
Domestic Multinationals and Foreign-Owned Firms in Italy: Evidence from Quantile Regression¹

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Abstract

This paper investigates the performance differences across and within foreign-owned firms and domestic multinationals in Italy. Used for the empirical analysis are non-parametric tests based on the concept of first order stochastic dominance and quantile regression technique. The firm-level analysis distinguishes between foreign-owned firms of different nationalities and domestic MNEs according to the location of their FDI, and it focuses not only on productivity but also on differences in average wages, capital intensity, and financial and non-financial indicators, namely ROS, ROI and debt leverage. Overall, the results provide evidence of remarkable heterogeneity across and within multinationals. In particular, it seems not possible to identify a clear foreign advantage at least in terms of productivity, because foreign-owned firms do not outperform domestic multinationals. Interesting results are obtained when focusing on ROS and ROI, where the profitability gaps change as one moves from the bottom to the top of the conditional distribution. Domestic multinationals investing only in developed countries present higher ROS and ROI compared with the subgroups of foreign-owned firms, but only at the lower quantiles, while at the upper quantiles the advantage seems to favour foreign firms. Finally, in regard to domestic multinationals, there is strong evidence that those active only in less developed countries persistently exhibit the worst performances.

JEL Classification: F23, D21, L10

Keywords: Multinationals, Performance indicators, Heterogeneity, Quantile Regression

1. Introduction and Literature Background

Several studies based on firm or plant level data have documented the growing importance of firm heterogeneity. The pioneering works in this area focus on comparison between exporters and non-exporters (Bernard and Jensen, 1999; Clerides et al., 1998; Delgado et al., 2002), documenting that the former tend to outperform the latter. Recently, also foreign direct investment (FDI) has become an important issue in the discussion on heterogeneity. In this regard, the main prediction considered in empirical studies is that productivity differences among firms have a role in explaining the presence of domestic firms, exporting firms and investing firms (Helpman et al., 2004; Head and Ries, 2003). This is consistent with the self-selection hypothesis suggesting that firms engaged in some kind of foreign activity need to have some ex-ante advantages in order to deal with the costs and the complexities of international markets. This idea has clear links with the consolidated literature on multinationals and according to which one reason why firms invest abroad is their desire to exploit firm-specific advantages in host countries (Markusen, 1995; Caves, 1996).

The paper builds on this analysis and conducts empirical discussion on the less explored issue of heterogeneity across and within multinationals in Italy.

¹ The paper has benefitted from comments by the editor and two anonymous referees.

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Only a few studies in the literature explore the role of firm heterogeneity in explaining the relationships between productivity and internationalization strategies, comparing foreign affiliates and domestic firms and distinguishing the latter between non-multinational and multinational enterprises (MNEs) (Castellani and Zanfei, 2006; Temouri et al., 2008; Criscuolo and Martin, 2009; Doms and Jensen, 1998). These studies find essentially that foreign affiliates exhibit higher productivity than domestic non-MNEs, while foreign and domestic MNEs differ only marginally. Thus, in explaining the better productivity performance of MNEs, some of their advantages are more important than foreign ownership advantages per se. Regarding Italy, Castellani and Zanfei (2006) show that foreign-owned firms outperform domestic firms, but the gap disappears when foreign firms and domestic MNEs are compared. Moreover, US foreign firms perform better than affiliates from other countries, and they exhibit productivity levels similar to those of domestic MNEs. In a different work (2007), Castellani and Zanfei find that domestic multinationals with production activities abroad exhibit higher productivity as well as better innovation performance than multinationals with only non-production activities abroad. Overall, MNEs are characterized by better performances than exporters and domestic firms. However, the analyses in that work do not include foreign-owned firms.

