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## Foreign ownership and performance: evidence from a panel of Italian firms<sup>1</sup>

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<sup>1</sup> This paper was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

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# Foreign ownership and performance: Evidence from a panel of Italian firms

by Chiara Bentivogli\* and Litterio Mirenda†

## Abstract

The paper studies the impact of foreign ownership on a firm's economic performance. We use a unique panel dataset to test the foreign ownership premium by comparing our sample of firms based in Italy and owned by a foreign subject with a sample of purely domestic firms that, in order to have a proper counterfactual, were selected using propensity score matching. Our difference-in-differences results show the existence of a premium for the size, profitability and financial soundness of the foreign-owned companies. The premium increases with time, is concentrated in the service sector, and disappears if the foreign investor is based in a fiscal haven.

JEL Classification: F23, F61

Keywords: Multinational enterprise; ownership; foreign direct investment, firm performance.

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## 1. Introduction<sup>1</sup>

Foreign direct investment (FDI) plays an important role in the world economy. In 2014 FDI stock reached a volume of more than US\$ 26 trillion, rising from an average of US\$14 trillion in the three years before the financial crisis; employment of foreign affiliates reached 75 million (Unctad, 2015).

The size and pervasiveness of FDI in the world motivate the analysis of the effects of FDI on national economies and, in particular, the performance comparison of foreign-controlled firms *vis-à-vis* domestic-owned ones in order to assess the existence of systematic differences due specifically to foreign acquisition. The topic is of interest for economic policy, as it could give analytical support to the implementation of policies to attract or discourage foreign investment.

Two main streams of theoretical literature dealing with different performances of foreign-controlled firms can be identified:

1. the first one is related to the general hypothesis of the existence of advantages for multinational companies (MNEs) over purely domestic firms (Hymer, 1960; Dunning, 1988). In a context of within-sector firm heterogeneity in productivity, only the more productive companies engage in FDI, given that entry into a foreign market involves high fixed costs (Helpman *et al.*, 2004). This, in turn, implies that improvement in the performance of a foreign-owned firm depends on the transfer of proprietary assets from its MNE parent company (ex-post forward linkages). According to this stream of literature, foreign investors are indeed able to transfer superior technology and organizational practices to potential local subsidiaries (Barba Navaretti and Venables, 2004), thus generating a foreign ownership premium (FOP);

2. the second one derives from the market for corporate control literature; this stream highlights the importance of the ex-ante selection bias as the key factor that explains the different performance of foreign-controlled firms. According to Manne (1965) well-performing foreign firms choose underperforming companies for their acquisitions, (negative selection) in order to remove inefficient managers and fully exploit the firm's potential. Negative selection could also emerge from high information asymmetries about the quality of the acquired local company. It could also be the case that, on the contrary, international acquisition only happens to the (ex-ante) best domestic firms, so that their superior performance is partially due to the selection process (positive selection).<sup>2</sup> Guadalupe *et al.* (2012) explain se-

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<sup>2</sup> Negative and positive selection are also mentioned in the literature as, respectively, 'lemon-grabbing' and 'cherry-picking' effects.

lection in terms of complementarities between foreign and domestic firms' characteristics. As an example they cite the introduction of a new product into a foreign market through the acquisition of a domestic firm, which will be more valuable the greater the marketing abilities of the acquired firm.

The empirical tests of these two strands of literature on foreign acquisition use very different strategies. While the positive/negative/complementary selection hypotheses require a test on the ex-ante differences (in terms of economic performance and structural features) between the foreign acquired firms and the purely domestic ones, the foreign ownership premium (FOP) hypothesis entails the identification of the causal effect of foreign acquisition on the ex-post performance of the foreign-owned firm. However, the two theories discussed are not mutually exclusive but rather coexist. This implies that FOP testing requires controlling for the endogeneity of the selection process, in order to disentangle the differences in performance due to ex-ante factors from those due to the acquisition itself.

Empirical studies have investigated the selection process with mixed conclusions. Many authors find evidence of positive selection. Looking at the Spanish case, Guadalupe *et al.* (2012) find evidence of foreign acquisition of the most productive firms within industries; Blonigen *et al.* (2012) find a higher probability of foreign acquisition of domestic companies with higher productivity levels some years before the acquisition. Weche Gelübcke (2013) finds that German manufacturing firms with above average productivity are more likely to become targets for foreign takeovers. At the same time, Weche Gelübcke shows that the exact opposite is true regarding profitability, as very low performing firms are MNEs' favourite targets. Evidence of negative selection due to information asymmetries is less common. One example is the analysis of Gioia and Thomsen (2004) which identifies negative selection for Danish companies acquired by MNEs in the nineties.<sup>3</sup> However, a major limitation of these studies is that, in general, positive or negative selection is analysed without considering the element of price in driving the acquisition decision together with performance characteristics. Indeed, the price could make an acquisition a good deal or a bad deal depending on the associated firm's 'quality'.

Most of the empirical studies on foreign ownership premium converge on the its existence, mainly in productivity and wages. Arnold and Javorcik (2009) find that a set of performance variables for Indonesia, including wages and productivity, increase under foreign ownership. Guadalupe *et al.* (2012) find that, after controlling for selection, acquired firms increase their process innovation. Girma and Gorg (2007) find positive wage effects for UK companies after an acquisition by a US MNE. Criscuolo and Martin (2009) find that US- owned plants have a significant productivity advantage in the United Kingdom, in relation to both British MNEs and

<sup>3</sup> For Italian firms, Mattevi (2014) finds positive selection: before the acquisition, foreign-controlled firms are bigger and more export-oriented than domestic firms. Crinò and Onida (2007) find positive selection only in manufacturing firms in the Italian region of Lombardy. Castellani and Zanfei (2004) do not find positive selection for a sample of Italian manufacturing firms in the years 1997-2000.

other foreign- owned plants. Bandick *et al.* (2014) find FOP for foreign-controlled firms' R&D in Sweden.<sup>4</sup>

This paper belongs to the FOP vein of literature: we test the existence of a causal relationship between foreign acquisition and the economic performance of the acquired Italian firms. Following previous works, we select an identification strategy that allows us to control for the endogeneity of the selection process. Our contribution to this strand of literature is mainly the database that we use and the variables chosen as performance indicators:

1. we update previous empirical work by building and exploiting a matched firm-shareholder panel containing information on firms' balance sheets and on the shareholders; the dataset is obtained from the administrative register and includes almost all the Italian limited companies for seven years (from 2007 to 2013). Previous works mainly use small samples often focused on a single industry (e.g. Guadalupe *et al.* (2012) use a panel of manufacturing firms, Girma and Gorg (2007) focus on electronics and food and Piscitello and Rabbiosi (2005) work on manufacturing). Moreover, this is the first empirical FOP analysis of the Italian economy for the period that covers most of the recent economic crisis. Studying FDI during the most recent crisis is interesting, since foreign acquisition has been an important part of firms' toolboxes for reacting to the crisis. On the other hand, the crisis should not distort the results of the analysis because our empirical strategy (see below) controls for the heterogeneous effects of the crisis on the firms in our sample;

2. we test FOP on selected balance sheet indicators in order to investigate the effect of FDI on three different features of a firm's performance: size, profitability and financial soundness. These characteristics are of interest for policy purposes as they complement the analysis on FOP based on productivity and wages, given that productivity and wage premiums have been extensively studied up to now.<sup>5</sup> Indeed, size is an important source of competitive advantage for several reasons, the most important of which is the exploitation of economies of scale. Secondly, profitability is the ultimate indicator of a firm's success and the main engine of an entrepreneur's activity. Lastly, financial soundness is often disregarded by the literature, yet it is crucial to ensure a steady growth for a firm and to insulate it from market volatility. Specifically, we consider net sales as a proxy for size, return on equity and cash flow on assets as measures of profitability, and financial debt on assets together with a comprehensive credit risk indicator to identify financial soundness.

In order to evaluate FOP, our empirical strategy is to apply a difference-in-differences (DID) methodology considering foreign participation as the 'treatment'. This allows us to control for all observable and unobservable time-invariant variables that influence the acquisition decision and the outcome. As the literature on

<sup>4</sup> For Italy, Piscitello and Rabbiosi (2005) find FOP on labour productivity in the nineties, while Benfratello and Sembenelli (2006) exclude it.

<sup>5</sup> See the survey of the literature on FOP discussed above.

the selection process points out, we are still left with the problem of non-random sample selection. We approach this problem by combining DID with propensity score matching (PSM), which restricts the control sample to firms with similar observable pre-acquisition characteristics. These firms are used as a counterfactual, i.e. they proxy how the foreign owned firms would have behaved had they not been acquired by foreign firms.

PSM and DID have been widely used in the FOP literature, but as far as we know they have been applied to other performance variables, or to test the effects of an internationalization strategy on investing firms. Among others, the abovementioned Girma and Gorg (2007) use PSM and DID to test FOP on wages, Arnold and Javorcik (2009) on productivity, investment, employment, and wages, Guadalupe *et al.* (2012) on productivity, and Bandick *et al.* (2014) on R&D intensity after acquisition. Borin and Mancini (2015) use the PSM-DID strategy to test the foreign direct investment effect on investor performance. Despite the use of the same empirical strategy, a one-to-one comparison of our results with those on productivity and wages is hampered by the different information content of our outcome variables. Nonetheless, we believe that our findings can strengthen the general result for FOP in terms of the sign of the causal effect.

Looking at our results, our difference-in-differences matching estimates indicate that acquisition leads to better company results: several indicators of firms' performance improve after FDI, and the effect increases over time. Moreover, the effect of FDI on performance is significant only in services and disappears if the foreign investor is based in a fiscal haven.

