

FDI IMPACT ON THE PRODUCTIVITY AND EMPLOYMENT OF SPANISH MANUFACTURING FIRMS (2001-2010)

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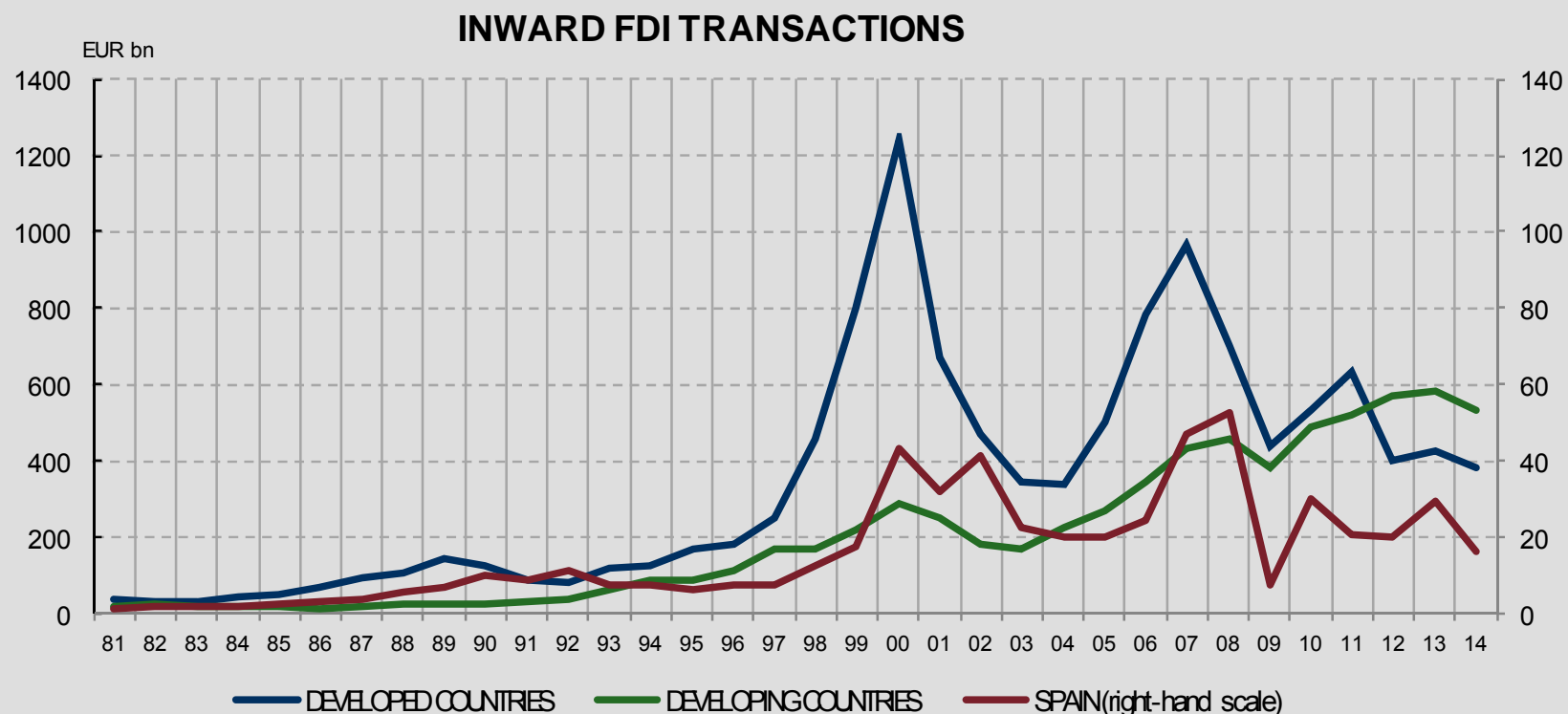
ECONOMIC ANALYSIS AND FORECASTING DEPARTMENT

OUTLINE

- **Motivation**
- **A literature review**
- **FDI stylized facts in Spain: the aggregate data**
- **FDI stylized facts in Spain: a firm-level approach**
- **Impact of FDI on productivity and employment:**
 - *The empirical strategy*
 - *The main results*

MOTIVATION (I)

- Growing importance of (and competition from) of developing countries as recipient of international FDI flows



- Governments, especially in developing countries, offer special incentives to attract FDI

MOTIVATION (II)



- **Why are FDI inflows different from others financial flows?**
 - They are less volatile than others
 - They generate *direct effects* (on affiliate performance) and *indirect effects* (on domestic firms performance), that is, “*positive*” externalities.
 - Channels: technological transfers, management improvements, client networks, intercompany loans,....
- **Are foreign-owned firms more productive? Do foreign firms target more productive domestic firms? (“*cherry picking*”)**
- **Do domestic firms benefit from FDI in affiliates?**
- **Are special incentives –public subsidies- to foreign enterprises justified?**

- **Research question:** what is the inward FDI impact on the productivity and employment performance of Spanish affiliates of foreign firms (*the direct effect*)?