Finally, there are two studies that focus on productivity spillover from foreign investment and which employ the same econometric techniques as used in this paper: Dimelis and Louri (2002) and Kosteas (2008). The former examines data on Greek firms to find a positive effect on the labour productivity of fully or majority owned foreign affiliates. The latter study uses data on Mexican manufacturing plants to distinguish among FDI from North America, Canada, and the rest of the world. Kosteas finds that Canadian-owned plants yield higher spillovers than other foreign-owned plants, suggesting a large amount of heterogeneity among inward FDI. Both papers, however, focus on spillover effects and do not analyze performance differences in great detail: for example, they do not have information on outward investment and concentrate only on productivity.

This paper makes two contributions to the empirical literature. Firstly, it presents a detailed analysis of the role of multinationality in explaining heterogeneity, focusing in particular on differences between foreign-owned firms and domestic MNEs in Italian manufacturing industries. Much of the analysis in this area has hitherto focused on productivity differences. This study furnishes additional insight into the issue of heterogeneity by investigating not only productivity but also average wages, capital intensity, as well as various measures of non-financial and financial performance, such as return on sales (ROS), return on investment (ROI), and debt leverage. The advantages of these three indicators are that they are easy to calculate and, especially, that their definitions are agreed and well-known: traditionally in the international business literature, the success of a company has been examined using these measures (Tangen, 2003).

Secondly, the paper highlights the differences in performance among multinationals. To address this issue it distinguishes between foreign-owned firms of different nationalities and domestic MNEs according to the locality of their FDI. The nationality of foreign-owned firms may be crucial for understanding whether there is a performance leader among them. Such leadership, for instance, may be the consequence

of an advantage of the home country compared to another. Performance gaps may exist even within domestic multinationals: in fact, the choice of the geographical areas in which affiliates are established may reflect distinct structural characteristics as well as distinct motivations.

The empirical analysis reported by the paper is performed using Kolmogorov-Smirnov tests of stochastic dominance and by applying Quantile Regression Technique (QR). The non-parametric tests compare the cumulative distribution of the variable for different types of firms and not just the mean. The QR permits evaluation of the differences across and within multinationals at different points of the conditional distribution of the dependent variable. Therefore, if one acknowledges that multinationals are heterogeneous, there are reasons to suspect that the differences across and within firms do not need to be the same across the performance distributions. On the contrary, ordinary least squares method (OLS) assumes that the conditional distribution of the performance variables is homogeneous.

The rest of the paper is organized as follows: Section 2 discusses the characteristics of the sample and describes the econometric framework. The results are presented in Section 3, and Section 4 concludes.

2. Data and Empirical Model

2.1 Data and Descriptive Statistics

Used for the empirical investigation of the issue of heterogeneity across and within multinationals operating in Italy during the 1990s is the “Centro Studi Luca D’Agliano-Reprint” dataset resulting from merging the Reprint dataset of Politecnico di Milano, which contains information on foreign affiliates (FO) and domestic multinationals (MNE^D) with the AIDA database of Bureau Van Dijk, which provides balance sheet data and other economic data on Italian firms.³

An useful feature of the dataset is that it stated the nationalities of foreign firms, thus making it possible to distinguish in the empirical study among US, European and Other foreign-owned firms (FO^{US}, FO^{Europe} and FO^{Other}). Moreover, regarding domestic multinationals, the dataset provides information on the country of localisation of their foreign subsidiaries, permitting comparative analysis among the different characteristics of domestic multinationals investing only in developed countries, investing only in less developed countries, and investing in both (MNE^{D_DC}, MNE^{D_LDC}, MNE^{D_Both}).⁴

Owing to limited information on the localisation of outward investment and given that observations for balance sheet data are missing, the econometric analysis is conducted using an unbalanced panel which includes data on foreign firms and domestic multinationals, with at least one foreign subsidiary, for the years 1995 and 1997.

³ The two groups of firms, FO and MNE^D, are separated in the dataset. Which means that a firm cannot be foreign owned and also invest in other countries.

⁴ Unfortunately, the dataset does not provide information neither on domestic firms serving only the domestic market nor on exporters.

The variables used in the empirical analysis are: labour productivity, defined as value added per employee; average wages; capital intensity, defined as total tangible assets over number of employees; return on sales, ROS; return on investment, ROI; and debt leverage, Leverage, defined as total debt over equity.

