Firm heterogeneity in multinational and domestic firms in Italian logistics

Brouwer, Aleid; Mariotti, Ilaria

Published in:
European Transport

Publication date:
2014

European Transport \ Trasporti Europei (2014) Issue 56, Paper n° 8, ISSN 1825-3997

Firm heterogeneity in multinational and domestic firms in Italian logistics

Aleid E. Brouwer (corresponding author)

Faculty of Spatial Sciences, University of Groningen, The Netherlands. Landleven 1, 9747 AD, Groningen, The Netherlands, a.e.brouwer@rug.nl, +31 50 3638658

Ilaria Mariotti

Politecnico di Milano, DAStU, piazza L. da Vinci, 32 - 20133 Milano,Italy. ilaria.mariotti@polimi.it

Abstract

In general it is accepted that foreign multinational enterprises (MNE's) perform better than domestic firms for a number of performance indicators. Micro level data revealed - especially in manufacturing – MNEs are larger, more productive and innovative and pay higher wages than domestic firms. Studies on firm heterogeneity refer to the manufacturing sector, while little evidence is provided for other sectors. The present paper examines how logistics firms located in Italy (2002-2005) differ in terms of size, labour productivity and fixed assets, by their ownership structure (foreign MNEs versus domestic firms). Specifically is investigated whether foreign MNEs do indeed outperform domestic firms on profitability.

By propensity score estimation and discrete choice models we compare the performance-indicators of the two types of firms. The resultsshow that the differences among the two groups persist, mainly as concerns turnover and value added, suggesting that foreign MNEs have a higher return on capital.

Keywords: Logistics, firm heterogeneity, profitability, MNEs, propensity score matching.

1. Introduction

Firms significantly differ (within industries) in terms of behaviour and performance. Recent theoretical and empirical literature has widely documented a superior performance of international firms, whereby multinationals (MNEs) are more productive than exporters, which in turn outperform purely domestic firms (Castellani andZanfei, 2006; Greenaway and Kneller, 2007; Mayer and Ottaviano, 2007). The sources of these premia have, however, largelyremained a black box in which standard theoretical models consider differences in productivityas the results of a random draw (Castellani and Giovannetti, 2007). Only recently models have acknowledged that firms in more competitive environments, such as the international markets (as opposed to smaller domestic markets) are more likely to adopt new technologies and achieve higher productivity than firms just having a monopoly power (Schmitz, 2005).

A stream of this literature has, therefore, investigated whether foreign MNEs show a better performance due to the ownership structure or whether superior performance can be explained by other variables (size, labour productivity and fixed assets). For example, Ruigrok and Wagner (2003) state that the organizational learning process goes hand in hand with the internationalization process of multinationals, therefore they find a clear relationship between level of internationalization and level of performance. However, in the majority of studies, the focus is on the manufacturing sector; with relatively little evidence is provided on the service sector. The only studies, at least to our knowledge, focusing on the service sector in Italy have been carried out by Crinò and Onida (2007) and Maggi and Mariotti (2012). Crinò and Onida (2007) focus on both manufacturing and services located in Lombardy region, in the north west of Italy in 2000-2005 and develop an econometric analysis; Maggi and Mariotti (2012) investigate the logistics sector in the year 2004 by means of a descriptive analysis.

Within this context, the present paper extends the literature by focusing on the logistics service sector[i] in Italy in 2002-2005, and accounting for the relationship between foreign ownership and economic performance. The interest on logistics derives from its recent and significant internationalisation openness. During the last decade the sector has registered an increasing number of inward and outward foreign direct investments (FDI). The growth rate of utilities (energy, air, water), transport, logistics and communications in Italy has tripled in the last years (UNCTAD, 2006), and outward FDI in the logistics sector equals to 26% of the total service FDI. Large foreign logistics suppliers now play a major role in the Italian market. For example, TPG-TNT and Deutsche Post each own about the 8% of the market share while SaimaAvandero, Geodis-ZustAmbrosetti and Shenker each own 1.5-3.5% of the market share (Federtrasporto, 2006). This increased internationalisation is linked to the fact that since the 1950s, the transportation and logistics industry has experienced the so-called logistics revolution, which can be related to: (i) the consumer-oriented economy (Strasser, 1998) demanding a level of service customization and delivery speed which is only possible by employing more frequent shipments of goods (McCann, 1998); (ii) the internet-based information systems(Hummels, 1999; Nooteboom, 2007; McCann, 2008); (iii) the substantial reductions in trade barriers, tariffs and transportation costs (Glaeser andKohlhase, 2004; McCann, 2008); (iv) the European Traffic Policy (Vahrenkamp, 2010), as well as; the (v) processes of vertical disintegration and value-chain decomposition in most industries associated with the on-goingglobalization of the economy, which has increased the amount of goods flows to be moved around the globe (Browne, 1993; Gereffi et al., 2005; Vahrenkamp, 2010; Maggi and Mariotti, 2012).

The aim of the paper is to investigate how logistics firms, located in Italy, differ in performance according to their international involvement in the period 2002-2005. We distinguish between domestic logistics firms (hereafter DOMs) and affiliates of foreign multinational logistics firms (hereafter FMNEs) and in our analysis we take into account the following firms' characteristics: (i) turnover, (ii) number of employees, (iii) value added, (iv) fixed assets, (v) labour productivity, (vi) sector and (vii) location. The dataset combines two different databases: the LogINT (Logistics and Internationalisation) database, developed by DiAP-Politecnico di Milano, and Amadeus database, and consists of unconsolidated balance sheet information for 11,338 domestic logistics firms DOMs and 273 foreign logistics firms MNEs located in Italy in the period 2002-2005.

In order to investigate the relationship between foreign participation and economic performance, the analysis is carried out by using a propensity score (hereafterpscore) estimation to construct an appropriate counterfactual of domestic firms (Rosenbaum and Rubin, 1983) at the year 2002. The propensity score approach controls for the probability of receiving treatment (foreign ownership in the present context) conditional on firms' characteristics (size, sector, location, etc.), so as to reduce the dimensionality problem. This

technique, therefore, allows us to investigate the performance differences which exist between FMNEs and DOMs at the year 2002. After properly controlling for firm-specific characteristics and matching those characteristics that are likely to impact on firms' profitability, the goal of the paper is to evaluate whether there are any remaining significant differences in profitability which are to be attributed to foreign ownership. In addition, discrete choice (logit) models are employed to compare the characteristics of the two sets of firms (before and after p-score matching) in the period 2002-2005.

