Upgrading through Outward FDI- Evidence from Chinese EMNEs

C. Cozza[a], R. Rabellotti[b] and M. Sanfilippo[c*]
[a] University of Trieste, Italy;
[b]University of Pavia, Italy;
[c] European University Institute, Italy
*marco.sanfilippo@eui.eu

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Abstract

This paper adopts a new firm-level database, EMENDATA, to examine the impact of Outward FDI direct to advanced markets in Europe on the domestic performance of Chinese multinational enterprises. Propensity score matching are combined with a difference-in-difference estimator to reduce concerns over self-selection of treated firms in foreign markets and to eliminate time-invariant and unobservable differences between the treated and the controls. Our results provide robust evidence in support to the view that outward FDI from China have so far resulted in an increase of domestic activities, contributing to enhance either firms' productivity and their scale of operation, measured through assets, sales and employment. Significant differences are recorded when we distinguish investments on the basis of their modalities, showing that acquisitions favor early gains in productivity and the access to intangible assets, while greenfield investment are more likely to improve firms' scale.

Keywords: Outward FDI; Reverse Spillovers; Firm's performance; Chinese MNEs
JEL Codes: F45

Introduction

Outward Foreign Direct Investments (OFDI) from China and the globalisation of domestic multinationals have become increasingly debated topics in the literature because of their "unconventional" patterns, which are often characterised by early internationalisation strategies driven by the need to develop, rather than exploit, the firm's competitive advantages. A large share of the existing evidence has so far confirmed the relevance of such asset-augmenting motivations, showing that the objective of these investments is to access advanced knowledge and capabilities available and to utilize them to improve technology endowments, know-how and the productive efficiency of the parent companies back home (Deng, 2009; Amighini, et al., 2013).

These motivations are broadly in line with the original scope of the Go Global strategy, launched with the 10th five-year plan in 2000, and reiterated in the following plans, which fostered the internationalization of Chinese firms with the aim of promoting industrialization and technological upgrading to support the growth of the domestic economy (Wang, 2012; Davies, 2013).

While the expansion of foreign activities by MNEs from advanced countries raises often concerns on the loss of business and employment at home, the case of ladder countries such as China can be seen from a different perspective. On the one hand, it can be argued that multinational activities serve for the purpose of creating overseas platforms for sales and distribution, with jobs and investments moved to the home country where input costs are low. On the other hand, as discussed above, in the case of asset-exploring investments the acquisition of foreign technologies, knowledge and brands is clearly motivated by the need to develop, rather than exploit, existing competitive advantages of the domestic MNE. These latter investments, aimed at sourcing assets not fully developed at home, affect the traditional direction of knowledge flows, giving rise to "reverse spillovers" from the affiliate to the parent (Narula, 2010).

Up to now, the existing literature on OFDI from so-called Emerging Market Multinationals (EMNEs) has mostly focussed on the analysis of the host country's determinants and on the location choice of such firms. And, in fact, the drivers of Chinese OFDI have been largely analysed by studies at both the country (Buckley et al., 2007; Deng, 2009) and the firm's level (Amighini et al., 2013; Ramasamy et al., 2013). Mainly because of the lack of good quality firms' level information, including in particular on financial indicators, the analysis on the effect of OFDI on the domestic performance of EMNEs has received little attention so far (Chen et al., 2012; Liu and Nunnenkamp, 2011; Debaere et al., 2010), and to our knowledge none of the existing studies has directly focussed on Chinese firms.

Thanks to the availability of a unique database, EMENDATA (see Amighini et al., 2014, for a description), which merges FDI projects' information with financial data from Bureau van Dijk's (BvD) *Orbis* at the levels of the parents and the affiliates, we are able to overcome these limitations. More specifically, we perform our analysis on an initial sample of 368 Chinese companies with an affiliate in Europe, covering the years 2003-2011.

The aim of this paper is to understand whether and how OFDI have contributed to the domestic performance of Chinese firms, enhancing their competitiveness by means of the introduction of more efficient production techniques, as well as by contributing to improve their overall performance in terms of scale, sales and financial profitability. Thanks to the richness of our data, we are able in fact to measure the impact of OFDI on a number of indicators, including in particular productivity, output, investment, size and financial (such as profit margins, operative profits, EBITDA, ROE and ROCE). Our focus is on investments undertaken in advanced economies in Europe, given that those are more likely to translate into an asset-seeking behavior or – due to the high geographic and cultural distances – involve higher levels of coordination by the parent.

Empirically, we do this by adopting propensity score matching, which involves the selection of a "control" group of firms closely matched to the "treatment" group of firms with an affiliate in Europe. Our control group is based on the subgroup of all the Chinese companies included in *Orbis* that have not invested abroad, but with at least one domestic affiliate. Propensity score matching are then combined with difference-in-difference estimators to further eliminate time-invariant and unobservable differences between the treated and the controls.

By doing so, we expect the contribution of this work to the existing literature being threefold. First of all, we improve on the rising literature on OFDI from emerging markets. While most of the existing studies have focused so far on the impact of asset augmenting strategies for the decision to entry foreign markets, there is no evidence showing the impact of investment decisions on Chinese EMNEs' actual performance. Second, we also complement the literature on heterogeneous firms (Helpman et al., 2004), testing whether the hypothesis of superior performance of international firms compared to domestic ones holds also in the case of a relevant emerging country such as China. Lastly, this work contributes as well to explain the process of economic growth and further upgrading of the Chinese economy, showing how domestic firms use OFDI to expand their operations and to move up the value chain.