The rest of the article is organized as follows: Section 2 describes the dataset and presents some preliminary statistics. Section 3 outlines the empirical strategy, while Section 4 focuses on econometric results and presents some robustness tests. Section 5 concludes.

## 2. Data description

We combine two different panels of data. The first one is the Infocamere database, which is taken from Italian official business registers managed by the association of Italian Chambers of Commerce. It contains exhaustive, current and historical vital statistics on firms and their ownership structure (domestic and foreign shareholders, participation shares and so on) covering about 1.12 million unlisted limited companies for 2010. Given its coverage, the Bank of Italy uses it to feed a register of foreign-owned firms, and to extract the sample for Direct Reporting (a survey used to compile the balance of payments statistics on FDI) from it. The second dataset is Cerved, a company accounts data system provided by the Cerved Group, which collects companies' balance sheets and indicators. The Cerved database covers a very

large portion of Italian limited companies (about 965,000 balance sheets for 2010) providing detailed company balance sheet data.

In order to build our panel we extract a seven-year subset (from 2007 to 2013, the latest available year) from the Infocamere dataset and do some cleaning when the country of investor is missing and for other problems related to the administrative nature of the data. Then from the Infocamere subset we identify a group of firms with the following characteristics: 1) companies subject to foreign direct investment for the first time in 2010;<sup>6</sup> 2) the FDI gives a foreign investor a control share ( $\geq 50\%$ ); 3) companies remain under foreign control in the three years following 2010. This group of firms represents our 'treated' group (780 firms in 2010). We then merge this group with the Cerved database in order to attribute to each firm its annual balance sheet information for the whole period (2007-2013). Finally, we get a seven-year panel of 4,987 observations in which treated companies are observed for three years (from 2007 to 2009) before the treatment and for four years (from 2010 to 2013) after the treatment.

As far as purely domestic firms are concerned, we extract them from the Cerved database, with the constraint that they had no foreign investor for the whole period 2007-13 (checked with Infocamere).<sup>7</sup> This panel amounts to 2,903,794 observations.

Graph 1 plots the distribution by the size classes and industry groups of the two samples of data in 2009, one year before the foreign acquisition. It provides some evidence of a concentration of treated firms in the groups of a greater size, while 74% of the untreated firms have yearly net sales of at most € 2 million. Moreover, foreign acquisition is oriented towards specific sectors, i.e. consumer services, metalworking and firm services.

Graph a1 in the Appendix provides some evidence on the pre-acquisition difference between the two samples. We consider the following group of performance variables: i) net sales, a size variable; ii) ROE, return on equity, a profitability indicator; iii) value added to labour cost, which measures firms' competitiveness in terms of labour cost; iv) financial debt on assets, a measure of the financial structure and, indirectly, of financial soundness. We also consider some variables that proxy the structural characteristics of companies: i) knowledge intensity (intangible assets/total assets), a measure of the level of knowledge capital (e.g., brands, trademarks and patents) employed in the business; ii) vertical integration (value added/net sales), an indicator that proxies the number of stages of the production process performed within the confines of the firm, in relation to those carried out ex-

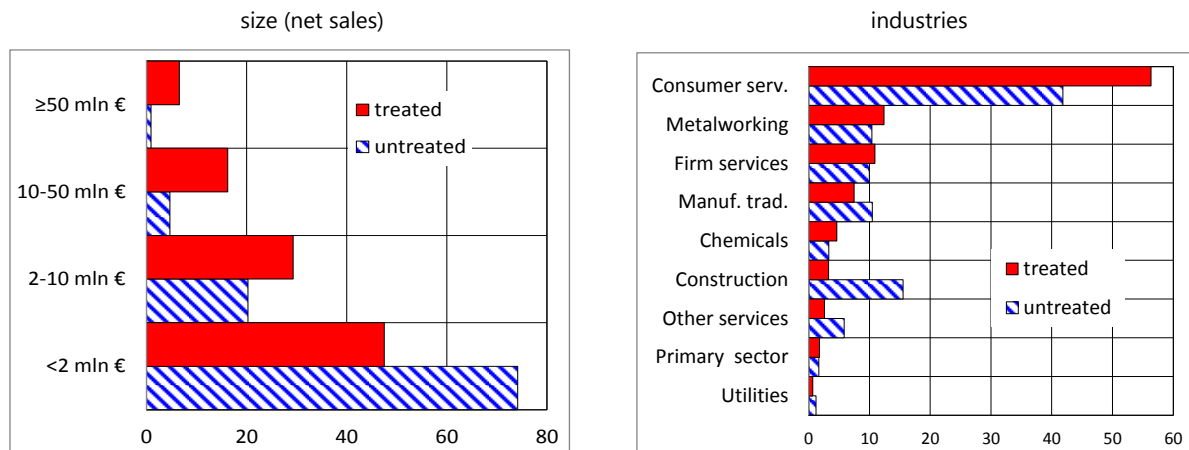
<sup>6</sup> The choice of 2010 allows us to have enough data before and after FDI.

<sup>7</sup> We apply some filters to Cerved data in order to select active, "comparable" companies. Financial (including holdings) and real estate companies have been excluded from the analysis.

ternally; iii) age.<sup>8</sup> These variables, together with other controls, have been used in the probit model of the PSM procedure (see section 3).

Distribution by size and industry of treated firms and those that stay purely domestic (2009; percentages)

Graph 1



Source: Infocamere and Cerved.

In order to smooth the tails of the distribution and to eliminate some extreme outliers, we winsorize ROE at the 1% and 99% levels. Nevertheless, after winsorization, ROE still presents very long tails (with a mean of -1.2, and values ranging from -600 to 167); this feature is due to the high sensitivity of the ratio as equity reaches low levels, following for instance a sequence of negative economic results. Therefore, in order to handle the indicator more easily, we do some smoothing with a percentile filter for the ROE by replacing each data point with its percentile rank.

In Graph a1, in the left-hand column, pre-acquisition means (2007-09) of these variables for foreign-controlled (dotted lines) and purely domestic firms are compared. A mixed picture emerges: the former are older and have a greater size and a smaller financial debt on assets ratio, but lower profitability. Thus the graphic evidence of ex-ante characteristics does not confirm that positive selection is present in all the performance variables.

### 3. The strategy

We combine two different techniques: a difference-in-difference (DID) estimation and a propensity score matching (PSM). The first one allows us to handle endogeneity related to time-invariant unobserved effects. The credibility of the DID estimator crucially relies on the assumption that in absence of the treatment, the average outcomes for treated and controls would have followed parallel trends over time. In order to address this concern and to select a more appropriate control sample we adopt a propensity score matching methodology that pairs each treated

<sup>8</sup> See Table a1 for a complete description of the variables.

firm with 'similar' control units. This approach should strengthen the parallel paths hypothesis, allowing us to control for time-variant pre-treatment observables. The validity of PSM also rests on the conditional independence assumption (CIA). CIA holds when, conditional on the observed covariates used in the PSM, assignment to treatment is independent of the outcome. Unfortunately, this assumption is not directly testable, but we can assume it if we believe that we have included all the relevant variables in the PSM. We discussed the variable choice in chapter 2, and from this viewpoint we are confident about our selection of variables. Other tests on the quality of matching are presented in paragraph 4.1.

In the PSM we match FDI firms (treated) with non-FDI firms (controls). Specifically, we adopt nearest-neighbour matching, selecting the non-FDI firms with a (predicted) probability of being treated that is closest to that of the FDI firms. For each treated unit, we match the ten nearest neighbours, allowing a given non-FDI firm to be matched to more than one FDI firm.

We choose those presented in the previous paragraph as covariates; they represent performance and structural firm characteristics that we believe best fit the acquisition process. In our choice of covariates we follow the suggestions of the literature reviewed in the introduction: we choose performance variables that allow us to control for bias due to positive (or negative) selection. We also add a set of covariates for firms' characteristics that could drive the acquisition choice when it aims at exploiting some complementarities between a foreign and a domestic firm (Gualupe *et al.*, 2012).<sup>9</sup>

We also add controls for sector effects (a full set of dummies for the groups of industries presented in graph 1), and per capita GDP of the area where the firm is located. In order to smooth the value of the pre-acquisition covariates chosen to find appropriate controls, we consider 2007-09 averages. The probit model of foreign acquisition can be represented as follows:

$$p_i = \Pr(D_i = 1|X_i) = \Phi(X_i'\beta + \varepsilon_i) \quad (1)$$

where  $D_i$  is a binary variable describing treatment status:  $D=1$  if the firm  $i$  becomes an MNE, and  $D=0$  otherwise;  $X_i$  is a vector of observable characteristics in the three years before the acquisition, and  $\Phi$  is a standard normal cumulative distribution function. Then we calculate the predicted probability of switching (propensity score) from domestic to foreign-controlled and we create a sample where for each foreign-controlled (treated) firm there are ten purely domestic firms (matched counterfactual) having a very similar ex-ante probability of becoming foreign-owned.

<sup>9</sup> For example, a firm with a good distribution network and high production costs may search for a partner with low production costs due to long production experience. In this case, structural variables like age (high) and intangible assets (low) may be relevant for the selection.