Our results demonstrate that FMNEs tend to outperform DOMs in 2002-2005 in terms of their turnover and productivity. This is partly related to the fact that the multinational foreign-owned firms exhibit lower fixed assets than domestic firms and achieve higher rates of return on capital.

The paper is organized into five sections. The next section discusses the likely impact of firms' heterogeneity on profitability. The data and propensity score matching techniques are described in section three. The results of the discrete choice models are then presented and discussed in section four. Finally, we point to some conclusions.

2. Literature review and hypotheses

Firms are heterogeneous in terms of efficiency and competitive capabilities, and this reflects on their competitive performance (Barbosa and Louri, 2005). The existence of firm heterogeneity has been largely debated in the empirical literature (Castellani andZanfei, 2006; Greenaway and Kneller, 2007; Mayer and Ottaviano, 2007), and in particular a strand of literature has focused on heterogeneity linked to ownership. Doms and Jensen (1998), using US data, show that there are substantial differences between domestic and FMNEs. More specifically they find that foreign MNEs have higher labour productivity, pay higher wages and are more capital intensive than US domestic non-multinational plants, while the US domestic multinationals are the productivity leaders. Griffith and Simpson (2001) in their study for the UK find that FMNEs exhibit higher labour productivity than domestic firms, while the De Backer and Sleuwaegen (2002) analysis of Belgian firms shows that foreign firms are more productive than domestic firms. However the Belgian MNEs are very similar to FMNEs in terms of efficiency and returns to scale. In the case of Portugal, Barbosa and Louri (2005) find that ownership ties to make a difference with respect to a firm's performance and firms with foreign ownership outperform domestically owned firms with similar characteristics. This superior performance is explained by the fact that MNEs have higher capital intensity and a larger size. As far as the case of Italy is concerned, Castellani and Zanfei (2006) find that belonging to multinational groups is related to higher productivity, while the innovation activity is more evident in Italian MNEs than in foreign MNEs. Meanwhile, the study on Italy by Grasseni (2007) indicates a higher level of labour productivity and a higher average wage for foreign MNEs in respect to domestic MNEs, which dominate in terms of return on sales and leverage. Even though the evidence on Italy suggest that FMNEs are mostly seeking market expansion, they still may benefit from a different managerial structure which is different in Italy than in their home markets.

Within this wide-ranging literature, there are only a limited number of studies specifically analysing whether foreign MNE cherry-pick the high performing domestic firms. Girma and Gorg (2007), for instance, find positive effects of acquisition by US MNEs on wage growth in the UK. Comparing FMNEs and domestic firms in UK, Criscuolo and Martin (2004) find that US MNEs are the productivity leaders in the market and this leadership seems due to the selection of better plants (the cherry-picking argument). The UK MNEs are as productive as any non-UK MNEs. The available evidence about the Italian case (Crinò and Onida 2007) suggests that foreign MNEs are more knowledge-intensive, more productive, pay higher

wages and show a more solid financial structure than domestic firms. However, Benfratello and Sembenelli (2006) focus on Italy in the period 1992-1999 and find that, after accounting for endogeneity in an instrumental variable set-up, the productivity advantage of foreign firms disappears, implying that foreign firms tend to cherry pick the best Italian firms, without contributing to raising their economic performance. As such, in terms of the direction of causality between foreign participation and economic performance, if the decision to participate in a foreign firm is endogenous, a positive link between foreign ownership and economic performance may simply suggest that foreign firms invest in the already high-performing national firms (see Crinò andOnida, 2007 for a detailed review). However, the majority of existing studies refer to the manufacturing sector, while little evidence is provided for services and specifically for the logistics sector, which is the object of the present paper. For Italy, one of the few papers to investigate the foreign-domestic differences in the performance of services has been undertaken by Crinò and Onida (2007). They find that in the services sector the difference in favour of FMNEs is mostly accounted for by a differential pattern of industry location between the two types of firms, by the larger size of FMNEs, and by the likely tendency of foreign firms to invest in already high-performing national firms (so called "cherry picking").

The only work to our knowledge which compares the performance of foreign logistics MNEs and domestic firms by means of a descriptive analysis, has been undertaken by Maggi and Mariotti (2012). They refer to the Italian case for the year 2004 and find that foreign MNEs show productivity levels, measured as value added per worker, that are higher than the Italian firms' average. The descriptive analysis suggests that the higher performance of MNEs is related to their larger size (measured both in numbers of employees and turnover), which allows firms to achieve economies of scale and scope and to acquire and develop advanced technological tools and human resources. Italian logistics firms are, on the other hand, smaller in size, especially if they work in the transport by road sub-sector. According to the Italian Statistical Institute (ISTAT), 60% of the logistics firms are single-person companies and 16.2% has two employees (ISTAT, 2007). The small and very small size, therefore, appears to limit their ability to invest and become competitive in comparison with larger, and in particular, foreign-owned firms .

The significant heterogeneity in size between small and very small domestic firms and the larger and more innovative foreign MNEs, points to a probable weakness in the domestic supply of integrated logistics services which are appropriate for responding to the increasing demand for high value-added and customized logistics services. This leads foreign investors to privilege the most value added sectors, such as "multimodal transport operators", "freight integrators" and "couriers" (Maggi and Mariotti, 2012), because within a global market where products and services flow internationally every day and commercial borders have overtaken national borders, there is an increasing need of integrated logistics able to support the international supply chain (Vastag et al., 1994).