Our results provide robust evidence in support to the view that outward FDI from China have so far resulted in an increase of domestic activities. We find in particular that investments do have an impact on actual firms' efficiency and performance and that such reverse spillovers are likely to materialize at different points in time. We notice for instance that a rise in productivity is recorded after four years since the first investment, coherently with the view that knowledge spillovers to local firms take some time to materialize (Mansfield, 1985; Chen et al., 2012). Conversely, there is an immediate reaction in terms of the scale of the company, as showed by the increases in total assets and the number of employees. Also total sales show an upsurge in consequence of the investment, proving the high relevance of market-seeking motives or of intra-firm trade. Finally, more ambiguity is recorded in terms of financial indicators, some of which seem to point – not surprisingly – to a negative effect of the investment in its first years, whereas the profitability increases afterwards. Significant differences on the above results are recorded when we

distinguish investments on the basis of their modalities, showing that acquisitions favor productivity and the access to intangible assets, while greenfield investment are more likely to improve firms' scale.

The remaining of the paper is structured as follows. Section 1 reviews the existing literature on the spillover effects of OFDI. Section 2 presents the original data used for the analysis, while Section 3 discusses the methodology adopted. Results are discussed in Section 4. Section 5 concludes.

1. The domestic impact of Outward FDI

Although the extant literature has so far been mostly focussed on the impact of inward FDI on foreign affiliates and local firms, the interest on the effects of outward FDI on the domestic part of the multinational is also high. The most noticeable difference with the traditional literature on the impact of inward FDI is in the direction of the spillovers. Theoretically, in fact, spillovers from outward FDI occur when affiliates do not internalize completely the gains from the investment, and some of them flow back to the home country (Globerman, 1994).

As a matter of fact, such "reverse spillovers" may materialize through a number of different mechanisms, in part similar to those analyzed by the literature on inward FDI spillovers (Gorg and Greenaway, 1995). Desai et al. (2009) outline a model in which firms made domestic and foreign input choices to maximize their profits, and this can lead to complementarity or substitution among the two. In their model, if total production is not fixed, an increase in overseas activities might influence home based activities stimulating domestic factor demand and domestic output. Castellani and Barba Navaretti (2004: 2-3) show that the performance/productivity of parent companies in the home country can be affected by foreign affiliates through a number of mechanisms, including the exploitation of firm- and plant-level scale economies; the change in composition of inputs used; and through sourcing technological and managerial knowledge from abroad.

Such different effects, in turn, can be associated to the motivation of the investments (Hijzen et al., 2011). Though the case of *horizontal* FDI (*market-seeking*) theoretically involves a substitution between domestic and foreign activities (Liu and Nunnenkamp, 2011), it is also true that an increase in the operations of MNEs might stimulate the exploitation of economies of scale at the level of the parent company, which provides intermediate goods and specialized services to the affiliates. In such context, not only MNEs increase their overall size, but they combine domestic and foreign production to enhance their productivity and competitiveness in both the home and the host country (Herzer, 2012).
Vertical FDI, on the other hand, are mostly oriented to complement domestic activities, even if those targeted to lower wage countries might potentially disrupt domestic employment. The effect on domestic performance is clearly stronger in the case of asset- or technology-seeking FDI, which are by far the most frequent for EMNEs (Amighini et al., 2010). Foreign affiliates settled up with an asset augmenting or technology-sourcing motivation can be seen as a vehicle to acquire knowledge, technologies, know-how, management capacities

and the like. These strategic assets are then transferred back to the parent company in the form of reverse technology and knowledge transfers (Chen et al., 2012).

Evidence on the extent of such reverse spillovers has been made initially available in the context of advanced economies and show in general that concerns over downsizing of domestic activities due to MNEs' foreign expansion is exaggerated, such as in the case of US (Desai et al., 2009). The work by Castellani and Barba Navaretti (2004) on a group of Italian MNEs compared with a control group selected through matching techniques shows indeed that investments contribute to enhance firms' productivity and turnover growth, while there is no significant effect on employment. Other studies have analyzed these effects showing that the investment destination matters, with increases in productivity being associated to investments in higher technology intensive countries (de la Potterie and Lichenberg, 2001; Barba Navaretti et al., 2010).

Evidence on emerging and developing countries, on the other hand, is still scant despite their rising role as global sources of OFDI (UNCTAD, 2014), as well as on the relevance of asset-seeking investments as strategies to catch-up, especially for investments directed to more advanced economies (Amighini et al., 2010).

Among the few exceptions are some empirical works, mostly looking at the effect of OFDI on the technological performance of EMNEs (Chen et al., 2012; Pradhan and Singh, 2009). The work by Chen et al. (2012), in particular, tries to measure the return of FDI directed to advanced markets on the innovative performance of the parent from a large number of emerging countries. Results show that there are reverse spillovers on the technological effort when the affiliates are based in a host country with stronger R&D capabilities. In addition, only a few other studies focus on the effects of OFDI on other aspects of firms' performance in the context of emerging economies. Among them, the work by Debaere et al. (2010) combines matching with difference-in-difference to study the effect of FDI on employment growth for a group of Korean MNEs, showing contrasting results according to the location of the investment. Two other studies use Taiwanese firm level data and show that foreign operations generally contribute to: a) increase domestic production and employment, conditional on the size of the investment (Liu and Nunnenkamp, 2011); and b) raise firms' productivity, since they affect both technological endowments and their technical efficiency (Yang et al., 2013).

To our knowledge, no such work has been done to analyse the effect of OFDI on the performance of Chinese EMNEs[1], despite investments represent one of the key instruments supported by the outward looking strategy of the Government to raise productivity, acquire strategic resources not yet available at home and reduce inefficiencies in the production process due to overcapacity and market saturation (Wang, 2012).