A LITERATURE REVIEW: THE EMPIRICAL EVIDENCE (I)



➤ **Effects on productivity:** direct and indirect (*spillover*) effects

- **Positive effects:**

- Fons-Rosen et al (2014), differences between developed and developing economies
- Jude (2012) for Romanian affiliates
- Arndt and Mattes (2010) and Mattes (2010), only in the case of German multinational firms
- Arnold and Javorcik (2009), for Indonesian affiliates
- Karpaty (2007) for Swedish affiliates
- Girma et al. (2006), only for British exporting companies
- Benfratello and Sembenelli (2006) only if FDI inflows come from United States
- Havranek and Irsova (2011) and Nourzad (2008), *positive spillovers effects*, in both developed and undeveloped countries, independently of the country originator of the FDI flows [Moran and Oldenski (2013)]

- **Negative effects:**

- Harris and Robinson (2002), on British affiliates
- Aitken and Harrison (1999), for Venezuelan domestic firms

A LITERATURE REVIEW: THE EMPIRICAL EVIDENCE (II)



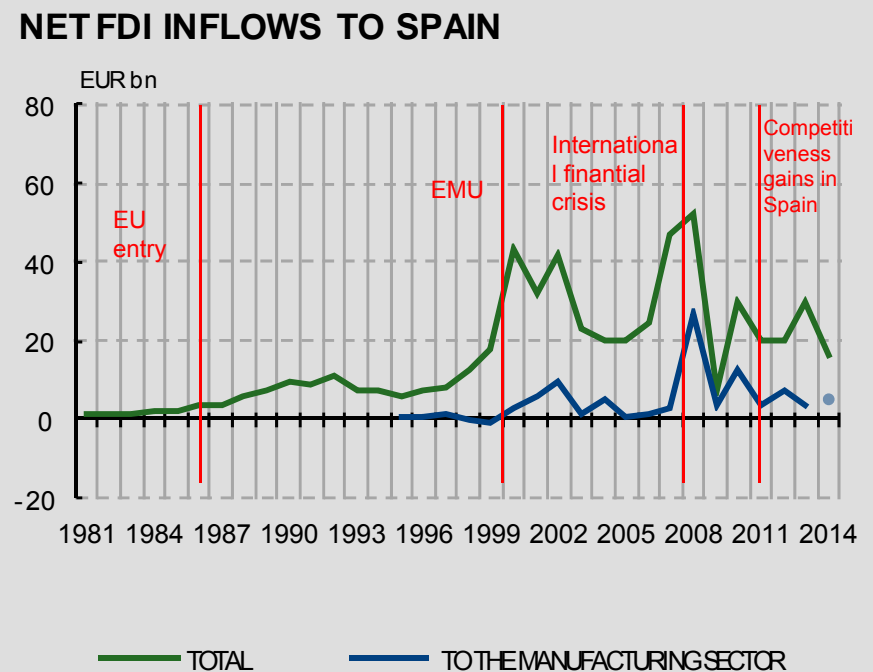
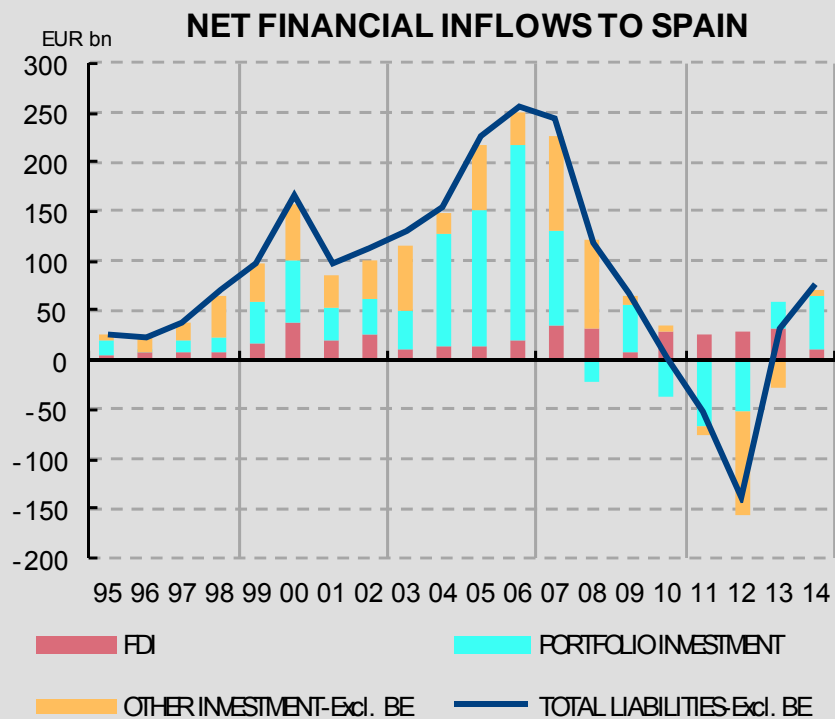
- **Effects on employment:** direct and indirect (*spillover*) effects
 - *Direct effects* depend on the type of FDI: mergers and acquisitions vs greenfield projects
 - **Non-conclusive results**
 - Arndt and Mattes (2010), no effects
 - Arnold and Javorcik (2009), modest and positive
 - Bandick and Karpaty (2007), positive on skilled workers

- **Spanish empirical evidence:** mainly macro based studies, micro papers are scarce (limited samples and/or most recent period not considered)
 - **Positive and significant effect on productivity** [Guadalupe et al. (2012); Moreno (2012)], **not significant on employment** [Fernández-Otheo and Myro (2008)].