In terms of geography, much evidence also suggests that foreign MNEs logistics providers prefer to be located in the core area of the country because, as underlined by Vastag et al. (1994),Ball (1996), Rhim et al.(2003) and Lasserre (2004), they adopt the so-called "follow the customer" strategy. This means that international firms (global dimension) can benefit from being located in certain agglomerations (Cantwell and Iammarino, 2010). Both Cantwell and Iammarino (2003) and Castellani and Zanfei (2007) find that that the relationship between local and global dimensions within a firms is a crucial issue and influence on performance of firms. As argued by Balcet and Evangelista (2005), localization in a territory and a particular district has an influence on performance and hence on the difference between firms within sectors. In particular, this is linked to the expectation that foreign MNEs are located in the most developed/competitive areas, which in the case of Italy means that they

are the northeast and northwest. As stated by Qian (2000), in terms of geographic diversification, firms can often use the same firm-specific advantages that they utilize in their home markets. Due to the similarity of their value chains, their ownership advantages are likely to provide a significant source of competitive advantage in the new geographic market. Geographical diversification also helps firms take advantage of economies of scale, scope and experience, and international diversification leads to firms exploiting differences in the goods and factor markets across geographic areas. Ownership advantages may help firms to achieve such diversification advantages in the context of tightly-controlled network economies.

On the basis of these arguments, the present paper aims to test the following hypotheses:

H1: Foreign-owned logistics firms FMNEs are larger (in terms of turnover) than domestic logistics DOMs firms within the Italian logistics sector.

H2 : Logistics FMNEs have higher labour productivity than DOMs within the Italian logistic sector.

H3: LogisticsFMNEs are mainly located in the core area of Italy.

H4: Within the logistics sector, FMNEs are more likely to be in the higher value added sub-sectors than DOMs.

Leading all to the main hypothesis:

H5: LogisticsFMNE are more likely to have higher profitability and efficiency than DOMs.

3. Data, descriptive statistics and propensity score estimation

The dataset we used to carry out the analyses at the firm level combines two different databases: (i) LogINT database, developed by the Laboratory of Economics, Logistics and Territory (LabELT), DAStU – Politechnic of Milan, which is updated every year, and registers inward and outward logistics FDIs, which have taken place in Italy since the 2000[ii]; (ii) Amadeus database, developed by Bureau Van Dijk, which registers the top MNEs in Europe. Amadeus is a Pan-European financial database (7 million companies), which contains financial information on the European companies and is updated very frequently. Amadeus comprises information on the Italian logistics firms, too. The dataset consists of unconsolidated balance sheet information for 11,338 domestic logistics firm and 273 foreign multinational logistics firms located in Italy in the period 2002-2005. As a result of data cleaning – deleting cases with missing values - we were left with just over 9,000 domesticfirms DOM and 242 foreign multinational logistics firms MNEs. The observation period is chosen, since after 2002 Inward FDI in Italy increased strongly, for the first half of that decade. This phenomenon of FMNE moving into Italy was very pronounced in that specific period. Later, data is still mostly available, however, the missing values are much larger, making the data less good to use.Furthermore, comparing incoming FDI in Italy to Italian firms justifies the period chosen, when much dynamics in these phenomenon were present.

Both FMNEs and DOMs tend to be located in the northwest, which is the most industrialized area of Italy accounting for 20.9% of the total Italian GDP. In this respect, 55.8% of the foreign-owned FMNEs and 32.2% of the domestic firms DOMs locate in this macro area, as against 6.9% of the FMNEs and 20.9% of the domestic logistics firms DOMs which are located in the South and Italian Islands. More specifically, in 2005 the Lombardy

region attracted 41.3% of the foreign logistics MNEs and 34.9% of the foreign manufacturing MNEs (Mariotti and Mutinelli, 2007). This is likely to be the result of the fact that the northwest is the macro area hosting the majority of the national and international flows and where the main logistics nodes are settled. In addition, the concentration in the "core area" of the country, mainly in the northwest, can be explained by the fact that this area hosts more manufactures and other service related businesses than any other macro-area in Italy, and therefore the demand for logistics services is higher. By contrast, the limited number of manufacturing and service firms in the south of Italy does not represents only a limited 'pull factor' for both domestic and foreign logistics MNEs. This is consistent with the findings from Rhim et al., (2003), Vastag et al. (1994) for North Carolina, United States of America, and Jayaraman et al. (1999) for North America.

When investigating our data with DOMs and FMNEs as separate groups, we find that the firms are divided between the logistics sub-sectors, as indicated in Figures 1a and 1b. FMNEs are concentrated in sub-sectors characterized by higher value added sectors than pure transportation, such as 'logistics' (including: integrated logistics, courier, international forwarding) and air transport, while DOMs are mostly working in 'transport by road', which displays a lower value added per firm (ISTAT, 2007). This is consistent with our expectations and the literature. The predominance of the transport by road is due to the transport-intensive model which predominates in Italy where the majority of firms are small and medium sized, and limited in their ability to develop know-how, upgrade human resources and apply the innovations required to offer integrated logistics services. We also show in Table 1 and Figures 1-5 the comparison between the foreign and domestic logistics firms in terms of their turnover, number of employees, value added, labour productivity, and fixed assets during the period 2002-2005.

Table 1: Logistics sub-sectors of the DOMs and FMNEs in Italy in percentages in 2005

Sub-sector	**DOM**	**FMNE**
Air	0%	2%
Sea	2%	3%
Road	51%	48%
Rail	1%	1%
Logistics	29%	48%
Infrastructure	5%	11%
Tour operator	12%	8%

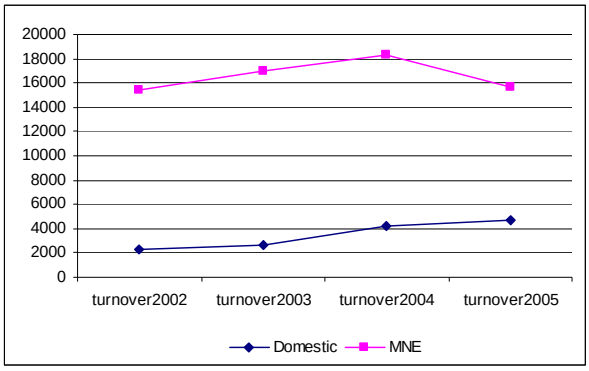


Figure 1: Turnover in 2002-2005 (thousand €)

