

# FDI and Superstar Spillovers: Evidence from Firm-to-Firm Transactions

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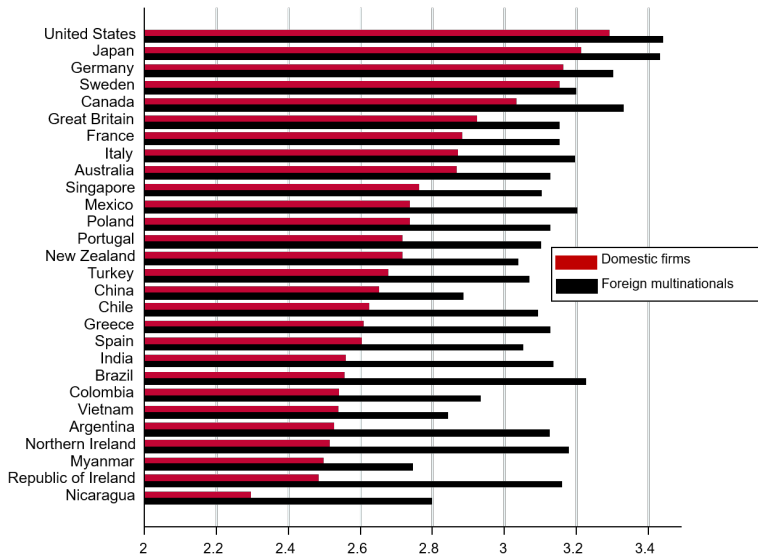


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# Introduction

- Governments often encourage inward Foreign Direct Investment (FDI) by multinationals
  - FDI firms have well-known advantages of higher productivity, pay, technologies, management, . . . .
  - Also see this when looking at takeovers (with lag & much variance). Example: Bloom, Sadun & Van Reenen (2013, AER) on management & IT productivity

## DIRECT EFFECT: MULTINATIONALS SEEM TO TRANSPLANT BETTER MANAGEMENT PRACTICES WHEREVER THEY LOCATE



Source: Bloom, Sadun and Van Reenen (2017), World Management Survey

Management score

# Introduction

- Policy rationale assumes FDI firms also generate “spillover” benefits to local firms
- **Case studies often positive:** Iacovone, Javorcik, Keller & Tybout (2015) on Wal-Mex; Sutton (2004) on Toyota; Bloom, Van Reenen & Melvin (2013) on Gokaldas/Nike



TOYOTA



# Introduction

- **General Econometric studies mixed:** e.g. Aitken & Harrison (1999) find negative effects (horizontal FDI); Javorcik (2004) find positive effects (from downstream FDI)
  - Use industry level data on MNE exposure. But do benefits require having direct relationship with MNE (like case studies suggest)?
  - Alfaro-Urena, Manelici & Vasquez (2019) use firm-to-firm sales from Costa-Rica. Positive TFP effects in selling to MNE (event study).
- Does this result generalize to richer countries? Is it FDI or any “superstar firm” (e.g. heavy exporter and/or very large domestic firms)? If so, what is the mechanism?

# Summary of this paper

- Use B2B firm-level panel data 2002-2014 on universe of Belgian firms.
  - Diff-In-Diff Event studies find positive TFP effects for firms who start selling to a FDI firm (~8% after 4+ years). Also increase in outputs, inputs (intermediates, labor, capital), international trade, etc.
- We **also** find similar performance when start selling to heavy exporters and very large firms (even if these are not globally engaged)
- By contrast, no effect from starting to sell to a non-“superstar” firm (e.g. smaller firms) & relationship robust to controls for unobserved TFP shocks
- Mechanisms:
  - **Tech transfer**: treatment effects particularly large when a superstar firm intensive in R&D, ICT or human capital
  - **Match making**: Number of buyers increases, but particularly to other firms in the superstar firms’ network
- Suggests benefits of high productivity “anchor” firms goes beyond FDI

## Some Existing Literature

- **Higher productivity of FDI firms:** Bloom, Sadun & Van Reenen (2013); Helpman et al. (2004); Chaney (2014), Antràs and Chor (2013), Eaton et al. (2011), Antràs et al. (2017), Lim (2018), Dhyne et al. (2021).
- **FDI Spillovers:** Alfaro-Urena, Manelici & Vasquez (2019), Aitken & Harrison (1999); Javorcik (2004); Alvarez & Lopez (2008), Keller & Yeaple (2009), Setzler and Tintelnot (2021), Keller (2021)
- **Impact of large firm entry:** “Million Dollar Plants” – Greenstone, Hornbeck, and Moretti (2010); Bloom et al (2019)
- **Production Networks:** Acemoglu et al. (2012, 2017); Liu (2019); Acemoglu & Azar (2020); Atalay et al. (2011); Iyoha (2021); Kikkawa et al (2019); Bernard and Moxnes (2018); Bernard et al (2019)
- **Rise of Superstar Firms:** Furman and Orszag (2018); Autor et al (2020); Bajgar et al (2018); Philippon (2019); de Loecker et al (2020)

# Outline

Data

Econometric Strategy

Baseline Results

Extensions

Mechanisms

Superstar Spillover Model



# Data

- National Bank of Belgium (NBB) B2B Transaction dataset (Dhyne et al, 2015) – value of sales between all buyer-seller relationships in Belgium from 2002 to 2014 based on VAT declarations (all  $> \text{€}250$ )
- Company accounts from NBB Central Balance Sheet office (all incorporated firms) – sales, labor, intermediate inputs, capital
- NBB Foreign Direct Investment (FDI) survey
- Intrastat trade survey (intra-EU) & customs trade data (extra EU)
- TFP measurement – Baseline is Wooldridge (2009) but compare with Ghandi et al (2020), Collard-Wexler & de Loecker (2020), ACF, OP, etc.

Summary statistics

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# Empirical Strategy

- Event study Diff-in-Diffs
- Define Superstar firm  $j$  in three separate ways (& look at each)
  - Foreign multinational (>10% foreign owned, inward FDI)
  - Exporter (non-wholesalers with >10% of sales exported)
  - Large Firm (top 0.1% of the sales distribution)
- Examine a firm  $i$  who starts selling to superstar firm  $j$  at time  $t$ 
  - focus on “serious relationships”: firm  $i$  must sell at least 10% of its sales to the superstar:

$$y_{i,t} = \sum_{t=-5}^5 \beta_t I_{i,t} + \delta_i + \gamma_{s,t} + \epsilon_{i,t}$$

- $I_{i,t} = 1$  when firm  $i$  starts selling to superstar, otherwise zero (so  $t = 5$  indicates 4+ years after event);  $\delta_i$  = firm FE;  $\gamma_{s,t}$  = 4 digit NACE (648 industries) by year FE

