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The impact of outward FDI on the performance of Chinese multinationals

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Abstract

Using a new firm-level database, EMENDATA, this paper investigates the effects on Chinese multinational enterprises of Outward FDI (OFDI) into advanced European countries. Propensity score matching is combined with a difference-in-difference estimator to reduce the problems of self-selection of treated firms in foreign markets and to eliminate time-invariant and unobservable differences between those firms and the controls. The results provide robust evidence in support of the view that China's OFDI had so far a positive impact on domestic activities in enhancing firms' productivity and scales of operation, as measured by assets, sales and employment. Distinguishing among such investments on the basis of entry mode shows that acquisitions facilitate early access to intangible assets but are detrimental to financial performance, whereas greenfield investments have a positive impact on the scale and productivity of Chinese investors.

Keywords: outward FDI; reverse spillovers; performance; Chinese multinationals
JEL Codes: F45

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1 Introduction

Outward Foreign Direct Investment (OFDI) from China has become a popular topic in the academic literature because of its rapid increase and unconventional patterns (among many others, see Child and Rodrigues, 2005; Buckley et al, 2007). The related empirical literature has focused on analysis of the drivers of internationalization and on location choices, which have been analysed in numerous studies at both country level (Buckley et al., 2007; Deng, 2009) and firm level (Amighini et al, 2013; Ramasamy et al, 2013).

The rise of Chinese investments follows the provisions of the "Going Out" strategy, launched with the 10th Five-year Plan in 2000 and later reinforced in subsequent plans that fostered the internationalization of domestic firms. The aim was to promote industrialization and technological upgrading to support growth of the domestic economy (Wang, 2012; Davies, 2013). But so far there is only a limited amount of empirical research available regarding the effect of OFDI on the performance of Chinese investor companies. Some recent notable exceptions include a paper by Chen and Tang (2014) analysing the impact of Chinese OFDI on firms' performance on the basis of data from the Chinese Ministry of Commerce and another paper by Edamura et al (2014) that deals with the impacts of acquisitions and uses a Chinese-based financial database (ChinaVenture).

In this paper, we investigate whether and how OFDI has a positive impact on the performance of Chinese investing companies, using a sample of 368 Chinese firms, each having an affiliate in Europe, and covering the years 2003-2011. The empirical analysis takes advantage of the availability of a new database, EMENDATA (see Amighini et al., 2014, for a complete description), which merges FDI information with firm financial data from *Orbis* Bureau van Dijk's (BvD).

We measure the impact of OFDI on the investing companies by means of several indicators, including labour productivity, total factor productivity, assets, sales, employees, and profitability. In addition, we disaggregate OFDIs according to the mode of entry - Mergers and Acquisitions (M&As) or greenfield investments - and we assess whether there is any difference in impact on investors. To the best of our knowledge, this is the only study examining the impact of Chinese OFDI (a) into advanced economies and (b) accounting for specific effects of the different modes of entry.

Europe is an interesting destination because Chinese OFDI into EU countries is mainly motivated by the search of new markets, with the aim of creating overseas plat-

forms for sales and distribution, and of strategic assets, aimed at acquiring foreign technologies, knowledge and brands that are not fully available at home (Amighini et al, 2013). Therefore, it is of particular interest to investigate whether these investments - by introducing more efficient production techniques and improving overall performance in terms of scale, sales and profitability – generate positive effects on the performance of the investor firms.

We use the propensity score matching (PSM) technique to investigate the impact of OFDI on treated firms, each having an affiliate in Europe, by comparing them with a closely matched control group, selected from the subgroup of all the Chinese companies included in BvD Orbis with no investments abroad. Propensity score matching is then combined with difference-in-difference estimators to further eliminate time-invariant and unobservable differences between the treated and control firms.

Our results confirm that outward FDI does affect Chinese investor firms' performance. We find a positive effect on firms' efficiency and performance, which materialize at different points in time: the productivity enhancement takes some time (Mansfield, 1985; Chen et al., 2012), whereas there is an immediate impact on company scale, as indicated by increases in total assets and in numbers of employees. Total sales also show an upsurge as a result of the investment, showing the importance of market-seeking motives. Significant differences in the above results occur when we distinguish among investments on the basis of entry mode: acquisitions favour early access to intangible assets, but they result in negative financial performance, whereas it is via greenfield investments that Chinese firms are more likely to improve their scale and productivity.

Our analysis has important implications, since it adds to the existing knowledge of Chinese OFDI, in that we shed light on the kinds of spillovers that result from asset-exploring strategies in the more advanced markets and on which modes of entry enable Chinese companies to gain competitive advantages.

The remainder of the paper is structured as follows. Section 2 reviews the existing literature on the effects of OFDI on the investor firms' performance. Section 3 presents the original data used for the analysis and discusses the methodology. Results are discussed in Section 4, and Section 5 concludes.

2 The effect of outward FDI on investor firms' performance

The nexus between outward FDI and the investor companies has been mainly investigated in the context of advanced economies, and the results have not been clear-cut. The empirical literature on heterogeneous firms shows that MNEs enjoy a productivity advantage over other types of firms (Helpman et al., 2004), but the evidence on other dimensions of performance, including employment and profitability, is less straightforward. Several studies have shown that both horizontal and vertical OFDI generally have positive effects on productivity as well as on the size of domestic activities (Barba Navaretti et al., 2010; Desai et al., 2009), but the effects of vertical FDI on employment are not as obvious (Castellani and Barba Navaretti, 2004; Hijzen et al., 2011).

On emerging and developing countries, the empirical evidence on the impact of OFDIs on the investor firms is more limited. In contrast to the traditional MNEs, firms from emerging economies invest abroad in order to gain new competitive advantages and strategic resources they do not possess (Ramasamy, 2012; Luo and Tung, 2007). In light of this, it is not uncommon for EMNEs to undertake OFDIs as a deliberate strategy to grow larger and increase the overall scale of their activities (Luo and Tung, 2007).

Furthermore, both the motivation of the investments and their final destination have an important influence on performance. This is a relevant aspect for the purposes of this study, which focuses on the emerging economies' OFDI into advanced economies, characterized by a prevalence of *market-* and *strategic asset-seeking* motivations (Wang, 2012; Ramasamy, 2012).