The last step of our strategy is to compare treated firms and controls after the acquisition of the treated ones using difference-in-differences (DID). We consider 2010-2013 as post-acquisition time.<sup>10</sup>

For each performance variable, we estimate an equation including year, firm fixed effects and a set of time-variant controls on the geographical area and industry of the firm, to take account of possible different trends among sectors or geographical areas. Panel data help to control for the unobservable non-random elements of the acquisition decision that are constant over time. The baseline estimated equation is:

$$\text{performance}_{it} = \alpha + \beta * \text{FDI}_i * \text{post}_t + \text{year FE} + \text{firm FE} + \text{sector}_i * \text{trend}_t + \text{area}_i * \text{trend}_t + u_{it} \quad (2)$$

where

$i$  = firm;  $t$  = time

$\text{FDI} = 1$  for  $i$  = foreign- acquired and 0 otherwise

$\text{post} = 1$  for  $t \geq 2010$  and 0 otherwise

$\text{sector}$  = firm's sector (see table a1)

$\text{area}$  = firm's geographical location (see table a1)

$\text{trend} = 1, 2, 3, \dots$  for the time span considered in the equation

A different approach for dealing with the potential endogeneity of the ownership variable is to use instrumental variables (Benfratello and Sembenelli, 2006, among others). The papers that use this methodology focus on productivity (TFP) as an outcome variable, and this allows them to exploit structural functional forms (a Cobb-Douglas production function) in the analysis. Since our examination extends to a large set of economic performance indicators, there is much less a priori theoretical ground for the assumptions on the form of the estimating equations, and therefore DID is our preferred choice.

## 4. Results

### 4.1 Propensity score matching

As a first step for propensity score matching, we estimate the probability of being foreign- acquired using a probit model. Table 1 presents the results of the probit model in equation (1).

All the covariates are significant at 1%, supporting the assumption that size, profitability, the financial situation and the structural indicators chosen influence the acquisition decision.

<sup>10</sup> The choice to consider 2010 as the post-acquisition year is somewhat arbitrary; however, as our analysis also considers the FOP effects for each year after the acquisition (see table 5), we believe that this choice should not affect the results..

Probit model: probability of being acquired in 2010 using 2007-09 variables Table 1

Variables	Coefficients	Standard error
log(net sales)	0.169 ***	0.009
vadded labour	-0.037 ***	0.009
ROE rank	-0.003 ***	0.001
fdebt asset	-0.170 ***	0.064
intangible assets	-0.423 ***	0.157
vertical integration	0.320 ***	0.067
age	-0.009 ***	0.001
GDP	0.000 ***	0.000
chemicals	0.155 *	0.094
construction	-0.260 ***	0.094
traditional manuf.	0.020	0.084
metalworking	0.087	0.080
primary sector	0.405 ***	0.118
firm services	0.155 *	0.081
consumer serv.	0.262 ***	0.074
utilities	-0.166	0.160
constant	-5.489 ***	0.134

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Number of observations: 392,254. The first eight variables are 2007-09 means. See Table a1 for a complete description of the variables.

PSM provides a robust and reliable control sample for estimating the foreign acquisition effect if the pre-acquisition variables are balanced between the acquired and the non-acquired groups. The balancing property implies that the control group produced by PSM has a distribution of covariates very similar to that in the treated group. Table 2 shows the mean values of treated firms and controls both in the full sample and in the post-PSM sample, and the results of a simple t-test on the mean value differences of the performance variables of the two groups of firms.

The third column shows that, before matching, size (net sales) and age are significantly larger for treated firms than for the rest of the sample, while the value added/labour ratio and profitability are lower. At the same time, there is no ex-ante important difference in the financial structure and in the importance of intangible assets. After matching, the differences in means are significantly reduced: the hypothesis that the difference in covariate means of treated firms and controls is null cannot be rejected. At the bottom of the table we also report the growth rates of the outcome variables, both for treated firms and controls in the pre-treatment period. After matching, the t-test shows that the assumption of similar mean growth rates cannot be rejected, supporting the common trend assumption required by DID methodology.

Comparisons between full sample, treated firms and controls; means for 2007-09 Table 2

Variables	Full sample				Propensity score matching sample			
	Mean		Difference in means		Mean		% Bias	Difference in means
	Treated	Control			Treated	Control		
log(net sales)	8.01	6.89	1.12	***	8.01	8.08	-4.5	-0.07
vadded labour	1.64	2.14	-0.50	***	1.64	1.72	-3.4	-0.08
ROE rank	46.45	51.01	-4.57	***	46.45	46.73	-1.1	-0.28
fdebt asset	0.22	0.22	-0.01		0.22	0.22	-2.7	-0.01
intangible assets	0.04	0.04	0.00		0.04	0.04	2.5	0.00
vertical integration	0.29	0.31	-0.03	***	0.29	0.28	-1.4	0.00
age	14.60	13.19	1.41	***	14.60	14.45	-1.3	0.15
GDP	32,282	27,331	4,951	***	32,282	32,151	2.3	131
chemicals	0.05	0.03	0.02		0.05	0.05	0.7	0.00
construction	0.03	0.04	-0.01		0.03	0.04	-2.6	-0.01
traditional manuf.	0.08	0.11	-0.03		0.08	0.07	0.9	0.00
metalworking	0.13	0.11	0.02		0.13	0.12	1.1	0.00
primary sector	0.02	0.01	0.00		0.02	0.02	-3.1	0.00
firm services	0.11	0.10	0.01		0.11	0.10	1.5	0.00
consumer serv.	0.56	0.41	0.14		0.56	0.55	0.8	0.00
utilities	0.01	0.01	0.00		0.01	0.01	-1.3	0.00
2007-09 % Growth rates of performance variables								
net sales	-5.92	-11.93	-6.01	**	-5.92	-3.35		-2.57
ROE rank	-11.25	-5.98	-5.27	***	-11.25	-9.03		-2.22
cash asset rank	-4.94	-1.45	-3.49	***	-4.94	-3.55		-1.39
fdebt asset	-0.49	11.71	12.2	**	-0.49	9.18		-9.67
score	8.28	5.02	-3.26	***	8.28	8.51		-0.23

Firms are observed in the three years before acquisition. Differences in means are accompanied by a t-test to document significant differences between the treated firms and the matched control subset; the standardized bias is defined as the difference of sample means in the treated and matched control subsample as a percentage of the square root of the average of sample variances in both groups. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

The balancing property is confirmed by the size of the standardized bias (at most 4.5% for net sales) as suggested by Rosenbaum and Rubin (1985). For each covariate it is defined as the difference of sample means in the treated and matched subsamples as a percentage of the square root of the average of sample variances in both groups.

Even though there is no clear threshold for establishing the success of the matching procedure, a standardized bias of around 5% or less is considered acceptable (Caliendo and Kopeinig, 2008). The balancing property is supported by the result of the Hotelling T2 test of the joint significance of differences in means (see Table a2).

Lastly, we verified “common support”, which is the overlap between values of  $X$  for the comparison groups (treated and controls), confirming our a priori assumption that the large sample from which controls are selected would ensure it.<sup>11</sup>

## 4.2 Difference-in-differences

As mentioned in the introduction, our analysis focuses on a set of selected balance sheet indicators, which allow us to investigate the effect of FDI on three different features of firm performance: size, profitability, and financial soundness. Specifically, we considered net sales as a proxy for size, ROE and cash flow on assets as measures of profitability, and financial debt on assets together with a score (a comprehensive credit risk indicator obtained by linear discriminant analysis with lower values indicating safer firms) as measures of financial soundness.<sup>12</sup> Both ROE and cash flow on assets are measured as a percentile rank. For the last two variables we expect a negative sign of the coefficients, while we expect positive signs for all the other variables.

Before implementing a difference-in-differences estimate, as a robustness check, we test the DID common trend assumption using pre-treatment data (2007-09).<sup>13</sup> The test is carried out by estimating two placebo experiments that artificially move the acquisition year from 2010 to 2008 (the first one) and to 2009 (the second one, Waldinger, 2012). The estimated equations have the following structure:

$$\text{performance}_{it} = \alpha + \beta * \text{FDI}_i * \text{placebo}_t + \text{year FE} + \text{firm FE} \\ + \text{sector}_i * \text{trend}_t + \text{area}_i * \text{trend}_t + u_{it} \quad (3)$$

where

$i$  = firm;  $t$  = time (2007, 2008, 2009)

$\text{FDI} = 1$  for  $i$  = foreign-acquired and 0 for the matched controls

$\text{placebo} = 1$  for  $t \geq 2008$  in the first placebo test and 0 otherwise

$\text{placebo} = 1$  for  $t = 2009$  in the second placebo test and 0 otherwise

$\text{sector}$ ,  $\text{area}$ ,  $\text{trend}$  as defined in equation (2)

The results reported in Table 3 shows that the  $\beta$  coefficients in the regressions (3) are not significant, excluding the existence of an ex-ante divergent trend of future treated firms compared to the matched controls.

<sup>11</sup> We used the Stata routine `psmatch2` to implement the matching and to verify the common support assumption.

<sup>12</sup> See Table a1 for a description of the variables.

<sup>13</sup> The common trend assumption is that, in the absence of the acquisition, treated firms and controls would have followed the same trend.

