

The productivity and export spillovers of the internationalisation behaviour of Belgian firms

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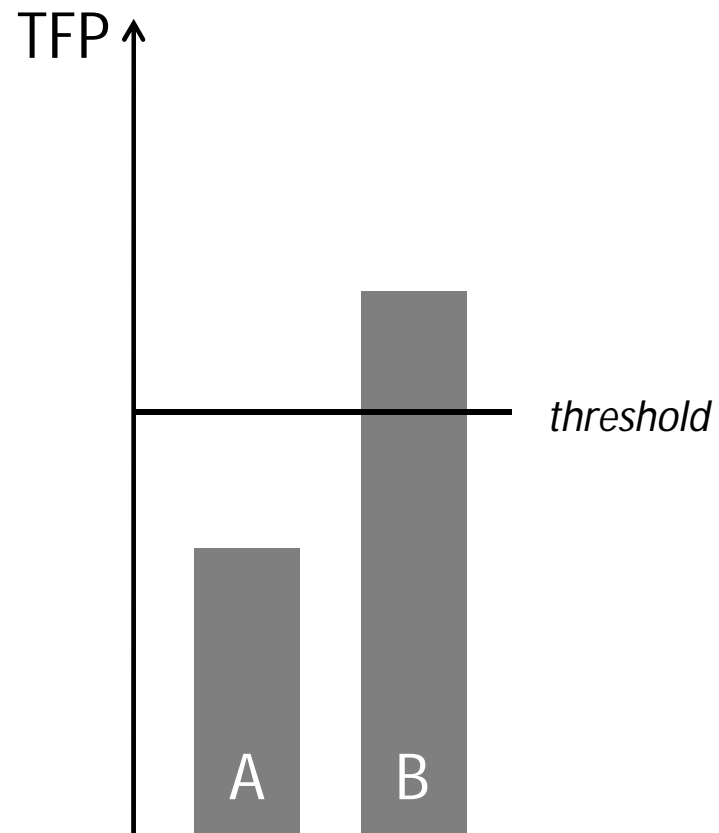
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Introduction

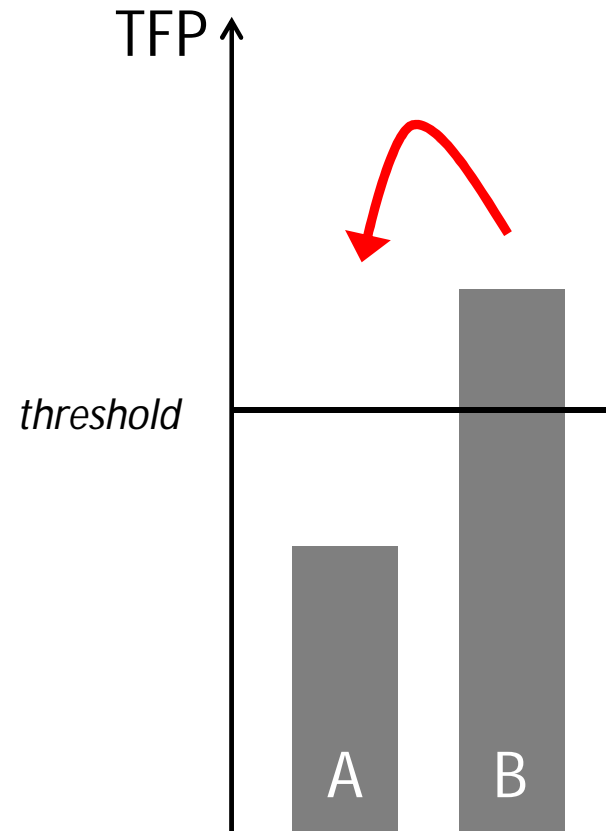
- Are there spillover effects on the decision to start exporting by Belgian domestic firms of the internationalisation behaviour of other firms in Belgium?
- Firms will export if their productivity exceeds a threshold (Melitz, 2003)
 - Suggest two channels for spillovers
 - Productivity
 - Threshold

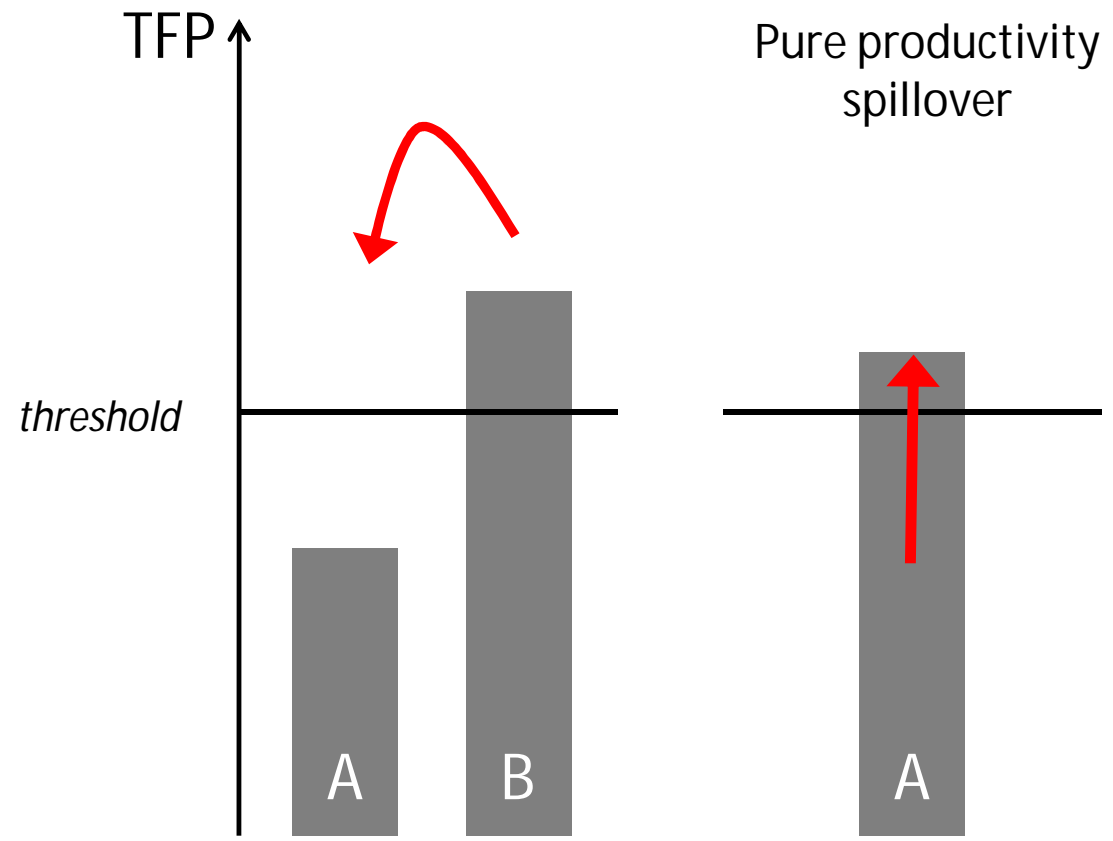
Firm A → domestic firm
Firm B → internationalised firm