[1] An exception is represented by a work looking at the effect of Chinese OFDI on TFP (Zhao et al., 2010). However, the study – which shows a positive relation between OFDI and productivity - looks at aggregate, rather than at firm-level, data.

2. Data

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 has been set-up matching different data sources: the Financial Times Group's *fDiMarkets*, Bureau van Dijk's (BvD) *Zephyr*, and Thomson Reuter's *SDC Platinum*. Financial Times' *fDiMarkets* provides information on greenfield investments, *Zephyr* and *SDC Platinum* on M&A and other minority investments (corresponding to a share of less than 50% of ownership). EMENDATA is currently focused on all FDI from emerging multinationals (EMNEs) occurred between 2003 and 2011.
In addition, in EMENDATA all these data sources have been linked to information on both the investing company and its Global Ultimate Owner (GUO) from another data source, that is BvD's *Orbis*. This implies the possibility of performing analysis at the deal, at the company and at the group level.

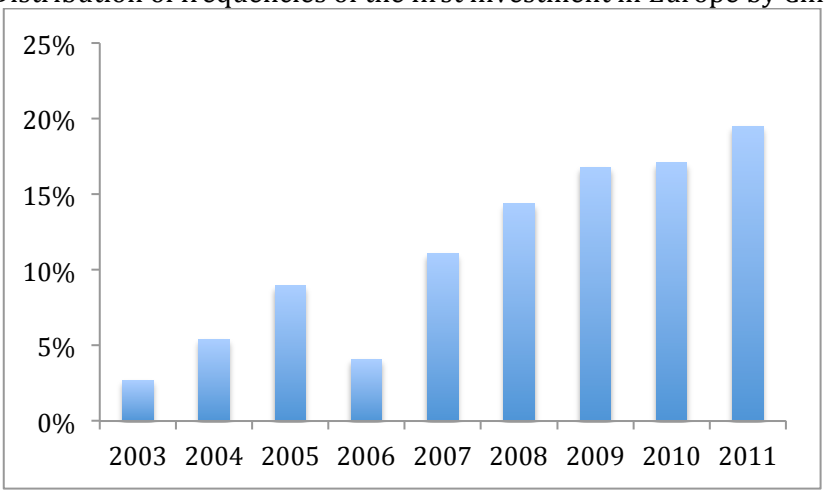
For the specific purposes of this work, all the deals undertaken by Chinese (mainland) investors in the EU27 have been extracted. This original sample is made of 521 Chinese investors, 423 of which have undertaken a single deal in the EU27, while the remaining 98 have performed multiple deals. Information on such deals range from the country of investment, the mode of entry, the sector and their specific purposes (e.g. the activity of the newly established plant).

As already mentioned, cross-border deals in EMENDATA have been linked to economic and financial variables taken from BvD's Orbis. These variables have been extracted at the parent company level, in order to consolidate all the deals of the same business groups, even if undertaken through different Chinese subsidiaries[2]. This matching strategy resulted successful for 368 Chinese investors in the EU27 over the years 2003-2011.

We rely on the first investment made by Chinese firms in Europe.[3] Figure 1 reports the distribution of the investment years, showing intensification over the most recent years. This is pretty in line with the existing evidence, including at the macro level, which shows a sudden increase in the number of Chinese investors in advanced economies especially in the aftermath of the financial crisis (Davies, 2013).

[2] Among the whole sample, only 30 Chinese investors have undertaken cross-border deals through multiple investors belonging to their business group. This implies that for all investors the matching with BvD variables has been done using the consolidated balance sheet, unless in the cases of firms that did not consolidate.
[3] Although it is likely that Chinese firms have performed their first cross-border deal, if any, since year 2003, we cannot exclude that some of them had invested abroad before the considered time period.

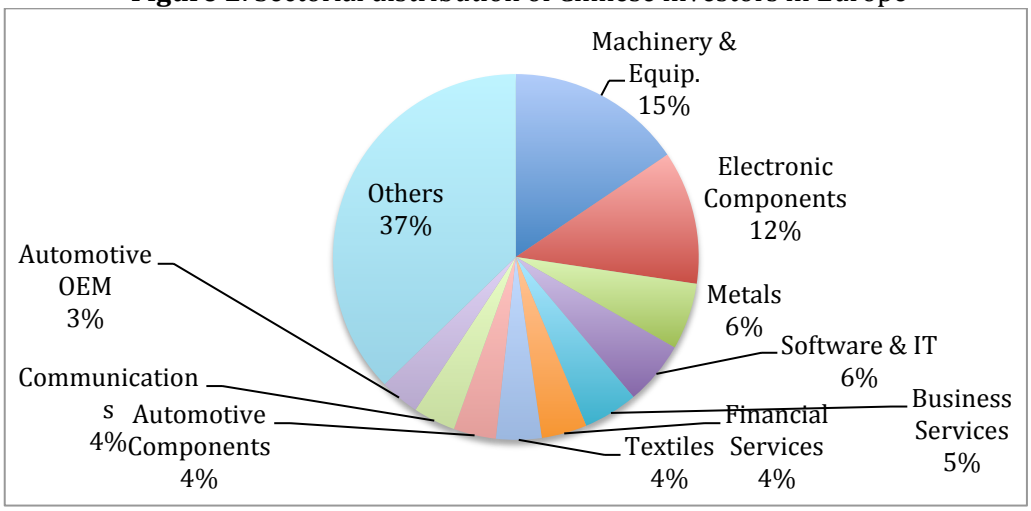
Figure 1. Distribution of frequencies of the first investment in Europe by Chinese MNEs



Source: Authors' elaboration on EMENDATA

As regards other descriptive statistics, our data show that the list of destinations of the first investment in Europe is quite concentrated, as the top five locations (in order of relevance: Germany, UK, France, Netherlands and Italy) represent together the 77.7% of the total[4]. Sectorally, on the other hand, there is a larger diversification, but it is not surprising to observe that all the main sectors of specialization available in the European markets have been targeted so far by Chinese investors (see Figure 2).