# Outline

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Econometric Strategy

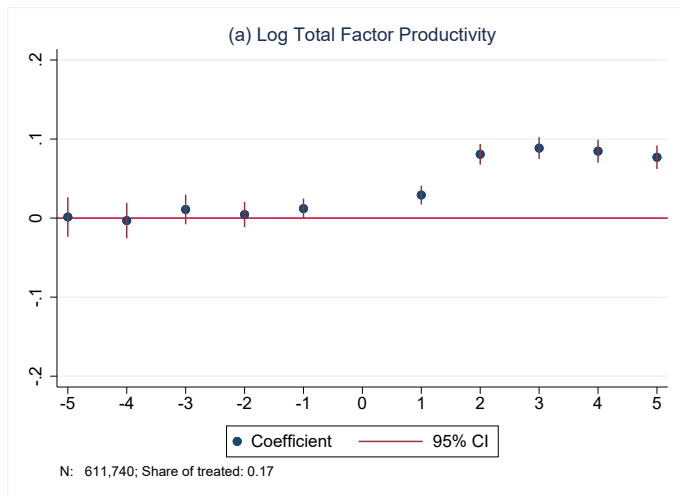
Baseline Results

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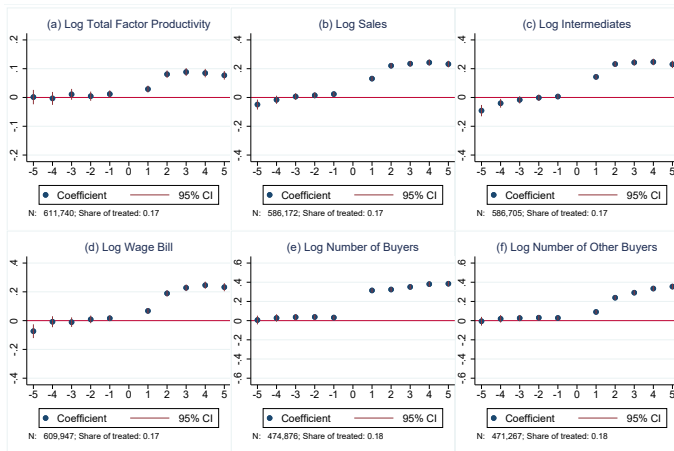
Superstar Spillover Model

# Selling to FDI firm increases TFP by ~8% after 4 years



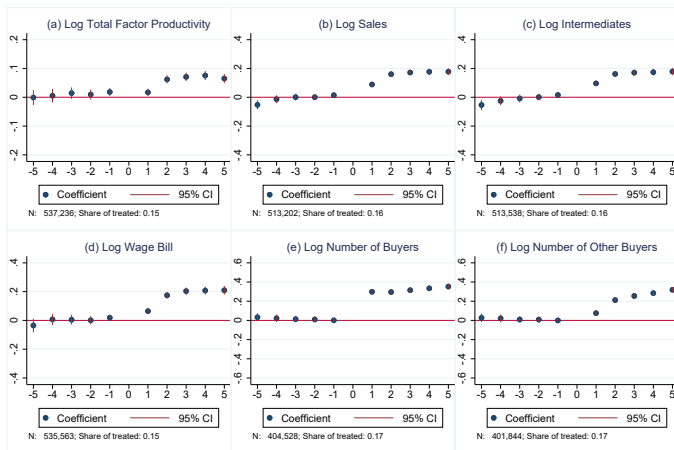
**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$  (i.e. 4+ years after event). Regressions include 4-digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

# Selling to FDI firm also increases sales, intermediates, labor & no. of business buyers



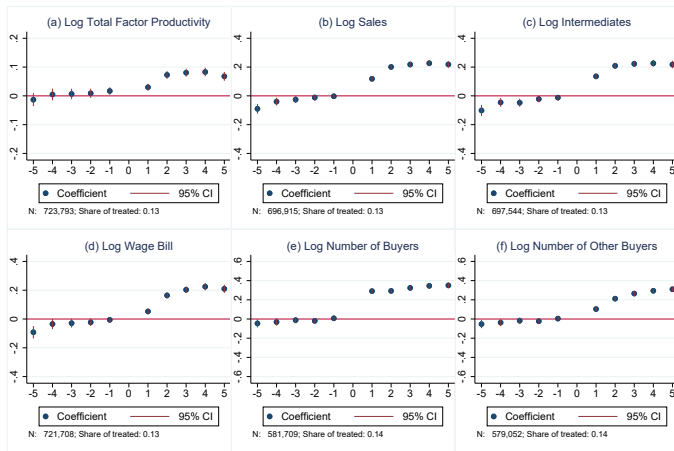
**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

# Selling to a “Serious exporter” also increases TFP, sales, intermediate inputs, labor & #Buyers



**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method. Serious exporter is a (non-wholesale) firm with an export to sales ratio of 10% or more.

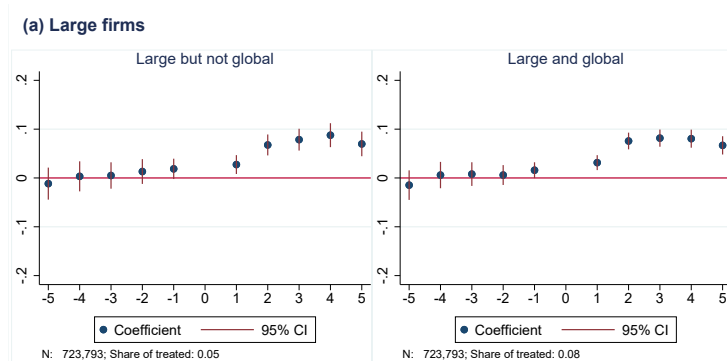
# BUT selling to a Very Large Firm also increases TFP, sales, intermediate inputs, labor & #Buyers



**Notes:** Two-thirds of large firms are also FDI and/or serious exporters.  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method. “Very large” is defined as being in the top 0.1% of the sales distribution ( $>€199m$ )



Large domestic firms give just as big a TFP pay-off as large global firms.



**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

Examples

Large interactions

Outward FDI

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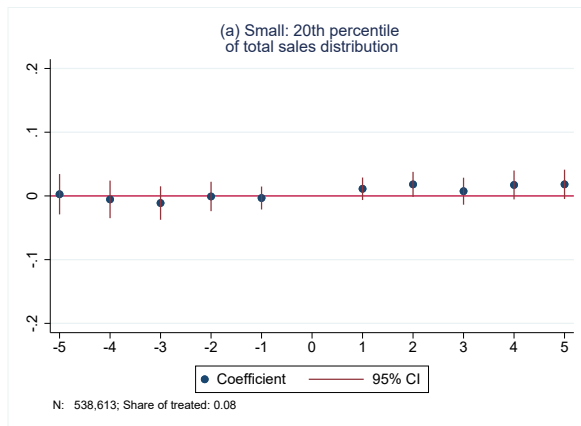
Mechanisms