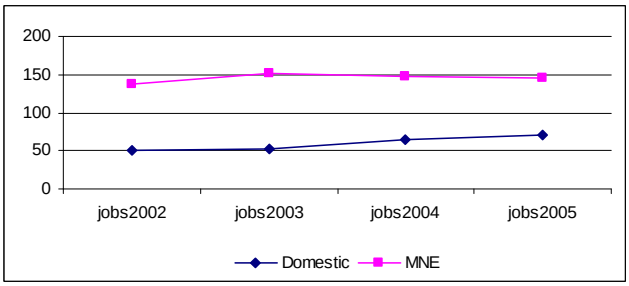
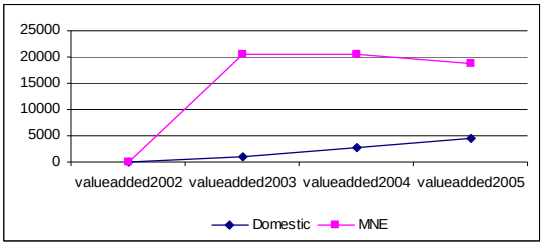


Figure 2: Number of employees in 2002-2005



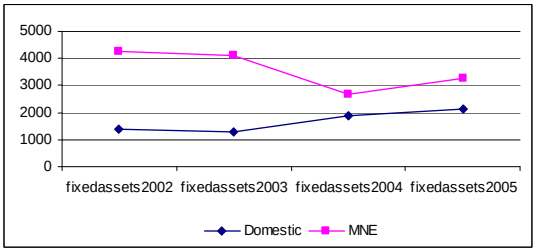


Figure 3: Value added in 2002-2005 (thousand €)[iii] *Figure 4: Fixed Assets in 2002-2005 (thousand €)*

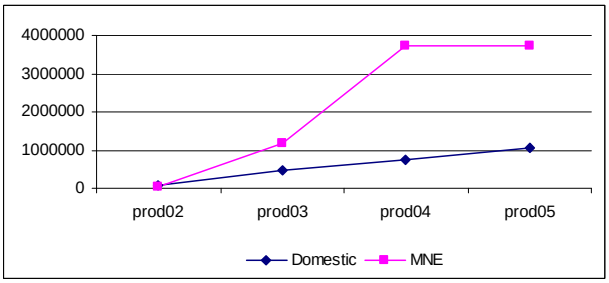


Figure 5: Labour productivity in 2002-2005 (thousand €)

It is clear from all above figures that on average FMNEs perform better in terms of turnover, jobs, value added, except for the starting year 2002, in terms of fixed assets and productivity than DOMs. The outcomes of the descriptive statistics therefore appear to emphasize the heterogeneity between FMNEs and DOMs at this level of aggregation and provide evidence in favor of the hypotheses framed in section 2. FMNEs are larger in size (measured in turnover and numbers of employees) than DOMs, are more productive, with the exception of the year 2002 and undertake larger investments in fixed assets, as advocated by the literature. Besides, FMNEs tend to be located in the core area and are more present in the higher value added segment of the Italian logistics sector than DOMs.

Even though the results so far look clear, the comparison is as yet unconditional, in that it does not account for differences between the two groups of firms. In order to examine these issues, throughout our analysis we assume profit-maximising firms and accordingly we will measure the firms' performance related to efficiency and profitability. Differences in profitability may not be entirely driven by an MNE-premium, but result instead from the effects of the other concomitant factors, like, for instance, differences in size and sector. We tackle this issue by means of propensity score estimations to build up a counterfactual of domestic firms to be compared with FMNEs. Propensity score estimation allows us to compare the sample of treated units (FMNEs) with the sample of untreated (DOMs) firms without imposing restrictions on the estimating functional forms (Girma andGorg, 2007). Under these assumptions, the comparison yields the pure effect of foreign participation, which are the observed differences in economic performance that can be associated only to the effects of differences in ownership. A positive difference in favor of FMNEs will then reveal that foreign ownership is associated with higher performance (Becker and Ichino, 2002; Cai et al.,2008).

The method of propensity score p-score matching was developed by Rubin (1974). The goal of the p-score matching technique is to create a comparison group, which is similar to the group of participants in all characteristics but one that might simultaneously affects potential outcomes. The crucial assumption behind the matching is that, conditional on a set of observable characteristics X, the potential outcomes (Y_0, Y_1) are independent of the

'outcome' status. When selecting cases on this assumption, the counterfactual outcome of the cases in group A should be the average outcome of the group B with the same observable characteristics (Caliendo, 2008). Therefore, a good matching results in the characteristics of the counterfactual which are as close as possible to those of the FMNEs. In formal terms, the matched sample should satisfy the balancing property, that is, the distribution of the vector of observable should be balanced across DOMs and FMNEs (Becker and Ichino, 2002)[iv].

The first step of the p-score is to estimate the firms' propensity scores based on their basic characteristics (turnover, jobs, value added, fixed assets) at the initial year of the analysis: 2002. The propensity score measures for each firm, based on the 2002 value, the tendency to be either a FMNE or a DOM firm. The magnitude of a propensity score is between 0 and 1, the larger the score, the more likely the firm is a FMNE (Becker and Ichino, 2002). After the firm's propensity score are estimated, the second step is to divide the firms into two groups. Firms in each group have similar propensity score. In order to control for the robustness of the matching we run T-tests, which confirm that differences between FMNE and DOM control firms are not statistically significant. Now that we have two balanced groups we can compare the different types of firms in each group. When we compare the descriptive for the new sample, after p-score estimation, we have 187 FMNEs and 160 DOMs (347 firms in total). To statistically confirm that differences still persist between the counterfactual group and the group of selected FMNEs in the three year period (2002-2005), we run an econometric analysis in the next section.

4. Econometric analysis

In this section we provide more robust evidence on firms' heterogeneity by means of econometric analysis, which investigates whether the differences in profitability between FMNEs and DOMs persist in the three years period (2002-2005). The differences in firm characteristics are modeled by means of a logit estimation relating the probability to be either a FMNE or DOM, in the period 2002-2005, to a set of explanatory variables xi. The probability of a specific ownership of a firm is:

$$F(x'i\ \beta) \text{ where } F(.) = \exp(.)/[1+\exp(.)], \quad (1)$$

and β is the vector of coefficients, and for the discrete choice 0 represents DOM and 1 represents FMNE and the random utility components are assumed to be independent and identically Gumbel (extreme value) distributed (Greene, 2003). The explanatory variables, which capture the difference in characteristics between FMNE and DOM, are: ΔTurnover, ΔJobs, ΔValueadded, ΔProductvity (labour productivity), ΔFixed Assets. They are expressed in natural logarithms, and account for variations in firm characteristics' in 2002-2005. In addition, sector and macro-area dummies are added to the model in order to control for fixed effects.