FDI STYLIZED FACTS IN SPAIN: THE AGGREGATE DATA (I)

- **FDI flows are less volatile** than others financial flows, even during the international financial crisis
- **Both external (EU/EMU effects) and, more recently, domestic factors** (internal devaluation/structural reforms -ULCs adjustment-) **have increased Spain's attractiveness as FDI recipient economy**

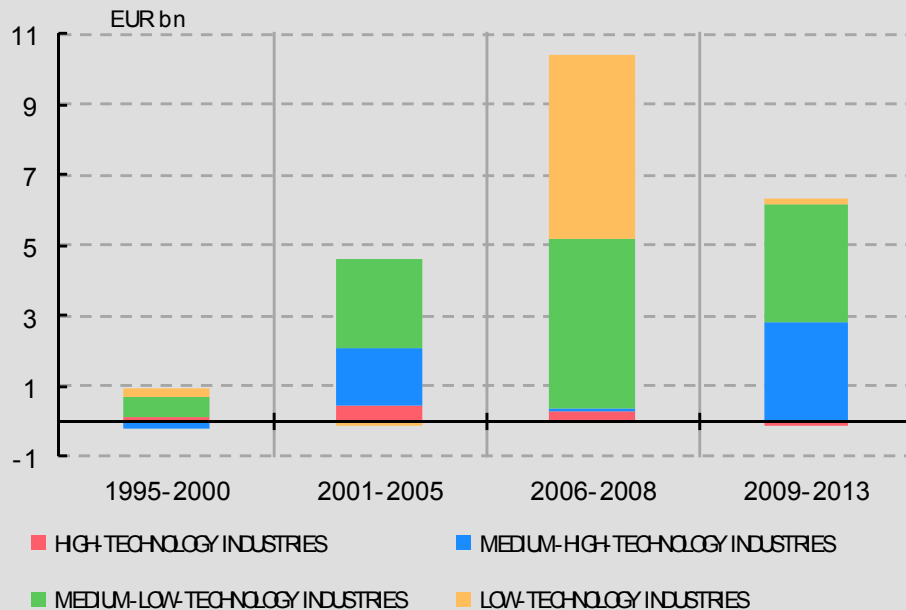


FDI STYLIZED FACTS IN SPAIN: THE AGGREGATE DATA (II)

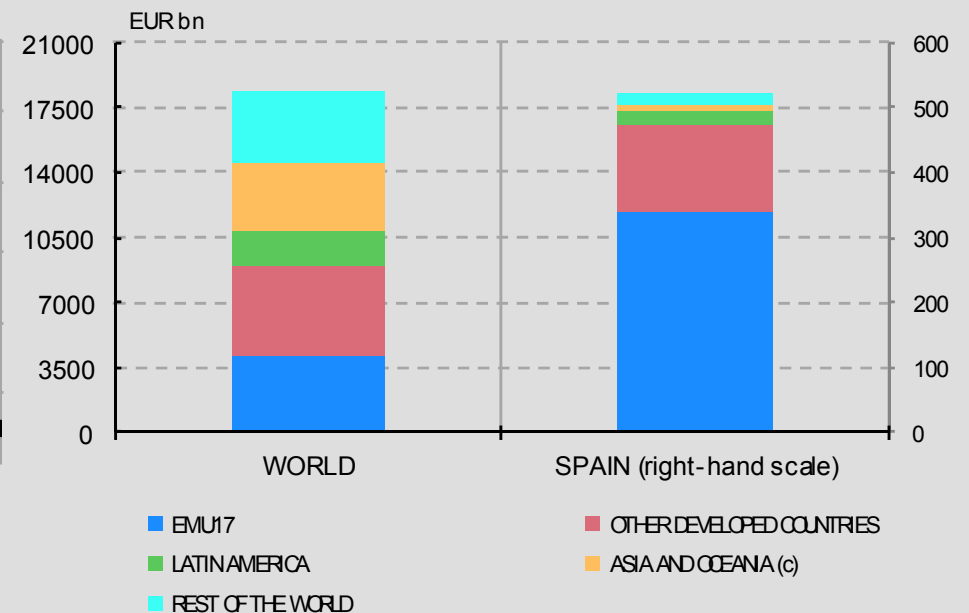


- **FDI recipient sectors:** Manufacturing FDI inflows are concentrated across those low and medium-low tech sectors
- **Geographical origin of FDI inflows:** FDI from developed countries accounts for 90% of the total stock at the end of 2013

INWARD FDI TRANSACTIONS IN MANUFACTURING SECTOR: BREAKDOWN BY TECHNOLOGICAL CONTENT



FDI LIABILITIES STOCK. GEOGRAPHICAL BREAKDOWN. YEAR 2013



FDI STYLIZED FACTS IN SPAIN: A FIRM-LEVEL APPROACH. THE DATABASE (I)



- **The database combines information from three statistical data sources (2001-2010)**
 - **Balance of Payments (BOP).** Details of international activity of Spanish firms
 - **Central Balance Sheet Data (CBA).** An extensive list of the main characteristics of Spanish non-financial firms: size, age, innovation, temporary ratio, labour productivity,..
 - **Annual Accounts in Mercantile Registry (CBB).** A few characteristics of the whole population of Spanish firms
- **Database caveats**
 - **BOP:** A declaration threshold. FDI: information only on flows, not on stocks
 - **CBA:** it is biased towards large firms, partially corrected using CBB
- **Database representativeness.** Besides its caveats, the database shows a much higher coverage than previous papers and includes a more recent period (2001-2010)
 - Good representativeness in terms of GVA and of number of firms (60%)

FDI STYLIZED FACTS IN SPAIN: A FIRM-LEVEL APPROACH. THE DATABASE (II)



➤ **Affiliate: How is it defined?**

- **Affiliates** are those manufacturing firms receiving positive net FDI flows in shares and other equity during 2001-2010
- **Domestic firms** are those manufacturing resident firms that have not received any FDI flow between 2001-2010

Number of firms in the manufacturing sector	2001-2010 AVERAGE		
	Database	% /Total population	% /Total GVA
Affiliates	1,645	67%	-
Domestic firms	127,679	64%	-
TOTAL	129,324	64%	60%

FDI STYLIZED FACTS IN SPAIN: A FIRM-LEVEL APPROACH. THE DATABASE (III)



- **Affiliates are a very small group of companies.** This proportion increases with the company's size: 14.2 % of large firms received positive FDI net flows, compared to 1.0% of the companies in the sample