Superstar Spillover Model

# Extensions

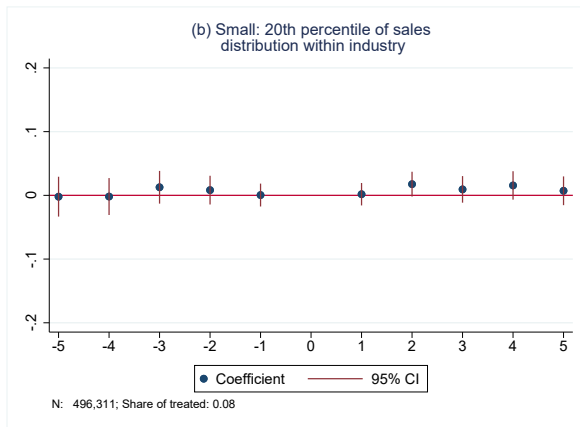
- Placebos on non-Superstar Firms
- Matched Controls: Nearest Neighbor
- Endogeneity of superstar relationships: control functions
- Alternative TFP measurement
- Other Robustness

# No TFP effect from starting to sell to non-superstar firms: Small Firms



**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

# No TFP effect from starting to sell to non-superstar firms: Small Firm (within industry)



**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

# Matching: Nearest Neighbor

	Log Total Factor Productivity (1)	Log Total Sales (2)	Log Total Inputs (3)	Log Wage Bill (4)	Log Number of Buyers (5)	Log Number of Other Buyers (6)
<b>FDI</b>						
t1: Year of event	0.058*** (0.006)	0.176*** (0.008)	0.190*** (0.008)	0.182*** (0.010)	0.330*** (0.011)	0.113*** (0.011)
1 or more years after event	0.080*** (0.007)	0.218*** (0.010)	0.231*** (0.011)	0.232*** (0.013)	0.318*** (0.013)	0.261*** (0.013)
Observations	125,983	124,979	125,140	125,666	99,280	96,923
Adjusted $R^2$	0.640	0.857	0.871	0.817	0.780	0.778
<b>Exporters</b>						
t1: Year of event	0.041*** (0.007)	0.145*** (0.008)	0.141*** (0.008)	0.162*** (0.011)	0.325*** (0.011)	0.102*** (0.012)
1 or more years after event	0.066*** (0.007)	0.179*** (0.010)	0.176*** (0.011)	0.214*** (0.014)	0.305*** (0.013)	0.245*** (0.013)
Observations	102,102	101,397	101,473	101,835	80,065	78,387
Adjusted $R^2$	0.632	0.847	0.861	0.809	0.738	0.734
<b>Large</b>						
t1: Year of event	0.057*** (0.006)	0.187*** (0.008)	0.200*** (0.009)	0.175*** (0.010)	0.333*** (0.011)	0.147*** (0.011)
1 or more years after event	0.069*** (0.007)	0.227*** (0.010)	0.241*** (0.011)	0.222*** (0.013)	0.312*** (0.013)	0.252*** (0.013)
Observations	120,658	119,684	119,814	120,392	99,199	97,420
Adjusted $R^2$	0.654	0.871	0.879	0.840	0.813	0.811

**Notes:** We match on the basis of the pre-treated average values of TFP, sales, inputs and average wages. Each treated firm is matched to exactly one control firm.

# Correlated TFP shocks: A Control Function Approach

- Consider the two-period case:

$$\Delta TFP_{i,t} = \beta \Delta I_{i,j,t} + \gamma_s + \Delta \epsilon_{i,t}$$

- If TFP shocks to firm  $i$  increase chances of forming a superstar relationship,  $E(\Delta I_{i,j,t} \Delta \epsilon_{i,t}) > 0$  and  $\hat{\beta} > \beta$
- Write sales growth between firm  $i$  and  $j$  (cf. Amiti & Weinstein, 2018 - allows for new relationships):

$$\Delta Y_{i,j,t} / Y_{i,j,t} = \mu_{it} + \pi_{jt} + u_{ijt}$$

- We recover firm  $i$  specific shock  $\mu_{it}$  and construct control function  $Control_{it} = \hat{\mu}_{it} Y_{it-1}$  and condition on  $f(Control_{it})$  in main equation
- Implies identification effectively from shocks to firm  $j$  (not  $i$ )
- Allows for selection on permanent component of firm  $i$  & match-specific  $ij$  productivity, & shocks to firm  $i$  ( $\mu_{it}$ )

# Results from Control Function Approach (emp $\geq 10$ sample)

Dep. var.: Log TFP	FDI			Exporters			Large		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 or more years after event	0.070*** (0.017)	0.059*** (0.021)	0.046** (0.021)	0.091*** (0.022)	0.074*** (0.027)	0.071*** (0.027)	0.067*** (0.015)	0.056*** (0.019)	0.046** (0.019)
Control <sub>it</sub>			0.027*** (0.004)			0.029*** (0.004)			0.026*** (0.003)
Observations	26,092	16,680	16,680	23,689	14,522	14,522	37,736	25,690	25,690
Adjusted $R^2$	0.749	0.775	0.777	0.740	0.772	0.775	0.741	0.768	0.770

**Notes:** TFP estimated using Wooldridge (2009) methodology. Regressions include 4-digit NACE industry-year and firm fixed effects. SEs clustered at firm level. All regressions include indicator for the year of the event (t1).



# Alternative TFP measures

	WR (1)	WR with wagebill (2)	ACF (3)	ACF with translog (4)	GNR (5)	OP (6)	CWDL (7)	OLS (8)
<b>FDI</b>								
t1: Year of event	0.025*** (0.006)	0.035*** (0.006)	0.001 (0.006)	0.060*** (0.007)	0.025*** (0.004)	0.015** (0.006)	0.014** (0.006)	0.002 (0.006)
1 or more years after event	0.077*** (0.006)	0.098*** (0.006)	0.039*** (0.006)	0.168*** (0.008)	0.046*** (0.004)	0.059*** (0.006)	0.067*** (0.006)	0.034*** (0.006)
Observations	611,740	613,615	609,820	614,396	581,735	610,362	611,188	609,047
Adjusted $R^2$	0.647	0.679	0.606	0.795	0.796	0.611	0.615	0.541
<b>Exporters</b>								
t1: Year of event	0.010 (0.006)	0.014** (0.006)	-0.006 (0.007)	0.043*** (0.008)	0.014*** (0.004)	0.003 (0.006)	-0.005 (0.007)	-0.010 (0.006)
1 or more years after event	0.059*** (0.006)	0.073*** (0.006)	0.029*** (0.006)	0.144*** (0.008)	0.033*** (0.004)	0.044*** (0.006)	0.046*** (0.007)	0.021*** (0.006)
Observations	537,236	538,823	535,728	539,469	509,097	536,068	536,727	535,093
Adjusted $R^2$	0.644	0.680	0.605	0.798	0.762	0.606	0.609	0.534
<b>Large</b>								
t1: Year of event	0.025*** (0.006)	0.035*** (0.006)	0.008 (0.006)	0.065*** (0.007)	0.034*** (0.004)	0.019*** (0.006)	0.013** (0.006)	0.006 (0.006)
1 or more years after event	0.069*** (0.006)	0.088*** (0.006)	0.036*** (0.006)	0.159*** (0.008)	0.051*** (0.004)	0.054*** (0.006)	0.053*** (0.006)	0.027*** (0.006)
Observations	723,793	725,826	721,576	726,859	692,643	722,290	723,063	720,935
Adjusted $R^2$	0.649	0.682	0.606	0.799	0.795	0.611	0.616	0.542

**Notes:** WR = Wooldridge (2009). ACF = Akerberg, Caves, and Frazer (2015). GNR = Gandhi, Navarro, and Rivers (2020). OP = Olley and Pakes (1996). CWDL = Collard-Wexler and De Loecker (2020).