Placebo tests for common trend (1)					Table 3
Variables	log (net sales)	ROE rank	cash asset rank	fdebt asset	score
<b>first regression: moving acquisition to 2008</b>					
FDI*placebo <sub>2008,2009</sub>	<b>-0.030</b> (0.018)	<b>-1.117</b> (1.285)	<b>-0.182</b> (0.541)	<b>-0.006</b> (0.008)	<b>-0.028</b> (0.055)
constant	<b>8.190***</b> (0.009)	<b>57.970***</b> (0.571)	<b>8.341***</b> (0.236)	<b>0.198***</b> (0.003)	<b>4.427***</b> (0.025)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	20,227	19,233	20,227	20,227	20,227
<b>second regression: moving acquisition to 2009</b>					
FDI*placebo <sub>2009</sub>	<b>-0.016</b> (0.020)	<b>-2.139</b> (1.346)	<b>-0.876</b> (0.593)	<b>0.003</b> (0.007)	<b>0.005</b> (0.057)
constant	<b>8.193***</b> (0.009)	<b>57.73***</b> (0.637)	<b>8.177***</b> (0.262)	<b>0.200***</b> (0.004)	<b>4.435***</b> (0.027)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	20,227	19,233	20,227	20,227	20,227

(1) Robust standard errors (clustered by firm) in parentheses. \*\*\*significance at 1%; \*\* at 5%; \* at 10%.

We performed four different exercises using difference-in-differences. The first one is the baseline and simply tests the effect on the five performance variables of being foreign-owned. The second one tests FOP on FDI versus non-FDI for each year after acquisition, in order to check the timing of the effect of foreign acquisition on performance. The third exercise examines the possible differences in FOP between manufacturing and services. The last one (discussed in the section dedicated to the robustness checks) looks for differential FOP effects depending on the country of origin of the controlling firm (advanced countries versus tax havens).

Table 4 shows the results of the first exercise: a DID regression based on equation (2). As expected, the foreign ownership premium is significant; the signs for all the performance indicators are consistent with the expected ones.

After acquisition, net sales improve by 7%; profitability increases by 1.8 positions in terms of ROE and 1.7 positions in terms of cash flow on assets (in a ranking of 1 to 100); the level of indebtedness decreases by 2.8 percentage points; the score (a measure increasing in level of riskiness) improves by 0.1 on a scale of 1 to 10.

Difference-in-differences: FDI versus non-FDI (1)					Table 4
Variables	log (net sales)	ROE rank	cash asset rank	fdebt asset	score
FDI*post	<b>0.070***</b> (0.026)	<b>1.800*</b> (0.988)	<b>1.691*</b> (0.929)	<b>-0.028***</b> (0.007)	<b>-0.102**</b> (0.049)
constant	<b>8.237***</b> (0.013)	<b>55.360***</b> (0.601)	<b>53.64***</b> (0.532)	<b>0.206***</b> (0.004)	<b>4.552***</b> (0.028)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	44,231	41,375	44,231	44,231	44,231

(1) Firm controls include sector trends and geographical area trends. Robust standard errors (clustered by firm) in parentheses.  
\*\*\*significance at 1%; \*\* at 5%; \* at 10%.

Table 5 shows the results of the second exercise: a DID regression based on the following equation:

$$\text{performance}_{it} = \alpha + \beta_1 \text{FDI}_i * Y_{2010} + \beta_2 \text{FDI}_i * Y_{2011} + \beta_3 \text{FDI}_i * Y_{2012} + \beta_4 \text{FDI}_i * Y_{2013} + \text{year FE} + \text{firm FE} + \text{sector}_i * \text{trend}_t + \text{area}_i * \text{trend}_t + u_{it} \quad (4)$$

where

- i = firm; t= time
- FDI = 1 for i = foreign-acquired and 0 otherwise
- Y2010 = 1 for t = 2010 and 0 otherwise
- Y2011 = 1 for t = 2011 and 0 otherwise
- Y2012 = 1 for t = 2012 and 0 otherwise
- Y2013 = 1 for t = 2013 and 0 otherwise
- sector, area, trend as defined in equation (2)

The effect of foreign ownership increases over time for all variables. For net sales, the greater effects emerge three years after the acquisition. Improvement in profitability is less steady: coefficients for the ROE rank and for cash flow on the assets rank are at their highest in 2013, but they are not significant in 2010 and 2012. This effect is expected to a certain extent as these variables depend on a large range of company variables: sales, cost structure and financial equilibrium; a certain delay is necessary in order to transmit the improvement of these variables to profits. The financial indicator coefficient is always significant, stays negative and increases in absolute value year after year. Lastly, the score variable, which can be considered as a comprehensive indicator of economic and financial performance, grows in magnitude and is significant from the third year onwards.

Difference-in-differences: FDI versus non-FDI each year after acquisition (1) Table 5

Variables	log (net sales)	ROE rank	cash asset rank	fdebt asset	score
FDI * Y2010	<b>0.047**</b> (0.023)	<b>-0.456</b> (1.158)	<b>0.186</b> (1.012)	<b>-0.019***</b> (0.007)	<b>-0.010</b> (0.051)
FDI * Y2011	<b>0.072**</b> 0.028	<b>2.163*</b> (1.311)	<b>2.241*</b> (1.159)	<b>-0.023***</b> (0.008)	<b>-0.052</b> (0.056)
FDI * Y2012	<b>0.070**</b> (0.034)	<b>1.388</b> (1.378)	<b>1.902</b> (1.257)	<b>-0.037***</b> (0.009)	<b>-0.182***</b> (0.066)
FDI * Y2013	<b>0.100***</b> (0.037)	<b>4.995***</b> (1.450)	<b>2.867**</b> (1.372)	<b>-0.038***</b> (0.009)	<b>-0.202***</b> (0.071)
constant	<b>8.240***</b> (0.012)	<b>55.640***</b> (0.598)	<b>53.740***</b> (0.528)	<b>0.206***</b> (0.004)	<b>4.543***</b> (0.028)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	44,231	41,375	44,231	44,231	44,231

(1) Firm controls include sector trends and geographical area trends. Robust standard errors (clustered by firm) in parentheses.  
\*\*\*significance at 1%; \*\* at 5%; \* at 10%.

Table 6 shows the impact of the foreign ownership premium across broad industry groups. The DID regression is based on the following equation which presents triple interaction terms; second-order non-collinear factors have been considered too:<sup>14</sup>

$$\text{performance}_{it} = \alpha + \beta_1 \text{FDI}_i * \text{manufacturing}_i * \text{post}_t + \beta_2 \text{FDI}_i * \text{services}_i * \text{post}_t + \beta_3 \text{FDI}_i * \text{other}_i * \text{post}_t + \beta_4 \text{manufacturing}_i * \text{post}_t + \beta_5 \text{services}_i * \text{post}_t + \beta_6 \text{other}_i * \text{post}_t + \text{year FE} + \text{firm FE} + \text{sector}_i * \text{trend}_t + \text{area}_i * \text{trend}_t + u_{it} \quad (5)$$

where

$i$  = firm;  $t$  = time

$\text{FDI} = 1$  for  $i$  = foreign-acquired and 0 otherwise

$\text{post} = 1$  for  $t \geq 2010$  and 0 otherwise

$\text{manufacturing} = 1$  for manufacturing and 0 otherwise

$\text{services} = 1$  for services and 0 otherwise

<sup>14</sup> The second-order interactions:  $\text{FDI}_i * \text{manufacturing}_i$ ,  $\text{FDI}_i * \text{services}_i$  and  $\text{FDI}_i * \text{other}_i$  are time-invariant dummies absorbed by a firm's fixed effects; the interaction  $\text{FDI}_i * \text{post}_t$  can be obtained as the sum of the three dummies:  $\text{FDI}_i * \text{manufacturing}_i * \text{post}_t$ ,  $\beta_2 \text{FDI}_i * \text{services}_i * \text{post}_t$  and  $\beta_3 \text{FDI}_i * \text{other}_i * \text{post}_t$ , given that the three broad industry groups are exhaustive.

other = 1 for firms in the residual sectors (primary and construction) and 0 otherwise<sup>15</sup>

sector, area, trend as defined in equation (2)

The  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  coefficients, which interest us, show that the impact of foreign ownership is not homogeneous across broad groups of industries, being significant in services but not in manufacturing. A possible explanation for this phenomenon could depend on the greater exposure of manufacturing industries to international market discipline that induces greater efficiency. On the other hand, many service branches are regulated and have some forms of barriers to entry that limit efficiency achievements. Therefore foreign acquisition should improve performance more for service sector firms than for manufacturing entities that possibly tend to be nearer to the efficiency frontier. The results are confirmed if we reapply the PSM + DID procedure as defined in equations (1) and (2) separately from the subsample of manufacturing and from the subsample of service firms; the figures are shown in Tables a3 and a4 in the appendix. Obviously, this approach does not allow us to make a meaningful comparison of the estimations, but it helps us to refine the matching procedure for the purpose of testing the treatment effect separately within each broad industry.

Difference-in-differences: FDI in manufacturing versus FDI in services (1)					Table 6
Variables	log (net sales)	ROE rank	cash asset rank	fdebt asset	score
FDI * manufacturing * post	<b>0.040</b> (0.050)	<b>1.064</b> (1.762)	<b>0.682</b> (1.743)	<b>-0.013</b> (0.014)	<b>-0.092</b> (0.105)
FDI * services * post	<b>0.076**</b> (0.032)	<b>2.009</b> (1.224)	<b>2.156*</b> (1.115)	<b>-0.032***</b> (0.008)	<b>-0.112*</b> (0.056)
FDI * other * post	<b>0.157</b> (0.137)	<b>2.806</b> (4.522)	<b>0.136</b> (4.585)	<b>-0.069***</b> (0.031)	<b>0.030</b> (0.202)
constant	<b>8.239***</b> (0.017)	<b>55.620***</b> (0.785)	<b>53.91***</b> (0.700)	<b>0.207***</b> (0.005)	<b>4.519***</b> (0.036)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
manufacturing * post	Y	Y	Y	Y	Y
services * post	Y	Y	Y	Y	Y
other * post	Y	Y	Y	Y	Y
obs.	44,231	41,375	44,231	44,231	44,231

(1) Firm controls include sector trends and geographical area trends. Robust standard errors (clustered by firm) in parentheses.  
\*\*\*significance at 1%; \*\* at 5%; \* at 10%.