Manufacturing sector (2001-2010)	Number of firms		
	Affiliates	Domestic firms	% of affiliates/total
Micro-firms	402	83,481	0.5
Small firms	339	28,691	1.2
Medium-sized firms	301	4,153	6.4
Large firms	121	589	14.2
TOTAL SAMPLE	1,163	116,914	1.0

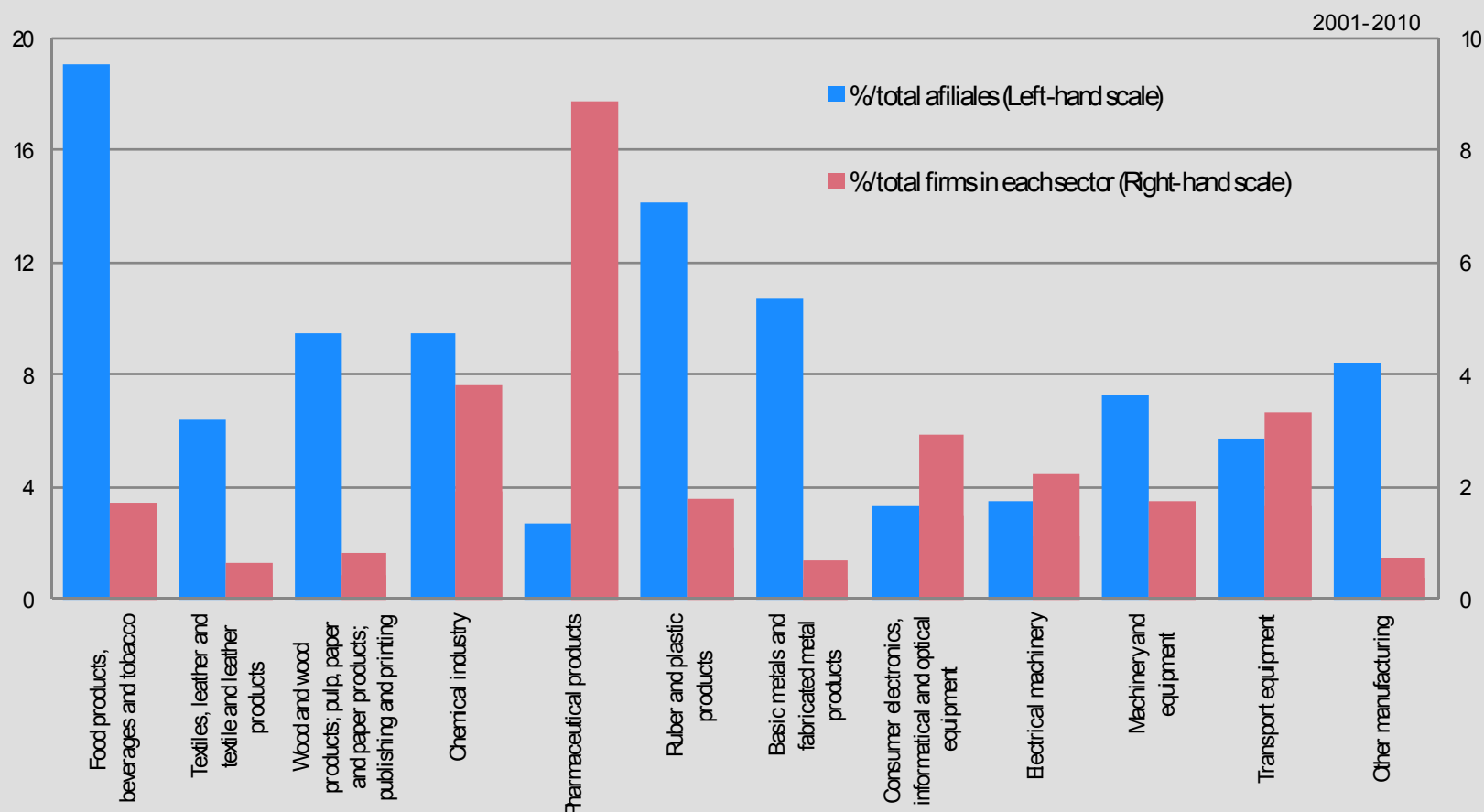
SOURCE: Author's own elaboration based on Balance of Payments, Central Balance Sheet Data Office and Business Register statistics.

a. The size of the firms is determined by the number of its employees. Therefore, micro-firms are those with less than 10 employees, small firms have between 10 and 49 employees and medium-sized and large firms count respectively between 50 and 249 employees and 250 employees or more.

FDI STYLIZED FACTS IN SPAIN: A FIRM-LEVEL APPROACH. THE DATABASE (IV)