## Other Robustness

- Thresholds for “serious” relationships
- Balanced Panel
- Thresholds for FDI ownership, export intensity

Table

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**Mechanisms**

Superstar Spillover Model

# Mechanism I: Tech transfer – impact on TFP much larger for high tech/high skill superstar firms

Dependent variable:	Log TFP		
	RD (1)	ICT (2)	Skill labor (3)
<b>FDI</b>			
1 or more years after event	0.072*** (0.006)	0.068*** (0.007)	0.065*** (0.006)
x indicator variable	0.030*** (0.011)	0.028*** (0.009)	0.040*** (0.010)
Observations	611,740	611,740	611,740
Adjusted $R^2$	0.647	0.647	0.647
<b>Exporters</b>			
1 or more years after event	0.056*** (0.006)	0.056*** (0.007)	0.060*** (0.008)
x indicator variable	0.022* (0.013)	0.010 (0.010)	-0.001 (0.010)
Observations	537,236	537,236	537,236
Adjusted $R^2$	0.644	0.644	0.644
<b>Large</b>			
1 or more years after event	0.060*** (0.006)	0.062*** (0.007)	0.059*** (0.006)
x indicator variable	0.065*** (0.012)	0.019** (0.009)	0.041*** (0.011)
Observations	723,793	723,793	723,793
Adjusted $R^2$	0.649	0.649	0.649

**Notes:** (1) top decile of R&D/Sales; (2) top quartile of ICT spend/Purchases, (3) top quartile of share of workers with college degree. All regressions include 4-digit industry-year and firm FE.

## Mechanism II: Dating Agency – impact on buyers within the superstar's network is strong

Dependent variable:	Number of buyers in network (1)	Number of buyers outside network (2)
<b>FDI</b>		
1 or more years after event	1.14*** (0.22)	3.74*** (0.44)
Observations	471,267	471,267
Adjusted $R^2$	0.93	0.84
<b>Exporters</b>		
1 or more years after event	0.33*** (0.05)	2.84*** (0.20)
Observations	396,418	396,418
Adjusted $R^2$	0.90	0.85
<b>Large</b>		
1 or more years after event	2.21*** (0.59)	4.74*** (0.64)
Observations	579,052	579,052
Adjusted $R^2$	0.80	0.88

**Notes:** Mean of Number of buyers in Superstar's network is 0.62 for FDI; 0.37 for Exporters; 0.73 for Large. Mean Number of buyers outside network 12.6 for FDI; 8.8 for exporters; and 15.2 for Large.

# Larger Treatment effects for Young Firms

	Log Total Factor Productivity (1)	Log Total Sales (2)	Log Total Inputs (3)	Log Wage Bill (4)	Log Number of Buyers (5)	Log Number of Buyers In Network (6)	Log Number of Buyers Outside Network (7)
<b>FDI</b>							
1 or more years after event	0.068*** (0.006)	0.222*** (0.009)	0.240*** (0.010)	0.215*** (0.012)	0.339*** (0.012)	0.100*** (0.007)	0.226*** (0.010)
x Young	0.059*** (0.006)	0.029*** (0.008)	0.026*** (0.009)	0.049*** (0.011)	0.002 (0.009)	0.014** (0.006)	-0.063*** (0.009)
Observations	611,702	586,134	586,667	609,909	474,849	474,849	474,849
Adjusted $R^2$	0.647	0.855	0.873	0.807	0.842	0.877	0.856
<b>Exporters</b>							
1 or more years after event	0.053*** (0.006)	0.170*** (0.009)	0.173*** (0.010)	0.189*** (0.012)	0.318*** (0.012)	0.062*** (0.005)	0.243*** (0.010)
x Young	0.043*** (0.007)	0.015* (0.008)	0.006 (0.009)	0.042*** (0.012)	-0.000 (0.010)	0.009 (0.006)	-0.039*** (0.009)
Observations	537,195	513,161	513,497	535,522	404,493	404,493	404,493
Adjusted $R^2$	0.644	0.844	0.865	0.809	0.806	0.819	0.823
<b>Large</b>							
1 or more years after event	0.061*** (0.006)	0.225*** (0.009)	0.236*** (0.011)	0.208*** (0.012)	0.335*** (0.012)	0.119*** (0.008)	0.227*** (0.010)
x Young	0.056*** (0.007)	0.031*** (0.008)	0.032*** (0.009)	0.061*** (0.012)	-0.003 (0.010)	0.022*** (0.007)	-0.065*** (0.009)
Observations	723,753	696,875	697,504	721,668	581,678	581,678	581,678
Adjusted $R^2$	0.649	0.860	0.877	0.814	0.851	0.888	0.864

**Notes:** The Young indicator equals one if the age of the firm is less than or equal to five years.

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# Set Up

- Stage 1: firms ( $i = 1, \dots, N$ ) enter & draw TFP ( $\phi_i$ ) from distribution,  $\bar{F}(\cdot)$
- Stage 2: A Superstar Firm (SS) enters, forms contract with 1 firm (via procurement auction)
  - In long-run, marginal cost  $c_i$  is reduced to  $\gamma c_i$  ( $\gamma < 1$ ) from this relationship
- Stage 3: Firm  $i$ 's sell on spot market under monopolistic competition
  - with production  $q_i = \phi_i G(x_i)$ ;  $x$  = competitively supplied input vector



## Output market (Stage 3)

- Price cost markup

$$\frac{p_i - c_i}{p_i} = \frac{1}{\eta} \quad (1)$$

$\eta, \eta > 1$ , = elasticity of consumer demand;  $p_i$  = firm's product price.