<sup>15</sup> They represent 3.75% of the treated sample; see Table a1 for sector definitions.

### 4.3 Further robustness checks

As a further check on the existence and the strength of the foreign ownership premium, we test it by grouping treated firms into classes, according to the country of origin of the acquisition. In fact at micro level our dataset shows a significant share of foreign investors located in countries that provide fiscal or legal benefits. Anecdotal evidence indicates that in many cases the ultimate control subject of these entities is domestic, and the 'foreign investor' is only a shell company created in a fiscal haven just for fiscal or legal reasons. Consequently, this kind of business does not imply any true acquisition: thus in this case we do not expect any foreign ownership premium.

Unfortunately, we cannot test our assumption directly on 'vested foreign investors' because our dataset does not allow us to detect the ultimate investor. In any case, even if the assumption on tax havens is true only in part, we can use it to test the robustness of FOP. Assuming the existence of 'vested foreign investors' implies that a fraction of our treated sample has not really been treated; this fraction is concentrated among the firms controlled by foreign owners located in tax havens. By interacting the treatment variable with a dummy for tax havens, we are in fact carrying out a falsification test on FOP as, in this case, the treatment is mostly a false treatment and then we expect the absence of a premium.

We create three dummy variables: the first one assumes value 1 if the company is treated and the country of origin of the participation is an 'advanced' one (0 otherwise); the second assumes value 1 if the company is treated and the country of origin of participation can be considered a tax haven (0 otherwise); the third one assumes value 1 if the company is treated and the participation comes from a country not considered before (0 otherwise; this group represents 2.93% of the treated sample). The sum of the three dummies gives exactly the treatment variable (FDI). The regression takes the following form:

$$\begin{aligned} \text{performance}_{it} = & \alpha + \beta_1 \text{advanced}_i \cdot \text{post}_t + \beta_2 \text{havens}_i \cdot \text{post}_t + \\ & \beta_3 \text{other}_i \cdot \text{post}_t + \text{year FE} + \text{firm FE} + \\ & \text{sector}_i \cdot \text{trend}_t + \text{area}_i \cdot \text{trend}_t + u_{it} \end{aligned} \quad (6)$$

where

$i$  = firm;  $t$  = time

$\text{post} = 1$  for  $t \geq 2010$  and 0 otherwise

$\text{advanced} = 1$  for  $i$  = foreign-acquired from an advanced country and 0 otherwise

$\text{havens} = 1$  for  $i$  = foreign-acquired from a tax haven and 0 otherwise<sup>16</sup>

$\text{other} = 1$  for  $i$  = foreign-acquired from other countries and 0 otherwise

$\text{sector}$ ,  $\text{area}$ ,  $\text{trend}$  as defined in equation (2)

<sup>16</sup> See Table a1 for details.

The results of the regression (table 7) show that FOP is not significant for any performance variable when the acquisition comes from a tax haven. On the contrary, controlling entities from advanced countries produce real and financial improvements in the acquired firms.

The findings discussed so far are based on a selection of variables for PSM that include performance and structural firm characteristics that we believe best fit the acquisition process and influence the outcome. This follows a general trend of the literature, which suggests including variables correlated with both the treatment and the outcome. However, the set of performance variables used is slightly different from that considered as the outcome in the DID estimation.

Difference-in-differences: FDI from advanced countries/from tax havens (1)					Table 7
Variables	log (net sales)	ROE rank	cash asset rank	fdebt asset	score
advanced*post	<b>0.101***</b> (0.027)	<b>1.952*</b> (1.152)	<b>2.070*</b> (1.111)	<b>-0.030***</b> (0.008)	<b>-0.154***</b> (0.057)
havens*post	<b>0.017</b> (0.068)	<b>1.871</b> (1.926)	<b>1.141</b> (1.715)	<b>-0.020</b> (0.014)	<b>0.023</b> (0.096)
other*post	<b>-0.031</b> (0.288)	<b>-0.005</b> (5.105)	<b>-1.373</b> (3-313)	<b>-0.039</b> (0.0340)	<b>0.128</b> (0.205)
constant	<b>8.237***</b> (0.013)	<b>55.37***</b> (0.602)	<b>53.64***</b> (0.533)	<b>0.206***</b> (0.004)	<b>4.551***</b> (0.028)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	44,231	41,375	44,231	44,231	44,231

(1) Firm controls include sector trends and geographical area trends. Robust standard errors (clustered by firm) in parentheses.  
\*\*\*significance at 1%; \*\* at 5%; \* at 10%.

Even if there is no common point of view in the literature about the requirement of coincidence between covariates in PSM and outcomes in DID, we propose an alternative estimation of our baseline as a robustness test, using all the outcome variables considered in the DID estimation as covariates for PSM. Thus we re-estimate equation (1) using an alternative Xi vector of observables that includes the 2007-2009 means of our five performance indicators (log net sales, ROE rank, cash asset rank, fdebt asset and score) plus controls for sector effects, and then our baseline equation (2) using the new control sample obtained. Table 8 shows results consistent with the previous ones.

## 5. Conclusions

The main stream of theoretical literature on foreign acquisition emphasizes the superior technical and managerial skills that multinationals transfer to acquired firms. This process, in turn, generates a foreign ownership premium (FOP) that materializes through the improvement of the acquired firm's performance.

In order to test this theoretical argument empirically it is necessary to rule out the possibility that the different performances of foreign-acquired firms, compared with purely domestic ones, is simply due to an ex-ante selection bias.

Using PSM combined with a difference-in-differences methodology to control for the possible ex-ante selection bias, we find that the performance of domestic firms improves after FDI. In order to identify the covariates to control for, we exploited the literature on selection processes. These variables are, in turn, the ones relevant for MNEs' investment choices.

A foreign ownership premium is present in all three characteristics considered for a firm's performance: size, profitability, and financial soundness. The effects increase over time, indicating that the transmission of knowledge and organizational and managerial changes is a slow process.

The effect of FDI on performance is only significant for service firms; this sector is generally more sheltered from international market discipline, leaving greater room for performance improvement than for industrial firms.

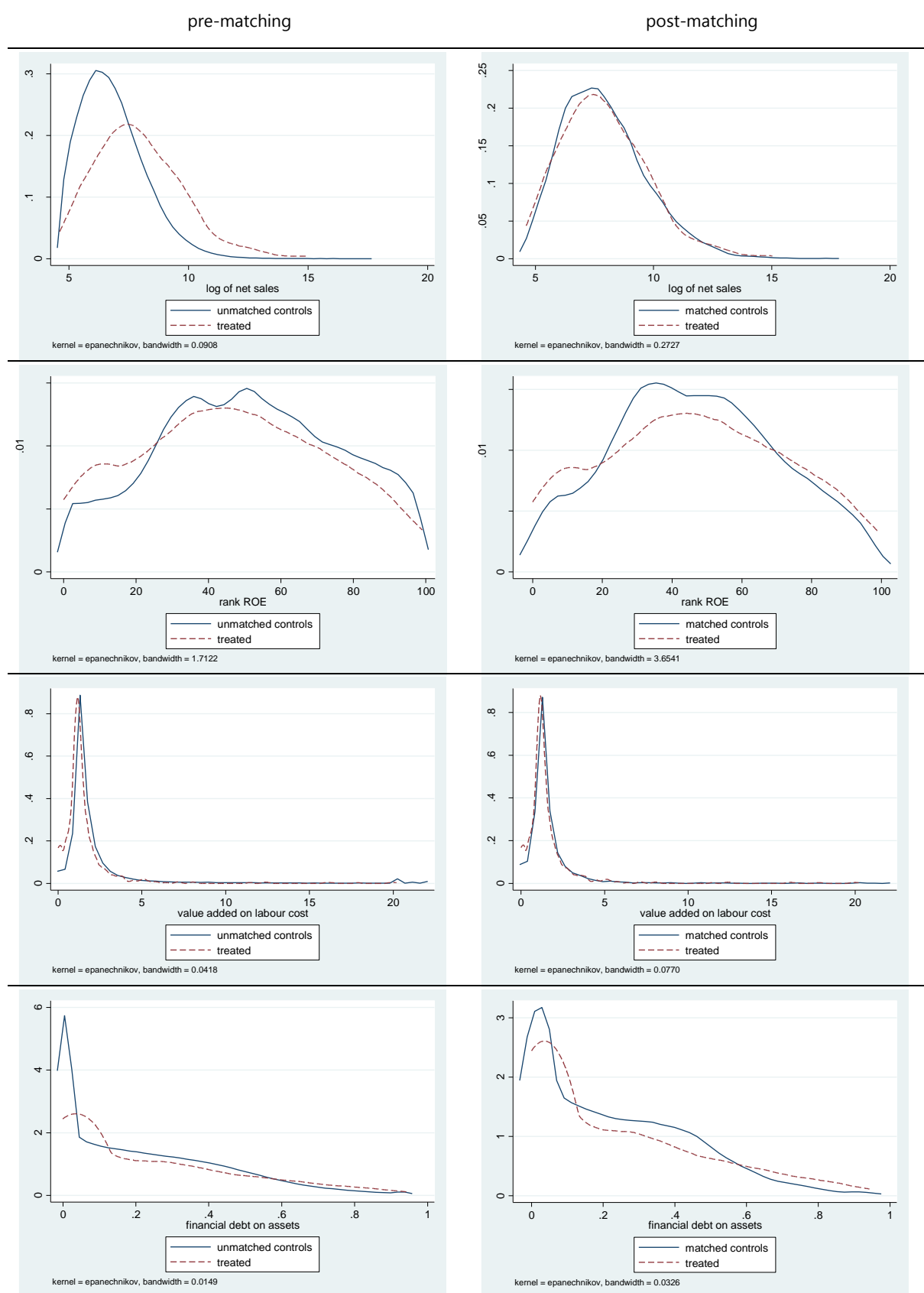
Lastly, FOP is not significant for any performance variable when the FDI comes from a tax haven. Assuming the existence of a significant number of 'vested foreign investors' concentrated in tax havens, we consider this result a falsification test: only 'true' acquisitions generate FOP, while shell companies with parent companies located in tax havens do not actually affect performance.