In the case of *market-seeking* FDI, the resulting increase in the scope of operations of MNEs may stimulate the exploitation of economies of scale, at the level of both parent company and affiliate. This might happen as a consequence of sharing sunk costs, information, or learning by doing (Hijzen et al., 2011). In addition, economies of scale may significantly impact the performance of the parent company, which provides specialized services to the affiliates as well as intermediate goods, if the latter are involved in overseas production activities serving foreign markets. In this context, not only do MNEs increase their overall size; they also combine domestic and foreign production to enhance their productivity and competitiveness in both the home and host country (Herzer, 2012; Desai et al., 2009).

The effect is potentially stronger in the case of *asset- or technology-seeking* FDI, which are usually directed at advanced economies[1], and are common for EMNEs. Foreign affiliates can be seen as a vehicle to acquire knowledge, technologies, know-how, and management capabilities, all assets that are then transferred back to the parent company in the form of reverse technology and knowledge transfers (Chen et al., 2012). It should be noted that in some circumstances the potential benefits of such investments might be offset because of a lack of international experience of EMNEs and a lack of knowledge of foreign markets, especially those more culturally distant, as recently shown by Buckley et al. (2014).

Among the few studies investigating the effects of OFDIs on the performance of EMNEs, some have looked specifically at the effect of asset-seeking motivation on the technological performance of investor firms (Chen et al., 2012; Pradhan and Singh, 2009). Only a few other studies focus on the effects of OFDIs on other aspects of firms' performance in the context of emerging economies. Among them, a paper by Debaere et al. (2010) combines propensity score matching with difference-in-difference estimators to study the effect of FDI on employment growth in a group of Korean MNEs and shows significant reductions for firms investing in developing countries but non significant effects for investments into advanced economies. Two other studies focus on Taiwan and show that foreign operations generally: a) promote an increase in domestic production and employment, conditional on the size of the investment (Liu and Nunnenkamp, 2011); and b) raise firms' productivity, as they affect both technological endowments and the firms' technical efficiency (Yang et al., 2013).

A recent work by Chen and Tang (2014) investigates the effect of OFDI on different dimensions of performance of Chinese firms. The paper is based on MOFCOM approved investments[2] and finds positive effects of OFDIs on productivity, employment and on various dimensions of export performance. With respect to this analysis, we focus here on Chinese investments into advanced economies and we include information on the entry modes (greenfield versus M&As) of the investments.

[1] Indeed, extant literature on MNEs has showed that the investment destination matters, with increases in productivity being associated with investments in higher technology intensive countries (de la Potterie and Lichenberg, 2001; Barba Navaretti et al., 2010).

[2] As recognized by the same authors, MOFCOM data are biased towards financial centers, like Hong Kong, and in some cases this hides the real final destination of the investments (for a comparison of the database used in our empirical analysis versus MOFCOM data, see Amighini et al., 2014).

As regards the mode of entry, there are few studies available on M&As undertaken by EMNEs that scrutinize the effects of these investments. Using a sample of public listed firms, Edamura et al. (2014) have empirically shown the existence of a positive effect on sales, productivity, and assets of M&As for Chinese acquiring firms. But there is also evidence suggesting that EMNEs may lack the internal capability needed for completing well performing M&A deals (Chari et al., 2010). This is consistent with the findings of Bertrand and Bertschinger (2012) based on a sample of Russian MNEs, which look at the effects of acquisitions on profitability and find that a lack of international experience, together with the limited ownership advantages, have undermined the capacity to leverage values from foreign acquisitions.

There is also some evidence from case studies on Chinese EMNEs confirming that the expected positive outcomes of M&As in advanced countries are often delayed or reduced because of a lack of experience and competitive advantages, especially in contexts characterized by wide cultural differences (Nolan, 2012; Spigarelli et al., 2013; Hensen et al., 2014).

3 Data and methodology

3.1 The database

Our analysis is based on a novel database – the Emerging Multinationals' Events and Networks DATAbase (EMENDATA) – which includes greenfield investments, mergers and acquisitions (M&A), and other minority investments (Amighini et al., 2014). EMENDATA matches different international data sources: *fDiMarkets* from the Financial Times Group providing information on greenfield investments; *Zephyr* from Bureau van Dijk (BvD) and *SDC Platinum* from Thomson Reuter offering information on M&A; and other minority investments (corresponding to a share of less than 50% of ownership). EMENDATA covers all FDI from emerging multinationals (EMNEs) in Europe between 2003 and 2011. In addition, EMENDATA provides information on investor companies and their Global Ultimate Owners (GUO) from *Orbis* (BvD).

For the specific purposes of this work, we look at all the deals undertaken by Chinese investor firms within the EU27. According to EMENDATA, the EU27 is the most

attractive region for Chinese OFDI, followed by Asia (Amighini et al, 2014).[3] The total number of Chinese companies with one or more investments in Europe is 521 (423 with one investment and 98 with more than one deal). The sample shrinks to 368 companies (70% of the initial sample) because of the limited availability of firm level information. The information has been extracted at the parent company level, consolidating all the deals of the same business group, even when undertaken through different subsidiaries.[4]

From BvD Orbis we also included 4,801 Chinese companies that control at least one subsidiary in China but do not have any foreign subsidiaries, that is, companies that have not undertaken OFDI. We include in the control group those companies with at least one domestic affiliate in order to have firms that are as similar as possible to the investor companies in the main sample.

3.2 The econometric methodology

The empirical assessment of the impact of OFDI on the investor companies faces a major problem of endogeneity and reverse causality, widely recognized in the literature (Helpman et al., 2004). In fact, there is problem of self-selection because larger and more productive firms could be more likely to undertake foreign investments. In other words, the better performance of MNEs with respect to firms without foreign investments could be independent of their decision to undertake OFDI (Castellani and Barba Navaretti, 2004).

The first step of our analysis is to assess the existence of structural differences between two groups of firms: the *treated* firms corresponding to those companies that have invested in the EU27 and the *control* group of companies without foreign investments, as indicated in the previous paragraph. Table 1 presents their key characteristics in the year before the first investment. [5] The choice of considering the first investment in the EU27 is motivated by the fact that the decision to internationalise and become a multinational rep-

[3] This is the case where we exclude from Asia all the investments from Mainland China into Honk Kong; if these are included, Asia becomes the main destination for Chinese OFDI.

[4] In the whole sample, only 30 Chinese investor firms have undertaken cross-border deals through multiple companies within the same business group. This implies that for all investors the matching with BvD variables has been done via the consolidated balance sheets, except for firms that did not consolidate.

