

# **International Competition and Firm Performance. Evidence from Belgium**

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# Competition and firm performance

- ▶ Economic integration of regions (countries or groups of countries) can lead to substantial welfare gains through a variety of channels such as:
  - ▶ increased specialization,
  - ▶ access to new varieties/ lower prices,
  - ▶ access to inputs and technology,
  - ▶ increasing productive efficiency.
- ▶ The very same process also imposes stronger competition on (domestic) firms and in order to benefit from such integration, domestic firms must be able to compete in the global market place.
- ▶ The survival of firms then depends on both *cost of production* and *product quality*.

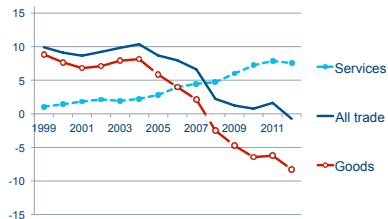
# The case of Belgium

- ▶ Aggregate statistics suggest a decline in the overall competitiveness of the economy.
- ▶ In particular we have seen:
  - ▶ current account surplus in 1997 (10 BLN EUR) to a deficit in 2012 (3 BLN EUR).
  - ▶ Declining TFP, especially relative to EU15 and in particular Germany.
- ▶ This happened while increased competition from abroad substantially changed the economic environment of firms:
  - ▶ Increased import competition from low wage countries (most notably China).
  - ▶ Labor cost are increasing compared to neighbouring countries
- ▶ The aggregate picture is misleading as different firms are experiencing different shocks, and will react differently depending on initial conditions (efficiency/quality).

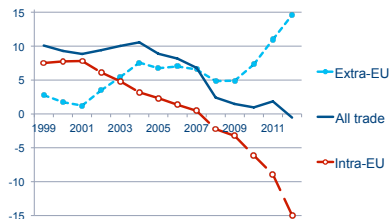
# Breaking down aggregate trends

- ▶ Driving negative trend is goods markets and intra-EU trade

Motivation: Trade balance is down



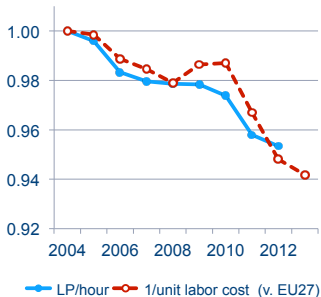
Motivation: Trade balance is down



# Declining Productivity

- ▶ Belgian productivity is slowing down compared to EU, and in particular compared to *direct competitors*.

## Productivity v. EU15

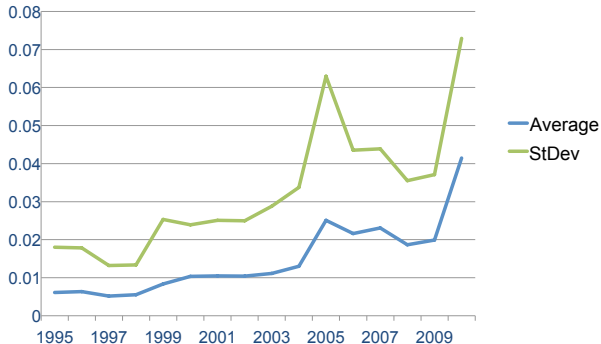


## Productivity v. Germany



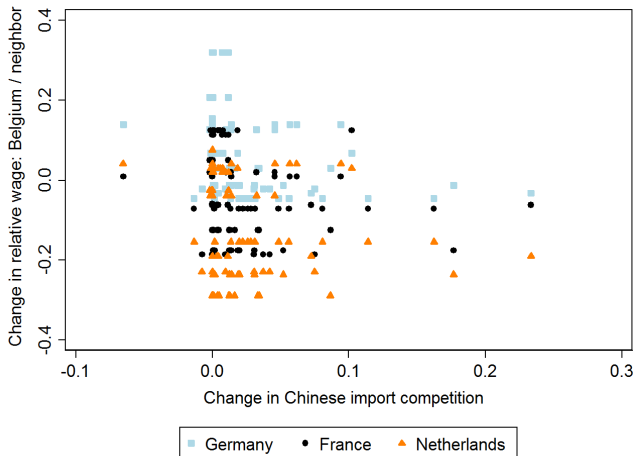
# Increased import competition from China

- ▶ Imports from China are rising, and expected to continue



# Industry and Firm-level heterogeneity

- ▶ Measures of increased competition are *not strongly* correlated
- ▶ We can expect different responses across firms and sectors, depending on whether output and/or input market prices are affected.



## Goal of this paper

- ▶ Evaluate the impact of increased international competition on the performance of Belgian producers.
- ▶ Relevant measures of firm performance are *not observed* in the data, and we recover them by imposing a robust behavioral model informed by detailed micro data on production, prices and trade.
- ▶ We exploit sectoral variation in international competition to gauge the effect on firm-level performance, with a focus on several potential margins of adjustment such as TFPR, prices, TFPQ, markups and marginal cost of production.
- ▶ Focus is to *identify* underlying mechanisms by using one consistent framework.