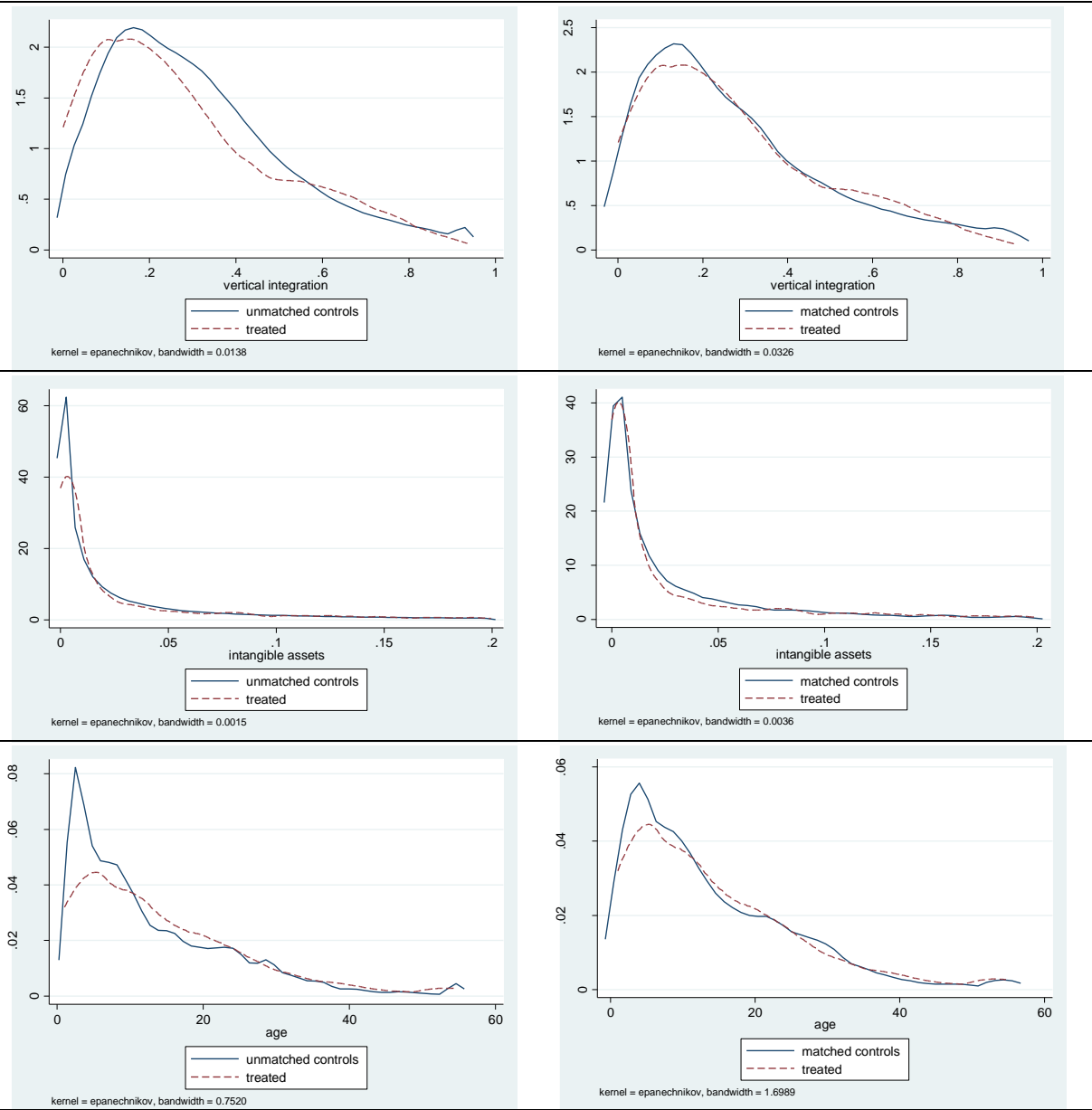
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## Appendix

Variables description		Table a1
Variable name	Description [source]	
FDI	Dummy equal to 1 if the firm is foreign-owned for the first time in 2010 (treated) and 0 if is not foreign-owned from 2007 to 2013 [Infocamere]	
log (net sales)	Log of net sales [Cerved]	
ROE rank	Return on equity (rank centiles) [Cerved]	
vadded labour	Value added to labour cost [Cerved]	
fdebt asset	Financial debt on assets [Cerved]	
intangible assets	Intangible assets/total assets [Cerved]	
vertical integration	Value added/net sales [Cerved]	
age	Firm's age [Cerved]	
score	Z-score; it is a measure of credit risk obtained by linear discriminant analysis; value range is 1 to 10, with lower values indicating safer firms and higher values risky firms [Cerved]	
cash asset rank	Cash flow on assets (rank centiles) [Cerved]	
GDP	Per-capita GDP in the province where the firm is located	
sector (1..9)	2-digits NACE Rev. 2 classification:	
	1 Other serv. = 84-99 2 Chemicals = 19-23 3 Construction = 41-43 4 Traditional manuf.= 10-18, 31-33 5 Metalworking = 24-30	6 Primary sector = 01-09 7 Firm services = 69-82 8 Consumer serv. = 45-63 9 Utilities = 35-39
area	1 North West 2 North East	3 Centre 4 South
manufacturing, services	manufacturing= sectors 2, 4, 5, 9 services= sectors 1, 7, 8 other= sectors 3, 6	
country type (countries selected are those included in the dataset)	Advanced = Austria, Belgium, Bulgaria, Canada, Czech Republic, Cyprus, Croatia, Denmark, Finland, France, Germany, Japan, Gibraltar, Greece, Ireland, Israel, Lithuania, Malta, Norway, Netherlands, Poland, Portugal, United Kingdom, Romania, Singapore, Spain, United States, Sweden, Hungary	Tax havens = Liechtenstein, Luxembourg, Panama, San Marino, Switzerland





Propensity score matching: Hotelling T-squared test (1)

Table a2

Sample	Hotelling P-value
treated vs unmatched	0.000
treated vs matched	0.979

(1)  $H_0$ : difference between covariates means jointly null.

Difference-in-differences: FDI versus non-FDI - manufacturing (1) Table a3

Variables	log (net sales)	ROE rank	cash asset rank	fdebt asset	score
FDI*post	<b>0.018</b> (0.049)	<b>1.771</b> (1.742)	<b>0.626</b> (1.737)	<b>-0.013</b> (0.014)	<b>-0.068</b> (0.103)
constant	<b>8.892***</b> (0.022)	<b>54.010***</b> (1.005)	<b>55,440***</b> (0.969)	<b>0.241***</b> (0.009)	<b>4.400***</b> (0.060)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	11,920	11,334	11,920	11,920	11,920

(1) Firm controls include sector trends and geographical area trends. Robust standard errors (clustered by firm) in parentheses.  
\*\*\*significance at 1%; \*\* at 5%; \* at 10%.

Difference-in-differences: FDI versus non-FDI services (1) Table a4

Variables	log (net sales)	ROE rank	cash asset rank	fdebt asset	score
FDI*post	<b>0.076**</b> (0.032)	<b>2.517***</b> (1.241)	<b>2,624**</b> (1.135)	<b>-0.031***</b> (0.008)	<b>-0.159**</b> (0.057)
constant	<b>8.060***</b> (0.016)	<b>55.980***</b> (0.759)	<b>53.550***</b> (0.648)	<b>0.182***</b> (0.005)	<b>4.564***</b> (0.032)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	30,472	28,263	30,472	30,472	30,472

(1) Firm controls include sector trends and geographical area trends. Robust standard errors (clustered by firm) in parentheses.  
\*\*\*significance at 1%; \*\* at 5%; \* at 10%.