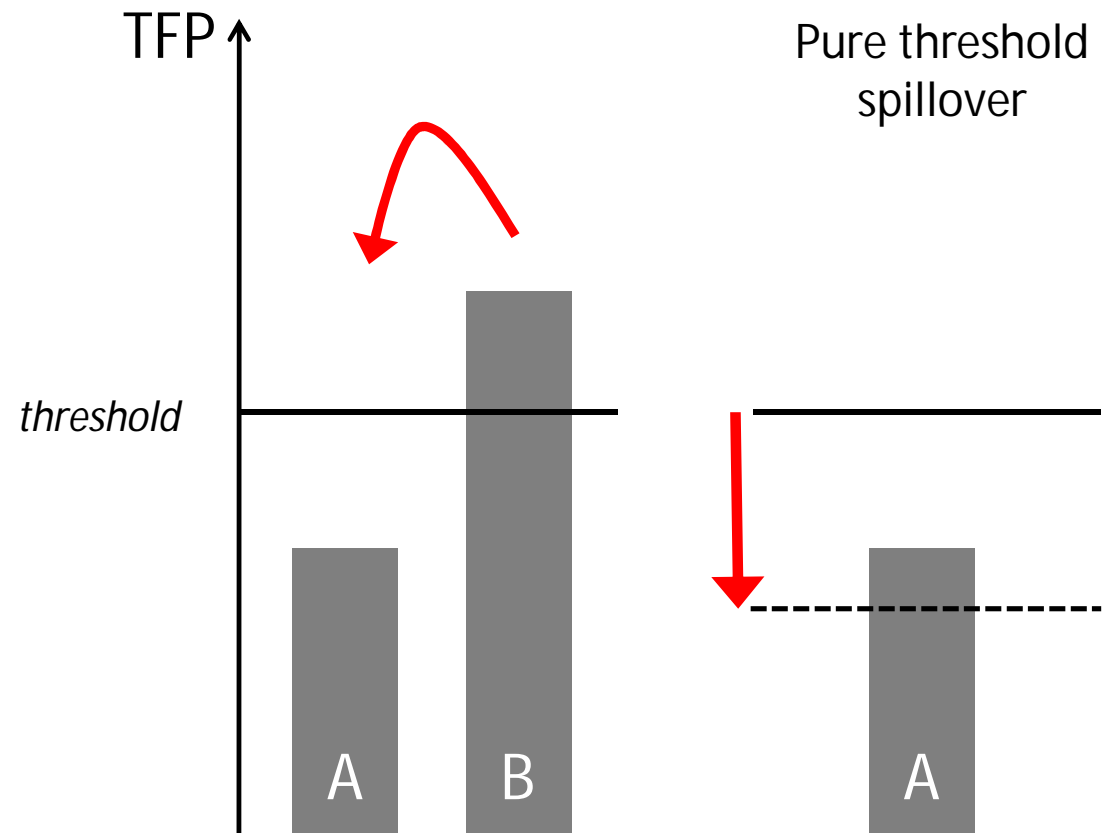


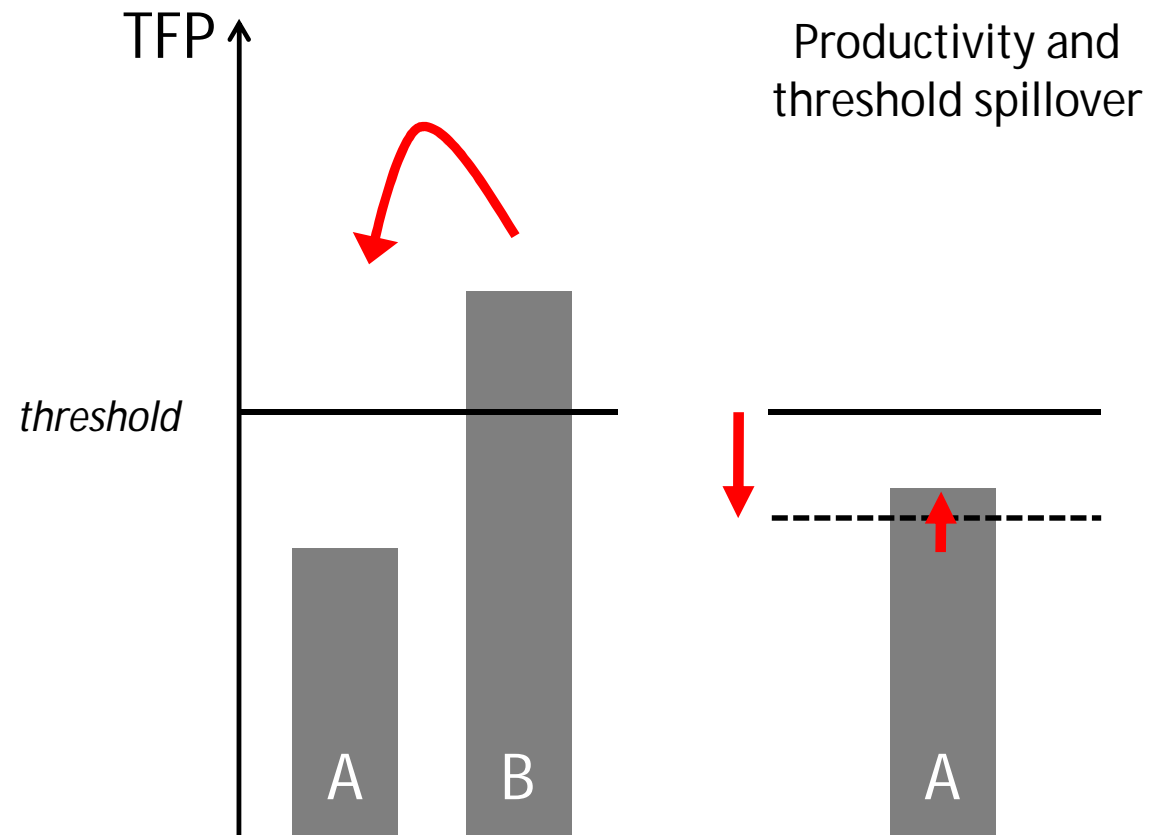
Firm A → domestic firm

Firm B → internationalised firm









Productivity spillover effects

- Do spillovers affect the productivity of domestic firms?
- Ample research on impact of foreign MNE presence
 - Alvarez and Lopez (2008) focus on spillovers from domestic exporters
- Within and between industries
- Demonstration effects, competition effects, labour mobility, better inputs, technical assistance, ...
- see e.g. Görg-Greenaway (2004), Crespo-Fontoura (2007), Meyer-Sinani (2009)

Threshold spillover effects

- Do spillovers affect the probability to start exporting controlling for productivity?
- Yes
 - *Aitken et al. (1997)*: multinational exporters in Mexico
 - *Greenaway and Kneller (2008)*: both exporters in same industry and in same region (independent) in the UK
 - *Koenig et al. (2010)*: local export spillovers at the firm-product-destination level on the decision to start exporting in France
- No
 - *Bernard and Jensen (2004)*: geographic, industry for large US plants
 - *Barrios et al. (2003)*: other exporters or multinationals in Spain

This paper

- Spillover effects on
 - TFP
 - Decision to start exporting (controlling for tfp)
- Spillover at
 - industry level (economic distance)
 - regional level (geographic distance)
- Spillover from
 - Exporters (domestic and foreign)
 - MNEs (domestic and foreign)

Data

- Sample of Belgian manufacturing firms with at least 5 employees
- Detailed information at product-destination level for exports
 - *data collapsed to 4 digits nomenclature*
- Because reporting thresholds were raised in 1998 and in 2006 with respect to foreign trade data we focus on the period 1998-2005