Figure 2. Sectorial distribution of Chinese investors in Europe



Source: Authors' elaboration on EMENDATA

Finally, in order to correctly assess the performance of foreign investors, we have built our counterfactual extracting a control sample of companies from Orbis. The starting sample includes 4,801 Chinese companies with at least one subsidiary in China but no foreign subsidiaries. We choose firms with at least one domestic affiliate in order to have – at least theoretically – a control group of firms more structured compared to small businesses.

[4] The sample include salso a small percentage of investments directed to Eastern European countries (including Poland, Romania, Hungary, Bulgaria, Czech Republic and Slovakia), most OECD members, that together represents 8.5% of the sample size.

As mentioned before, the reduction of the treated sample from 521 to 368 investors (70% of the sample) is due to the complete absence of these Chinese firms in BvD Orbis. However, a further reduction of the sample is caused by the unavailability of several balance sheet variables for Chinese companies included in Orbis. The same problem occurs also for the firms in the control sample. As it is showed in table A1 in the Appendix, the effective coverage for some key indicators, including for instance the number of employees, total assets and sales range around 30-40% of the sample, whereas for other relevant variables such as value added, cost of materials, exports and R&D expenses the number of available observations is so low to make them unusable for the scope of running robust empirical analyses.

3. Methodology

The objective of this work is to measure the changes in a range of performance indicators that can be attributed to the decision to invest in an European market.

A major concern faced by such kind of analysis has to do with reverse causality and the potential risk of endogeneity, due to the self-selection of bigger and more productive firms in foreign markets (Helpman et al., 2004). The differences in performance between MNEs and domestic firms could be due to the fact that they were already best performers before the investment, rather than only because their performance improved as a result of internationalization (Castellani and Barba Navaretti, 2004). Based on the assumptions of heterogeneous firms' models (Melitz, 2003; Helpman et al., 2004), in fact, it is realistic to assume that firms becoming MNEs are larger and perform better compared to firms that remain national, even if they export.

Our data seem to support such concerns. Table 1 compares some key structural characteristics of firms included in the treated and control groups in the year before the investment took place[5]. Despite we have tried to select more structured firms for the control sample, it comes quite clear from the data that there are significant differences between the two groups. This has an implication for the rest of our analysis, considering that this is likely to affect results posing evidence problems related to the self-selection of bigger firms into foreign markets.

Table 1. Structural characteristics of sample firms in the year before investment

	Treated	N	Control	N
N. of Employees	23097.4	134	2202.96	1295
Total assets (USD million)	29,300	152	749	1395
Year of establishment	1997	212	1995	1868
N. of affiliates	385.267	221	15.188	1917
Sales (USD million)	1530	140	234	1384

[5] Following the works by Petkova (2009) and Chari et al. (2012) we have assigned counterfactual investment dates to firms in the control group by assuming the same distribution of targeted firms investing abroad in each year (see Figure 1).

Turnover (USD million)	2350	150	251	1394
Profit margin	12.711	138	8.084	1250
Patents*	116.172	221	15.668	1917

Source: Authors' elaboration on EMENDATA and Bvd Orbis
*Data on patents is cumulate and refers to the last year available, 2011.

In light of the above discussion, we test such provisions of heterogeneous firms' model in order to better emphasize the differences between MNEs and other companies. We do this by running a simple OLS regression in which we test the relationship between a number of indicators of productivity and performance on a dummy variable (*EMNE*) taking the value of 1 to identify the investors and 0 otherwise:

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

Where Y is an indicator of performance for firm i in region j, sector x and year t, while γ_j, δ_x, and ρ_t, are region, sector, and year effects, respectively. We test this model on a range of indicators of productivity.

We first estimate a total factor productivity (TFP) function as a residual of the following production function:

$$Y_{it} = A_{it} L_{it}^{\alpha_L} K_{it}^{\alpha_K}$$

in which total sales are the proxy for the output, while the number of employees is used for the labor component and total assets[6] to measure capital[7]. Unfortunately, the lack of a number of sufficient observations to proxy intermediate inputs (see Table AX), does not allow us to adopt 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). We therefore estimate (X) using the system GMM approach and a standard OLS function, well aware of the concerns arisen by the existing literature on these methodologies (del Gatto et al., 2009; Van Beveren, 2012).

In light of such data restrictions, we turn to less computationally demanding measures of productivity. Specifically, we construct a simple estimation of total factor productivity using a constant return to scale Cobb-Douglas production function:

$$TFP_i = Y_i / (K_i^{\alpha} L_i^{1-\alpha})$$

Where Y, the output, is measured by sales, L is the total number of employees and K total assets, assuming a share of $2/3$ for the former and $1/3$ for the latter.

[6] Total assets are used instead of fixed assets given the presence of firms operating in the service sectors, where intangibles are relevant.
[7] Variables reported in monetary terms are deflated with their respective industry price indexes.

In addition, we also measure firms' efficiency through labour productivity, computed as a ratio between deflated sales and the number of employees. Here, a relatively productive firm is one that produces more output with fewer workers.

Not surprisingly, results (see Table 2) show that the assumptions of firm's heterogeneity holds also in the context of China, with foreign investors being on average more productive than other non-investing companies. As showed in the last columns of Table 2, these results are robust to the inclusion of further controls, such as firm's size, age and capital intensity.