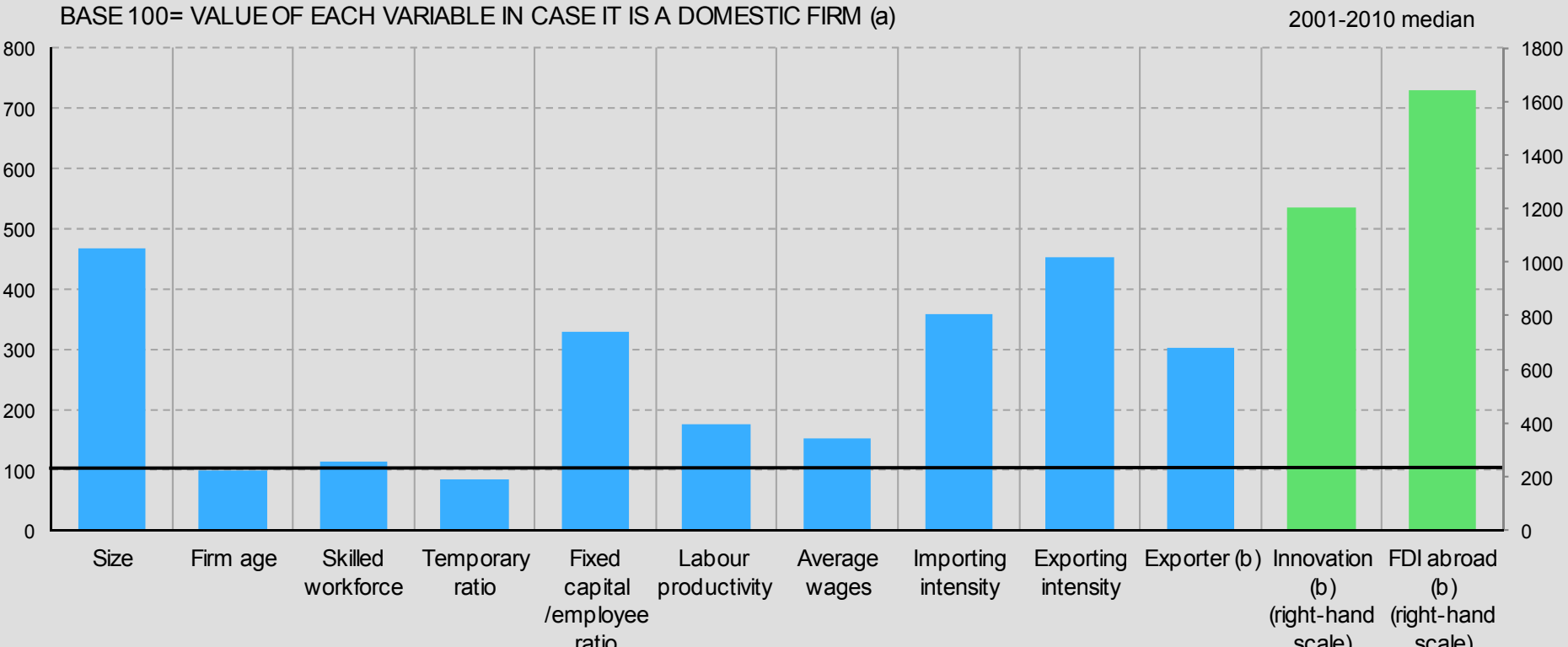
- **Breakdown by sector (NACE-2009): FDI net flows are more frequent in high-tech sector, such as the chemical and pharmaceutical industries. But, in absolute terms, the number of affiliates is higher in low- and medium-tech sectors**





MAIN CHARACTERISTICS OF SPANISH MANUFACTURING FIRMS (I)

➤ **Characteristics of Affiliates vs Domestic firms:** Manufacturing affiliates are larger, use capital more intensively, have a higher labour productivity, pay higher wages and show a more intense international scope and are more likely to export and to invest abroad



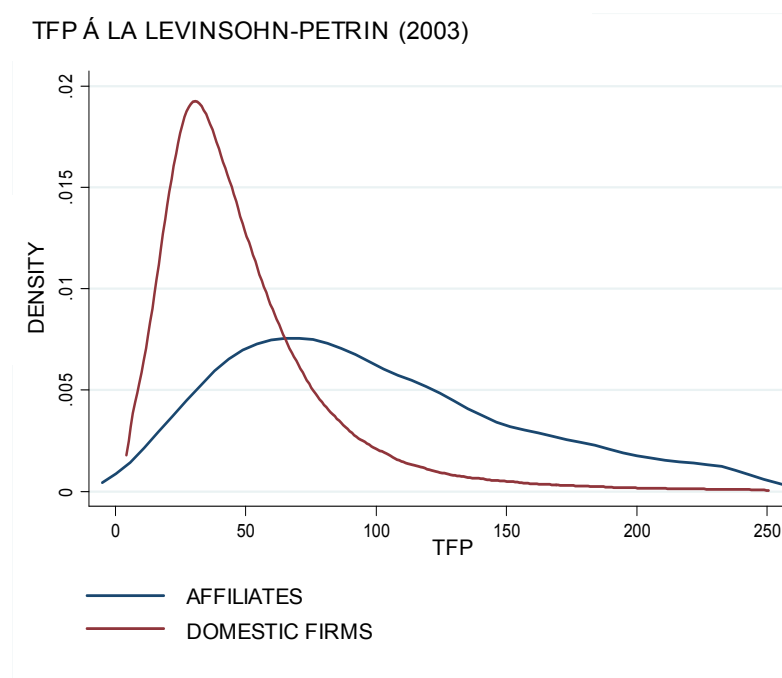
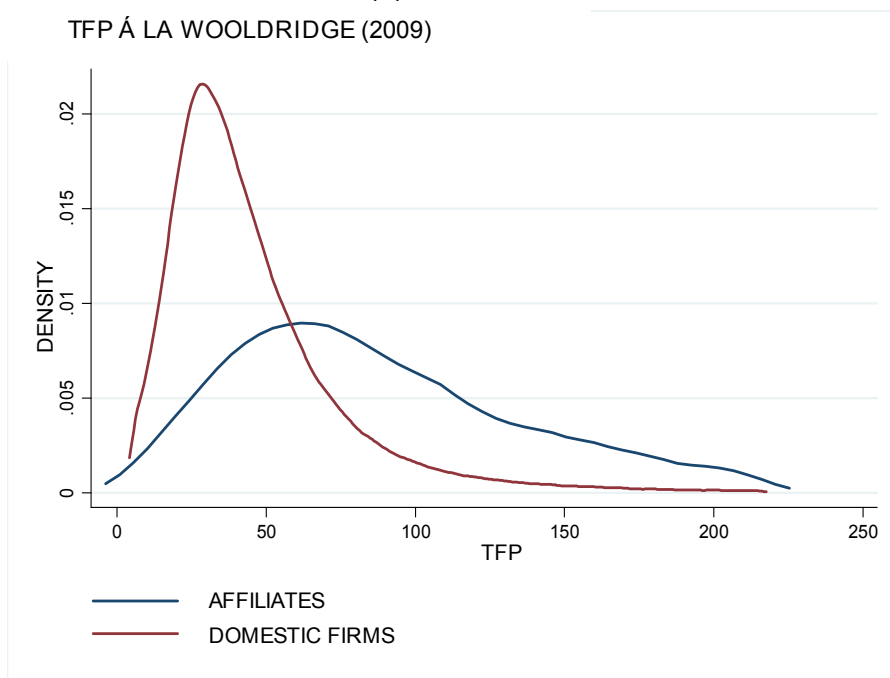
a In the case of size, the chart should be interpreted as meaning that size of affiliates is around 4 and a half times higher than that of domestic firms. b. For these variables, the statistic plotted is the sample average. For example, exporter value should be interpreted as affiliates have a probability to export around 3 times higher than a domestic firms