Data

Table 1: Population of manufacturing firms in 2005

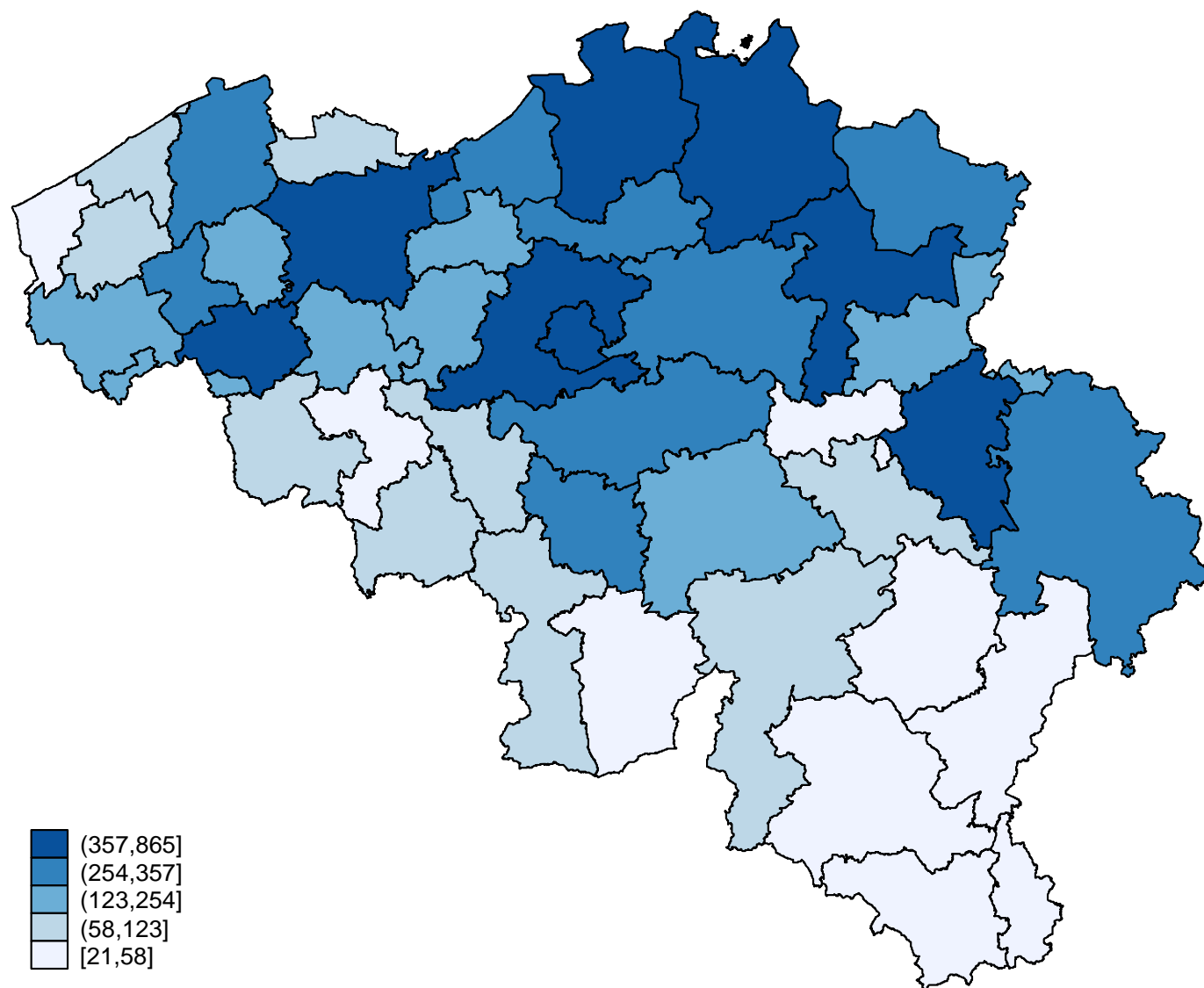
	Total population	Firms with less than 5 employees ¹	Firms with at least 5 employees ¹	Firms with TFP estimates based on the index method ²
Number of firms	24,027	15,250	8,777	6,114
Number of exporters	5,632	1180	4,452	3,324
Number of foreign firms	642	28	614	460
<i>of which exporters</i>	<i>572</i>	<i>11</i>	<i>561</i>	<i>429</i>
Number of Belgian multinationals	177	17	160	133
<i>of which exporters</i>	<i>146</i>	<i>3</i>	<i>143</i>	<i>123</i>
Sum value added (millions of euro)	47,058	1,402	45,656	35,950
Sum exports (millions of euro)	92,208	2,672	89,536	73,801
Average number of export destinations	7.6	3.0	8.8	9.2