An overview of the distribution of firms by firm type, nationalities and localization of FDI and sectors is provided by Table 1, where firms are classified according to the Pavitt classification among traditional, high returns to scale, specialized, and high-tech sectors.

In 1995, around 40% of domestic MNEs have subsidiaries located only in developed countries. There is the same percentage for outward investment in less developed countries, while only 19.6% of domestic MNEs have higher international involvement by adopting the strategy of investing in developed countries as well as in less developed ones. In 1997 there is an increase in the number of Italian firms choosing to invest abroad, but this rise essentially concerns firms with subsidiaries located in LDC.⁵

In regard to the ownerships of foreign affiliates, in 1995 about 70% of them have European nationality and about 24% are from the US. In 1997 the foreign firms in Italy increase in number, but the percentage composition does not change. Overall, these stylised facts are not particularly surprising and confirm the great amount of foreign direct investment that takes place among developed countries, and especially among European countries.

Table 1 also gives an overview of the sectoral distribution of firms. In the sample, the highest percentage of domestic MNEs are active in high return to scale sectors, around 40%, and traditional sectors, around 30%. The former have foreign subsidiaries especially in DC, around 50%, while the latter invest mainly in LDC, around 66%. Foreign-owned firms are more concentrated in high return to scale sectors, around 56%, and specialised sectors, around 22%; and in both sectors most FO have European nationality.

⁵ Closer inspection of the foreign markets in which foreign affiliates are localised shows that Europe is the area in which the greater number of domestic multinationals invest. Among the less developed countries, the which receives most outward FDI are those of East Europe. However, in 1997 there is an increase of outward FDI in every area considered, but the most substantial rises are in less developed countries. The most interesting result seems to be the increase in the number of domestic MNEs investing in Asia, 81.8%, while there is also a remarkable growth in the number of firms that invest in more than one less developed area, in particular Asia and East Europe, 87.5%. However, the absolute number of firms in these cases is fairly small.

Table 1. Distribution of Domestic Multinationals and Foreign Owned Firms

	MNE ^D	FO	MNE ^{D_DC}	MNE ^{D_LDC}	MNE ^{D_Both}	FO ^{US}	FO ^{Europe}	FO ^{Other}
1995	403	933	161 (40%)	163 (40.4%)	79 (19.6%)	219 (23.5%)	657 (70.4%)	57 (6.1%)
1997	496	1149	183 (37%)	218 (44%)	95 (19%)	279 (24.3%)	796 (69.3%)	74 (6.4%)
Traditional Sectors								
1995	118 (29.3%)	130 (14%)	20 (17%)	76 (64.4%)	22 (18.6%)	23 (17.7%)	96 (73.8%)	11 (8.5%)
1997	153 (30.8%)	158 (13.8%)	30 (19.6%)	101 (66%)	22 (14.4%)	29 (18.4%)	117 (74%)	12 (7.6%)
High Return to Scale Sectors								
1995	166 (42.2%)	530 (56.8%)	89 (53.6%)	44 (26.5%)	33 (19.9%)	125 (23.6%)	377 (71.1%)	28 (5.3%)
1997	193 (38.9%)	649 (56.5%)	90 (46.6%)	63 (32.7%)	40 (20.7%)	157 (24.2%)	450 (69.3%)	42 (6.5%)
Specialised Sectors								
1995	97 (24%)	210 (22.5%)	42 (43.3%)	36 (37.1%)	19 (19.6%)	58 (27.6%)	138 (65.7%)	14 (6.7%)
1997	119 (24%)	261 (22.7%)	50 (42%)	41 (34.5%)	28 (23.5%)	73 (28%)	172 (66%)	16 (6%)
High-Tech Sectors								
1995	22 (5.5%)	63 (6.7%)	10 (45.5%)	7 (31.8%)	5 (22.7%)	13 (20.6%)	46 (73%)	4 (6.4%)
1997	31 (6.3%)	81 (7%)	13 (42%)	13 (42%)	5 (16%)	20 (24.7%)	57 (70.4%)	4 (4.9%)

Note: MNE^D and FO represent domestic multinationals and foreign affiliates, respectively, MNE^{D_DC}, MNE^{D_LDC} and MNE^{D_Both} represent domestic multinationals investing only in developed countries, investing only in less developed countries and investing in both developed and less developed countries, respectively. FO^{US}, FO^{Europe} and FO^{Other} represent foreign affiliates from US, Europe and Other countries.