IFC-ECCBSO-CBRT Conference on *"Uses of Central Balance Sheet Data Offices' information"*

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Özdere-İzmir, Turkey, 26 September 2016

## Foreign ownership and performance: evidence from a panel of Italian firms<sup>1</sup>

Chiara Bentivogli and Litterio Mirenda,  
Bank of Italy

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<sup>1</sup> This presentation was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

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**BANCA D'ITALIA**

**EUROSISTEMA**

# **Foreign ownership and performance**

*evidence from a panel of Italian firms*

Chiara Bentivogli and Litterio Mirenda

***The opinions expressed in this paper are the authors' own  
and do not reflect the view of the Bank of Italy***

## Abstract

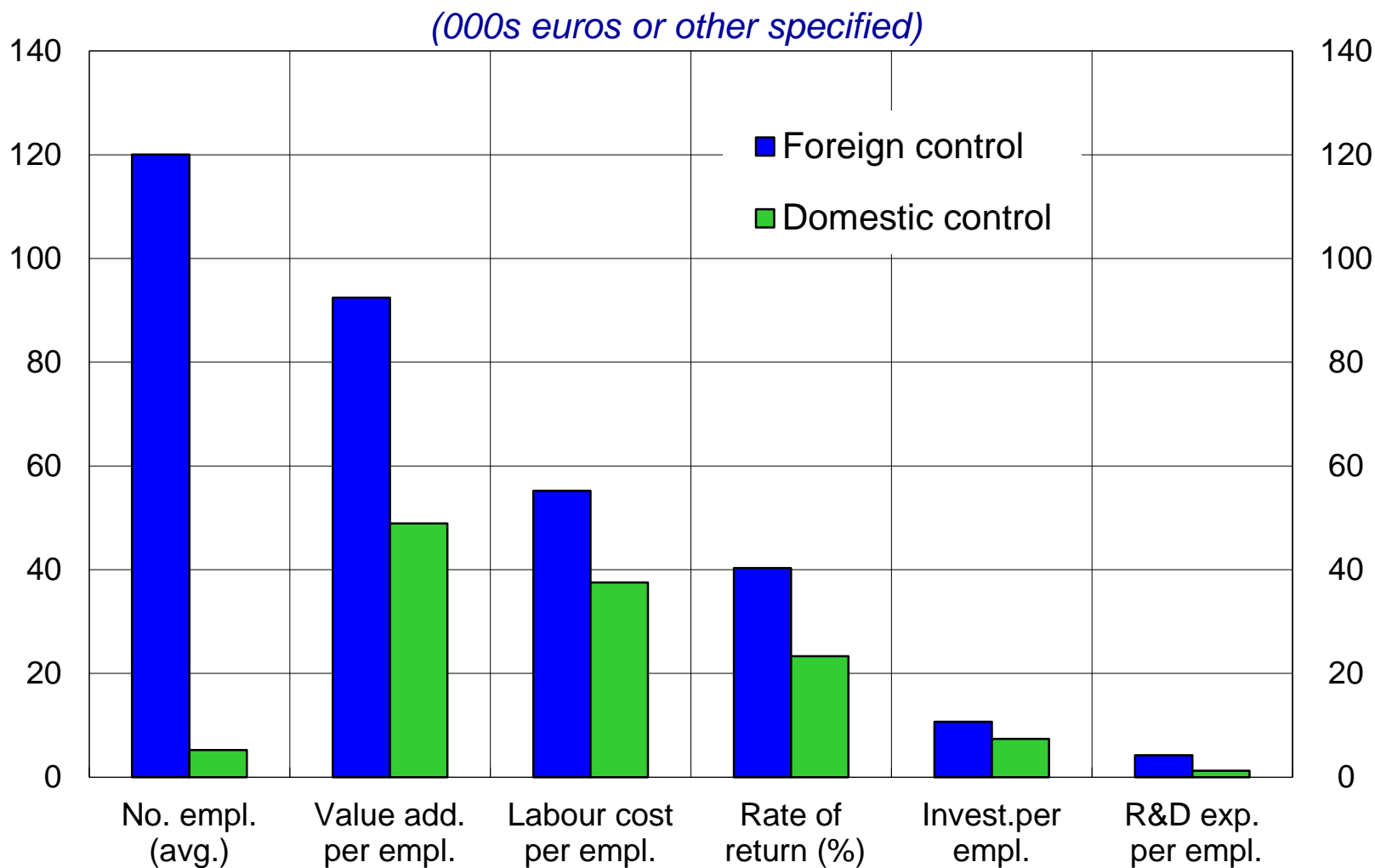
The paper studies the impact of the foreign ownership on the firm's economic performance. We use a unique panel dataset to test foreign ownership premium by comparing our sample of firms based in Italy and participated by a foreign subject with a sample of purely domestic firms that, in order to have a proper counterfactual, have been selected through a propensity score matching. Our difference-in-differences results show the existence of a premium for size, profitability and financial soundness of the foreign-participated companies. The premium increases with time, it is concentrated in service sector, and disappears if the foreign investor is based in a fiscal haven.

- **JEL Classification:** F23, F61
- **Keywords:** Multinational enterprise; Ownership; Foreign direct investment, Firm performance.

# Agenda

- **Why** we do investigate foreign ownership premium? Its existence could justify policies to attract FDIs
- **How:**
  - ✓ **Introduction:** foreign ownership premium (FOP) facts & theory
  - ✓ **Empirical strategy:** counterfactual, controls, DIFF-IN-DIFF
  - ✓ **Results:** we find foreign ownership premium

data show better performance of foreign owned firms  
vis-à-vis domestic firms



Source: Istat, FATS. Year 2012, industry, Italy.

## Why? Ex-ante vs ex-post

### ✓ Ex-post: Forward linkages:

MNE parent company transfers superior technology and organizational practices to its affiliate, thus improving performance (Hymer, Dunning) → FOP

### ✓ Ex-ante: selection bias:

- Well-performing foreign firms choose to acquire underperforming companies (negative selection; Manne);
- Only best firms are acquired (positive selection; Guadalupe)

# Literature on FOP

## Mixed results:

- Guadalupe et al. (2012), Arnold and Javorcik (2009), Girma and Gorg (2007), Piscitello and Rabbiosi (2005) find FOP
- Benfratello & Sembenelli (2006) do not find FOP on productivity
- Crinò & Onida (2008) find small FOP only in manufacturing

Previous literature	This paper
Cross sections	Panel
Small samples	Large sample
Productivity and wages	Balance sheet indicators

## Endogeneity:

We would like to estimate  $\beta$  in

$$\rightarrow \text{performance} = \alpha + \beta \text{ FDI} + \text{controls} + u$$

But as firms are chosen **non randomly** by foreign investors:

$$\rightarrow \text{FDI} = \alpha + \beta \text{ performance} + \text{controls} + u$$

## Endogeneity - our strategy (PSM-DID)

- Need a counterfactual: How would the firm have performed had the FDI not taken place?
- The control sample: firms with similar observable characteristics selected using propensity score matching (PSM)
- Panel data to control for time invariant unobservables
- DID est.

$$\text{performance}_{it} = \alpha + \beta * \text{FDI}_i * \text{post}_t + \text{time FE} + \text{firm FE} + \text{sector}_i * \text{trend}_t + \text{area}_i * \text{trend}_t + u_{it}$$

## Data selection

### Treated

- Using 'Infocamere' data on shareholdings, we extract the subset of new FDI in 2010 (same database used to extract the sample for Bank of Italy's Direct Reporting survey (BOP FDI))
- Dataset has been cleaned (missing country of investor, inconsistent data, etc..); only control (share  $\geq 50\%$ ) shareholding has been considered

### Control

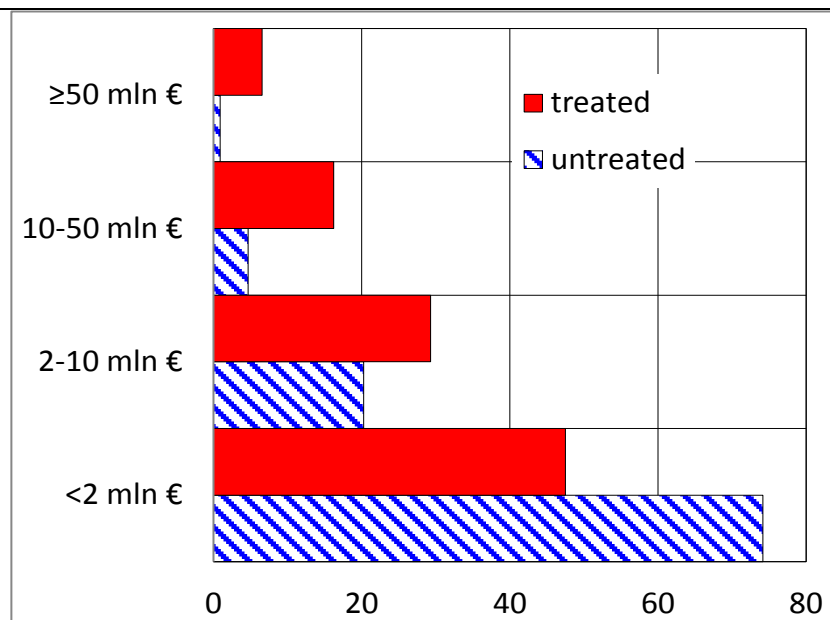
- Selection of the control sample → from the 2010 Cerved database (965,000 companies)

**Final panel** (2007-2013) ~ 44,000 obs.

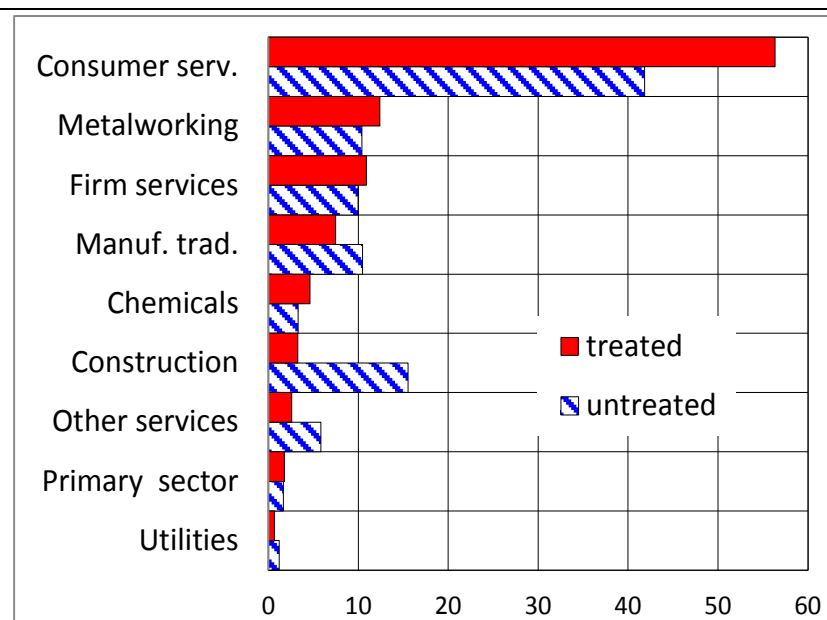
## Treated firms concentrate on larger size – specific industries