MAIN CHARACTERISTICS OF SPANISH MANUFACTURING FIRMS (II). TFP



- **Total Factor Productivity (TFP)** estimation methodology: semi-parametric Levinsohn and Petrin (2003) and non-parametric Wooldridge (2009) procedures

TOTAL FACTOR PRODUCTIVITY (TFP) DISTRIBUTION. MANUFACTURING SECTOR (a)
Affiliates vs domestic firms (b)

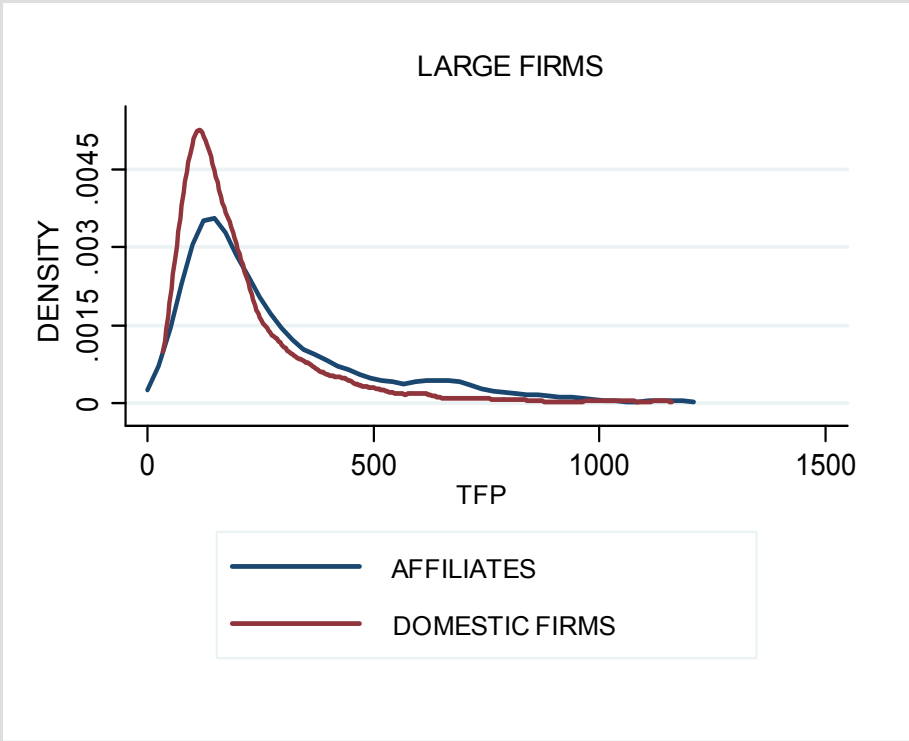
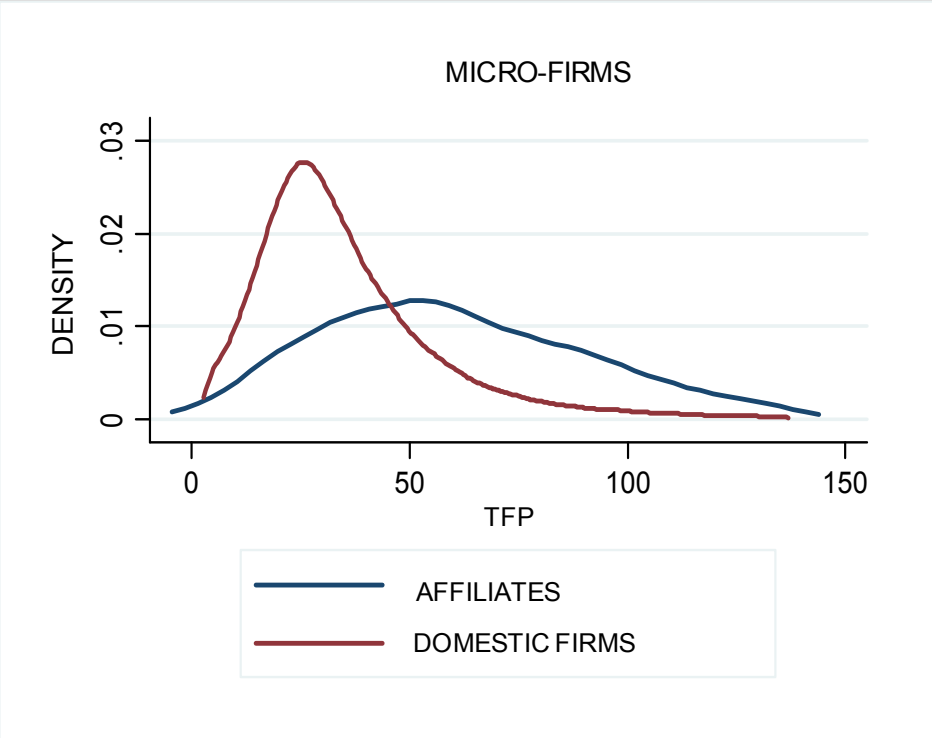