[5] Given that the first investments undertaken by Chinese investor fi8rms into the EU27 occurred in different years for the treated firms, in assigning counterfactual treatment dates to the control groups we follow Petkova (2009) and Chari et al. (2012) and adopt the approach of proportional random investment time assignment. We determine the number of investments that occur in each calendar year during our sample period and then assign the hypothetical treatment year to the companies in the control group in the same proportion as the investments occurred in the treated group.

resents a radical change of status for a company.[6] In the empirical analysis we aim at investigating whether this decision has an impact on firms' productivity and structural characteristics.

Our data confirm that there are significant differences between the two considered groups: the treated companies are younger, larger and more profitable than the companies in the control group.

Table 1 Structural characteristics of sample firms (year before investment)

	Treated	**#**	**Control**	**#**
Year of establishment	1997	212	1995	1868
Employees (#)	23097.4	134	2202.96	1295
Total assets (USD million)	29,300	152	749	1395
Sales (USD million)	1530	140	234	1384
Turnover (USD million)	2350	150	251	1394
Profit margin (%)	12.711	138	8.084	1250

Source: Authors' elaboration on EMENDATA and Bvd Orbis

The second step of the analysis is therefore to further investigate the existence of heterogeneity among the sample firms using a simple OLS regression to test the relationship between firms' characteristics, performance indicators and a dummy variable (*OFDI*) taking the value of 1 in the year of the first investment and 0 otherwise. The model is:

$$Y_{i,j,x,t} = \beta OFDI_{i,j,x,t} + \gamma_j + \delta_x + \rho_t + \varepsilon_{i,j,x,t}$$

where Y indicates firms' characteristics and measures of productivity (see Appendix A for details) in firm i in province j, sector x and year t, and γ_j, δ_x, and ρ_t, are respectively province, industry (2 digit codes of the ISIC Rev. 3 classification), and year effects.

Table 2 shows that the effects of the investments are positive and significant with respect to labour productivity, TFP, total assets, sales and employment, while there is a negative effect on financial performance, especially on the return on assets[7].

[6] In 63% of the greenfield and 82% of the M&As, the companies have not previously invested in any other country, Furthermore, in 78% of the greenfield and 95% of the M&As the companies have not carried out any other investments in other advanced countries (i.e. Australia, Canada, Japan, Switzerland and the US).
[7] Summary statistics for all the variables included in the different models are reported in Table B2 in the Appendix.

Table 2 Determinants of firms' productivity

	(I) LAB PROD	(II) TFP	(III) TFP_GMM	(IV) TFP_OLS	(V) TOT ASS	(VI) SALES	(VII) EMP	(VIII) PROF	(IX) ROA
OFDI	0.160***	0.129***	0.0242	0.0144	1.491***	1.501***	1.428***	–0.00871	–0.663*
	(0.0497)	(0.0405)	(0.0356)	(0.0349)	(0.0817)	(0.0895)	(0.0782)	(0.00597)	(0.372)
Constant	11.15***	7.325***	8.006***	10.17***	18.98***	18.64***	7.583***	0.0349**	2.641**
	(0.116)	(0.0828)	(0.0559)	(0.0556)	(0.103)	(0.103)	(0.144)	(0.0153)	(1.198)
Province effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	11,982	11,982	11,975	11,981	13,647	13,422	12,200	12,589	12,821
R^2	0.200	0.165	0.941	0.911	0.377	0.212	0.229	0.131	0.064

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In the third step of the empirical analysis we follow a well-established strand of empirical literature (Barba Navaretti and Castellani, 2004; Debaere et al., 2010) and build a counterfactual by selecting a group of non-investors whose characteristics closely match the Chinese investing companies using propensity score matching techniques. Therefore, the control group includes Chinese companies without any foreign affiliates but with the same ex-ante probability to undertake an OFDI. PSM is a non-parametric estimator of the mean difference in outcomes between the treated and non-treated companies under the common support. Formally, the average treatment effect on the treated (ATT) resulting from the matching is equal to the difference in average outcomes for the firms included in the treated group and those in the control group (Imbens and Wooldridge, 2009):

$$ATT = E(y^t - y^c|D = 1) = E(y^t|D = 1) - E(y^c|D = 1)$$

where y^t and y^c are the outcomes for the treated and control groups, respectively, and D is a dummy equal to 1 if the firm is treated.

We estimate the probability of investing in Europe as a function of observable characteristics by means of a Probit model:

$$Prob\ (EMNE_{i,t} = 1|X_{i,t-1})$$

Our vector of observable characteristics, *X*, includes a number of standard variables that can affect the probability of investing overseas (see Debaere et al., 2010; Chari et al., 2012), including age and age squared, as a proxy for the experience of the firm, size (measured by the number of employees), capital intensity, financial performance (measured by the return on assets), and a dummy variable equal to 1 if the firm is listed on the stock exchange or 0 otherwise as a proxy for the capacity to access financial capital.[8] The specification also includes 2-digit industry dummies, to control for industry-specific performance and to take into account specific incentives and policies aimed to selected sectors; and provincial dummies based on the geographic distribution of firms within provinces and autonomous municipalities, to control for the heterogeneity of local policies which might affect the decision of the firms to invest. Finally, we also include year dummies to control for common shocks and business cycle fluctuations.

The results for the Probit model, reported in Table B1 in the Appendix, show that larger firms, in terms of employment, those more capital intensive, as well as those with higher returns on assets are more likely to invest in Europe. Age appears to have a negative effect, as in Edamura et al (2014), which is explained by the high propensity of Chinese MNEs to undertake early internationalization strategies and thus leapfrog the traditional stages of development. However, the relation between age and the propensity to invest in advanced countries is non-linear, indicating that the most recently established firms have lower probabilities to go abroad. Finally, public listed firms are more likely to undertake M&As compared to non-listed ones since M&As usually require larger capital commitments, and public listed firms are more likely to have access to financial resources. This is even more likely in the case of China, where access to credit is a constraint to potential (non-listed) investors (Sutherland and Ning, 2011).