Table 2. Determinants of firms' productivity

	(1) LAB_PROD	(2) TFP	(3) TFP_GMM	(4) TFP_OLS	(5) LAB_PROD	(6) TFP	(7) TFP_GMM	(8) TFP_OLS
EMNE	0.152***	0.145***	0.0802***	0.0740***	0.0640**	0.0640**	0.0623**	0.0366
	(0.0386)	(0.0310)	(0.0277)	(0.0270)	(0.0301)	(0.0301)	(0.0299)	(0.0294)
AGE					-0.0843***	-0.0843***	-0.0890***	-0.0823***
					(0.0136)	(0.0136)	(0.0137)	(0.0132)
EMPL					0.0490***	0.0490***	-0.00123	0.0154**
					(0.00663)	(0.00663)	(0.00667)	(0.00652)
K/E					0.723***	0.389***	-0.00829	0.00385
					(0.0108)	(0.0108)	(0.0108)	(0.0104)
Constant	11.15***	7.320***	8.002***	10.17***	2.636***	2.636***	8.270***	10.16***
	(0.116)	(0.0829)	(0.0558)	(0.0555)	(0.146)	(0.146)	(0.149)	(0.142)
Province effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,982	11,982	11,975	11,981	11,910	11,910	11,903	11,909
R-squared	0.200	0.165	0.941	0.911	0.582	0.337	0.942	0.912

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

3.1 Difference-in-difference Matching estimator

In light of the above discussion, ideally, one would like to compare the outcome of firms that decide to invest with a counterfactual in which the same firm decided to not invest. Given that such counterfactual is not available, in line with a well-established strand of empirical literature (Barba Navaretti and Castellani, 2004; Debaere et al., 2010), we construct it artificially by means of propensity score matching techniques.

The preliminary objective of our empirical analysis is thus to select an appropriate group of non-investors whose characteristics closely match the group of EMNEs, i.e. other national companies that would have the same ex-ante probability to become a multinational. Matching is a non-parametric estimator that provides the mean difference in outcomes and the treated under the common support. Formally, the average treatment effect (ATT) that results from this match is equal to the differences in the average outcomes for the firms included in the treated and those in the control group (Imbens and Wooldridge, 2009):

$$\hat{\alpha} = E(y^t - y^c|D = 1) = E(y^t|D = 1) - E(y^c|D = 1)$$

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

We first estimate the probability of investing in Europe as a function of observables 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 variables that affect firms' performance and the probability to invest overseas (see Debaere et al., 2010; Chari et al., 2012). Among these variables, we include firms' age and age squared, as a proxy for experience, the structure (using the number of employees, total assets and turnover) to control for the size, financial performance (roe and roa) to take into account the financial health and profitability as well as a dummy variable which is equal to 1 if the firm is public listed and 0 otherwise[8]. The specification includes also 2-digit industry dummies to control for industry-specific performance and to take into account for incentives and policies targeted to selected sectors; regional dummies based on the geographic distribution of firms within provinces and autonomous municipalities, which is needed to control for the heterogeneity in local policies potentially affecting a firm's status. Finally, we also include year dummies in order to control for common shocks and business cycle fluctuations.

Results of the Probit model, reported in table A2 in the Appendix, show that bigger firms in terms of employees and assets, as well as those with higher returns on assets are more likely to invest. Experience, on the other hand, has a negative effect, this being not entirely surprising in the context of emerging economies, including China, where most of domestic MNEs undertake early internationalization strategies leapfrogging the traditional stages of development (Mathews, 2006; Li, 2007). Finally, public listed firms are less likely to become MNEs compared to private ones.

Propensity scores are then computed based on the output of the probit analysis. We select firms as close as possible to EMNEs on the basis of their propensity scores using the Kernel matching estimator with common support, by means of the Leuven-Sianesi (2003) algorithm[9].

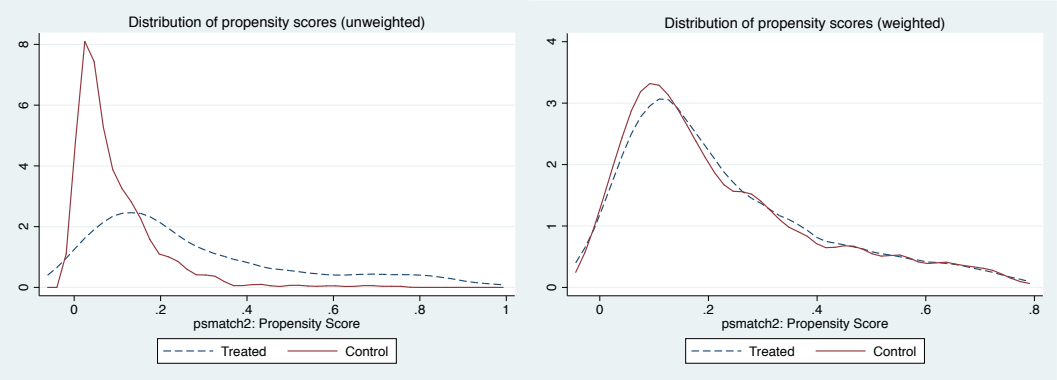
[8] For the variables representing a firm's structure and financial performance we use the average value for the last three years before the investment. This is due to two reasons. The first is that, by doing this, we are able to increase the number of usable observations given the large number of missing values. The second is that the decision to invest abroad might not necessarely be taken the year before investing (on this see also Hijzen et al., 2011), especially when – as in the case of China – approval procedures are time consuming (Davies, 2013).