- Profits

$$\pi_i = \tilde{\eta} \left( \frac{1}{c_i} \right)^{\eta-1} \quad (2)$$

$$\tilde{\eta} = \eta^{-\eta} (\eta - 1)^{\eta-1} > 0.$$

## Superstar Relationship (Stage 2)

- First price sealed bid auction.  $\bar{q}^{SS} = SS$  contract;  $I = \#Bidders$ ; Revenue from winning the auction is  $Z_i$ .
- Opportunity costs,  $\sigma(\phi_i) = \pi_{0i}^{SS} - \pi_{1i}^{SS}$  profit difference in spot market of *not* having a SS relationship ( $\pi_{0i}^{SS}$ ) vs. having one ( $\pi_{1i}^{SS}$ )
- Bid solves (usual trade-off):

$$\max_{Z_i} (Z_i - \sigma_i) Pr(D_i = 1 | Z_i) \quad (3)$$

- A firm with productivity  $\phi_i$  bids  $s_i$  (Milgrom and Weber, 1982):

$$s_i = \sigma_i \delta_i; \text{ where } \delta_i = 1 + \frac{\int_{\sigma_i}^{\bar{\sigma}} [1 - F(\bar{\sigma})]^{I-1} d\bar{\sigma}}{\sigma_i [1 - F(\sigma_i)]^{I-1}} \quad (4)$$

- $\delta_i \geq 1$  is **markup over op. cost**, decreases with  $\#Bidders$  ( $I$ ):
- This defines unique symmetric equilibrium. Winner:

$$D_i = 1 \{s(\phi_i) < s(\phi_{i'})\}, \forall i' \neq i \text{ such that } i, i' \in \mathcal{H}$$

- Supplies SS and obtains lower costs,  $\gamma c_i$

# Implications


- Impact on seller of forming a relationship with a SS firm:
  - Increases TFP
  - Increases output (both to SS and non-SS)
  - Increases inputs
- The firms who form relationships with SS will tend to be
  - Higher TFP firms
  - Larger firms


# Conclusions

- Forming a relationship with a superstar firm improves outcomes (TFP, outputs, inputs & survival)
  - Non-trivial magnitudes
  - Likely through both transfer of know-how & match making
- But does not have to be a MNE or globally engaged firm. Local superstars also bring benefits
- Does not rule out more general spillovers (these are absorbed by industry by year effects)
- Policy: barriers to firms to grow to become future superstar could be costly (misallocation). e.g. Aghion, Bergeaud & Van Reenen (2021) on regulations
- Next Steps: quantification; modeling dating agency

# Examples of Large Domestic Firms

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Comfort Energy has 50 years of experience in the fuel oil sector. Since 2011, we have been the largest independent distributor of quality oil in Belgium. With 19 branches across the country, we are always available and close to you. Our extensive network of local partners ensures a fast and personal service. If you need oil, you can always count on Comfort Energy, the coziest oil supplier in the country!



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## Who are we?

We mainly ensure that our customers receive their orders, which they have placed before 11 a.m., the next day (based on the established rounds). Every customer can count on a complete product range, smooth logistics and organization, solid commercial services and a set of powerful marketing tools.



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# Examples of Large Domestic Firms

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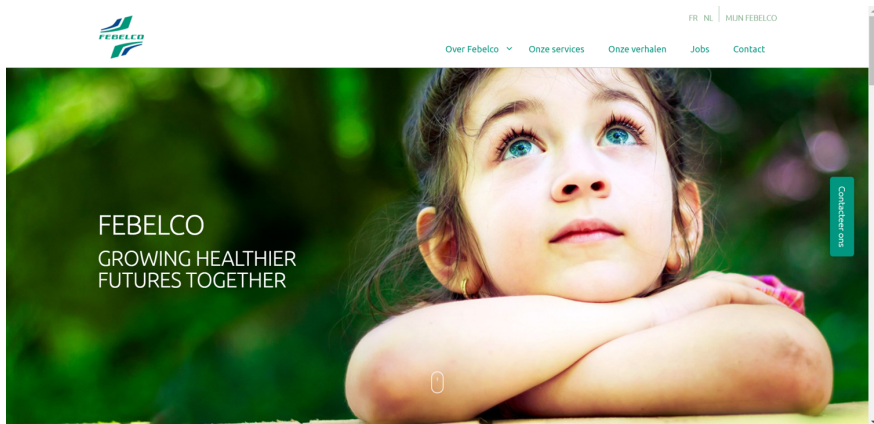
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More than a thousand local growers  
bring more flavor to your plate every day

The fresher, the better. This has been the surprisingly simple principle of BelOrta since 1905. Meanwhile, every day more than a thousand local growers grow the tastiest vegetables and the juiciest fruit. Then they land off the field directly onto your board.  
Crisp fresh, full of flavor and surprisingly enjoyable for everyone at the table.

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# Examples of Large Domestic Firms



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# Examples of Large Domestic Firms

The screenshot displays the Hubo website's homepage. At the top, there is a navigation bar with links for 'Hubo Newsletter', 'Bonus Card', 'Vacancies', and 'NL'. Below this is a search bar with the placeholder text 'What are you looking for?' and a 'To search' button. To the right of the search bar are links for 'To register' and 'shopping cart'. A dark blue navigation bar contains links for 'Product Range', 'Promotions', 'outlet', and 'Help and advice', along with a 'Find your store' button. The main content area features a large red banner with the text 'Ontdek onze HERFSTPROMO'S!!!' and an image of an open promotional folder. Below the banner is a link '> Bekijk hier onze nieuwe folder'. To the right of the banner is a blue section titled 'BEDANKT voor jullie stem!' featuring a grid of photos of Hubo staff members. Below this grid is a 'KORTINGBON €5,-' coupon with a barcode and a link '> Download je bon!'. At the bottom of the page, there are three category-specific promotional banners: 'Tuinhout', 'Levi's Herfstpromo', and 'Verwarmingspromoties'.

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Hubo

What are you looking for?

To search

To register

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Product Range Promotions outlet Help and advice

Find your store

Ontdek onze **HERFSTPROMO'S!!!**

> Bekijk hier onze nieuwe folder

BEDANKT voor jullie stem!

Koop nu met korting bij de BESTE doe-het-zelfketen!

Hubo KORTINGBON €5,-

> Download je bon!

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# Robustness Additional Outcomes (FDI)

	Firm survival (1)	Log employment (2)	Log tangible fixed assets (3)	Export value (4)	Export dummy (5)	Export varieties (6)	Import value (7)	Import dummy (8)	Import varieties (9)
<b>FDI</b>									
t1: Year of event	0.046*** (0.002)	0.078*** (0.009)	0.104*** (0.013)	-0.026 (0.023)	0.004** (0.002)	0.019 (0.072)	-0.054* (0.031)	0.010*** (0.002)	-0.023 (0.131)
1 or more years after event	0.046*** (0.003)	0.201*** (0.010)	0.164*** (0.015)	0.063*** (0.015)	0.011*** (0.002)	0.291*** (0.091)	0.052*** (0.018)	0.025*** (0.002)	0.421*** (0.161)
Observations	1,128,950	606,260	610,328	611,740	611,740	611,740	611,740	611,740	611,740
Adjusted $R^2$	0.548	0.799	0.806	0.903	0.677	0.867	0.895	0.642	0.746

**Notes:** These specifications are the same as in the baseline results except with a different outcome variable as the dependent variable. All regressions include 4-digit NACE industry-year and firm fixed effects. Standard errors are clustered at the firm level. The mean of the firm exit variable is 0.886.