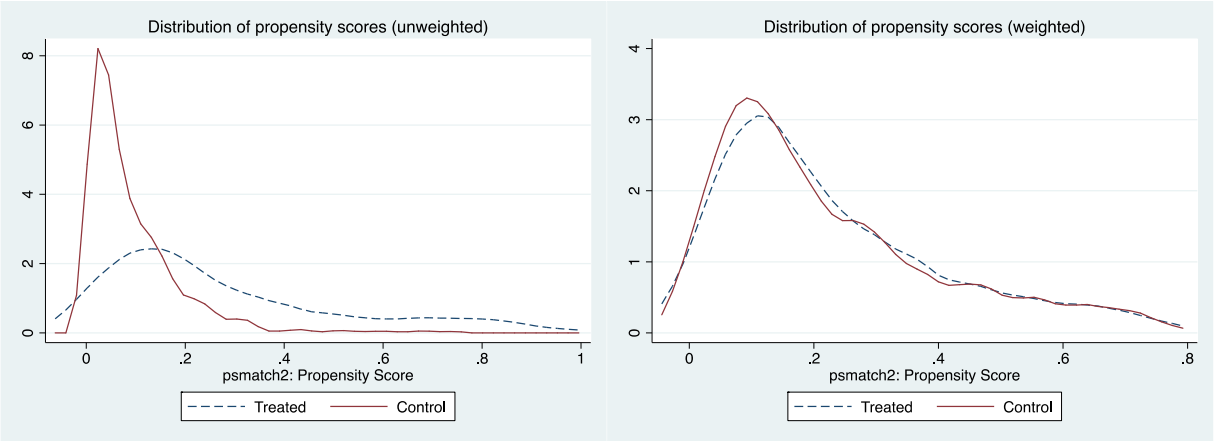
Propensity scores are then computed based on the output of the Probit analysis. We select those firms that are as similar as possible to the investing companies in terms of

8 It would have been of interest to include a dummy identifying State Owned Enterprises, but this information is not directly available either in our database or in Orbis. For the variables representing firm structure, capital intensity and financial performance we use the average values for the last three years before the investment. Two main reasons for this: first we are able to increase the number of observations given the large number of missing values in our sample; second the decision to invest abroad might not necessarily be taken the year before investing (on this see Hijzen et al., 2011), especially when – as in the case of China – approval procedures take time (Davies, 2013).

propensity scores, using the Kernel matching estimator with common support by means of the Leuven-Sianesi (2003) algorithm.[9]

Figure 1 provides an illustration of the matching procedure. The graph on the left shows the predicted probability, i.e. the propensity score, of investing abroad for the entire control group before matching *vis-à-vis* the treated firms, while the right graph presents the same probability for the groups of the matched controls and the treated, showing that the two distributions almost overlap after the matching procedure.

Figure 1 Distribution of propensity scores before (left panel) and after (right panel) matching



Source: Authors' elaboration

Another way to evaluate the results of the matching procedures is to test the so-called balancing hypothesis, which means that observations with the same score have the same distribution of observable characteristics independently of the treatment. This hypothesis is tested both before and after the matching. Table 3 shows that the two samples can be considered well-balanced given that the standardized percentage bias falls well below the 5% threshold, and that the t-tests on the selected variables are not significant (Rosenbaum and Rubin, 1985). Furthermore, following Sianesi (2004), we compare the *pseudo* R^2 before and after the matching finding a sensible reduction.[10]

[9] Alternative matching algorithms, including the nearest neighbour and the Mahalanobis one, were also tested, but their performance was worse in terms of the balancing test.
[10] As the *pseudo* R^2 is an indicator of how well the regressors explain the probability of selection, after matching, its value should decrease considerably compared to that prior to the procedures (Sianesi, 2004).

Table 3 Balancing test, before and after matching

Sample	Pseudo R2	LR chi2	p>chi2	Mean bias	Median bias
Raw	0.183	1382.49	0.000	8.3	6.3
Matched	0.022	7.76	1.000	2	0.5

Finally, in the fourth step of our empirical analysis, we use the propensity scores to calculate a difference-in-difference (DID) estimator to further rule out time-invariant and unobservable differences between treated firms and the controls, using the following model:

$$Y_i = \beta_0 + \beta_1 t_i + \beta_2 treated_i + \beta_3 treated_i * t_i + \gamma_j + \delta_x + \rho_t + \varepsilon_i$$

where firms in the control group are weighted on the basis the propensity score difference between treated and control firms, obtained via the matching procedure described earlier (Heckman et al., 1997). The DID allows one to compare the change in the average outcomes for the two groups of firms in our sample ($t=n$), during a time period before the investment took place ($t= -1$) and a time period after the investment. Given the availability of a relatively long time series, we are able to test the effects on performance from the year of the investment ($t=0$) up to five years after ($t=5$).

4 Results

Table 4 provides the results of our difference-in-difference estimator including a number of indicators over a period covering from the year of the investment (t=0) up to five years (t= 1,…,5) after it.[11]

[11] We have run a number of robustness checks, investigating the stability of our PSM-DID model to the exclusion of companies having undertaken more than one investment, as well as replicating the model by means of a GMM approach. A description and results for these robustness checks are reported in Appendix C.

Table 4 Propensity score matching difference-in-difference estimator

	(I)		(II)		(III)		(IV)		(V)	
t	LAB PROD	N	TFP	N	TFP_GMM	N	TFP_OLS	N	K/L	N
0	0.0468	2,122	0.0748	2,122	0.0793	2,122	0.0837	2,122	–0.0805	2,155
1	–0.0328	1,991	–0.00888	1,991	–0.0397	1,991	–0.0187	1,991	–0.0126	2,024
2	–0.0324	1,707	–0.0261	1,707	–0.127	1,707	–0.0971	1,707	0.0374	1,735
3	0.154	1,506	0.15	1,506	0.0642	1,506	0.0762	1,506	0.0342	1,533
4	0.379**	1,349	0.307**	1,349	0.201*	1,349	0.184*	1,349	0.235	1,373
5	0.582**	1,259	0.469***	1,259	0.292**	1,259	0.258**	1,259	0.357	1,282

	(VI)		(VII)		(VIII)		(IX)	
t	TOT ASS	N	INT/TOT	N	EMP	N	SALES	N
0	0.293***	2,266	0.00498	1,410	0.549***	2,155	0.429***	2,233
1	0.613***	2,115	1.31E–05	1,393	0.714***	2,024	0.607***	2,082
2	0.888***	1,846	–0.00157	1,208	1.094***	1,735	0.962***	1,816
3	0.891***	1,627	–0.0103*	1,071	0.901***	1,533	0.875***	1,599
4	1.009***	1,438	–0.0183**	952	0.853***	1,373	1.025***	1,414
5	1.305***	1,295	–0.0126	858	1.019***	1,282	1.600***	1,272

	(X)		(XI)	
t	PROF	N	ROA	N
0	–0.00921	1,995	–0.0623	2,033
1	–0.0295	1,862	–1.025	1,903
2	0.00114	1,605	–0.226	1,646
3	–0.0167	1,418	–0.182	1,452
4	–0.0212	1,285	0.0379	1,312
5	–0.00574	1,156	–0.147	1,185

Note: This table reports difference-in-difference estimates for the post-investment performance between treated and control firms on different outcomes. All equations include province, sector and years fixed effects. t={0,5} denotes the post-investment year.