We computed a logit model as described in formula (1), to see whether the difference between FMNE and DOM are significantly different from zero. The results can be found in Table 2 to 5. In Tables 2 and 3, we compare all FMNEs versus all DOMs, while in Tables 4 and 5 the FMNEs versus all DOMs after p-score matching are compared. We twice ran three sets of models in sequence, and when we include dummy variables, the model fit improves as reflected by the small increase of the pseudo R2. Logit models are commonly accepted to have very low R2 values (Norušis, 2005, Lammers et al, 2007). We apply two sets of models (1 and 2; 4 and 5), with and without productivity, because Δproductivity, Δvalue added, and Δjobs suffer from endogeneity. In models 1(a,b,c) and 4 (a,b,c) we specifically regress ΔTurnover, ΔFixed Assets and ΔProductivity, adding sector dummies and macro-area

dummies, in sequence. In models 2 (a,b,c) and 5 (a,b,c) we regress ΔTurnover, ΔFixed Assets, ΔValue Added and ΔJobs and add sector and macro-area dummies. In the last set of models (3 and 6), productivity, value added and jobs are left out, to see if, when only modeling the two factors needed to calculate profitability, the significant results remain robust.

The columns show the β coefficients estimated by running two sets of three binominal logits with the inclusion of control variables. A positive sign of the β coefficient indicates the presence of a positive difference in the average values between DOM and MNE. The β value indicates the difference in probability between each specific indicator and the assigned reference group, the stars indicate whether the difference is significant.

Table 2: FMNE vs DOM WITH PRODUCTIVITY

	Model 1a	Model 1b	Model 1c
Constant	-2.0957***	-2.5230***	-2.2493***
Δ Turnover	.14027*	.15144*	.14556*
Δ Fixed Assets	-.25129***	-.26124***	-.25455***
Δ Productivity	.33362***	.33056***	.33552***
Δ Value Added			
Δ Jobs			
Subsector1 (logistics)		.79063***	.78535***
Subsector2 (tour operator		.29554	.26135
MA_Northeast			-.61059**
MA_Center			-2.28251
MA_ South & Islands			-.94638**
Log likelihood	-561.103	-549.908	-542.295
Pseudo R^2	0.0289	0.0483	0.0614
N	1606	1606	1606

Notes:
***, ** and * mean results are significant at the 1%, 5% and 10% level respectively
The reference group for sub-sector is transport (by road, rail, over sea) and the reference group for macroarea is northwest.

Table 3: FMNE vs DOM WITHOUT PRODUCTIVITY

	Model 2a	Model 2b	Model 2c	Model 3a	Model 3b	Model 3c
Cotant	-2.0879***	-2.4658***	-2.2016***	2.0937***	-2.4756***	-2.2058***
Δ Turnover	.16312*	.19009*	.17476*	.21732**	.22982**	.22481**
Δ Fixed Assets	-2.4413***	-.25377***	-.24991***	-.23075***	-.24727***	-.23768**
Δ Productivity						
Δ Value Added	.31401**	.29660**	.31102**			
Δ Jobs	-.43204**	-.44664**	-.43444**			
Subsector1		.74648**	.74498**		.75317***	.75994***

(logistics) Subsector2 (tour operator)		* drop	* drop		drop	drop
MA_Northeast			-.61219**			-.64731**
MA_Center			-.26355			-.28260
MA_ South & Islands			-.93823**			-.85417*
Log likelihood	-560.703	-549.746	-542.166	-569.182	-557.824	-550.178
Pseudo R^2	0.0296	0.0485	0.0617	0.0149	0.0346	0.0478
N	1606	1606	1606	1606	1606	1606

Notes:
***, ** and * mean results are significant at the 1%, 5% and 10% level respectively
The reference group for sub-sector is transport (by road, rail, over sea) and the reference group for macroarea is northwest.

Concerning the whole sample of firms, Models 1,2 and 3 (tables 2 and 3) clearly show that the results are very significant. When comparing FMNEs and DOMs within the Italian logistics sector on a set of variables that we use as performance indicators and two sets of dummies (sector and macro-area), it is found that the two groups of firms differ significantly on several accounts. Turnover is significant and positive, and fixed assets negative and significant. This means that over the three years period under study, turnover increased within FMNEs and fixed assets decreased. This implies that FMNEs became more efficient, and therefore the rate on return on capital is higher, and profitability is higher (higher revenues with less costs). Similarly, in model 2, value added and jobs' variation are positive and significant, and negative and significant, respectively. The value added increases significantly (higher income) and the number of jobs decreases in this period (less costs). Again, FMNEs are more efficient than DOMs, they do need less employees, and have a higher profitability. Indeed,foreign firms have previously been found to exhibit a larger overall size and fewer employees per unit of capital, contributing to a positive differential in performance (Barbosa and Louri, 2005).Furthermore, when controlling for sector dummies, we see that FMNEs are mostly in the more highly value adding activities and are less likely to be located in the northeast or southern Italy.

In order to corroborate the results of the variables strictly related to profitability, in model 3 turnover and fixed assets are regressed and show high significance. FMNEs display a significant increase in turnover and a significant decrease in fixed assets, indicating higher efficiency and higher profitability. In model 3, then, the sector dummy "tour operator" is dropped probably because the majority of firms in this sub-sector are domestic owned: the Italian logistics market only attracted few foreign entrants.

Table 4: P-score FMNE vs DOM WITH PRODUCTIVITY

	Model 4a	Model 4b	Model 4c
Constant	.0487	-.2761	-.11518
Δ Turnover	.30847*	..31881*	.34508*
Δ Fixed Assets	-.26273*	-.28550**	-301435**
Δ Productivity	.07946	.09146	.12174
Δ Value Added			
Δ Jobs			
Subsector1 (logistics)		.6123**	.65877**
Subsector2 (tour operator)		drop	drop
MA_Northeast			-.54260*
MA_Center			.07235
MA_ South & Islands			-1.0263*
Log likelihood	-233.926	-230.087	-225.625
Pseudo R^2	.0232	.0392	.0578
N	347	347	347

Notes:
***, ** and * mean results are significant at the 1%, 5% and 10% level respectively
The reference group for sub-sector is transport (by road, rail, over sea) and the reference group for macroarea is northwest.