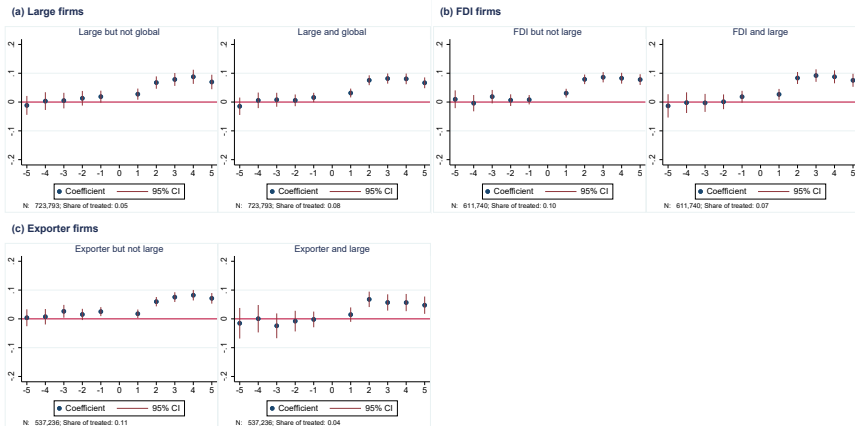
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# Robustness Additional Outcomes

	Firm survival (1)	Log employment (2)	Log tangible fixed assets (3)	Export value (4)	Export dummy (5)	Export varieties (6)	Import value (7)	Import dummy (8)	Import varieties (9)
<b>FDI</b>									
t1: Year of event	0.046*** (0.002)	0.078*** (0.009)	0.104*** (0.013)	-0.026 (0.023)	0.004** (0.002)	0.019 (0.072)	-0.054* (0.031)	0.010*** (0.002)	-0.023 (0.131)
1 or more years after event	0.046*** (0.003)	0.201*** (0.010)	0.164*** (0.015)	0.063*** (0.015)	0.011*** (0.002)	0.291*** (0.091)	0.052*** (0.018)	0.025*** (0.002)	0.421*** (0.161)
Observations	1,128,950	606,260	610,328	611,740	611,740	611,740	611,740	611,740	611,740
Adjusted $R^2$	0.548	0.799	0.806	0.903	0.677	0.867	0.895	0.642	0.746
<b>Exporters</b>									
t1: Year of event	0.048*** (0.002)	0.055*** (0.010)	0.120*** (0.014)	-0.001 (0.001)	0.001 (0.002)	-0.142 (0.201)	0.002 (0.005)	0.004* (0.002)	0.156 (0.115)
1 or more years after event	0.061*** (0.003)	0.162*** (0.011)	0.175*** (0.017)	0.004 (0.004)	0.005*** (0.002)	-0.442 (0.580)	0.016** (0.006)	0.013*** (0.002)	0.335*** (0.122)
Observations	995,232	532,126	536,024	537,236	537,236	537,236	537,236	537,236	537,236
Adjusted $R^2$	0.550	0.801	0.805	0.622	0.515	0.319	0.728	0.536	0.738
<b>Large</b>									
t1: Year of event	0.046*** (0.002)	0.072*** (0.009)	0.131*** (0.013)	0.040** (0.016)	0.007*** (0.002)	0.244** (0.119)	0.032** (0.016)	0.011*** (0.003)	0.130 (0.125)
1 or more years after event	0.051*** (0.003)	0.190*** (0.010)	0.197*** (0.016)	0.116*** (0.022)	0.014*** (0.002)	0.464** (0.191)	0.119*** (0.023)	0.024*** (0.003)	0.680*** (0.171)
Observations	1,323,549	717,441	722,141	723,793	723,793	723,793	723,793	723,793	723,793
Adjusted $R^2$	0.549	0.806	0.803	0.826	0.684	0.752	0.784	0.663	0.767

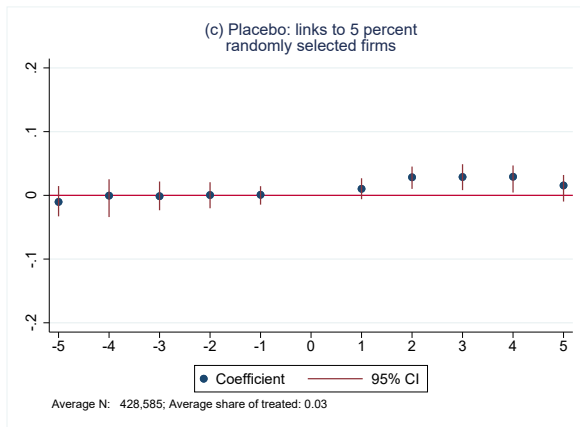
**Notes:** These specifications are the same as in the baseline results except with a different outcome variable as the dependent variable.

# TFP gains from selling to Large vs Global Firms



**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

# No TFP effect from starting to sell to non-superstar firms: Random firm partners



**Notes:**  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

# Summary Statistics–Sample and Cleaning

Sample cleaning

Sample	Average annual		Share of sample dropped	
	N firms (thousands)	Employment (millions)	N firms	Employment
Full sample NBB	368.19	1.78		
Drop missing initial emp	364.50	1.78	1.0	
Drop firms not in B2B	286.46	1.72	21.4	3.6
Drop firms with no TFP measure	170.40	1.49	40.5	13.1

Summary statistics

Variable	P5	P50	P95	Mean	SD
$\ln(TFP_{WR})$	-1.43	-0.25	0.78	-0.28	0.67
$\Delta \ln(TFP_{WR})$	-0.60	0.02	0.62	0.02	0.40
Sales (millions euros)	0.08	0.60	11.01	4.40	114.39
Inputs (millions euros)	0.03	0.37	8.86	3.77	127.88
Wage bill (millions euros)	0.01	0.09	1.69	0.61	6.53
# buyers (hundreds)	0.01	0.15	2.54	0.66	2.85
Employment (FTE)	0.25	2.80	36.70	12.39	124.54
Total fixed assets (millions euros)	0.00	0.10	1.75	0.87	17.40
Export value (millions euros)	0.00	0.00	0.00	0.85	27.83
Export dummy	0.00	0.00	1.00	0.12	0.32
Export varieties	0.00	0.00	10.00	5.16	75.73
Import value (millions euros)	0.00	0.00	1.36	0.80	31.15
Import dummy	0.00	0.00	1.00	0.17	0.38
Import varieties	0.00	0.00	36.00	6.94	39.49