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Columns I-IV present the effects of the investment on firms' efficiency, showing that investments hardly induce a significant immediate increase in productivity. The sign of the coefficient (although still not significant) switches from positive at t=0 to negative for the following two years. The positive sign at t=0 can be considered a further sign of the existence of a productivity premium for foreign investors, as already pointed out in the previous section. Whereas, the switch to a negative sign from t=1 can be interpreted as an initial impact of the investment, which requires a period of adaptation in the investing firms. Then after four years from the investment, Chinese firms investing in Europe experience a significant increase in their productivity, which is measured at some 18 to 58 percentage

points higher than for non-treated firms, depending on the indicators used. There are two possible explanations for this positive and significant difference in productivity. It could be the result of reorganization of production activities, leading to a more efficient division of labour between parent and affiliates. Moreover, we can expect intra-firm transfer of knowledge, technologies and managerial best practices, which would provide evidence of spillovers, showing that they take on average four years to be absorbed by firms (Mansfield, 1985; Chen et al., 2012).

Column V shows a positive (though not significant) increase in the coefficient of capital intensity, which could explain the difference in productivity – in addition to or as an alternative to foreign investment. In order to address such potential concern, as a further robustness check, we also ran the DID model on the four measures of productivity reported in Columns I-IV of Table 5, including K/L among the regressors. The results, reported in Table B3 in the Appendix, are not in favour of a substitution effect.[12]

Column VI shows that, compared to control firms, there is significantly higher growth in terms of total assets in the companies with foreign investments. This is a relevant finding that is consistent with the view that investments in foreign and domestic markets complement each other, especially in emerging economies like China, which are still far from full employment of production factors (Deng, 2009).

In Column VII, we control for intangible assets, as a proxy for the asset-seeking motivation (Deng, 2009; Buckley et al., 2014). In fact, one of the reasons why EMNEs invest abroad, especially in advanced markets, is to complement their resources with new assets hardly available in the home country (Ramamurti, 2012). Nevertheless, we do not find any significant improvements relative to non-investors in the share of intangible or total assets, which actually show a small relative decrease in years three and four, possibly due to more rapid accumulation of fixed assets

Another key implication of outward FDI is represented by the capacity to expand the overall scale of investors' activities. Though such an investment itself represents an expansion of the investor's scale, this can also be due to a number of different factors, including, for instance, the need to serve new markets or to extend and coordinate existing activities across borders. We test this hypothesis using different variables.

[12] It is interesting to notice, however, that there is a reduction in the size of the effect on the different measures of productivity, which can indeed be attributed to the moderating effect of the covariates.

In Column VIII, we measure the impact of investments in Europe on the employment of Chinese EMNEs finding a positive and significant sign. This result is consistent with the existing evidence on the employment effect of OFDI in Chinese firms (Chen and Tang, 2014) as well as in firms in other emerging economies, such as Korea (Debaere et al., 2010) and Taiwan (Liu and Nunnenkamp, 2011). In the case of China, it is very likely that efficiency seeking investments can be excluded and that OFDI is generally oriented to increasing the scale of the investor companies rather than substituting domestic employment with the establishment of foreign affiliates.

In a similar vein, we find that investments lead to a significantly larger increase in total sales as compared to the control group (Column IX). Unfortunately, due to data limitations, we cannot determine whether exports, intra-company trade or domestic sales explain this increase. Consistently, based on the literature on the determinants of Chinese FDI (Buckley et al., 2007), we assume that such an increase could be explained by market seeking investments aimed at strengthening the market position in advanced countries through the establishment of trade offices and/or the acquisition of distribution networks. The importance of market seeking as motivation for investments is also confirmed by surveys undertaken on Chinese investors in Europe (European Chamber of Commerce, 2013). Moreover, Chinese investments in advanced economies are also aimed at responding to the increasing sophistication of domestic demand, as documented in the case of the investments of Haier, an Italian white goods company, by Pietrobelli et al (2011). This helps to explain the rise in domestic sales compared to national firms. Finally, in the case of production related vertical investments there could also be an increase in intra-firm trade (Barba Navaretti and Venables, 2004).

Columns X and XI report the impact of the investments on certain financial indicators for investigating how the profitability of the investors is affected by OFDI. The results are always not significant, but the situation changes in the next section, where we take into account the different modes of entry of the investments - greenfield versus M&As – given the different financial efforts involved (Norback and Persson, 2002).

4.1 Does the entry mode influence domestic performance?

In this section, we replicate the empirical analysis presented in the previous section introducing the distinction between two different entry modes –greenfield and M&As – to ex-

plore whether there is any differences in their impact on investors.[13] Tables 5 and 6 present the results of this analysis.

Table 5 Results for propensity score matching difference-in-difference estimator (Greenfield)

	(1)		(2)		(3)		(4)		(5)	
t	LAB PROD	N	TFP	N	TFP_GMM	N	TFP_OLS	N	K/L	N
0	0.0825	1,634	0.13	1,634	0.0742	1,634	0.109	1,634	–0.0907	1,667
1	–0.0616	1,602	–0.0411	1,602	–0.156	1,602	–0.0925	1,602	0.0048	1,632
2	–0.118	1,427	–0.119	1,427	–0.223	1,427	–0.21	1,427	0.0136	1,456
3	0.261	1,252	0.175	1,252	–0.0124	1,252	–0.00468	1,252	0.265	1,280
4	0.676***	1,111	0.509***	1,111	0.134	1,111	0.167	1,111	0.345	1,134
5	1.017***	1,010	0.894***	1,010	0.587***	1,010	0.572***	1,010	0.346	1,028