Table 5: P-score FMNE vs DOM WITHOUT PRODUCTIVITY

	Model 5a	Model 5b	Model 5c	Model 6a	Model 6b	Model 6c
Constant	.08664	-.26053	-.12281	.05516	-.26266	-.0972
Δ Turnover	.62182**	.632097**	.63588**	.33393*	.3470*	.37605*
Δ Fixed Assets	-.22260*	-.24237*	-.26201*	-.25491*	-.2751**	-.28784**
Δ Productivity						
Δ Value Added	-.05527	-.05028	-.00135			
Δ Jobs	-.55256*	-.60046**	-.66585**			
Subsector1 (logistics)		.66896**	.72022**		.60165**	.64524**
Subsector2 (tour operator		drop	drop		Drop	Drop
MA_Northeast			-.48451*			-.55223*
MA_Center			.18575			.052622
MA_ South & Islands			-1.0953*			-.937461*

Log likelihood	-230.561	-226.098	-224.4117	-234.260	-230.537	-226.416
Pseudo R^2	0.0372	0.0599	0.0754	.0218	0.0373	0.0545
N	347	347	347	347	347	347

Notes:
***, ** and * mean results are significant at the 1%, 5% and 10% level respectively
The reference group for sub-sector is transport (by road, rail, over sea) and the reference group for macroarea is northwest.

As described above, we decided to re-run the logit analysis on a counterfactual group of DOM firms, selected by p-score matching. Matching FMNEs with this sample of domestic firms which are similar in all characteristics to FMNEs at the beginning of the period (year 2002), and then comparing them over the years 2002-2005, gives us the opportunity to ascribe a significant difference which really is linked to ownership.

When comparing the counterfactual DOMs and FMNEs on a set of variables that we use as performance indicators, and also two control variables (sector and macro area), it is found that these two sets of firms significantly differ on several accounts. In the three models (4,5,6) FMNEs differ significantly from DOMs in turnover and in fixed assets: FMNEs have a significant higher probability to have a larger growth on turnover than DOMs over the 2002-2005 period, and a significant lower probability to invest in fixed assets than DOMs. FMNEs are, indeed, less willing to invest in premises because they may be foot-lose, while DOMs tend to be more embedded, and therefore, are prone to make investments in the long run. Again, these results indicate that FMNEs are more efficient and more profitable.

As far as employment variation (ΔJobs) is concerned, we see in model 5 that FMNEs have a significant negative probability to have a more positive employment growth than DOMs, and this can be explained by the fact that FMNEs are generally in higher value added subsectors of logistics. They are more technologically advanced and innovative, and therefore on the one hand they are less labor-intensive, and on the other hand, they are more likely to outsource activities[v]. Different from the previous analysis (models 1,2,3), productivity variation in 2002-2005 and value added are not significant here. This can be explained by the fact that the sample of 187 FMNEs resulting from the p-score at the year 2002 is composed by smaller firms on average, than the initial FMNE sample of 242 firms. However, even smaller FMNEs display turnover growth, and a lower growth in fixed assets and employment, thus confirming the argument that FMNEs show a higher rate on return on capital, and profitability than DOMs.

From the above results we can accept H1: FMNEs are larger in terms of turnover than DOMs in the Italian logistics sector. The growth in labor productivity is positive for the whole sample of FMNEs and DOMs (models 1,2,3), while it is not significant within the p-score samples, which are mainly composed by smaller sized firms. Therefore, H2 can be partially accepted.

The results confirm that FMNEs tend to be located in the core area of the country, the northwest, which we used as a reference group. FMNEs are less likely to be settled in any other area than the northwest (core), and display an even lower likelihood to be located in the South and Islands where the demand for logistics is much lower than in the north. Regarding the sub-sectors, FMNEs have a positive and significantly higher probability to be operating in the higher value-added subsectors, such as international forwarding operators, integrated logistics, couriers. These results tend to support hypotheses 3 and 4, that is FMNEs are more likely to be located in the northwest core area than DOMs, and they are more willing to operate in the higher value added sub-sectors. Finally, FMNEs have a significant lower probability of experiencing employment growth in 2002-2005, while they do not show a significant value added growth, probably because, as explained above, the sample resulting

from the p-score is composed, on average, by small firms. We can therefore accept of fifth hypothesis whereby logistics FMNEs are more likely to exhibit higher profitability and efficiency than domestic firms. These results are significant and robust in all models.

5. Conclusions

Our data and analysis did not allow us to make any conclusive statements about the direction of causality between internationalization and performances. However, we demonstrated that greater international involvement is associated with a higher profitability. The results from the propensity score estimation and the empirical analyses confirm that there is significant firm heterogeneity within the Italian logistics sector, in which FMNEs display a higher return on capital, are more efficient, and, therefore, are more profitable than their domestic counterparts. They tend to be characterized by lower fixed assets than DOMs and this is linked to the multinational corporations' strategy. The relative growth of jobs in 2002-2005 is negative and significant for FMNEs, suggesting that, although on average, they are larger. Their labour force grows less when compared to DOMs. The FMNE combination of higher revenue growth allied with a lower growth in fixed assets and employment than DOM firms suggest that foreign firms display a higher value of the Learner index associated with the provision of more advanced, differentiated customized services exhibiting a lower price elasticity than those offered by the domestic firms which are more tied to more competitive and undifferentiated logistics services. This observation is related to the sub-sectors in which the FMNEs operate, which tend to be more technologically advanced, innovative and less labor-intensive. In addition, FMNEs being larger and more innovative, are also more likely to outsource activities. Finally, as expected, FMNEs favor locations in the north west core area, adopting the "follow the customer" approach. While our results may be country- specific, they do however, support the findings from Barbosa and Louri (2005) who investigated similar issues in Portugal and Greece, and who also found thatFMNEs outperform domestic firms in any given setting.