Average number of exported products	11.7	4.3	13.7	14.1

Sources: Central Balance Sheet Office, Survey on foreign investment and foreign trade data.

Data

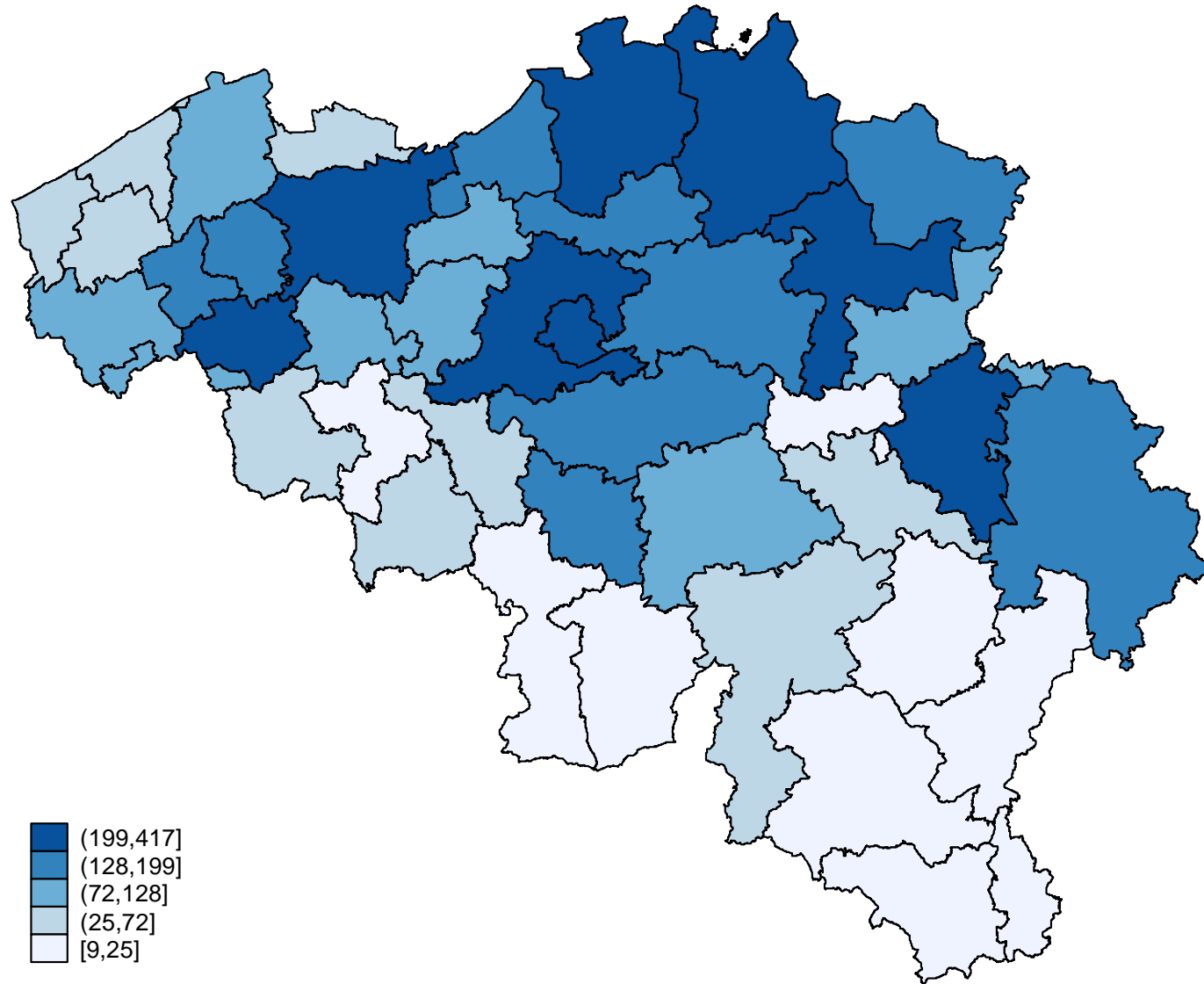
- Crossroads bank: address(es) of firms and their establishments
 - Determine region
- geographical unit = NUTS 3 level
 - Official classification used for dividing up economic territory of the EU
 - small regions for specific diagnoses with population between 150,000 and 800,000
 - Belgium has 43 districts
- in the estimations we only use single plant firms (i.e. those with a single address)
- for calculations of spillover variables we use info on all firms with at least 5 employees