	(6)		(7)		(8)		(9)	
t	TOT ASS	N	INT/TOT	N	EMP	N	SALES	N
0	0.333***	1,791	–0.0051	1,152	0.562***	1,669	0.533***	1,758
1	0.746***	1,734	–0.00616	1,174	0.808***	1,634	0.791***	1,702
2	0.658***	1,548	–0.00845	1,028	0.980***	1,457	0.575**	1,519
3	1.182***	1,356	0.0137	904	1.107***	1,281	1.018***	1,328
4	1.539***	1,203	–0.00196	797	1.599***	1,135	1.706***	1,179
5	1.712***	1,077	0.00789	722	1.455***	1,029	2.327***	1,059

	(10)		(11)	
t	PROF	N	ROA	N
0	0.0183	1,576	–0.0418	1,610
1	0.0135	1,529	–0.379	1,562
2	0.0303	1,377	–0.307	1,402
3	0.0228	1,198	–0.696	1,223
4	0.0144	1,064	–0.98	1,081
5	0.00123	943	0.896	959

Note: This table documents difference-in-difference estimates for the post-investment performance between treated and control firms on a different set of outcomes. All equations include province, sector and years fixed effects. t={0,5} denotes the post-investment year.
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

[13] Treated and control samples have been selected following the same procedures described in Section 3.1 and considering the first greenfield or M&A investment. Results of the Probit models are reported in Columns (2)-(3) in Appendix B, Table B1, and Tables B4-B5 report the results of the balancing tests for the two sub-samples.

Table 6 Results for propensity score matching difference-in-difference estimator (M&As)

	(1)		(2)		(3)		(4)		(5)	
t	LAB PROD	N	TFP	N	TFP_GMM	N	TFP_OLS	N	K/L	N
0	–0.0441	1,080	0.00643	1,080	0.0364	1,080	0.0491	1,080	–0.0974	1,095
1	–0.127	1,067	–0.105	1,067	–0.115	1,067	–0.0996	1,067	–0.0394	1,080
2	0.0261	951	0.0412	951	–0.00385	951	0.0208	951	0.0449	964
3	–0.0194	847	–0.0502	847	–0.135	847	–0.112	847	0.217	862
4	0.0746	775	0.107	775	0.101	775	0.0809	775	0.0135	787
5	0.769	685	0.571	685	0.262	685	0.232	685	0.673	694

	(6)		(7)		(8)		(9)	
t	TOT ASS	N	INT/TOT	N	EMP	N	SALES	N
0	0.246	1,196	0.0190**	783	0.215	1,097	0.332	1,181
1	0.422**	1,146	0.00878*	790	0.560***	1,080	0.328**	1,131
2	0.907***	1,026	–0.00736	675	0.912***	964	0.889***	1,013
3	0.884***	944	1.26E–05	628	0.671**	862	0.621**	929
4	0.568*	838	0.00756	567	0.544*	787	0.640*	826
5	0.616	732	–0.0059	489	0.018	694	0.787	723

	(10)		(11)	
t	PROF	N	ROA	N
0	–0.0627**	1,065	–5.349	1,091
1	–0.118***	1,012	–6.560**	1,038
2	–0.0929***	890	–8.433**	910
3	–0.139***	839	–12.83**	857
4	–0.0777***	745	–5.008*	758
5	–0.0874**	629	–4.407	641

Note: This table reports difference-in-difference estimates for post-investment performance between treated and control firms on a different set of outcomes. All equations include province, sector and years fixed effects. t={0,5} denotes the post-investment year.

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Considering Columns 1 to 4 in both tables, we see that it is through greenfield FDI rather than M&As that Chinese EMNEs increase their productivity. This result provides new evidence with respect to the analysis presented in Edamura et al. (2014), which is only focused on M&As. Our finding can be justified by two main facts. On the one hand, strategic acquisitions are more likely to be undertaken by Chinese firms with the objective of getting access to both tangible and intangible resources, which are mainly oriented to increasing the value added of production rather than its efficiency. On the other hand, it is also true that – especially in more distant contexts such as the EU27 – M&As are more complex operations to manage than greenfield investments, and this can result in underperforming

deals. Indeed, in some cases, the lack of prior international experience of many Chinese firms and their cultural distance from western companies cast doubts on their ability to successfully take advantage from foreign operations. This has been documented by case studies on several acquisitions made in Europe, showing the difficulty to obtain the expected gains through the production efficiency of the acquired company (Spigarelli et al., 2013) as well as the obstacles encountered in the transfer of knowledge and technology from the target to the acquirer (Hensen et al., 2014).

With regard to total assets, employment and sales, there are significant and positive effects of greenfield investments, which can be twice as larger as those of domestic firms. Such a result does not come as a surprise considering that setting up a new affiliate necessarily involves an addition to the stock of assets and employees. But given that the vast majority of greenfield investments in Europe are of small size[14], we would also expect that the large increase relative to domestic firms goes beyond the new activities created abroad and positively affects the sizes of investors. Taking into account sales, given that some greenfield investments in Europe consist of the establishment of market-seeking and trade-related activities, their increase can be considered a confirmation of the positive impact of their internationalization strategies.

Taking into account M&As (Table 6), the impact on size is also positive and significant from year 1 to 4, but it is smaller than in the case of greenfield investments. Given that M&As generally require higher cash flows and a more complex *ex ante* structure, firms investing via acquisitions are in general larger and better established companies and this can explain this relatively more limited impact on scale. In addition, considering that existing analyses linking the motivation of the investment to the entry mode consistently show that M&As are mainly used by Chinese firms to gain access to strategic assets for upgrading their operations (Deng, 2009; Cui and Jiang, 2009), while greenfield investments are used for expansion purposes (Quer et al., 2012), one could argue that acquisitions should contribute mainly (and earlier) to a qualitative, rather than quantitative, improvement of the firm.

Indeed, considering intangible assets, we observe that Chinese firms slightly increase their relative endowments as an immediate consequence of M&As in Europe, confirming a finding of Edamura et al. (2014) that it is mainly through acquisitions that Chi-

[14] According to our data, about 75% of affiliates established through greenfield investments in Europe has less than 50 employees.

nese firms tap into foreign technologies and knowledge for accelerating their strategies of upgrading (Deng, 2009).

Finally, the indicators of financial profitability weaken steadily as a consequence of M&As. This result is consistent with the literature on the effects of M&As. On the one hand, in line with Norback and Persson (2002), we confirm that negative profitability is more likely to be caused by M&As, rather than greenfield investments. On the other hand, in accordance with the findings of Bertrand and Betschinger (2012) on M&As undertaken by Russian MNEs, we show that also Chinese MNEs (in most cases at their first foreign M&A) are unable to leverage value from their foreign acquisitions.