- **Manufacturing affiliates** record a higher TFP than domestic firms (on average, domestic firms' TFP is 55% lower)



MAIN CHARACTERISTICS OF SPANISH MANUFACTURING FIRMS (III). TFP BY SIZE

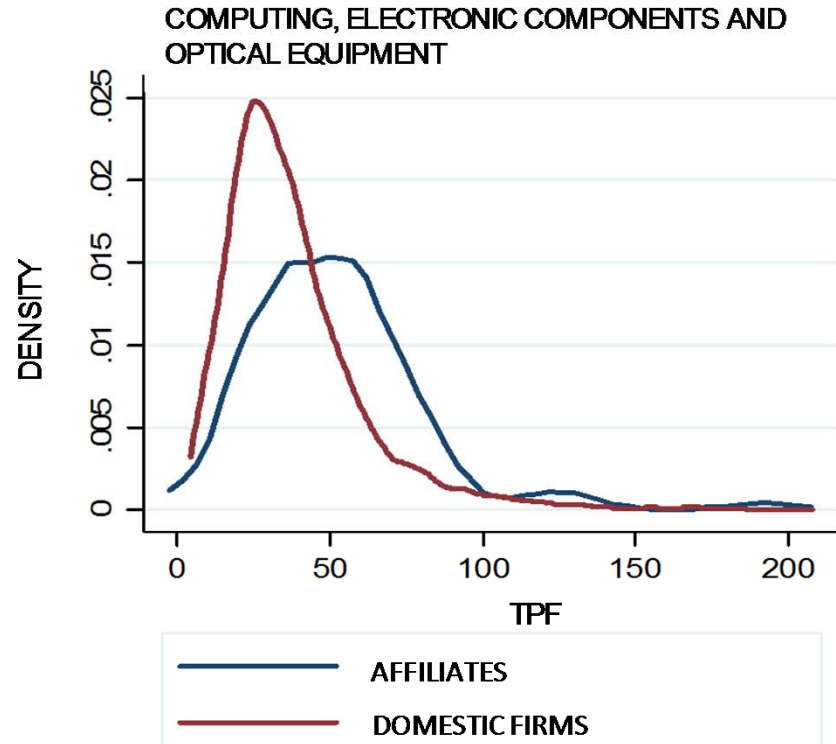
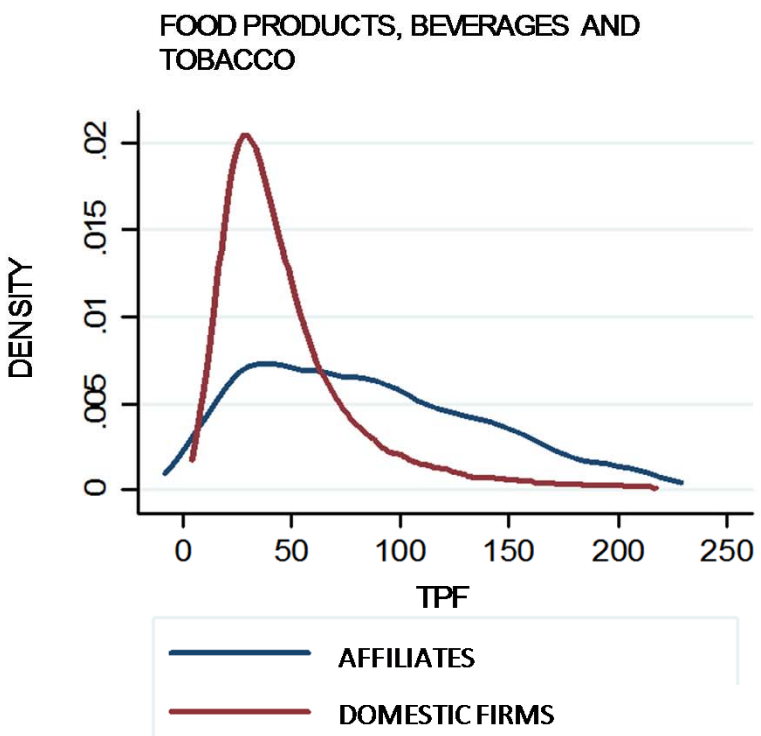
➤ **TFP differences tend to disappear with the size company:** the larger the foreign and domestic companies are, the more similar are their TFP





MAIN CHARACTERISTICS OF SPANISH MANUFACTURING FIRMS (IV). TFP BY SECTOR

➤ TFP differences decrease in high-tech sectors



FDI IMPACT ON TFP AND EMPLOYMENT: THE EMPIRICAL STRATEGY



- **Propensity score matching (PSM) combined with a difference-in-differences approach (ATT)** allows us to estimate FDI average effect taking into account the selection bias (“*cherry picking*”)
 - **PSM** matches each affiliates with their counterfactuals (domestic firms with similar characteristics): it allows us to estimate a scenario in which affiliates have not received FDI
 - **Propensity score estimation** (*Probit model*)
 - **Matching algorithms selection**
 - **ATT**: Average effect of the treatment (FDI) on the treated (affiliates), combined with a difference-in-differences estimator (DD)

$$ATT_{DD} = 1/n \sum [E(Y^1_{t+d} - Y^1_t | D=1) - E(Y^0_{t+d} - Y^0_t | D=1)]$$