*Distribution by size and industry of treated firms and those that stay purely domestic  
(2009; %)*

**size (net sales)**



**industries**



## PSM one-to-ten nearest neighbour matching (probit)

- **covariates in probit** = performance variables +  
structural vars **relevant for FDI**

Size (net sales)

profitability (ROE)

financial soundness (financial debt/assets)

competitiveness (value added/labour cost)

Knowledge intensity (intangible assets/total assets)

Vertical integration (value added/net sales)

Age; per-capita GDP; industry controls

## PSM: Probit model: probability of being acquired in 2010 using 2007-09 variables (means)

Variables	Coefficients	Standard error
log(net sales)	0.169***	0.009
vadded labour	-0.037***	0.009
rank ROE	-0.003***	0.001
fdebt asset	-0.170***	0.064
intangible assets	-0.423***	0.157
vertical integration	0.320***	0.067
age	-0.009***	0.001
GDP	0.000***	0.000

+ industry controls

(1) \*\*\*significance at 1%; \*\* at 5%; \* at 10%.

## PSM: evidence on balancing: T-test on difference in covariates means (means 2007-09)

Variables	Full sample				PSM sample			
	Mean		Diff. in means		Mean		% Bias	Diff.in means
	Treated	Control			Treated	Control		
log(net sales)	8.01	6.89	1.12	***	8.01	8.08	-4.5	-0.07
vadded labour	1.64	2.14	-0.50	***	1.64	1.72	-3,4	-0.08
rank ROE	46.45	51.01	-4.57	***	46.45	46.73	-1.1	-0.28
fdebt asset	0.22	0.22	-0.01		0.22	0.22	-2.7	-0.01
Int. assets	0.04	0.04	0.00		0.04	0.04	2.5	0.00
Vert.integrat.	0.29	0.31	-0.03	***	0.29	0.28	-1.4	0.00
age	14.60	13.19	1.41	***	14.60	14.45	-1.3	0.15

+ p.c. GDP + industry controls

Do not reject  $H_0$ : means T&M are equal

DID: step 1 -> placebo test for common trend  
using pre-treatment data ( $t=2007,2008,2009$ )

$$\text{performance}_{it} = \alpha + \beta * \text{FDI}_i * \text{placebo}_t + \text{year FE} + \text{firm FE} + \text{sector}_i * \text{trend}_t + \text{area}_i * \text{trend}_t + u_{it}$$

Variables	log (net sales)	rank ROE	rank cash asset	fdebt asset	score
<i>first regression: moving acquisition to 2008 (placebo<sub>t</sub>=1 for t=2008,2009)</i>					
FDI*placebo <sub>2008,2009</sub>	<b>-0.030</b> (0.018)	<b>-1.117</b> (1.285)	<b>-0.182</b> (0.541)	<b>-0.006</b> (0.008)	<b>-0.028</b> (0.055)
constant	<b>8.190***</b> (0.009)	<b>57.970***</b> (0.571)	<b>8.341***</b> (0.236)	<b>0.198***</b> (0.003)	<b>4.427***</b> (0.025)
<i>second regression: moving acquisition to 2009 (placebo<sub>t</sub>=1 for t=2009)</i>					
FDI*placebo <sub>2009</sub>	<b>-0.016</b> (0.020)	<b>-2.139</b> (1.346)	<b>-0.876</b> (0.593)	<b>0.003</b> (0.007)	<b>0.005</b> (0.057)
constant	<b>8.193***</b> (0.009)	<b>57.73***</b> (0.637)	<b>8.177***</b> (0.262)	<b>0.200***</b> (0.004)	<b>4.435***</b> (0.027)

+ firm FE, year FE, sector/area trend

(1) Robust std errors (clustered by firm) in parentheses. \*\*\*significance at 1%; \*\* at 5%; \* at 10%.

## (1) DID: FDI/non-FDI

Variables	log (net sales)	rank ROE	rank cash asset	fdebt asset	score
<b>FDI*post</b>	<b>0.070***</b>	<b>1.800*</b>	<b>1.691*</b>	<b>-0.028***</b>	<b>-0.102**</b>
	(0.026)	(0.988)	(0.929)	(0.007)	(0.049)
<b>constant</b>	<b>8.237***</b>	<b>55.360***</b>	<b>53.64***</b>	<b>0.206***</b>	<b>4.552***</b>
	(0.013)	(0.601)	(0.532)	(0.004)	(0.028)
firm FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
sector/area trend	Y	Y	Y	Y	Y
obs.	44,231	41,375	44,231	44,231	44,231

(1) Robust standard errors (clustered by firm) in parentheses. \*\*\*significance at 1%; \*\* at 5%; \* at 10%.

## (2) DID: FDI/non-FDI in each year after acquisition

Variables	log (net sales)	rank ROE	rank cash asset	fdebt asset	score
<b>FDI * Y2010</b>	<b>0.047**</b>	<b>-0.456</b>	<b>0.186</b>	<b>-0.019***</b>	<b>-0.010</b>
	(0.023)	(1.158)	(1.012)	(0.007)	(0.051)
<b>FDI * Y2011</b>	<b>0.072**</b>	<b>2.163*</b>	<b>2.241*</b>	<b>-0.023***</b>	<b>-0.052</b>
	0.028	(1.311)	(1.159)	(0.008)	(0.056)
<b>FDI * Y2012</b>	<b>0.070**</b>	<b>1.388</b>	<b>1.902</b>	<b>-0.037***</b>	<b>-0.182***</b>
	(0.034)	(1.378)	(1.257)	(0.009)	(0.066)
<b>FDI * Y2013</b>	<b>0.100***</b>	<b>4.995***</b>	<b>2.867**</b>	<b>-0.038***</b>	<b>-0.202***</b>
	(0.037)	(1.450)	(1.372)	(0.009)	(0.071)
<b>constant</b>	<b>8.240***</b>	<b>55.640***</b>	<b>53.740***</b>	<b>0.206***</b>	<b>4.543***</b>
	(0.012)	(0.598)	(0.528)	(0.004)	(0.028)
<b>firm FE, year FE, sect/area trend</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>	<b>Y</b>
<b>obs.</b>	44,231	41,375	44,231	44,231	44,231

(1) Robust standard errors (clustered by firm) in parentheses. \*\*\*significance at 1%; \*\* at 5%; \* at 10%.

### (3) DID: FDI manufacturing/FDI services

Variables	log (net sales)	Rank ROE	rank cash asset	fdebt asset	score
FDI * manufacturing	0.040 (0.050)	1.064 (1.762)	0.682 (1.743)	-0.013 (0.014)	-0.092 (0.105)
FDI * services	0.076** (0.032)	2.009 (1.224)	2.156* (1.115)	-0.032*** (0.008)	-0.112* (0.056)
FDI * other	0.157 (0.137)	2.806 (4.522)	0.136 (4.585)	-0.069*** (0.031)	0.030 (0.202)
constant	8.239*** (0.017)	55.620*** (0.785)	53.91*** (0.700)	0.207*** (0.005)	4.519*** (0.036)
firm FE, year FE, sector/area trend	Y	Y	Y	Y	Y
manufacturing*post, services*post, other*post	Y	Y	Y	Y	Y
obs.	44,231	41,375	44,231	44,231	44,231

(1) Robust standard errors (clustered by firm) in parentheses. \*\*\*significance at 1%; \*\* at 5%; \* at 10%.

## (4) FDI from advanced countries/from tax havens

Variables	log (net sales)	Rank ROE	rank cash asset	fdebt asset	score
FDI * advanced	<b>0.101***</b>	<b>1.952*</b>	<b>2.070*</b>	<b>-0.030***</b>	<b>-0.154***</b>
	(0.027)	(1.152)	(1.111)	(0.008)	(0.057)
FDI * havens	<b>0.017</b>	<b>1.871</b>	<b>1.141</b>	<b>-0.020</b>	<b>0.023</b>
	(0.068)	(1.926)	(1.715)	(0.014)	(0.096)
FDI * other	<b>-0.031</b>	<b>-0.005</b>	<b>-1.373</b>	<b>-0.039</b>	<b>0.128</b>
	(0.288)	(5.105)	(3-313)	(0.0340)	(0.205)
constant	<b>8.237***</b>	<b>55.37***</b>	<b>53.64***</b>	<b>0.206***</b>	<b>4.551***</b>
	(0.013)	(0.602)	(0.533)	(0.004)	(0.028)
firm FE, year FE, sector/area trend	Y	Y	Y	Y	Y
obs.	44,231	41,375	44,231	44,231	44,231

(1) Robust standard errors (clustered by firm) in parentheses. \*\*\*significance at 1%; \*\* at 5%; \* at 10%.

## Conclusions

- We find that performance of Italian firms improves after FDI
- The effect on performance increases with time
- The effect of FDI on performance is significant only for service firms (in manufacturing international markets discipline)
- FOP is stronger when FDI comes from advanced countries (know how transmission...)
- Only «true» acquisitions generate FOP (chinese boxes with parent companies in tax havens unaffected performance)



**Thanks for your attention**