# Summary Statistics by Treatment Type

Total N	491,155		
Treatment type	FDI	FX	Large
N	2,841	4,260	491
Share of firms	0.58	0.87	0.10
Share of employment	25.11	20.12	24.06
FDI intensity	71.79		
Export intensity (average)		45.51	
<b>Out of treated, share of:</b>			
FDI		13.38	57.84
Large	10.00	3.71	
FX	20.06		32.18
FDI or FX			66.40
Large or FX	25.98		
Large or FDI		14.37	
High TFP (1 percentile)	14.75	4.08	45.42
RD top-10 percentile cutoff	0.271	1.394	0.924
ICT top-25 percentile cutoff	2.072	1.203	2.196
Skill labor top-25 percentile cutoff	68.044	26.376	68.205
<b>Networks</b>			
Median number of buyers	32	37	132
Mean number of buyers	499	115	1,588
Mean number in network as share of all potential buyers	0.024	0.008	0.139
Median sales (million euros)	0.107	0.042	0.384
Mean sales (million euros)	1.104	0.277	3.438

# Summary Statistics Pre- and Post-Treatment

Variable	FDI			Exporters			Large		
	Pre	Post	Control	Pre	Post	Control	Pre	Post	Control
$\ln(TFP_{WR})$	0.082 (0.669)	0.123 (0.666)	-0.022 (0.670)	0.051 (0.645)	0.111 (0.645)	-0.016 (0.671)	0.110 (0.671)	0.146 (0.666)	-0.020 (0.663)
$\ln(\text{Sales})$	0.148 (1.217)	0.430 (1.283)	-0.071 (1.215)	0.149 (1.094)	0.375 (1.148)	-0.056 (1.202)	0.262 (1.317)	0.569 (1.350)	-0.070 (1.210)
$\ln(\text{Inputs})$	0.206 (1.359)	0.514 (1.418)	-0.086 (1.386)	0.215 (1.229)	0.437 (1.288)	-0.067 (1.345)	0.342 (1.460)	0.674 (1.490)	-0.085 (1.381)
$\ln(\text{Wage bill})$	0.060 (1.474)	0.420 (1.559)	-0.062 (1.384)	0.020 (1.410)	0.341 (1.492)	-0.042 (1.426)	0.147 (1.551)	0.500 (1.597)	-0.057 (1.413)
$\ln(\# \text{ buyers})$	-0.184 (1.042)	0.309 (1.290)	-0.041 (1.271)	-0.092 (0.937)	0.386 (1.172)	-0.052 (1.141)	-0.162 (1.122)	0.342 (1.348)	-0.032 (1.318)
$\ln(\text{Total fixed assets})$	0.116 (1.783)	0.177 (1.946)	-0.032 (1.896)	0.155 (1.726)	0.359 (1.887)	-0.052 (1.906)	0.262 (1.843)	0.328 (1.980)	-0.045 (1.875)
$\ln(\text{Employment})$	0.081 (1.293)	0.375 (1.361)	-0.057 (1.205)	0.056 (1.238)	0.300 (1.300)	-0.040 (1.240)	0.158 (1.365)	0.436 (1.398)	-0.051 (1.228)
Average N	28,725	71,720	499,556	24,241	55,753	445,925	28,647	63,366	619,179

**Notes:** The Pre columns report the mean value of each variable for treated firms for all years before treatment and the Post columns for the years of treatment i.e.  $t_1$  to  $t_5$ . The Control column reports the average over the sample period for untreated firms. The standard errors are reported in parentheses. The average N is the average number of observations across the different variables.



# Links to FDI Firms

	Log Total Factor Productivity (1)	Log Sales (2)	Log Intermediates (3)	Log Wage Bill (4)	Log Number of Buyers (5)	Log Number of Other Buyers (6)
t-5: 6 years before event	0.001 (0.013)	-0.049*** (0.018)	-0.091*** (0.020)	-0.073*** (0.024)	0.006 (0.023)	-0.006 (0.023)
t-4: 5 years before event	-0.003 (0.011)	-0.016 (0.014)	-0.040*** (0.016)	-0.008 (0.019)	0.027 (0.020)	0.019 (0.020)
t-3: 4 years before event	0.011 (0.010)	0.006 (0.012)	-0.016 (0.013)	-0.011 (0.017)	0.036** (0.017)	0.026 (0.017)
t-2: 3 years before event	0.004 (0.008)	0.015 (0.010)	-0.001 (0.011)	0.009 (0.013)	0.038*** (0.014)	0.031** (0.014)
t-1: 2 years before event	0.012* (0.007)	0.024*** (0.008)	0.007 (0.008)	0.016 (0.010)	0.032*** (0.011)	0.028*** (0.011)
t1: Year of event	0.029*** (0.006)	0.131*** (0.008)	0.143*** (0.009)	0.068*** (0.010)	0.315*** (0.011)	0.090*** (0.011)
t2: 1 year after event	0.081*** (0.007)	0.221*** (0.009)	0.232*** (0.010)	0.189*** (0.011)	0.324*** (0.012)	0.239*** (0.012)
t3: 2 years after event	0.088*** (0.007)	0.235*** (0.010)	0.243*** (0.011)	0.228*** (0.012)	0.351*** (0.012)	0.291*** (0.013)
t4: 3 years after event	0.085*** (0.007)	0.243*** (0.010)	0.247*** (0.012)	0.246*** (0.013)	0.380*** (0.013)	0.334*** (0.013)
t5: 4 years after event	0.077*** (0.008)	0.232*** (0.012)	0.230*** (0.013)	0.233*** (0.014)	0.385*** (0.014)	0.355*** (0.014)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	611,740	586,172	586,705	609,947	474,876	471,267
Adjusted $R^2$	0.647	0.855	0.873	0.807	0.842	0.841

# Links to Exporting Firms

	Log Total Factor Productivity (1)	Log Sales (2)	Log Intermediates (3)	Log Wage Bill (4)	Log Number of Buyers (5)	Log Number of Other Buyers (6)
t-5: 6 years before event	-0.001 (0.013)	-0.052*** (0.016)	-0.054*** (0.018)	-0.035 (0.024)	0.032 (0.022)	0.027 (0.022)
t-4: 5 years before event	0.005 (0.012)	-0.014 (0.014)	-0.025 (0.016)	0.007 (0.020)	0.022 (0.020)	0.021 (0.021)
t-3: 4 years before event	0.014 (0.010)	0.001 (0.012)	-0.008 (0.014)	0.005 (0.017)	0.013 (0.017)	0.010 (0.017)
t-2: 3 years before event	0.010 (0.009)	0.000 (0.010)	0.001 (0.011)	0.001 (0.015)	0.010 (0.015)	0.009 (0.015)
t-1: 2 years before event	0.018*** (0.007)	0.014* (0.008)	0.016* (0.009)	0.019* (0.011)	0.001 (0.012)	-0.000 (0.012)
t1: Year of event	0.017*** (0.007)	0.089*** (0.008)	0.096*** (0.009)	0.064*** (0.010)	0.298*** (0.011)	0.076*** (0.012)
t2: 1 year after event	0.062*** (0.007)	0.160*** (0.009)	0.162*** (0.010)	0.174*** (0.012)	0.295*** (0.012)	0.212*** (0.012)
t3: 2 years after event	0.071*** (0.007)	0.172*** (0.010)	0.171*** (0.011)	0.204*** (0.013)	0.315*** (0.013)	0.255*** (0.013)
t4: 3 years after event	0.075*** (0.008)	0.177*** (0.010)	0.174*** (0.012)	0.208*** (0.014)	0.334*** (0.014)	0.284*** (0.014)
t5: 4 years after event	0.065*** (0.008)	0.178*** (0.012)	0.179*** (0.013)	0.209*** (0.015)	0.353*** (0.015)	0.319*** (0.015)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	537,236	513,202	513,538	535,563	404,528	401,844
Adjusted $R^2$	0.644	0.844	0.865	0.809	0.806	0.805