# What do we know so far?

- ▶ Not the first to study the impact of international competition on firm performance, but the focus on identifying underlying drivers and distinguishing between price (**demand channel**) and cost (**supply channel**) is still unexplored – i.e., acknowledging both output and input market react.
- ▶ Traditional approach uncovers a relationship between changes in the international competitive environment and sales-per-input measures of productivity.

## Recent work on the various mechanisms

- ▶ Tariff reductions lead to higher TFP in Indonesia: due to cheaper or more varied inputs (Amiti-Konings 2007)
- ▶ In India the input channel lowers MC and leads to higher markups (De Loecker et al. 2012)
- ▶ In China output market competition raises efficiency and lowers markups (Brandt et al. 2012)
- ▶ Import competition from low-wage countries leads firms in the US to switch to more capital-intensive sectors (Bernard et al. 2006) and lower wages (Autor et al. 2013)
- ▶ Cross-country suggestive evidence on increase of product quality (Amiti-Khandelwal 2013)

### **The case of Belgium?**

1. adopted more skill-intensive processes (Mion-Zhu 2013)
2. lower final product prices in textile industry (De Loecker 2011)

## Data and institutional setting

- ▶ Balance Sheet database: wage bill, employment, tangible fixed assets, intermediate input use and revenue.
- ▶ Value Added Tax database: sales, intermediate input consumption
- ▶ Survey on Industrial Production: value and quantity produced for all 8-digit products
- ▶ Transaction Trade data set: Chinese import competition, exporter & importer dummies
- ▶ Survey on Foreign Direct Investment: foreign ownership dummy
- ▶ EU-KLEMS: relative labor compensation at 2-digit NACE

Sample: all manufacturing firms active 1997-2010

# Empirical framework to recover measures of firm performance

- ▶ We rely on a framework to recover markups, marginal costs and productivity that does not require specifying demand and market structure. Those are expected to react to the very same competition shocks!
- ▶ We leverage our detailed output and input data and follow De Loecker and Warzynski (2013 DLW) and rely on cost minimization of variable inputs to infer margins, and from there marginal costs.
- ▶ We *do not* consider the product-level markups since our RHS variables measuring changes in international competition are at most varying at 4-digit. For a product-level analysis see DLGKP.

# Identification of markups

- ▶ It is useful to compare the following two shares:

$$\frac{PQ}{wL} \sim \frac{cQ}{wL} \quad (1)$$

- ▶ Define the markup  $\mu \equiv P/c$ .
- ▶ Wedge between these two shares contains the markup ( $\mu$ ).
- ▶ The main problem is not observing cost shares (note role of capital!).

## Methodology ctd.

- ▶ DLW formalize this:
  1. Arbitrary production functions ( $Q = F(\mathbf{X})\Omega$ ),
  2. No restriction on Returns to Scale,
  3. FOC on a variable static input ( $V$ ) will only satisfy this relationship,
  4. Cost share is always output elasticity ( $\theta_v$ ).
- ▶ Therefore all we need is:

$$\mu = \theta_v \frac{PQ}{P_v V} \quad (2)$$

- ▶ We estimate a translog PF in  $(L, M, K)$  allowing for:
  1. adjustment costs in capital and labor
  2. arbitrary endogenous productivity process
  3. relevant *trade shifters* to impact input demand and profits.

# Measures of firm performance

- ▶ Delivers estimates for: markups ( $\mu$ ), TFPR, TFPQ ( $= TPFR/P$ ) and marginal costs ( $c$ ) with following relationships:

$$\ln TFPR = y - \mathbf{x}'\beta \quad (3)$$

$$\ln TFPQ = \ln TFPR - \ln P \quad (4)$$

$$\ln \mu = \ln \theta_v + \ln \frac{PQ}{P_v V} \quad (5)$$

$$\ln c = \ln P - \ln \mu \quad (6)$$

- ▶ Our framework implies:

$$\ln c = \ln f(\mathbf{w}, Q) - \ln TFPQ \quad (7)$$

$$\ln TFPR = \ln f(\mathbf{w}, Q) + \ln \mu \quad (8)$$

# Roadmap: results from empirical analysis

1. Equilibrium relationship among price, markup, cost and wages in a domestic setting – Check on estimates
2. Impact of increased import competition
  - ▶ by efficiency
  - ▶ by import status
3. Impact of relative wage increase – neighbouring countries
  - ▶ by location
  - ▶ towards services and local demand



# Domestic pass-through

- ▶ We consider pass-through regressions on own and industry-wide wage, controlling for either TFPR/TFPQ:

$$\ln P_{ist} = \alpha_j + \alpha_s + \alpha_t + \alpha_p Z_{ist} + \epsilon_{ist} \quad (9)$$

	(1)	(2)	(3)	(4)
Firm-level wage	0.047***	0.023	0.299***	0.290***
Industry-level wage				-0.006
TFPR		0.078***		
TFPQ			-0.952***	-0.922***
Observations	52,192	52,192	52,192	49,779
R-squared	0.967	0.967	0.998	0.998

## Domestic pass-through: ctd

- ▶ Repeat it for markups and costs – revisit importance of last regression.