5 Conclusions

This paper has analysed the effects of outward FDI into the EU-27countries on the performance of Chinese MNEs. Our results robustly show that Chinese OFDIs have so far affected different dimensions of MNEs performance. We find that Chinese investors register an increase in productivity and capital endowments, but these effects only materialize some years after the initial investment. In line with the existing literature on EMNEs, we also show that firms may speed up the process of gaining access to new resources and intangible assets via M&As, even if this seems to happen at the cost of a lower profitability. We show that M&As are not so frequently aimed at the quantitative growth *per se*, but rather at a qualitative improvement in the firm. Indeed, firms engaging in M&As are expected to be relatively larger ex ante but to grow more slowly after the acquisition, as their efforts concentrate on the assimilation of technological advantages. Conversely, Chinese firms undertaking internationalization via greenfield investments see larger complementarities between domestic and foreign activities, the former benefitting from significant increases in scale, sales and assets.

Taken together, these results provide new evidence that the recent rise of Chinese investments, spurred by the Government's strategy of promoting the internationalization of domestic firms, is leading to improved performance by the domestic sector. However, it is still difficult to say whether the improvements in performance can contribute to the upgrading of the productive structure of the country. We find only weak evidence that M&As are leading to the transfer of more valuable resources in the form of intangible assets to the parent companies making the investments, and this effect even disappears a few years after

the deal is concluded. In addition, due to the lack of information on value added, we are unable to investigate whether the gains in productivity lead to any process or product upgrading.

An implication of our work for the study of China's upgrading is that Chinese MNEs are still in the process of learning from their internationalization process and, especially in the case of M&As, they are gaining experience by accessing geographic and culturally distant markets. On the basis of our results, we can reasonably affirm that the stock of accumulated experience in overseas investments is directly related to an increase in the size of the gains accruing to domestic firms. This can be interpreted as an encouraging sign for Chinese investors, whose relative inexperience and lack of key competitive advantages have so far constrained their capacity to fully exploit the potential of overseas activities, as well as for the Chinese economy as a whole, which could well expect large returns from its increasing OFDI activities.

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Appendices

Appendix A

The following indicators of productivity are used in the empirical analysis.

1) A standard indicator of firms' efficiency in terms of labour productivity, measured by the ratio between sales and number of employees (LAB PROD).
2) An indicator of total factor productivity (TFP) obtained as a residual of the following production function:

$$Y_{it} = A_{it} L_{it}^{\alpha_L} K_{it}^{\alpha_K} \quad (1)$$

in which A_{it} is the Hicks-neutral efficiency level that represents the TFP of firms. Total sales is used as a proxy for output (Y), while the number of employees is used as the labour component (L) and total assets[15] to measure capital (K). All the variables reported in monetary terms are deflated by their respective industry price indexes. We calculate TFP with a constant return to scale Cobb-Douglas production function, assuming a share of 2/3 for the labour component and 1/3 for capital.

The lack of a number of sufficient observations to proxy intermediate inputs does not allow us to calculate more robust semi-parametric estimators using proxies to correct for the unobservable productivity shocks and input levels, such as the Olley-Pakes or Levinshon-Petrin methods (Petrin et al., 2004). Therefore, we also estimate TFP (1) using the GMM approach (TFP_GMM) (Arellano and Bond, 1991) and 2) using a standard OLS function (TFP_OLS), albeit with full awareness of concerns raised in the existing literature concerning these methodologies (del Gatto et al., 2009; Van Beveren, 2012).

[15] Total assets are used instead of fixed assets, given the presence of firms operating in the service sector, where intangibles are usually relevant.

Appendix B

Table B1 Results, probit estimator

	(1) All sample	(2) Greenfield	(3) M&As
AGE	–1.361***	–.746***	–1.079**
	(0.288)	(.2613)	(.495))
AGE^2	.199***	.092	.182
	(.0617)	(.0593)	(.112)
EMPL	.126***	.106**	.651***
	(.0399)	(.0438)	(.112)
K/L	.082	.0421	.639***
	(.05344)	(.0569)	(.154)
ROA	.0134**	.0144**	.026**
	(.0061)	(.0065)	(.013)
PUBLIC	–.062	–.213	.748**
	(.1319)	(.1431)	(.319)
Province effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Constant	–6.332***	–6.679	–23.923
Observations	1,235	1,072	742
Pseudo R^2	.2005	.1824	.4601

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table B2 Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LAB_PROD	11991	11.2401	1.1719	3.2050	20.2823
TFP	11991	7.3224	0.9301	–0.4101	13.8726
prod_OLS	11990	2.4430	2.4946	–16.3051	23.9412
prod_GMM	11984	2.0879	3.1555	–16.3051	23.9412
K/L	12172	11.7933	1.2678	7.0540	20.4665
TOT_ASSETS	13656	18.7257	1.8320	8.7566	28.3503
INTANGIBLES	10232	0.0503	0.0685	–0.0013	0.8396
EMPL	12209	6.9931	1.6071	0	13.1010
SALES	13431	18.1672	1.7816	7.2226	26.3514
ROA	12830	5.6443	10.7362	–97.9000	97.2200
PROFIT	12598	0.0879	0.1707	–0.9972	1
AGE	19417	2.3369	0.7233	0	5.0106
TURNOVER	14495	18.2347	1.8505	4.8741	26.6041
PUBLIC	20586	0.5545	0.4970	0	1

Table B3 Propensity score matching difference-in-difference estimator

t	LAB PROD	N	TFP	N	TFP_GMM	N	TFP_OLS	N
0	0.0949	2,122	0.0949	2,122	0.108*	2,122	0.0979*	2,122
1	–0.0211	1,991	–0.0211	1,991	–0.0277	1,991	–0.0268	1,991
2	–0.0342	1,707	–0.0342	1,707	–0.0648	1,707	–0.0606	1,707
3	0.114	1,506	0.114	1,506	0.0906	1,506	0.0861	1,506
4	0.229**	1,349	0.229**	1,349	0.247**	1,349	0.223**	1,349
5	0.362***	1,259	0.362***	1,259	0.372***	1,259	0.325***	1,259

Note: This table reports difference-in-difference estimates for the post-investment performance between treated and control firms on a different set of outcomes. All equations include capital labour ratio (K/L), the log of firms' age and the log of firms' employees as additional controls, together with province, sector and years fixed effects. t={0,5} denotes the post-investment year.