Table 2 reports mean and standard deviations of the key variables employed, for foreign owned firms, domestic multinationals and their subgroups. These basic statistics

reveal that, in both years, foreign firms are on average more productive than domestic multinationals, pay higher wages, exhibit higher capital intensity, and are more indebted. FO also exhibit a higher return on sales, ROS, and a higher return on investment, ROI, but only in 1997. However, the t-test for equality of means shows that there are considerable differences between FO and MNE^D only with regard to labour productivity, at least in 1997, and to the average wages paid, while there is no evidence of statistically significant differences in regard to the other variables.

Table 2. Descriptive Statistics

	MNE^D	FO	
1995	Mean (St. Dev.)	Mean (St. Dev.)	T-test for equality of mean*
Labour productivity	121.25 (74.92)	124.60 (63.85)	0.8347 (0.404)
Average wage	63.44 (20.03)	71.48 (20.66)	6.5884 (0.000)
Capital intensity	85.60 (115.06)	99.63 (165.62)	1.5469 (0.1221)
ROS	0.057 (0.088)	0.046 (0.119)	-1.6398 (0.1013)
ROI	0.068 (0.080)	0.063 (0.098)	-0.8870 (0.3753)
Leverage	18.79 (37.50)	24.84 (202.97)	0.5941 (0.5526)
1997	Mean (St. Dev.)	Mean (St. Dev.)	T-test for equality of mean*
Labour productivity	112.45 (63.10)	121.84 (61.14)	2.8309 (0.0047)
Average wage	64.34 (20.19)	72.12 (20.48)	7.0991 (0.0000)
Capital intensity	94.89 (160.72)	97.32 (155.29)	0.2887 (0.7729)
ROS	0.036 (0.240)	0.042 (0.094)	0.7091 (0.4783)
ROI	0.051 (0.074)	0.056 (0.102)	0.8401 (0.4010)
Leverage	21.29 (73.24)	29.70 (329.06)	0.5633 (0.5733)

* The values in parentheses are the p-values for the t-test

Even if the t-tests provide us with preliminary information on the differences among firms, the mean is only one moment in the statistical distribution. Therefore, because the purpose of this study is to analyze the heterogeneity among multinational firms, it is more interesting to focus on the entire distribution of the variables, rather than just on the unconditional mean. Hence, in order to conduct further comparison among the characteristics of the two groups – foreign-owned firms versus domestic multinationals – non-parametric Kolmogorov-Smirnov tests, K-S, for first order stochastic dominance are performed.⁶ Establishing stochastic dominance implies that one cumulative distribution lies to the right of another, but K-S tests check that statistically robust differences exist between the distributions.⁷ The results reported in Table 3 show some interesting findings that do not always confirm the evidence provided by the unconditional mean.

In both years, the labour productivity distribution of FO firms stochastically dominates that of domestic MNEs, providing strong evidence that foreign-owned firms are more productive than domestic multinational firms. The same pattern emerges on inspecting the wage distributions, proving, in line with the literature, that foreign firms pay higher wages, and at the capital intensity distribution, or at least did so in 1997.

By contrast, the Italian multinationals seem to be characterized by higher ROS than foreign-owned firms, but they are more indebted as well.⁸ With reference to the ROI variable, the non-parametric test provides evidence that the complete distribution of a variable gives much more interesting explanations of the discrepancies between groups of firms. In fact, the test shows that there are statistically significant differences between the two distributions of FO and MNE^D, but it is less clear which group stochastically dominates the other. This finding counsels caution and may indicate that the dominance changes along the distribution.⁹ Given this large amount of heterogeneity, further analysis is necessary, and the QR approach should shed more light on these different patterns.