# Links to Large-Sales Firms

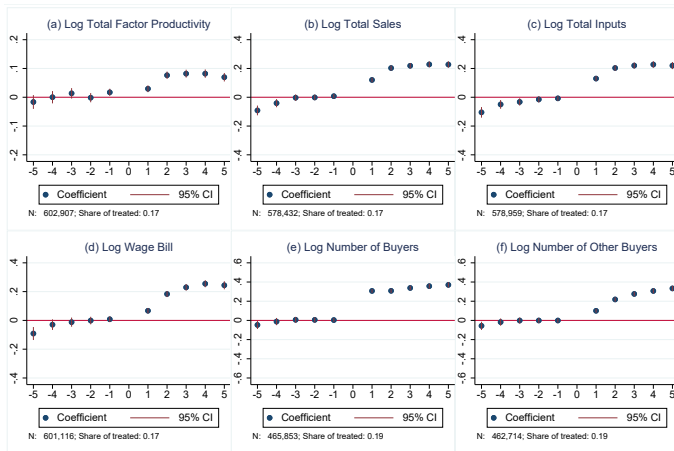
	Log Total Factor Productivity (1)	Log Sales (2)	Log Intermediates (3)	Log Wage Bill (4)	Log Number of Buyers (5)	Log Number of Other Buyers (6)
t-5: 6 years before event	-0.013 (0.011)	-0.090*** (0.017)	-0.102*** (0.020)	-0.092*** (0.022)	-0.046** (0.021)	-0.053** (0.022)
t-4: 5 years before event	0.005 (0.010)	-0.040*** (0.014)	-0.046*** (0.015)	-0.035* (0.018)	-0.032* (0.019)	-0.037* (0.019)
t-3: 4 years before event	0.007 (0.009)	-0.026** (0.012)	-0.047*** (0.014)	-0.029* (0.016)	-0.012 (0.016)	-0.018 (0.016)
t-2: 3 years before event	0.009 (0.008)	-0.012 (0.011)	-0.022* (0.011)	-0.023* (0.013)	-0.019 (0.014)	-0.023* (0.014)
t-1: 2 years before event	0.017*** (0.007)	-0.003 (0.008)	-0.012 (0.009)	-0.006 (0.010)	0.008 (0.011)	0.004 (0.011)
t1: Year of event	0.030*** (0.006)	0.119*** (0.008)	0.135*** (0.009)	0.053*** (0.009)	0.291*** (0.011)	0.104*** (0.011)
t2: 1 year after event	0.073*** (0.007)	0.201*** (0.009)	0.209*** (0.010)	0.164*** (0.011)	0.293*** (0.012)	0.212*** (0.012)
t3: 2 years after event	0.080*** (0.007)	0.218*** (0.010)	0.223*** (0.011)	0.203*** (0.012)	0.324*** (0.013)	0.265*** (0.013)
t4: 3 years after event	0.083*** (0.008)	0.227*** (0.011)	0.226*** (0.012)	0.225*** (0.013)	0.346*** (0.013)	0.295*** (0.014)
t5: 4 years after event	0.068*** (0.008)	0.218*** (0.012)	0.218*** (0.013)	0.210*** (0.015)	0.350*** (0.015)	0.310*** (0.015)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	723,793	696,915	697,544	721,708	581,709	579,052
Adjusted $R^2$	0.649	0.860	0.877	0.814	0.851	0.850

# Robustness Alternative Cutoffs

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Dep. var.: Log TFP	Alternative cutoffs for serious relationship					Alternative samples	
	0%	1%	5%	15%	20%	Min 1 year of pre and post treatment	Balanced panel
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>FDI</b>							
2 or more years before event	-0.014*** (0.003)	-0.005 (0.004)	0.007 (0.005)	0.005 (0.007)	0.005 (0.008)	0.003 (0.006)	0.002 (0.008)
t1: Year of event	0.022*** (0.003)	0.020*** (0.004)	0.027*** (0.005)	0.028*** (0.007)	0.029*** (0.007)	0.028*** (0.005)	0.042*** (0.008)
1 or more years after event	0.059*** (0.003)	0.068*** (0.004)	0.080*** (0.005)	0.077*** (0.007)	0.079*** (0.008)	0.075*** (0.005)	0.051*** (0.008)
Observations	823,675	731,560	649,141	592,506	579,534	645,849	346,361
Adjusted R-squared	0.657	0.650	0.648	0.647	0.647	0.649	0.661
<b>Exporters</b>							
2 or more years before event	-0.014*** (0.004)	-0.004 (0.004)	0.012** (0.006)	0.006 (0.008)	0.004 (0.009)	0.005 (0.006)	0.010 (0.008)
t1: Year of event	0.017*** (0.003)	0.017*** (0.004)	0.022*** (0.005)	0.013* (0.007)	0.012 (0.008)	0.016*** (0.006)	0.029*** (0.008)
1 or more years after event	0.053*** (0.004)	0.063*** (0.004)	0.070*** (0.006)	0.064*** (0.008)	0.064*** (0.008)	0.061*** (0.006)	0.050*** (0.009)
Observations	720,503	646,661	569,632	520,237	509,508	562,558	299,708
Adjusted R-squared	0.654	0.647	0.645	0.645	0.644	0.645	0.662
<b>Large</b>							
2 or more years before event	-0.014*** (0.003)	-0.006 (0.004)	0.007 (0.005)	0.003 (0.007)	0.002 (0.008)	0.007 (0.006)	-0.003 (0.008)
t1: Year of event	0.023*** (0.003)	0.025*** (0.004)	0.031*** (0.005)	0.029*** (0.007)	0.029*** (0.008)	0.030*** (0.006)	0.031*** (0.007)
1 or more years after event	0.050*** (0.003)	0.061*** (0.004)	0.072*** (0.005)	0.072*** (0.007)	0.074*** (0.008)	0.074*** (0.006)	0.039*** (0.008)
Observations	940,252	841,203	759,285	705,437	692,878	723,793	421,693
Adjusted R-squared	0.660	0.653	0.650	0.648	0.648	0.649	0.664

# Links to Outward-FDI Firms



**Notes:** These specifications are as in the baseline results except the treatment is defined as selling to a Belgium firm  $j$  with at least 10% outward FDI instead of inward FDI.  $t = 1$  first year of treatment;  $t = 5$  is all years  $\geq 5$ . Regressions include 4 digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.