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table B4 Balancing test, before and after matching – Greenfield investors

Sample	Pseudo R2	LR chi2	p>chi2	Mean Bias	Median Bias
Raw	0.174	958.22	0.000	9.2	6.2
Matched	0.024	7.27	1.000	2.2	0.3

Table B5 Balancing test, before and after matching – M&A investors

Sample	Pseudo R2	LR chi2	p>chi2	Mean Bias	Median Bias
Raw	0.398	1276.42	0.000	12.5	9.0
Matched	0.095	9.02	1.000	4.2	0.0

Appendix C – Robustness checks

As remarked in section 3.2, the propensity score matching estimator has several advantages over standard procedures, and it enables robust evaluation of causality between investments and performance, while taking in due account the issues related to endogeneity. This approach is nonetheless not immune to criticism. One point of contention that may be quite relevant to our case, is related to the issue of multiple treatments, i.e. the presence of firms performing multiple investments over the period considered. This may introduce biases into our estimations. One should not overlook the fact that the large size of the coefficients reported in Table 4 some years after the first investment could be attributable to the additional investments made in the following years.

In order to account for this potential bias, we ran our PSM-DID model on a sample of treated firms composed of individual investors only, i.e. excluding all firms that have undertaken more than one investment in the period considered. Table C1 shows that our concerns are not confirmed since the relations examined remain significant. Interestingly, however, we notice that the size of the scale-related coefficients (assets, employees and sales) tends to decrease as we move to later years and that in such cases this can be explained by the inclusion of multiple investors in this main sample.

Table C1 Results, propensity score matching difference-in-difference estimator – Individual investors only

t	Lab_prod	N	TFP	N	prod_GMM	N	prod_OLS	N	K/L	N
0	0.109	1,696	0.142*	1,696	0.127	1,696	0.137*	1,696	–0.0607	1,719
1	0.0423	1,652	0.0393	1,652	–0.0307	1,652	–0.00604	1,652	0.0911	1,675
2	0.0574	1,458	0.0182	1,458	–0.0794	1,458	–0.0634	1,458	0.203	1,478
3	0.0562	1,286	0.0379	1,286	0.00317	1,286	0.0184	1,286	0.128	1,309
4	0.312**	1,149	0.223*	1,149	0.139	1,149	0.129	1,149	0.289	1,167
5	0.477***	1,052	0.424***	1,052	0.431***	1,052	0.373**	1,052	0.148	1,068

t	total assets	N	Intangible assets/ tot. assets	N	Employees	N	Sales	N
0	0.269**	1,857	0.00345	1,189	0.493***	1,720	0.484***	1,834
1	0.682***	1,786	0.00242	1,206	0.639***	1,677	0.679***	1,761
2	0.821***	1,574	–0.000566	1,045	0.898***	1,479	0.774***	1,554
3	0.728***	1,382	–0.0122	920	0.657***	1,310	0.524*	1,359
4	0.699**	1,230	–0.0061	813	0.736**	1,168	0.726**	1,211
5	0.882**	1,115	–0.0152	738	0.709*	1,069	0.649**	1,099

t	Profit	N	ROA	N
0	0.00224	1,617	–0.358	1,650
1	–0.0206	1,570	–0.436	1,608
2	0.00679	1,400	–2.156	1,425
3	–0.00618	1,214	–1.177	1,241
4	0.00353	1,084	1.103	1,104
5	–0.00498	971	1.244	989

Note: This table reports difference-in-difference estimates for the post-investment performance between treated and control firms on a different set of outcomes. All equations include province, sector and years fixed effects. t={0,5} denotes the post-investment year.
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Following the empirical strategy adopted by Bertrand and Betschinger (2012), we further check the overall robustness of our approach by means of a GMM estimator. In our settings, the GMM is a good alternative to the PSM approach, given that it enables us to account for the endogeneity of the FDI variable. Moreover, it also controls for the possibility of omitted variables. This enables us to overcome the potential limitations due the assumptions of conditional independence in PSM (Imbens and Wooldridge, 2009). Finally, adopting a dynamic panel approach has the additional advantage of controlling for persistence, i.e. the dependence of performance indicators on their past values.

We control for factors affecting the performance of both investors and non-investors to isolate the effect of FDI using a system GMM approach (Roodman, 2009) to test the effects of FDI on productivity.[16] It is possible to infer from Table C1 that both the Hansen test of over-identification and the Arellano-Bond test of first- and second- order

[16] This choice is justified by the presence of a number of standard control variables (size, capital intensity and age), whose inclusion in the models used to estimate other performance indicators such as size, sales and profitability could be hardly motivated.

autocorrelation confirm the adequateness of the GMM specification adopted here. These results point once again to the positive relation between investment and productivity. In addition, coherently with what was shown at the beginning of this section, we notice that there are very little differences as compared the situation in which we control explicitly for the presence of multiple investors in the sample of treated firms.

Table C2 System GMM Estimator

	(1) Lab prod	(2) TFP	(3) TFP_GMM
L1	0.4478***	0.5493***	0.5688***
	[0.045]	[0.042]	[0.043]
N_OFDI	0.1901***	0.1549***	0.0841**
	[0.037]	[0.033]	[0.042]
AGE	–0.0196	–0.0162	–0.0313
	[0.016]	[0.014]	[0.107]
EMPL	–0.1046***	–0.0816***	–0.0368**
	[0.022]	[0.021]	[0.018]
K/E	0.3632***	0.1392***	–0.1421**
	[0.030]	[0.017]	[0.069]
Constant	2.8787***	2.4034***	5.5438***
	[0.430]	[0.387]	[1.161]
Province effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Observations	9,705	9,705	9,701
N. of panels	2,071	2,071	2,069
Hansen	0.100	0.144	0.0439
AR2	0.229	0.346	0.512

Note: This table reports the results of the System GMM estimator on the full sample of controls and treated firms on different measures of productivity. The variable L1 is the first lag of the dependent variable; N_OFDI is the number of investments for firms-years; AGE is the log of a firm's age; EMPL is the log of the number of employees; K/E is the capital labour ratio. In each model, only variables L1, OFDI and N_OFDI are treated as endogenous and instrumented by the other dependent variables, including fixed effects.
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

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