Plants of manufacturing firms* by NUTS3 region (data for 2005)



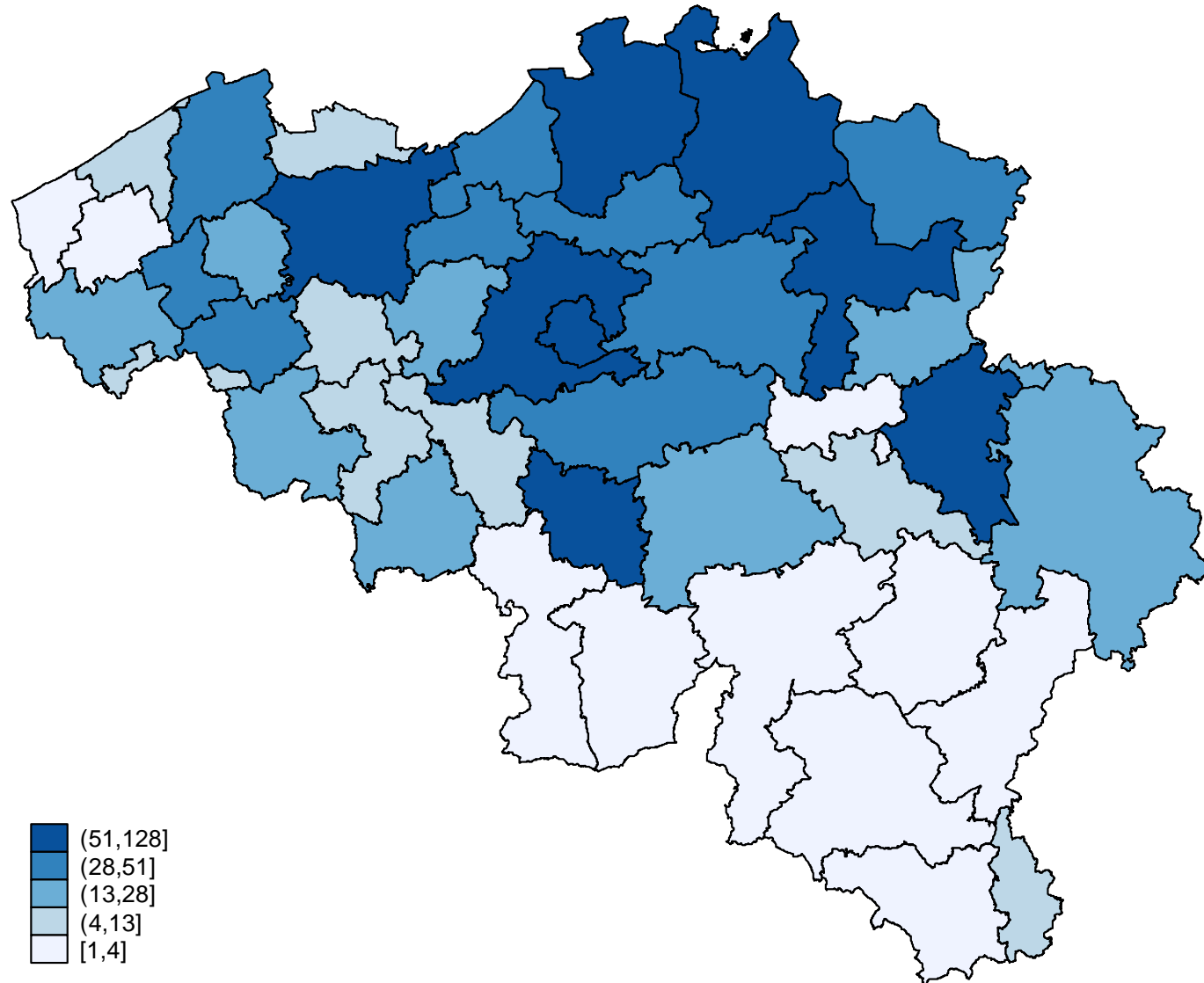
* Firms with at least 5 employees on average over the period 1998-2005

Plants of exporters* by NUTS3 region (data for 2005)



* Firms with at least 5 employees on average over the period 1998-2005

Plants of multinational firms* by NUTS3 region (data for 2005)