[9] Alternative matching algorithms, including the nearest neighbour and the Mahalanobis, have been tested, both performing less well in terms of balancing compared to the Kernel one.

We have evaluated the outcomes of the matching procedures in a number of ways.

Figure 3 provides an illustration of our procedures. The left Panel reports the predicted probability, i.e. the propensity score, of investing abroad for the entire control group before matching vis-à-vis the group of treated firms, while the right panel reports the same probability for the groups of matched controls and the treated. As it can be shown, the matching procedure works quite well as it can be seen by the fact that the two distributions almost overlaps after the matching has been completed.

Figure 3. Distribution of propensity scores before (left panel) and after (right panel) matching



Source: Authors' elaboration

Another way to evaluate the results of matching procedures is to test the so-called balancing hypothesis, which means that observations with the same score need to have the same distribution of the observable characteristics independently of the treatment. This hypothesis has been tested both before and after the matching. Tests' results from Table 3 show that two samples can be considered well-balanced given that the standardized percentage bias reduce well below the 5 per cent 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 is performed, showing a sensible reduction[10].

Table 3. Balancing test, before and after matching

Sample	Pseudo R2	LR chi2	p>chi2	Mean bias	Median bias
Raw	0.179	1346.15	0.000	8.8	6.3
Matched	0.023	8.17	1.000	2.1	0.5

Finally, propensity score matching are combined with difference-in-difference (DiD) estimators to further rule out time-invariant and unobservable differences between the treated and the controls, using the following model:

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

[10] As the *pseudo* R^2 represents an indicator of how well the regressors explain the probability of selection, after matching its value should reduce considerably compared to before the procedures (Sianesi, 2004).

Firms in the control group are weighted according to the matching method through a weighting function depending on the propensity score distance between the treated and the controls, which has been obtained by the matching procedure described before (Heckman et al., 1997). The DiD allows to compare the change in the average outcome between a time period before the investment took place (t=-1) and a time period after the investment between the two groups of firms in our sample. 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 up the fifth year after the investment.

Table 4. Results, propensity score matching difference-in-difference estimator

t	Lab_prod	N	TFP	N	TFP_GMM	N	TFP_OLS	N	K/L	N
0	0.0484	2,088	0.0807	2,088	0.0891	2,088	0.145	2,088	-0.0985	2,116
1	0.00108	1,959	0.0312	1,959	-0.115	1,959	0.02	1,959	-0.0508	1,986
2	0.00753	1,677	0.00348	1,677	0.0365	1,677	0.082	1,677	0.124	1,700
3	0.193	1,480	0.175	1,480	-0.11	1,480	0.116	1,480	0.269	1,502
4	0.403**	1,327	0.309**	1,327	0.324	1,327	0.397	1,327	0.683***	1,347
5	0.519*	1,239	0.468**	1,239	0.332	1,239	0.655	1,239	0.726*	1,258

t	Total assets	N	Intangible assets/Total	N	Employees	N	Sales	N
0	0.319***	2,225	0.006	1,382	0.613***	2,116	0.471***	2,197
1	0.653***	2,077	0.0004	1,365	0.795***	1,986	0.693***	2,050
2	0.938***	1,811	-0.002	1,182	1.148***	1,700	0.901***	1,786
3	1.214***	1,596	-0.006	1,047	0.986***	1,502	0.865***	1,573
4	1.770***	1,412	-0.021**	933	1.195***	1,347	1.101***	1,392
5	2.114***	1,271	-0.017	842	1.433***	1,258	1.663***	1,252

t	Profit	N	ROA	N
0	-0.00873	1,972	-0.0242	2,001
1	-0.02629	1,841	-0.534	1,872
2	0.00783	1,585	0.0636	1,617
3	0.00496	1,399	-0.309	1,426
4	0.01625	1,270	0.0298	1,292
5	0.067*	1,142	-0.0853	1,165

At first, we investigate the effects of the investment on firms' efficiency, using the constructed indicators of firms' productivity and capital intensity. Results seem to show that investments hardly translate in an increase in efficiency of the production process of the parent firm. This is true especially when we use estimation-based measures of TFP, for which we do not observe any significant

coefficient. Conversely, when we move to easy-to-compute TFP based on constant returns and the more general measure of labor productivity the picture changes. It shows in fact that, while the initial years after the investment do not differentiate the two groups of firms, a significant difference emerges starting from year four. Chinese firms investing in Europe experience in fact a productivity premium with respect to non-investors, which could be quantified in the order of 30-50 percentage points. This result complements pretty well with the one showing an improvement in the capital on employees ratio, also likely to be positively affected by the international investment four and five years later. Taken together, the latter results can be interpreted in two ways, not mutually exclusive. On the one hand, this could represent the general effect of the foreign investment on the reorganization of domestic production activities, leading to a more efficient division of labor between the parent and the affiliates, the former keeping at home the more capital-intensive part of the production process. On the other hand, this could be due to the "reverse spillover" effect, i.e. the transfer of knowledge, technologies and best practices from the affiliates to the parent. Interestingly, as the latter is concerned, our results appear coherent with existing evidence showing that such spillovers take on average four years to be absorbed by domestic firms (Mansfield, 1985; Chen et al., 2012).

Another key implication of outward FDI, as discussed, is represented by the capacity to raise a firm's domestic activities. This can be due to a number of different factors, including for instance the need to serve new markets, or to expand and coordinate existing activities across borders. We test this hypothesis using different variables.