⁶ Only few studies in the literature specifically perform K-S tests. See, e.g. Girma et al. (2005), Girma et al. (2004) and Merino (2004).

⁷ The graphs of cumulative distributions are not reported but are available from the author upon request.

⁸ Interestingly, these results are not always in line with the simple mean, confirming the large amount of heterogeneity existing among firms and the need for analyses to consider the entire distribution of the variables.

⁹ This pattern is also confirmed by the graph of the cumulative distributions.

Table 3. Kolmogorov – Smirnov tests for comparison between FO firms and MNE^D

	Equality of distributions	Difference favourable to:	
		FO	MNE ^D
Labour Productivity			
1995	0.0930 (0.015)	0.0222 (0.759)	-0.0930 (0.008)
1997	0.1076 (0.001)	0.0080 (0.956)	-0.1076 (0.000)
Average wage			
1995	0.2405 (0.000)	0.0054 (0.984)	-0.2405 (0.000)
1997	0.2268 (0.000)	0.0080 (0.956)	-0.2268 (0.000)
Capital Intensity			
1995	0.0708 (0.119)	0.0108 (0.937)	-0.0708 (0.059)
1997	0.0660 (0.097)	0.0300 (0.536)	-0.0660 (0.049)
ROS			
1995	0.1362 (0.000)	0.1362 (0.000)	-0.0369 (0.464)
1997	0.1013 (0.002)	0.1013 (0.001)	-0.0433 (0.274)
ROI			
1995	0.1270 (0.000)	0.1270 (0.000)	-0.0670 (0.080)
1997	0.0880 (0.009)	0.0880 (0.005)	-0.0865 (0.006)
Leverage			
1995	0.1476 (0.000)	0.1476 (0.000)	-0.0068 (0.974)
1997	0.1733 (0.000)	0.1733 (0.000)	-0.0114 (0.914)

P-values are in parentheses.

The evidence reported above does not account for differences in sector characteristics, which may be crucial for better disentanglement of the performance differences among groups of firms. Consequently, K-S tests are performed for each of the four Pavitt sectors, and the results are reported in Table 4. The importance of heterogeneity is strongly confirmed even across sectors. The labour productivity and capital intensity distributions of FO firms stochastically dominate those of domestic MNEs, but only in traditional sectors, while there is no evidence of better performance in the other ones. The higher average wages paid by FO firms are established in all sectors except for specialized sectors. Finally, MNEs outperform FO firms in terms of ROS and ROI in all sectors except for high-tech ones, and the same pattern is found in terms of leverage.

Table 4. Kolmogorov – Smirnov tests for comparison between FO firms and MNE^D according to the Pavitt-classification