* Firms with at least 5 employees on average over the period 1998-2005

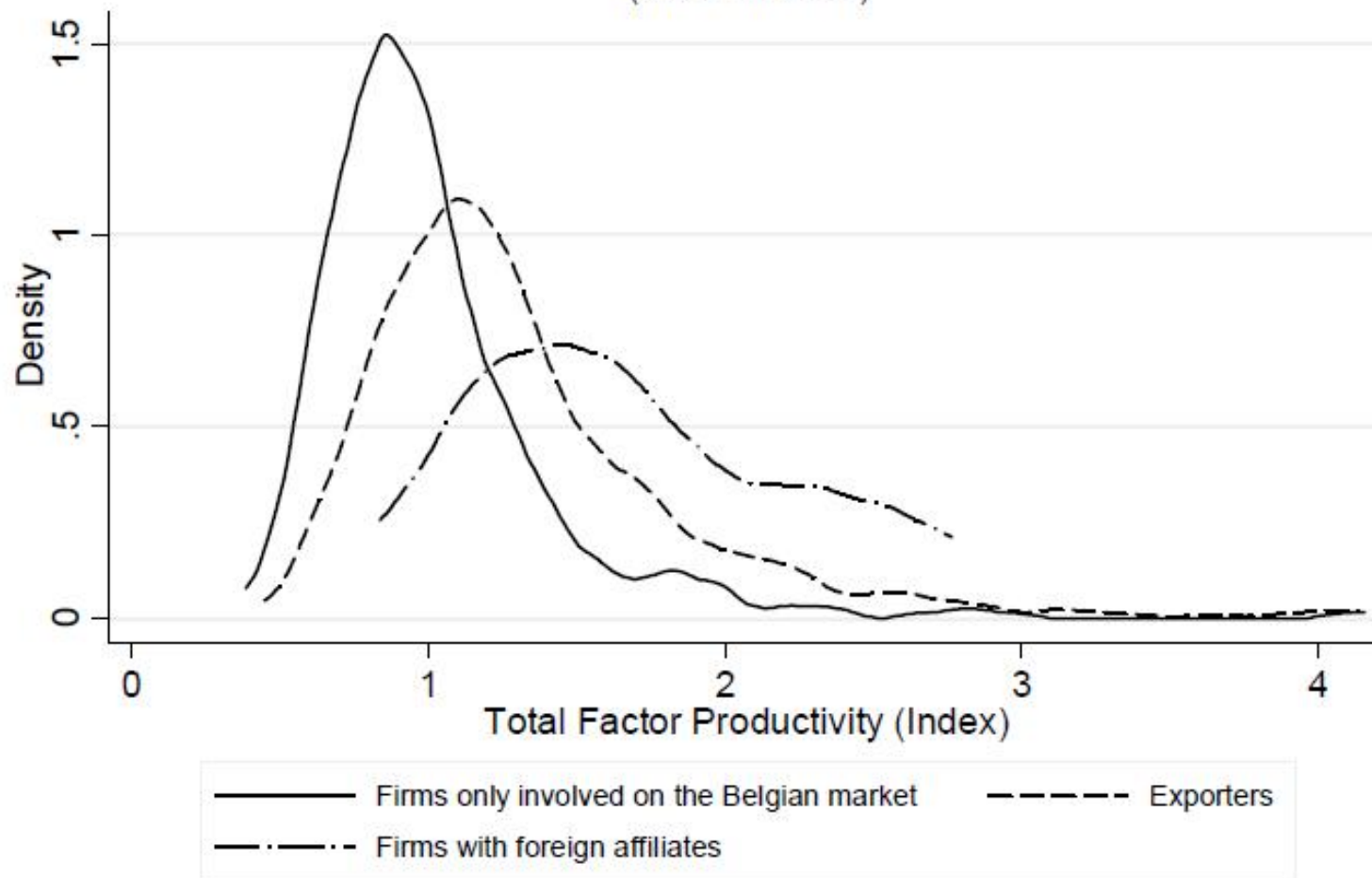
Productivity measures

- Index-approach as benchmark (Good et al., 1996):
firm-level total factor productivity computed using index approach, representative firm (2-digit industry mean):

$$\text{TFP}_{it} = \left[\left(y_{it} - y_t^* \right) + \sum_{s=2}^t \left(y_s^* - y_{s-1}^* \right) \right] \\ - \left[\frac{1}{2} \sum_{j=1}^n \left(S_{ijt} + S_{jt}^* \right) \left(x_{ijt} - x_{jt}^* \right) + \sum_{j=1}^n \frac{1}{2} \sum_{s=2}^t \left(S_{j,s}^* + S_{j,s-1}^* \right) \left(x_{j,s}^* - x_{j,s-1}^* \right) \right]$$

- Robustness: OLS and control function estimation (Akerberg et al. 2006 + De Loecker 2009)

TFP distribution according to the type of involvement on foreign markets
(data for 2005)



Estimation

- Identifying TFP spillovers
 - OLS on first differenced model

$$\Delta tfp_{it} = \Psi_1 \Delta f (TFPspill_{t-1}) + \gamma_2 \Delta X_{it} + \gamma_3 \Delta Y_{jt} + \gamma_t + \gamma_j + \gamma_r + \varepsilon'_{it}$$

- Identifying threshold spillovers
 - Logit on subsample of firms facing the decision to start exporting (product p to destination d)

$$\Pr (EXP_{it} = 1) = \Omega_1 f (Thresholdspill_{t-1}) + \beta_2 V_{it-1} + \beta_3 tfp_{it-1} + \beta_j + \beta_t + \beta_r + (\beta_d + \beta_p) + v_{it}$$

