Misallocation and the Gains from Trade

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Motivation

Decline in trade barriers, transportation and communication costs over the past 20 years has triggered a rapid expansion of trade flows across borders

Heterogenous firms trade models identify various channels through which trade impacts aggregate productivity

1. *Export demand* : within-sector reallocation due to higher demand for high productive firms (Melitz, 2003) and exporters' innovation (Bustos, 2011)
2. *Import competition* : within-sector reallocation due to selection of low productive firms (Melitz, 2003) and innovation of surviving firms (Aghion et al., 2005)
3. *Imports of inputs* (lower price, greater variety, quality) : supports firm-level innovation and productivity

Empirical challenge : identify the contribution of firm-level productivity growth and market shares reallocation consecutive to greater trade openness

What we do ?

We examine the impacts of export and import channels on the "margins" of aggregate productivity growth, in a multi-country framework

- Different works have explored these channels separately, using data for single countries (see for instance Pavcnik, 2002). Exception is recent work by Bloom et al. (2012), but focuses on Chinese import competition
- We make use of a unique dataset (Compnet data), which reports productivity indicators reflecting micro-level heterogeneity in European countries

We find strong evidence that all three significantly increase aggregate productivity :

- Exports impact mostly productivity through within-sector market shares reallocation, while import channels impact the average firm productivity

Data : productivity and trade indicators

CompNet productivity indicators :

- 16 countries (Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Poland, Portugal, Slovakia, Slovenia and Spain)
- "all files" for all countries, with exceptions (20E : Poland and Slovakia)
- 20 manufacturing sectors in NACE 2-digits
- Over the period 1998-2011, unbalanced panel
- Main variables used : Olley and Pakes (1996) decomposition of aggregate productivity

World Input Output Database (NACE 2-digits sectors) :

- **Exports of goods** by country and sector
- **Import competition** : Total imports in sect. k, excluding imports of inputs from sector k
- **Imports of inputs** : total imports of inputs by sector k (including from same sector)

Olley and Pakes decomposition

Sector-level productivity decomposition (Olley and Pakes, 1996) :

- Average firm labour productivity (in logs) ;
- Allocative efficiency : covariance between the log of firm labour productivity and the firm employment.

$$P_t = \left(\frac{1}{N_t} \sum_i P_{it} \right) + \sum_i (\theta_{it} - \overline{\theta_t})(P_{it} - \overline{P_t}) \quad (1)$$

Empirical strategy

Estimation of the long run relation between trade and productivity growth (5-year overlapping periods) :

$$\Delta \ln Y_{ikt} = \beta_1 \Delta \ln export_{ikt} + \beta_2 \Delta \ln imp.compet._{ikt} + \beta_3 Delta \ln imp.inputs_{ikt} + C_{ikt}\Omega' + \lambda_i + \lambda_k + \varepsilon_{ikt} \quad (2)$$

- Y_{ikt} is the dependent variable, either the average productivity ($lprod_{ikt}$) or the OP-gap ($lopgap_{ikt}$)
- $export_{ikt}$ is the exports by country i and sector k in year t
- $imp.compet._{ikt}$ is the import competition by country i and sector k in year t
- $imp.inputs_{ikt}$ is the imports of inputs by country i and sector k in year t
- Country (λ_i) and sector (λ_k) fixed effects included
- Controls for the number of firms included in each estimation

TABLE : Impacts of trade on productivity (Delta logs, 5-years overlapping periods)

Dep. Var.	(1) Δ ln $lprod_{ikt}$	(2) $\Delta lopgap_{ikt}$	(3) Δ ln $lprod_{ikt}$	(4) $\Delta lopgap_{ikt}$	(5) Δ ln $lprod_{ikt}$	(6) $\Delta lopgap_{ikt}$
	Delta range : 5 years overlapping periods					
Δ ln $export_{ikt}$	0.120***	0.061***				
	(0.021)	(0.018)				
Δ ln $imp.compet._{ikt}$			0.137***	0.021		
			(0.021)	(0.023)		
Δ ln $imp.inputs_{ikt}$					0.124***	0.029
					(0.020)	(0.019)
Δ ln $nb.firms_{ikt}$	0.066**	-0.012	0.054**	-0.001	0.040	-0.008
	(0.028)	(0.027)	(0.028)	(0.028)	(0.028)	(0.028)
Observations	1,562	1,562	1,565	1,565	1,565	1,565
R-squared	0.477	0.105	0.476	0.096	0.482	0.098
Country FE	yes	yes	yes	yes	yes	yes
Sector FE	yes	yes	yes	yes	yes	yes

Note : Source : estimations based on the CompNet and WIOD data for 16 European countries (Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain). Standard errors clustered by country and year.
Significance levels : *** p$<$0.01, ** p$<$0.05, * p$<$0.1.

