sample. Young Innovative Companies ?

Characteristics of firms with respect to their TFP dynamics

Change in TFP w.r. to the cutoff (7^{th} TFP decile)	N. of firms	Avg. turnover per firm (in 1,000 EUR)	Avg. n. of employees	Avg. Capital stock per employee (in 1,000 EUR)	Total Factor Productivity	Unit labour cost (in EUR per unit of value added)	Labour productivity (value added per employee)
Remain below	3823	4146.1	27	157.9	0.653	0.845	39.346
Move below	1010	12271.1	66.5	188.5	0.821	0.886	48.652
Move above	**942**	**7805.9**	**34**	**202.4**	**1.129**	**0.65**	**68.755**
Remain above	2856	53921.1	341.9	248.8	1.546	0.649	79.394
Total	8631	19462.2	126.3	193.1	0.989	0.772	55.441

Econometric Evidence

- Probit regressions to show the extent to which some firm characteristics influence the probability of switching. We include the following variables, derived from the EFIGE dataset:
  - **Structure**: size class, age, foreign ownership, facing competition, use of flexible contracts, quality certificates
  - **Management**: family managed (if $>$ national average), family CEO, decentralized management, performance-related bonus
  - **Innovation**: human capital (if graduate workers $>$ national average), R&D workers, product/process/market innovation
  - **Finance**: Financial Interdependency Index, Liquidity Ratio, bank credit requested & bank credit obtained

Note: other financial variables (Cash Ratio, Leverage Ratio, Index of Financial Pressure, Current Ratio) have been ruled out by a 2-step Heckman selection model where the (lagged) financial variable acts as a predictor of the internationalization status, controlling for (lagged) productivity in the first stage (to control for endogeneity)

Results on switching firms - 1

- **Financial variables**: Firms with higher human capital, higher financial stability and salaries linked to producitivity (bonus) have a higher probability of switching in both specifications (change in control group, as sensitivity check)

VARIABLES	Swing=1=Move Up Swing=0=Remain/get below	Swing=1=Move Up Swing=0=Remain
r_d	0.102	0.0996
	(0.0802)	(0.0854)
age	-0.0296	-0.0332
	(0.0865)	(0.0929)
hk	0.167**	0.185**
	(0.0827)	(0.0886)
labour_flex	-0.128	-0.163
	(0.105)	(0.114)
FII	0.643***	1.087***
	(0.212)	(0.234)
LR	-0.493**	-0.389
	(0.221)	(0.238)
fam_managed	-0.0812	-0.147
	(0.0891)	(0.0941)
fam_ceo	-0.0121	-0.0353
	(0.0876)	(0.0936)
for_group	-0.00848	0.377
	(0.252)	(0.314)
decentr_manag	-0.110	-0.0981
	(0.0928)	(0.0987)
bonus	0.145*	0.203**
	(0.0868)	(0.0939)
qual_cert	0.00311	-0.0163
	(0.0792)	(0.0842)
comp	0.0317	0.102
	(0.0807)	(0.0860)

Results on switching firms - 2

- **Credit variables:** Firms that invest more in R&D and apply for quality certification have a higher propensity to switch. Firms family managed and requiring more credit have a lower probability. In the second spec., a higher probability of switching is associated to more human capital, being part of a foreign group and having productivity-based salaries.

VARIABLES	Swing=1=Move Up Swing=0=Remain/get below	Swing=1=Move Up Swing=0=Remain
r_d	0.128***	0.139***
	(0.0459)	(0.0485)
age	-0.0260	0.0269
	(0.0472)	(0.0504)
hk	0.0598	0.0845*
	(0.0473)	(0.0505)
labour_flex	-0.00658	-0.0183
	(0.0601)	(0.0639)
fam_managed	-0.115**	-0.129**
	(0.0530)	(0.0555)
fam_ceo	-0.0570	-0.0823
	(0.0481)	(0.0511)
for_group	0.154	0.244**
	(0.0989)	(0.112)
decentr_manag	-0.00883	0.00512
	(0.0508)	(0.0544)
bonus	0.0738	0.115**
	(0.0495)	(0.0532)
qual_cert	0.0769*	0.103**
	(0.0457)	(0.0480)
comp	-0.0420	-0.0242
	(0.0455)	(0.0483)
credit_req	-0.231**	-0.278***
	(0.0989)	(0.104)
credit_obt	0.140	0.156
	(0.113)	(0.119)

Results on switching firms - 3

- **Innovation variables**. As in the previous case, family managed firms and those that have requested more credit have a lower probability of switching. Innovating (process) increases the same probability. The same is true for firms which are part of foreign group and partially link the salary to the performances of employees (only in the second specification).

VARIABLES	Swing=1=Move Up Swing=0=Remain/get below	Swing=1=Move Up Swing=0=Remain
age	-0.0270	0.0254
	(0.0472)	(0.0504)
hk	0.0714	0.0992**
	(0.0473)	(0.0505)
labour_flex	-0.00468	-0.0153
	(0.0601)	(0.0638)
fam_managed	-0.114**	-0.130**
	(0.0529)	(0.0554)
fam_ceo	-0.0576	-0.0823
	(0.0482)	(0.0511)
for_group	0.148	0.238**
	(0.0989)	(0.112)
decentr_manag	-0.00331	0.0121
	(0.0507)	(0.0542)
bonus	0.0744	0.116**
	(0.0497)	(0.0535)
qual_cert	0.0815*	0.109**
	(0.0458)	(0.0481)
comp	-0.0319	-0.0131
	(0.0453)	(0.0482)
credit_req	-0.225**	-0.274***
	(0.0988)	(0.104)
credit_obt	0.131	0.146
	(0.113)	(0.119)
product_innov	0.0641	0.0810
	(0.0579)	(0.0616)
process_innov	0.0801*	0.0824*
	(0.0445)	(0.0475)
mkt_innov	-0.0815	-0.109
	(0.0632)	(0.0675)

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3. the best export promotion policy is the creation of an economic environment conducive to the productivity growth of domestic firms, fostering the reallocation of firms above a given productivity cutoff
4. to that extent higher innovation (R&D, human capital, quality certification), better managerial practices (wages linked to productivity and no family involvement) and greater access to own financial resources (more equity financing) seem to be associated to a higher probability of reallocation and thus higher competitiveness

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