		Equality of distributions	Difference favourable to:	
			FO	MNE ^D
Traditional sectors				
Labour Productivity	1995	0.1675 (0.062)	0.0771 (0.480)	-0.1675 (0.031)
	1997	0.2285 (0.001)	0.0202 (0.938)	-0.2285 (0.000)
Average wage	1995	0.3565 (0.000)	0.0053 (0.996)	-0.3565 (0.000)
	1997	0.3823 (0.000)	0.0063 (0.994)	-0.3823 (0.000)
Capital Intensity	1995	0.1567 (0.096)	0.0553 (0.685)	-0.1567 (0.048)
	1997	0.1390 (0.099)	0.0606 (0.565)	-0.1390 (0.050)
ROS	1995	0.2232 (0.004)	0.2232 (0.002)	-0.0283 (0.906)
	1997	0.1279 (0.157)	0.1279 (0.078)	-0.0998 (0.212)
ROI	1995	0.2402 (0.002)	0.2402 (0.001)	-0.0592 (0.648)
	1997	0.1634 (0.031)	0.1634 (0.016)	-0.1004 (0.208)
Leverage	1995	0.2177 (0.006)	0.2177 (0.003)	0.0000 (1.000)
	1997	0.2037 (0.003)	0.2037 (0.002)	0.0000 (1.000)
High Return to Scale Sectors				
Labour Productivity	1995	0.0973 (0.182)	0.0208 (0.896)	-0.0973 (0.091)
	1997	0.0803 (0.292)	0.0111 (0.964)	-0.0803 (0.147)
Average wage	1995	0.2078 (0.000)	0.0094 (0.978)	-0.2078 (0.000)
	1997	0.1841 (0.000)	0.0087 (0.978)	-0.1841 (0.000)
Capital Intensity	1995	0.1038 (0.131)	0.0038 (0.996)	-0.1038 (0.066)
	1997	0.0812 (0.280)	0.0502 (0.472)	-0.0812 (0.141)
ROS	1995	0.1120 (0.084)	0.1120 (0.042)	-0.0397 (0.672)
	1997	0.1298 (0.014)	0.1298 (0.007)	-0.0383 (0.648)
ROI	1995	0.1107 (0.090)	0.1107 (0.045)	-0.0825 (0.179)
	1997	0.1152 (0.039)	0.1152 (0.019)	-0.0874 (0.103)
Leverage	1995	0.1335 (0.022)	0.1335 (0.011)	-0.0163 (0.935)
	1997	0.1864 (0.000)	0.1864 (0.000)	-0.0252 (0.828)

Specialised Sectors				
Labour Productivity	1995	0.0636 (0.896)	0.0636 (0.516)	-0.0346 (0.822)
	1997	0.0973 (0.182)	0.0208 (0.896)	-0.0973 (0.091)
Average wage	1995	0.1154 (0.340)	0.0087 (0.990)	-0.1154 (0.171)
	1997	0.0993 (0.396)	0.0307 (0.858)	-0.0993 (0.200)
Capital Intensity	1995	0.1004 (0.515)	0.1004 (0.262)	-0.0325 (0.869)
	1997	0.1942 (0.004)	0.1942 (0.002)	-0.0300 (0.863)
ROS	1995	0.2266 (0.002)	0.2266 (0.001)	-0.0492 (0.725)
	1997	0.0794 (0.681)	0.0794 (0.357)	-0.0230 (0.917)
ROI	1995	0.1748 (0.035)	0.1748 (0.017)	-0.0977 (0.282)
	1997	0.1123 (0.254)	0.0831 (0.324)	-0.1123 (0.127)
Leverage	1995	0.2270 (0.002)	0.2270 (0.001)	-0.0270 (0.908)
	1997	0.2332 (0.000)	0.2332 (0.000)	-0.0362 (0.807)
High-Tech Sectors				
Labour Productivity	1995	0.1710 (0.727)	0.0635 (0.877)	-0.1710 (0.385)
	1997	0.2075 (0.289)	0.1004 (0.637)	-0.2075 (0.145)
Average wage	1995	0.3211 (0.069)	0.0952 (0.744)	-0.3211 (0.035)
	1997	0.3138 (0.024)	0.0721 (0.792)	-0.3138 (0.012)
Capital Intensity	1995	0.1154 (0.982)	0.1154 (0.648)	-0.0620 (0.882)
	1997	0.1581 (0.630)	0.1581 (0.326)	-0.0522 (0.885)
ROS	1995	0.1962 (0.556)	0.1962 (0.285)	-0.0570 (0.899)
	1997	0.1533 (0.668)	0.1533 (0.349)	-0.0920 (0.684)
ROI	1995	0.2258 (0.376)	0.2258 (0.190)	-0.1140 (0.655)
	1997	0.0988 (0.981)	0.0490 (0.898)	-0.0988 (0.646)
Leverage	1995	0.1457 (0.879)	0.1457 (0.500)	-0.1118 (0.665)
	1997	0.1724 (0.518)	0.1724 (0.264)	-0.0199 (0.982)

P-values are in parenthesis.