FDI IMPACT ON TFP AND EMPLOYMENT : PROPENSITY SCORE



➤ Propensity score: *probit model*

$$P(\text{FDI}_{ist}=1)=\Phi(\alpha+\beta X_{ist}+\gamma_s+\delta_t+\varepsilon_{ist})$$

Dependent variable	Affiliates	
Workforce (b)	0.00075***	(0.000)
Fixed capital per employee ratio (b)	0.00023*	(0.000)
Firm age (b)	-0.00100***	(0.000)
Average wages (b)	0.00181***	(0.001)
Temporary ratio	-0.00002**	(0.000)
Importing intensity	0.00005***	(0.000)
Exporting intensity	0.00002***	(0.000)
Exporter	0.00150***	(0.000)
FDI abroad	0.00155**	(0.001)
Sector and year dummies	YES	
Likelihood function	-1554,2	
Pseudo R ²	0,100	
Prob > Chi ²	0,000	
Number of observations	106.141	

a. The probit model includes a constant. Dependent variable takes a value of 1 in the period at which the firm received the first positive net FDI inflow, 0 if it is a domestic firm. Average marginal effects are reported. Standard deviations are in brackets. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively. All variables, except firm age, are lagged one period.

b. As natural logarithm.

FDI IMPACT ON TFP AND EMPLOYMENT: TFP AVERAGE EFFECT



- **TFP:** Average inward FDI impact on TFP: **positive and significant**, maximum 2 years after the first net positive FDI inflow

Matching algorithm		$\Delta \ln(\text{TFP})$ (a)			
		Acquisition year	One year later	Two years later	Three years later
Nearest neighbour 1-1 with replacement. Caliper 0.01	Affiliates	0,138	0,098	0,095	0,071
	Domestic firms	0,020	-0,026	-0,091	-0,067
	ATT _{DD} (b)	0.119**	0,124	0.186**	0.139*
		(0.057)	(0.099)	(0.078)	(0.079)
	Number of affiliates	81	81	81	81
Nearest neighbour 1-5 with replacement. Caliper 0.001	Affiliates	0,159	0,186	0,139	0,117
	Domestic firms	0,024	-0,001	-0,049	-0,054
	ATT _{DD} (b)	0.135*	0.187**	0.188**	0.171*
		(0.069)	(0.086)	(0.081)	(0.091)
	Number of affiliates	56	56	56	56
Radius matching. Caliper 0.001	Affiliates	0,159	0,186	0,139	0,117
	Domestic firms	0,021	-0,006	-0,057	-0,069
	ATT _{DD} (b)	0.138**	0.192**	0.196***	0.186**
		(0.068)	(0.083)	(0.073)	(0.080)
	Number of affiliates	56	56	56	56

a. It is always calculated with respect to the pre-acquisition period (when the first positive net FDI flow is recorded).

b. Average FDI effect on affiliates' TFP is reported, combined with a difference-in-difference estimator (DD). See equation 2 from section 4. Standard deviations estimated via bootstrapping with 100 replications are in brackets. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively.

FDI IMPACT ON TFP AND EMPLOYMENT: EMPLOYMENT AVERAGE EFFECT



- **Employment:** Average inward FDI impact on employment: negative **but not significant**

Matching algorithm		$\Delta \ln(\text{Workforce})$ (a)			
		Acquisition year	One year later	Two years later	Three years later
Nearest neighbour 1-1 with replacement. Caliper 0.01	Affiliates	0,010	0,013	0,000	-0,089
	Domestic firms	0,032	0,062	0,041	0,035
	ATT _{DD} (b)	-0,022 (0.033)	-0,049 (0.041)	-0,041 (0.049)	-0,124 (0.076)
	Number of affiliates	89	89	89	89
Nearest neighbour 1-5 with replacement. Caliper 0.001	Affiliates	-0,001	0,003	-0,007	-0,112
	Domestic firms	0,026	0,038	0,026	0,002
	ATT _{DD} (b)	-0,027 (0.038)	-0,035 (0.046)	-0,033 (0.055)	-0,114 (0.120)
	Number of affiliates	64	64	64	64
Radius matching. Caliper 0.001	Affiliates	-0,001	0,003	-0,007	-0,112
	Domestic firms	0,017	0,030	0,018	0,004
	ATT _{DD} (b)	-0,018 (0.031)	-0,027 (0.037)	-0,025 (0.052)	-0,116 (0.088)
	Number of affiliates	64	64	64	64

a. It is always calculated with respect to the pre-acquisition period (when the first positive net FDI flow is recorded).

b. Average FDI effect on affiliates' TFP is reported, combined with a difference-in-difference estimator (DD). See equation 2 from section 4. Standard deviations estimated via bootstrapping with 100 replications are in brackets. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively.

c.

MAIN RESULTS

- The growing competition for attracting FDI flows, sometimes through public incentives – that are justified by the expected benefits in terms of growth and employment-, and the recent attractiveness of Spain as FDI recipient have increased the interest to analyze its impact on productivity and employment
- Spanish manufacturing affiliates are larger, use capital more intensively and undertake international activities ...and record a higher (labour/TFP) productivity level than domestic firms
- Using propensity score matching technics (to control the selection bias) combined with a difference-in-differences estimator approach (to eliminate the influence of observable and non-observable, but time-invariant, firm characteristics), we estimate:
 - A positive and significant impact on TFP: two years after the positive FDI flow, affiliates' TFP register an accumulated growth of around 19% higher than that of domestic companies
 - No significant impact on employment
- This result is very important: pre-condition for the existence of positive spillover effects on domestic firms, and it fosters competitiveness and exporting capacity of firms



THANK FOR YOUR ATTENTION

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