Spillover variables

- productivity and threshold spillover literature have measured spillover variables on a different basis
 - # exporters/MNEs likely affects prevalence of knowledge about foreign markets
 - volumes produced/sold likely affect the size and efficiency of linked industries
- productivity spillover → *share* in total output (value added) produced by internationally active firms
 - proxies probability of doing business with internationalised firms
 - see e.g. Görg-Greenaway (2004), Meyer-Sinani (2009)
- threshold spillover → *number* of internationally active firms
 - information spillovers varies little with firms' intensity of internationalisation
 - see e.g. Koenig et al. (2010) and Greenaway and Kneller (2008)

1. Productivity spillovers

exporters' share in region va

MNEs' share in region va

exporters' share in industry va

IO weighted exporters' share in
client industries va

IO weighted exporters' share in
supplier industries va

MNEs' share in industry va

IO weighted MNEs' share in
client industries va

IO weighted MNEs' share in
supplier industries va

Observations

R-squared

Standard errors are clustered at industry-region level; spillover variables are lagged one period; regressions include firms' lagged productivity growth, age, import status and industry competition; industries are defined at Nace 2-digit level (IO table classification)

Productivity spillovers

	(1)	(2)	(3)	(4)
		<i>non exporters</i>		<i>never exporters</i>
	index	ACF	OLS	index
exporters' share in region va	0.130***			
	[0.038]			
MNEs' share in region va	-0.026			
	[0.017]			
exporters' share in industry va	-0.105			
	[0.147]			
IO weighted exporters' share in client industries va	-0.133			
	[0.123]			
IO weighted exporters' share in supplier industries va	-0.164			
	[0.177]			
MNEs' share in industry va	-0.145*			
	[0.083]			
IO weighted MNEs' share in client industries va	0.449***			
	[0.124]			
IO weighted MNEs' share in supplier industries va	-0.271*			
	[0.156]			
Observations	13053			
R-squared	0.061			

Standard errors are clustered at industry-region level; spillover variables are lagged one period; regressions include firms' lagged productivity growth, age, import status and industry competition; industries are defined at Nace 2-digit level (IO table classification)

Firm productivity increases with

- presence of exporting firms in the same NUTS 3 region
- supplying to MNEs

decreases with

- MNE presence in the industry
- buying inputs from MNEs

Productivity spillovers

	(1)	(2)	(3)	(4)
		<i>non exporters</i>		<i>never exporters</i>
	index	ACF	OLS	index
exporters' share in region va	0.130*** [0.038]	-0.028 [0.067]	0.099** [0.041]	0.092** [0.045]
MNEs' share in region va	-0.026 [0.017]	0.023 [0.029]	-0.017 [0.018]	-0.017 [0.020]
exporters' share in industry va	-0.105 [0.147]	0.014 [0.381]	-0.064 [0.185]	0.054 [0.182]
IO weighted exporters' share in client industries va	-0.133 [0.123]	0.140 [0.250]	0.015 [0.146]	-0.171 [0.150]
IO weighted exporters' share in supplier industries va	-0.164 [0.177]	0.494 [0.386]	0.255 [0.229]	-0.405* [0.216]
MNEs' share in industry va	-0.145* [0.083]	0.242 [0.285]	0.005 [0.131]	-0.278*** [0.107]
IO weighted MNEs' share in client industries va	0.449*** [0.124]	0.189 [0.299]	0.318* [0.172]	0.474*** [0.173]
IO weighted MNEs' share in supplier industries va	-0.271* [0.156]	-0.654* [0.355]	-0.664*** [0.197]	-0.069 [0.189]
Observations	13053	5690	14919	9003
R-squared	0.061	0.067	0.076	0.068

Standard errors are clustered at industry-region level; spillover variables are lagged one period; regressions include firms' lagged productivity growth, age, import status and industry competition; industries are defined at Nace 2-digit level (IO table classification)

Firm productivity increases with

- presence of exporting firms in the same NUTS 3 region
- supplying to MNEs

decreases with

- MNE presence in the industry
- buying inputs from MNEs

confirmed for never exporters

2. Decision to start exporting

- create dependent variable indicating the "new exporter" status on the basis of a firm's export status
- a firm is a new exporter in year t if it exports in t but was not exporting in $t-1$ and $t-2$

	1998	1999	2000	2001	2002	2003	2004	2005
<i>export status dummy</i>	0	0	0	0	1	1	1	1
<i>new exporter dummy</i>	.	.	0	0	1	.	.	.

- continuous exporters are not part of the estimation sample
- never-exporters are (~ face decision to start exporting or not)
- two year burn-in period reduces sample period to 2000-05
- less than two percent of starters, start more than a single export spell

Decision to start exporting firm-level

- Lagged productivity is the only robust determinant
- No robust spillovers detected

Decision to start exporting - destination

- In order to restrict the sample to computer-power feasible proportions we selected
 - combinations of NACE 5 digit manufacturing industries and destinations where we observe at least 1 export starter over the period 2000-2005
- 176 destinations in the estimation sample