A first, important, dimension has to do with the domestic capital. Results show that – compared to non-investors – there is a significantly higher growth in terms of total assets for the foreign investors back in China. This is a relevant finding for our analysis, which sets coherently with the view that investments in foreign and domestic inputs complement each other, especially in converging economies like China still far from the production frontier. In addition, it has to be noted that one of the reasons why EMNEs have started to invest abroad, especially to advanced markets, is in fact the need to enhance their existing resources with new, and more valuable, assets hardly available in the home country. However, since we are not able to compare the quality of the new assets, we control for the performance in terms of intangible assets, which are the most valuable and so the most wanted as far as the asset-seeking motivations are concerned (Deng, 2009). We do not find significant improvements in the share of intangible on total assets, which show even a small relative decrease in year four, possible to be explained by the combination of the investment motive and the entry mode, the latter examined in the next section.

We also measure the impact of the investment in Europe on the domestic employment of Chinese MNEs, showing that they clearly seem to take advantage from internationalization. This result is consistent with the existing evidence on the home effect of OFDI, even if it must be noticed that most of this literature has so far examined the effect on MNEs from advanced countries, while the works looking at emerging economies have examined the cases of Korea (Debaere et al.,

2010) and Taiwan (Liu and Nunnenkamp, 2011), which cannot be considered as low-wage countries. In light of this, it is reasonable to believe that, in the absence of efficiency seeking motivations, Chinese investments are mostly oriented to rise up domestic, rather than foreign, employment.

On a similar vein, we find that the investment determines a significant increase in total sales. Unfortunately, due to data limitations, we cannot distinguish whether this measure reflects exports, intra-company trade or domestic sales. Thus we can only assume that such improvements are due to a mix of different strategies. On the one hand, consistently with a large literature on the determinants of Chinese EMNEs (Buckley et al., 2007), we can assume that such increase is a consequence of market oriented investments to acquire larger shares of advanced markets through the establishment of trade offices and distribution centres abroad. As a matter of fact, most of the surveys on Chinese investors in Europe rank the access to the local markets as the first motivation (European Chamber of Commerce, 2013). On the other hand, many investments to advanced economies, and especially M&As and JVs, are explicitly oriented to respond to the rising demand from the domestic market with the introduction of new and differentiated products. In the latter case, this would contribute to explain the increase of domestic sales compared to other national firms. A last explanation has to do with the increase of intra-firm trade, more likely to happen in case of production related vertical investments (Barba Navaretti and Venables, 2004).

Finally, the last columns of Table 4 report the impact of investments on some financial indicators, useful to compare the implications in terms of firms' restructuring after the investment. Differently from the previous sets of variables, results are more ambiguous in this case. Taken together, they seem to show that the capacity of firms to realize financial returns reduces during the first years after the investments and slightly increase afterwards. Based on this, it is not possible to judge over the profitability of such investments. However, we consider this dimension to be dependent on the financial efforts made by the investor, which is in turn related to the modality of the investment (Norback and Persson, 2002). And, even if we cannot control for the size of the investment due to lack of reliable information, we can still try to draw some additional inputs based on a distinction by the form used, i.e. greenfield or M&As (see next section).

4.1 Does the modality of investment influence domestic performance?

Previous results have highlighted some robust relationship between investment and successive improvements in firms' performance on a range of different indicators. Still, however, for some indicators, including productivity and profitability, some uncertainty remains over the home effects of investing abroad. Therefore, in order to better define our main results, in what follows we investigate whether the modality of entry has an influence on the successive effects on domestic firms' performance. Since, as remarked in section 2, our database allows to distinguish the forms of the investment according to its main modalities, we replicate the previous analysis distinguishing whether the first

investment into Europe is a greenfield or a M&A. Within the literature, it has been often argued that firms prefer M&As' growth strategies when their objective is to access complementary, and more valuable, assets, such as technologies, brands and distribution networks (Norback and Persson, 2002). This view has been recently confirmed also by empirical analyses on Chinese MNEs, showing that they use M&As to get access to strategic assets and to reduce the timing of their catching up (Cui and Jiang, 2009; Deng, 2009). Conversely, a more organic pattern of growth can be achieved through the establishment of wholly-owned subsidiaries. This is a relevant strategy for EMNEs, including Chinese, since it allows them to gain a foothold in more distant markets and acquire international experience with lower risks (Quer et al., 2012).

Some interesting results stand out from this comparison[11] (see Tables A3 and A4 in the Appendix). On the one hand, we observe that cross-border acquisitions seem to favor the increase in productivity more, and earlier, than Greenfield investments. This is not surprising, as we have mentioned that it is through M&As that Chinese firms are increasingly trying to tap in foreign technologies and knowledge spillovers to accelerate their catching-up towards more established competitors (Deng, 2009). And, given that the objective of such strategic-asset seeking acquisitions is to generate reverse spillovers, it seems realistic to assume that successful M&As can contribute to raise firms' productive efficiency at an earlier stage than greenfield FDI, mainly based on an organic process of growth.

On the other hand, it is mostly through Greenfield investments that Chinese companies rise up their scale. Our results show in particular that such investments allow increasing – even up to 3 times after four or five years from the investment – their domestic employees, sales and total assets. Also in this case this result does not come as a surprise. It is indeed realistic to assume that firms first investing through M&As have already some scale related advantages to exploit before the investment, and indeed many Chinese M&As have been so far conduced by established domestic players, including many SOEs (Buckley et al., 2014; Deng, 2009). Indeed, results of an empirical analysis have shown that are relatively smaller, and less experienced, Chinese firms that more frequently embark in greenfield investments (Quer et al., 2012).
With respect to the assets, it is interesting to observe that Chinese firms are able to increase also their intangible assets mostly by means of M&As (Buckley et al., 2014). This finding goes together with the ones on productivity and confirm the view that it is mainly through acquisitions that Chinese firms are undertaking their upgrading strategies.