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Δ ln $export_{ikt}$	0.070***	0.077***	0.030	0.081***	0.020	0.085***
	(0.025)	(0.020)	(0.031)	(0.028)	(0.031)	(0.028)
Δ ln $imp.compet._{ikt}$	0.094***	-0.030			0.054**	-0.023
	(0.026)	(0.026)			(0.027)	(0.027)
Δ ln $imp.inputs_{ikt}$			0.108***	-0.024	0.086**	-0.015
			(0.031)	(0.029)	(0.034)	(0.031)
Δ ln $nb.firms_{ikt}$	0.050*	-0.007	0.041	-0.007	0.037	-0.005
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
Observations	1,562	1,562	1,562	1,562	1,562	1,562
R-squared	0.482	0.106	0.485	0.106	0.487	0.107
Country FE	yes	yes	yes	yes	yes	yes
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Additional robustness

- Alternative measures of import competition or imports of inputs
- Initial levels of productivity and GDP per capita to capture catch-up effects
- Countries of origin and destination : low wage versus high wage countries, etc.
- Endogeneity : (1) simultaneity (2) reverse causality

Instrument for export demand using foreign demand addressed to each country, with appropriate weights :

$$FD_{ikt} = \sum_j \bar{\omega_{ijk}} Import_{jkt} \quad with \quad \bar{\omega_{ijk}} = Mean\left(\frac{Export_{ijkt}}{\sum_j Export_{ijkt}}\right) \tag{3}$$

Instrumental variables estimation using a 2-stage Least Squares estimation procedure

TABLE : Impacts of trade on productivity : 2SLS estimation (Delta logs, 5-years overlapping periods)

	(1)	(2)	(3)	(4)	(5)
	1st stage	2nd stage			
Dep. Var.	Δ ln $export_{ikt}$	Δ ln $lprod_{ikt}$	$\Delta lopgap_{ikt}$	Δ ln $lprod_{ikt}$	$\Delta lopgap_{ikt}$
Δ ln $foreigndemd_{ikt}$	1.007***				
	(0.057)				
Δ ln $export_{ikt}$		0.183***	0.134***	0.157***	0.132***
		(0.046)	(0.041)	(0.046)	(0.042)
$Init.lnProd_{ikt}$				-0.133***	-0.096***
				(0.013)	(0.014)
$Init.lnGDPcap_{it}$				-0.072	0.147***
				(0.050)	(0.044)
Δ ln $nb.firms_{ikt}$	0.221***	0.047	-0.034	0.017	0.014
	(0.041)	(0.030)	(0.029)	(0.030)	(0.028)
Observations	1,587	1,562	1,562	1,562	1,562
R-squared	0.479	0.472	0.090	0.526	0.144
Country FE	yes	yes	yes	yes	yes
Sector FE	yes	yes	yes	yes	yes

Note : Source : estimations based on the CompNet and WIOD data for 16 European countries (Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain). Standard errors clustered by country and year.
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Conclusion

We examine the impact of international trade on aggregate productivity.

We find strong evidence that export demand, import competition and imported-input supply significantly increase aggregate productivity.

While export demand operates mainly by improving allocative efficiency, the benefits from import penetration are mostly mediated by within-firm productivity upgrading.

These conclusions shed light on the gains from trade in the context of global production networks

Way forward

- Robustness : Use different ranges of variations of productivity and trade indicators
- Endogeneity : instruments for imports using foreign supply capacity, quasi-natural experiment using the end of multi-fibre agreement, ...
- Misallocation : use indicators of financial and labor market frictions, interacted with trade
- Experience of the Great Recession with asymmetric demand shocks in EU stressed countries

Descriptive statistics : productivity indicators

Table generated by Excel2LaTeX from sheet 'Feuil1'

TABLE : Productivity indicators : average variation over 5 years

	Weighted prod(ikt) (delta logs 5 years)	Mean prod (ikt) (delta logs 5 years)	Labor OP gap (ikt) (delta logs 5 years)
AUSTRIA	0.088	0.055	0.033
BELGIUM	0.113	0.099	0.014
ESTONIA	0.302	0.290	0.012
FINLAND	0.105	0.125	-0.020
FRANCE	0.169	0.183	-0.014
GERMANY	0.096	0.092	0.003
HUNGARY	0.199	0.075	0.124
ITALY	0.037	0.033	0.004
LITHUANIA	0.229	0.147	0.081
POLAND	0.359	0.356	0.003
PORTUGAL	0.038	-0.039	0.077
SLOVAKIA	0.463	0.482	-0.020
SLOVENIA	0.351	0.323	0.028
SPAIN	0.018	0.015	0.003
All countries	0.177	0.160	0.017

Trade and productivity : correlations

TABLE : Correlations between trade and productivity indicators : levels

	(1)	(2)	(3)	(4)
Dep. var.	ln mean prod(ikt)	Labor OP gap(ikt)	ln mean prod(ikt)	Labor OP gap(ikt)
ln export(ikt)	0.027*	0.066***		
	(0.014)	(0.006)		
ln import(ikt)			0.197***	0.067***
			(0.024)	(0.010)
ln nb. firms(ikt)	-0.059***	-0.034***	-0.080***	-0.008
	(0.018)	(0.006)	(0.015)	(0.006)
Observations	2,885	2,885	2,886	2,886
R-squared	0.895	0.588	0.898	0.572
Country FE	yes	yes	yes	yes
Sector FE	yes	yes	yes	yes

Note : Source : estimations based on the CompNet and WIOD data for 16 European countries (Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain). Standard errors clustered by country and year.
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