Decision to start exporting - destination

	<i>NACE industry aggregation level</i>					
	(1) 2-digit	(2) 3-digit	(3) 4-digit	(4) 2-digit	(5) 3-digit	(6) 4-digit
lagged TFP (index, in logs)	0.873*** [0.057]	0.885*** [0.056]	0.891*** [0.056]	0.820*** [0.058]	0.820*** [0.058]	0.828*** [0.058]
border-dummy	-0.060 [0.080]	-0.087 [0.081]	-0.090 [0.082]	-0.103 [0.081]	-0.102 [0.081]	-0.109 [0.082]
# other destinations the firm exports to	0.075*** [0.003]	0.076*** [0.003]	0.075*** [0.003]	0.075*** [0.003]	0.077*** [0.003]	0.077*** [0.003]
# exporters to d, same industry-same region	0.194*** [0.025]	0.206*** [0.028]	0.232*** [0.049]			
# exporters to d, other industries-same region	0.041*** [0.013]	0.062*** [0.014]	0.066*** [0.014]			
# exporters to d, same industry-other regions	0.196*** [0.029]	0.102*** [0.024]	0.129*** [0.021]			
# starters to d, same industry-same region				0.098*** [0.038]	0.200*** [0.057]	0.221*** [0.050]
# starters to d, other industries-same region				-0.128*** [0.024]	-0.105*** [0.025]	-0.101*** [0.027]
# starters to d, same industry-other regions				-0.147*** [0.026]	-0.035 [0.027]	-0.036 [0.026]
# est. exporters to d, same industry-same region				0.170*** [0.031]	0.016 [0.039]	0.039 [0.060]
# est. exporters to d, other industries-same region				0.056*** [0.020]	0.081*** [0.020]	0.086*** [0.020]
# est. exporters to d, same industry-other regions				0.272*** [0.037]	0.286*** [0.037]	0.327*** [0.039]
Observations	1519020	1518235	1518991	1519020	1518235	1518991

$\log(1+\dots)_{t-1}$

Dependent variable is a "new exporter" dummy that equals 1 if a firm exports to destination d in year t while it did not in $t-1$ and $t-2$ (see text for full definition); standard errors are clustered at industry-region level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; spillover variables are count variables, they are transformed by adding 1 and taking logs, in the regressions they are lagged one period; spillover are defined at different Nace industry classifications as indicated in column headings; regressions include time, region, industry, and destination dummies; regions are defined at NUTS 3 level

Decision to start exporting - destination

- lagged tfp and lagged # other destinations are important
- positive and significant spillovers from exporters in
 - same region-same industry
 - especially other starters
 - same region-other industries
 - established exporters
 - other regions-same industry
 - established exporters

Decision to start exporting product-destination

- Restrict sample to computer-power feasible proportions:
 - combinations of destinations and 4 digits product categories that were exported by at least ten firms on average over the period 1998-2005
 - then further reduced the sample by selecting combinations of NACE 5 digits manufacturing industries, destinations, and products where we observe at least 1 export starter over the period 2000-2005
- 56 destinations and 266 products
 - *due to the tougher restrictions the number of destinations is considerably reduced in comparison to the analysis at the destination-level, these are the more mature markets*
- spillovers from exporters in other industries not considered since products are industry specific

Decision to start exporting - product-destination

	(1)	(2)	(3)	(4)	(5)	(6)
<i>NACE industry aggregation level</i>	2-digit	3-digit	4-digit	2-digit	3-digit	4-digit
lagged TFP-level (index, in logs)	0.814*** [0.034]	0.814*** [0.034]	0.813*** [0.034]	0.814*** [0.034]	0.810*** [0.035]	0.812*** [0.035]
border-dummy	0.139*** [0.047]	0.140*** [0.047]	0.140*** [0.047]	0.138*** [0.047]	0.140*** [0.047]	0.139*** [0.047]
# other products exported to the same destination	0.866*** [0.023]	0.866*** [0.023]	0.866*** [0.023]	0.867*** [0.023]	0.867*** [0.023]	0.867*** [0.023]
# other destinations same product is exported to	1.009*** [0.042]	1.008*** [0.042]	1.008*** [0.042]	1.010*** [0.042]	1.008*** [0.042]	1.006*** [0.042]
# exporters of p to d, same industry-same region	0.176*** [0.028]	0.211*** [0.033]	0.196*** [0.037]			
# exporters of p to d, same industry-other regions	0.018 [0.022]	-0.009 [0.022]	-0.075*** [0.022]			
# starters of p to d, same industry-same region				0.077* [0.045]	0.087* [0.052]	0.030 [0.056]
# starters of p to d, same industry-other regions				-0.013 [0.024]	-0.049* [0.028]	-0.166*** [0.032]
# est. exporters of p to d, same industry-same region				0.210*** [0.033]	0.260*** [0.039]	0.282*** [0.044]
# est. exporters of p to d, same industry-other regions				0.063** [0.026]	0.041 [0.026]	-0.001 [0.026]
Observations	1685751	1685751	1685751	1683575	1675201	1670601

Dependent variable is a "new exporter" dummy that equals 1 if a firm exports product p to destination d in year t while it did not in $t-1$ and $t-2$ (see text for full definition); standard errors are clustered at industry-region level; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; spillover variables are count variables, they are transformed by adding 1 and taking logs, in the regressions they are lagged one period; spillover are defined at different Nace industry classifications as indicated in column headings; regressions include time, region, industry, destination, and product dummies; industries are defined at Nace levels indicated in column headings; regions are defined at NUTS 3 level

Decision to start exporting product-destination

- lagged tfp and border dummy are significant
- lagged # other destination-same product and same destination-other product are important
 - importance of within-firm learning from past export experience with other products and other destination markets
- positive and significant spillovers from exporters in same region-same industry
 - established exporters
- no spillovers from exporters in other region-same industry

Conclusions

- spillovers from the internationalisation behaviour of other firms in Belgian manufacturing in 1998-2005 on the decision to start exporting
 - Two possible channels
 - firm-level productivity
 - perceived threshold
 - Economic and geographic distance
 - in the same region
 - in the same, upstream or downstream industry

Conclusions

- productivity spillovers
 - increase with
 - presence of exporting firms in the same NUTS 3 region
 - supplying MNEs
 - indications of negative within-industry spillover effects
- threshold spillovers on the decision to start exporting
 - firm-level:
 - merely driven by productivity, not by spillovers
 - destination and the product-destination levels:
 - important regional spillovers
- both channels matter

To do

- Put two and two together
 - How do the channels relate?
- Marginal effects-type exercise