The in-depth analysis of firms' heterogeneity also offers some insights on the likely impact of logistics FMNEs on the host economy, which can be of interest for the policy makers. The literature stresses that FMNEs bring resources, such as advanced technologies, innovations, and managerial capabilities that might not be present in the host country. Working at global scale, requires, indeed, significant investments in innovation in order to stay competitive. Thus, the location in Italy of logistics FMNEs might have a positive impact on the industry itself and the local context because these firms may: (i) increase the number of employees, which can be directly employed by the FMNEs and by its local suppliers; (ii) promote a more efficient and effective logistics system as a whole; (iii) foster knowledge spillover towards domestic suppliers and competitors, which can give birth to spin-off firms; (iv) develop backward and forward linkages. A region hosting logistics FMNEs can therefore, become also attractive for manufacturing firms, which need an efficient and effective logistics system to compete successfully in the global scenario where the production is fragmented in very distant locations (Vastag et al., 1994; Lasserre, 2004;Maggi et al., 2008).

To clarify, foreign newcomers are always feared, for example they might steal market shares and jobs, or induce local suppliers to close down. Nevertheless, as the literature and the empirical evidence show, this is not always the case, rather the opposite. FMNEs are lager and therefore employ more people that are mainly "local". FMNEs are more productive and competitive and are therefore in need for local suppliers. This positive impact of FMNEs on the local firms is confirmed in the case of transport and logistics industry in Italy. Indeed, this industry is rather small: 60% of the logistics firms are single-person companies and 16.2% has two employees (ISTAT, 2007) and these firms are, in comparison with larger foreign

owned firms, less able to achieve economies of scale and scope,and to acquire and develop advanced technological tools and human resources. Attracting competitive logistics FMNEs, indeed, may foster the quality of logistics services' and increase the development and improvement of the logistics' infrastructure, the cooperation and coordination among logistics services providers, the investment into IT, the reduction of logistics costs and the increase of training on all aspects of supply chain management. Policymakers should take this into account when making various important logistics decisions, since the bidirectional link between economic development and logistics performance (see among the others Arvis et al. 2007).

Acknowledgements

We would gratefully acknowledge the valuable help from Philip McCann, Jouke van Dijk and the referees at the 49th European Regional Science Association conference in Lodz, Poland. Furthermore we gratefully acknowledge the two anonymous referees from the journal for the helpful comments and remarks.

References

Arvis, J. F., Marteau, J. F., and Raballand, G. (2010) "Directions in Development: Cost of Being Landlocked: Logistics Costs and Supply Chain Reliability" Herndon, VA, USA: World Bank Publications. p xi-77.

Balcet, G., Evangelista, R. (2005) "Global technology: innovation strategies of multinational affiliates in Italy" *Transnational Corporations,* 14 (2), pp. 53-92.

Ball, R. (1996), "Local sensitivities and the representation of peripherality", *Journal of Transport Geography,*4 (1), pp. 171-184.

Barbosa, N., Louri, H. (2005) "Corporate Performance: Does Ownership Matter? A Comparison of Foreign- and Domestic-Owned Firms in Greece and Portugal", *Review of Industrial Organization,* 27, pp. 73-102.

Becker, S.O., Ichino, A.(2002) "Estimation of average treatment effects based on propensity scores", *The Stata Journal,*2 (4), pp. 358-377.

Benfratello, L.,Sembenelli, A (2006) "Foreign ownership and productivity: Is the direction of causality so obvious?", *International Journal of Industrial Organization,* 24, pp. 733-751.

Berg, G., Van DenBergemann, A., Caliendo, M. (2008) "The effect of active labor market programs on Not Yet Treated unemployed individuals",*IZA Discussion Papers Series, Discussion paper, no. 3825*, Institute for the Study of Labor (IZA), Bonn, Germany.

Browne, M. (1993)"Logistics Strategies in the Single European Market and their Spatial Consequences",*Journal of Transport Geography,*1(2), pp.75-85.

Cai, J., Ung, L., Setboonsarng, S., Leung, P.S. (2008), "Rice contract farming in Cambodia: empowering farmers to move beyond the contract toward independence",*ADB Institute Discussion paper no. 109*.

Caliendo, M. (2008), "Start-Up subsidies in East Germany: Finally a Policy that works?" *IZA Discussion Papers Series. Discussion Paper no. 3360*, Institute for the Study of Labor (IZA), Bonn Germany.

Cantwell, J., Iammarino, S. (2003), *Multinational corporations and European regional systems of innovation*, Routledge, London.

Cantwell,J., Iammarino, S. (2010), "Multinational corporations and the location of technological innovation in the UK regions", *Regional Studies,* 34 (4), pp. 317-332.

Castellani, D., Gionvanetti, G. (2007), "Productivity and the International firm: dissecting heterogeneity", *Journal of Economic Policy Reform,*13 (1), pp. 25-42.

Castellani, D., Zanfei, A.I (2006), *Multinational firms, Innovation and productivity*, Edward Elgar, USA.

Castellani, D., Zanfei, A. (2007), "Internationalisation, innovation and productivity: how do firms differ in Italy?", *The World Economy,* 30 (1), pp. 156-176

Crinò, R., Oninda, F. (2007),"Foreign Ownership and Economic Performance in Italy: Not all is Cherry-Picking!",*KITeS Working Papers 207,*Centre for Knowledge, Internationalization and Technology Studies, Universita' Bocconi,Milan, Italy, November.

Criscuolo, C., Martin, R. (2004), "Multinationals and US productivity leadership: evidence from Great Britain".*STI Working Paper n.5*.

De Backer, K., Sleuwagen, L. (2002),*Foreign ownership and productivity dynamics*. VlerickWorking Papers n. 13.

Doms, M., Jensen, B. (1998), "Comparing Wages, Skills, and Productivity between Domestically and Foreign-Owned Manufacturing Establishments in the Unites States". In: Baldwin, R.,Lipsey, R., Richardson, J. (eds).,*Geography and Ownership as Bases for Economic Accounting, Studies in Income and Wealth*, Vol. 59, The University of Chicago Press, Chicago and London, pp. 235-255.

Federtrasporto, N. (2006), "Scenari dei trasporti. L'internazionalizzazione del trasporto: la posizione dell'impresa italiana". *Quaderno n. 8, Rome.*

Gereffi, G., Humphrey, J. Sturgeon, T.(2005),"The governance of global value chains", *Review of International Political Economy,* 12, pp. 78-104.

Girma, S.,Gorg H. (2007),"Evaluating the foreign ownership wage premium using a difference-in-differences matching approach". *Journal of International Economics,* 72, pp. 97-112.