Dependent variable:	log(price-cost ratio)	log(MC)
Firm-level wage	-0.011**	0.301***
Industry-level wage	0.050	-0.056
TFPQ	0.006*	-0.958***
Observations	49,779	49,779
R-squared	0.735	0.998

# Increased Chinese import competition (CIC)

- ▶ We evaluate impact of CIC on measures of firm performance ( $y$ ), allowing for decomposition of response.

$$\ln y_{ist} = \alpha_j + \alpha_s + \alpha_t + \alpha_p Z_{s't} + \epsilon_{ist} \quad (10)$$

	TFPR	TFPQ	Price	Markup	MC	MC
CIC	-0.888	-0.166	-0.722***	0.208**	-0.930***	-0.684**
TFPQ						-0.957***
Own wage						0.305***
Observations	52,192	52,192	52,192	52,192	52,192	52,192
R-squared	0.992	0.966	0.967	0.728	0.967	0.998

- ▶ Points to input channel and reduced input prices of equipment and intermediates – i.e.,  $mc = f(\mathbf{w}, \omega, Q)$ .

# Increased Chinese import competition (CIC): response by efficiency

- ▶ Impact of competition is greater on initially low-productive firms. Measurement is crucial to get this finding.

	TFPR	TFPQ	Price	Markup	MC*
CIC - average	-0.888	-0.166	-0.722***	0.208**	-0.684**
CIC *					
low-productivity	-0.831	3.507***	-4.339***	0.344***	-1.042***
med-productivity	-1.020*	-0.078	-0.942**	0.220**	-0.730**
high-productivity	-0.713	-3.158**	2.445**	0.083	-0.331

## Increased Chinese import competition (CIC): response by import status

	TFPR	TFPQ	Price	Markup	MC*
CIC - average	-0.888	-0.166	-0.722***	0.208**	-0.684**
CIC*					
no imports	-1.276**	-0.924	-0.352	0.268***	-0.780**
imports, not China	-0.896	-0.316	-0.581	0.156	-0.589*
CH imports, no int.	-0.711	0.129	-0.840	0.126	-0.767***
CH-imports, int.	-0.433	1.000*	-1.433***	0.241**	-0.653*

- ▶ Caveat: selection into product markets with initial low or no imports set aside.

# Relative labor cost in neighbouring countries

- ▶ Often documented fear of wage-price spiral negatively affecting Belgian firms' competitive edge.
- ▶ Important correlation in data:  $\rho(w_{ist}, w_{st})$  low and not significant arguing for firm-specific shocks to competition.

	TFPQ	MC	TFPR
W(Germany)	-0.065	-0.013	-0.012
W(firm)	0.251***	0.301***	0.302***
W(France)	0.944***	0.276**	0.256**
W(firm)	0.248***	0.300***	0.301***
W(Netherlands)	0.972***	0.682***	0.562***
W(firm)	0.299***	0.247***	0.297***

- ▶ We interpret high wage growth abroad as an indicator of a strong performance of foreign firms rather than an advantageous cost evolution for Belgian firms.

# Towards local competition: Impact of borders

- ▶ Previous results mix global/local competition and little power in these regressions.
- ▶ Focus on more local-demand sectors due to just-in-time delivery or where goods have a service component.
- ▶ Opens up door towards service sector with just enough data to compute TFPR and markups.
- ▶ Case study of Food Manufacturing.

# Results

$$\ln y_{ist} = \alpha_i + \alpha_t + \sum_{n=1}^3 \gamma_n \ln(w_{nt}/w_{Bt}) 1(\text{Border}_{in}) + \epsilon_{ist} \quad (11)$$

	TFPR	TFPQ	Price	Markup	MC
Relative wage (Germany – Belgium): using Belgian sectoral wage					
* German border	0.037	-0.630***	0.667***	-0.014	0.188***
Relative wage (Germany – Belgium): using Belgian firm-level wage					
* German border	-0.002	-0.077	0.074	-0.020	0.102

- ▶ Lower German wages are associated with lower prices, lower cost and higher efficiency for Belgian firms along border.
- ▶ Higher wages in France or the Netherlands do lead to higher markups, but with no distinct effects on any of the other performance dimensions.



## Towards local demand: integrating services

- ▶ Literature has focussed on either fully segmented (i.e. geograph. isolated markets as in Syverson) or fully integrated (global market).
- ▶ Large part of economic activity sits in the middle of this classification, and we need assesment of impact of competition on firm performance.
- ▶ Insight is to use markup estimates at the firm level to inspect role of local competition, using exogenous variation in degree of competition.
- ▶ Going forward this paper will bridge this gap and introduce PF-based market power analysis on local demand markets, and contrast to early entry literature initiated by Bresnahan and Reiss.

# Conclusions

- ▶ Impact of increased global competition for Belgian manufacturing firms is nuanced – i.e., same shocks impacts
  - ▶ prices through **direct** competitive effect
  - ▶ cost of production through **input markets**
  - ▶ Total impact depends on demand/market structure or **pass-through**
- ▶ Import competition plays double role on firm's profitability, while aggregate wage patterns of neighbouring countries at most reflects overall competitive environment of firms.
- ▶ Open door to services and local demand industries: identification of competition ~ firm performance with standard data.