Finally, and this time following our expectations, we show that financial indicators – and especially profits – weaken as a consequence of M&As,

[11] Treated and control samples have been selected following the same procedures described in Section 3.1, but considering the first greenfield or M&A as the treatment variables. The only noticeable difference is in the matching procedure for selecting the control group in the case of M&As. Due to the bad performance of the balancing test, the number of variables has been tightned and include age and its square, turnover, as well as province, industry and year fixed effects.

consistent with the view that, at least in the short run, profitability of the investors might reduce the more valuable the domestic assets of the acquired firms are (Norback and Persson, 2002).

5. Conclusions (TO BE WRITTEN)

References (TO BE COMPLETED)

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Appendix

Table A1. Missing information from Orbis, selected variables*

	TREATED	CONTROL	% COVERAGE ON TOTAL
Original sample (after match with Orbis)	368	4801	5169
Year of Establishment	289	2124	46.7%
NACE Rev. 2 (4 digit)	247	2061	44.7%
Total Assets	191	1765	37.8%
Turnover	194	1759	37.8%
Sales	180	1743	37.2%
Intangible assets	142	1256	27.0%
Number of Employees	143	1184	25.7%
Cost of Goods Sold	106	1061	22.6%
R&D Expenses	30	13	0.8%
Costs of employees	36	0	0.7%
Added value	35	0	0.7%
Export revenue	0	0	0.0%

Source: Authors' elaboration on EMENDATA and Orbis
* Data refers to the last year available (2011).

Table A2. Results, probit estimator

	Treatment
lage	-1.359***
	(0.288)
lage2	0.198***
	(0.0618)
empl_3	0.0435
	(0.0606)
turnover_pre	-0.00233
	(0.0792)
roa_3	0.0144*
	(0.00773)
roe_3	-0.000688
	(0.00192)
assets_pre	0.0834
	(0.0786)
public	-0.0646
	(0.133)
Province effects	Yes
Industry effects	Yes
Year effects	Yes
Constant	-5.129
	(138.1)
Observations	1,213

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

Table A3. Results, propensity score matching difference-in-difference estimator (Greenfield)

t	Lab_prod	N	TFP	N	TFP_GMM	N	TFP_OLS	N	K/L	N
0	.1332	1,623	.1773	1,623	-.25168	1,623	-.0457	1,623	-.0055	1,653
1	-.0363	1,583	.0367	1,583	-.5924	1,583	-.3332	1,583	-.0771	1,611
2	-.1608	1,382	-.1234	1,382	.1928	1,382	-.1943	1,382	.2896	1,405
3	.1513	1,236	.1547	1,236	-.3006	1,236	-.3357	1,236	.4262	1,256
4	.6192*	1,092	.6173**	1,092	-.2200	1,092	.0954	1,092	.8142*	1,113
5	.9611	991	.8801*	991	-.9054	991	-.0196	991	.7313	1,010

t	total assets	N	Intangible assets/Total	N	Employees	N	Sales	N
0	.3651***	1,763	-.0050	1117	.6071***	1,653	.5386***	1,733
1	.8502***	1,715	-.0064	1,128	.9991***	1,611	.8942***	1,686
2	1.1762***	1,503	-.0132*	975	1.6723***	1,406	.6654*	1,479
3	1.8064***	1,339	-.0147*	884	1.7421***	1,256	1.116**	1,319
4	2.6145***	1,185	-.0118	778	2.8541***	1,113	2.017***	1,164
5	3.1453***	1,061	-.0198*	703	2.3753***	1,010	3.020***	1,042

t	Profit	N	ROA	N
0	.0132	1,570	-.429	1,592
1	.0039	1,539	-.483	1,560
2	0.159	1,346	-.949	1,368
3	-.0078	1,200	-1.549	1,221
4	.0078	1,066	.403	1,085
5	.0124	940	-.426	958

Table A4. Results, propensity score matching difference-in-difference estimator (M&As)

t	Lab_prod	N	TFP	N	TFP_GMM	N	TFP_OLS	N	K/L	N
0	.138	1,987	.159	1,987	-.247	1,987	-.038	1,987	-.051	2,026
1	.172	1,887	.188	1,887	-.160	1,887	-.015	1,887	-.008	1,927
2	.447**	1,637	.420**	1,637	.346	1,637	.154	1,637	.108	1,673
3	.384**	1,441	.346**	1,441	.248	1,441	.054	1,441	.102	1,475
4	.540**	1,271	.512**	1,271	.866	1,271	.377	1,271	.159	1,300
5	.392	1,164	.415	1,164	.205	1,164	-0.046	1,164	.332	1,190

t	total assets	N	Intangible assets/Total	N	Employees	N	Sales	N
0	.453**	2,244	.024**	1,480	.451**	2,026	.477***	2,196
1	.326	1,715	.027**	1,465	.620**	1,927	.522**	2,067
2	.718***	1,503	.021	1,283	.712**	1,673	1.124***	1,805
3	.676**	1,339	.002	1,141	.665**	1,475	1.018***	1,595
4	1.272***	1,185	.003	1,003	.746**	1,300	1.285***	1,403
5	1.316***	1,061	.015	891	.815	1,190	1.154**	1,248

t	Profit	N	ROA	N
0	-.051**	2,001	-1.783	2,034
1	-.078**	1,891	-2.264*	1,927
2	-.058**	1,636	-.857	1,672
3	-.076**	1,452	-3.16*	1,478
4	-.067**	1,304	-1.812	1,323
5	-.001	1,157	-3.385	1,179