Glaeser, E.L. Kohlhase, J.E. (2004), "Cities, regions and the decline of transport costs". *Papers in Regional Science,* 83, pp. 197–228.

Grasseni, M. (2007), "Multinationals and firmheterogeneity: a non-parametric test",*Quaderni di ricerca del Dipartimento di Scienze Economiche "Hyman P. Minsky", n. 6*, University of Bergamo, Italy.

Greene, W.H. (2003),*Econometric analysis*. Fifth edition Prentince Hall, London

Greenaway, D. Kneller, R.(2007),"Firm heterogeneity, exporting and foreign direct investment: asurvey". *The Economic Journal*, 117 (517), pp. F134–F161.

Griffith, R., Simpson, H. (2001), "Characteristics of foreign-owned firms in British manufacturing". *IFS Working Paper 01/10*.

Hummels, D. (1999),"Have International Transportation Costs Declined?"*Department of Economics Working Paper*, Purdue University, (USA).

ISTAT (2007), *Statistichedeitrasporti*. Rome: ISTAT.

Jayaraman, J., Guide, V.D.R., Srivastava, R. (1999), "A closed-loop logistics model for remanufacturing". *Journal of Operational Research Society,* 50, pp. 497-508.

Lasserre, F. (2004), "Logistics and the Internet: transportation and location issues are crucial in the logistics chain".*Journal of Transport Geography,* 12, pp. 73-84.

Lammers, J., Pelzer, B., Hendrickx, J., Eisinga, R. (2007), *Categorische data analyse met SPSS. Inleiding in loglineaireanalysetechnieken*. Assen: Van Gorcum.

Maggi, E., Mariotti, I. (2012), "Globalisation and the rise of logistics FDI: the case of Italy". In:Desare, T.,Caprioglio, D. (eds).,*Foreign investment: types, methods and impacts*, New York, Nova Science Publishers, pp. 29-60.

Maggi, E., Mariotti, I.,Boscacci, F. (2008), "The indirect effects of manufacturing internationalisation on logistics. A focus on the industrial districts of Veneto", *International Journal of Logistics Economics and Globalisation,* 1 (2), pp.205-224.

Mariotti, S., Mutinelli, N.(2007),*Italia Multinazionale 2005*, Rubettino editore, Soveria Mannelli.

Mayer, T.,Ottaviano, G.I.P. (2007), *The happy few: the internationalisation of European firms*, Bruegel Blueprint Series, November.

McCann, P. (1998),*The Economics of Industrial Location: A Logistics Costs Approach*. Heidelberg, Germany:Springer.

McCann, P. (2008), "Globalisation and economic geography: the world is curved, not flat", *Cambridge Journal of Regions, Economy and Society,* 1, 351-370.

Norušis, M.J. (2005). *SPSS14.0 Statistical Procedures Companion*. Chicago: SPSS inc

Nooteboom, T. (2007),"Strategic challenges to container ports in a changing market environment. Devolution, Port Governance and Port Performance".*Research in Transportation Economics,* 17,pp. 29–52.

Qian, G. (2000), "Performance of U.S. FDI in different world regions". *Asia Pacific Journal of Management*17, pp. 67-83.

Reich, R.B. (2001), "Does corporate nationality matter?", *Issues in Science and Technology*, Winter 1990/1991, pp. 40-45.

Rhim, H., Ho, T.H., Karmarker, U.S. (2003), "Competitive location, production and market selection". *European Journal of Operational Research,* 149, pp. 211-228.

Rosenbaum, P.R., Rubin, D.B. (1983), "The central role of the propensity score in observational studies for causal effects", *Biometrika*, 70(1), pp. 41-55.

Ruigrok, W., Wagner, H. (2003), "Internationalization and Performance: An Organizational Learning Perspective". *Management International Review,* 43(1),pp. 63-83.

Rubin, D. (1974), "Estimating Causal Effects to Treatments in Randomized and Nonrandomized Studies". *Journal of Educational Psychology,* 66, pp. 688-701.

Schmitz, J. (2005). "What determines productivity? Lessons from the dramatic recovery of the US andCanadian iron ore industries following their early 1980s crisis". *Journal of Political Economy,*113 (3), pp. 582–625.

Strasser S. (1998),*Getting and spending: European and American consumer societies in the twentieth century*. Cambridge: Cambridge Univ. Press.

UNCTAD (2006),*World Investment Report 2006 – FDI from Developing and Transition Economies: Implications for Development*, United Nations, Geneve and New York.

Vahrenkamp, R. (2010),"Driving globalization: the rise of logistics in Europe 1950-2000". *European Transport,* 45, pp. 1-14.

Vastag, G., Kasarda, J.D., Boone, T. (1994), "Logistical support for manufacturing agility in global markets". *International Journal of Operations and Production Management,*14(11), pp. 73-85.

[i]In this paper we use a wide definition of logistics industry as the ensemble of the firms which offer all the services useful for the movements of goods along the supply chain and passengers from an origin to a final destination. More precisely, it comprises both Logistics Services Providers (LSP), offering single services, on a stand-alone basis (transportation, warehousing, handling, etc.) and Third-Party Logistics (3PLs) or Fourth Party Logistics (4PLs) Providers or Integrated Logistics Providers, supplying different services in a integrated way. To do so, we refer to all the codes included in 2002 NACE industry "I" "Transport, storage and communication", with the exception of telecommunications (.

[ii]The LogINT Observatory has been developed by the Economics, Logistics and Land Laboratory (LabELT) of DAStU-Politechnic of Milan (http://www.labelt.polimi.it/osservatorio_log-int.htm).

[iii]*In the figure it looks like in 2002 it has equal observations, this however is not the case in,2002 value added of both DOM and FMNE is low but higher than 0, specifically: FMNE is 6686401 and for DOM is 1697706. Similar for figure 5*

[iv] In p-score matching assumption have to be made about the choice of Kernel function and bandwidth. For the choice of bandwidth we follow the rule-of-thump and uses bandwidth 0.06 (see STATA manuals). The applied Kernel function is Epanechinokov, following Van den Berg et al (2008).

[v] This is the case, for instance, of the third-party logistics provider (3PL), which is a firm that provides outsourced or "third party" logistics services to companies for part, or sometimes all of their supply chain management function.