2.2 Econometric Analysis

Discussed in the previous section are the different characteristics of foreign and domestic multinationals, with the focus on the unconditional mean or on all the moments of the distribution of each variable considered. However, the differences illustrated may reflect a number of firms' characteristics. Hence, in order to take account of these sources of heterogeneity, an econometric analysis has been performed. The approach taken follows the standard procedure developed in previous studies (e.g. Bernard and Jensen, 1999). Hence, in an attempt to identify potential differences between foreign-owned firms and domestic MNEs, we estimate a regression of the form:

$$\ln X_{it} = \alpha + \beta FO_{it} + \delta Size_{it} + \gamma Industry_{it} + \theta Time_t + \varepsilon_{it} \quad (1)$$

Where i and t are firms and time subscripts; the dependent variable X_{it} refers to the performance indicators of the firms; FO_{it} is a dummy variable that takes value 1 if the firm is foreign owned. $Size_{it}$ are dummy variables measured by the number of employees;¹⁰ $Industry_{it}$ are two-digit sector dummies; $Time_t$ is a time dummy and ε_{it} is the error term.¹¹ β , δ , γ , and θ represent the parameters to be estimated, and, in particular, β denotes the differences between the performance of foreign owned firms and domestic MNEs.

To shed more light on performance differences, we estimate a second specification which differs only in the way firms are classified. Foreign firms are divided into three foreign ownership groups: firms owned by the United States, FO^{US} , firms owned by European countries, FO^{Europe} , and firms owned by countries in the rest of the world, FO^{Other} . Further, the specification distinguishes between subgroups of domestic MNEs according to the localisation of their outward FDI. Therefore domestic MNEs are grouped as follows: multinationals that own subsidiaries only in developed countries, MNE^{D_DC} , multinationals that own subsidiaries only in less developed countries, MNE^{D_LDC} , and multinationals that own subsidiaries in both developed and less developed countries, MNE^{D_Both} . In the second specification MNE^{D_DC} acts as reference group.

On the one hand, we may expect FO firms to be more productive than their counterparts because multinational corporations are more likely to establish affiliates in more productive industries and buy the more productive firms. The performance advantages may differ according to the nationality of the parent firm, because the performance of an affiliate may depend largely on the characteristics of its home system. Moreover, given the state of the Italian economy, foreign firms may seek to invest in Italy in order to exploit existing firm-specific advantages, and not acquire them from local firms.

¹⁰ We define the following size classes: Small: 1-50 employees, Medium: 51-150 employees, Medium-Large: 151-350 employees and Large: 351 employees or more.

¹¹ When the dependent variable is the labour productivity, the log of capital intensity is added as control.

On the other hand, in regard to outward FDI, domestic multinationals may have different characteristics according to the geographical areas in which they invest. This highlights the issue of vertical and horizontal FDI. According to the literature, the vertical pattern occurs when a multinational fragments the production process in foreign countries where the relative cost of factors is lower. This means that we may suppose that investments in less developed countries are likely to follow the vertical model. By contrast, the horizontal pattern arises when the same production process takes place in several countries. Since most horizontal FDI flows are among countries which are similar in size and relative endowments, we may suppose that investments in developed countries follow the horizontal model. These two patterns highlight two production strategies that may reflect different firms' characteristics. For instance, one may expect that there exists self-selection even within domestic multinationals: for example, MNE^{D-DC} may have better ex-ante performances compared to those of MNE^{D-LDC} because they have to face a higher competition in developed countries.

The empirical exercise performed has its own complications. Firstly, the use of labour productivity raises econometric problems, such as endogeneity issues. However, as several studies make use of labour productivity, the choice of this variable may be useful for the purposes of comparison. Secondly, in the regression with capital intensity and average wages as dependent variables control should have made for outsourcing, given that the MNE^{D-LDC} may have different characteristics because they outsourced their more labour-intensive production processes. Unfortunately, the dataset does not contain a variable for outsourcing, so that it is only possible to construct a sort of measure of vertical integration defined as value added over sales and add it as control variable in the regressions. The results, however, do not change significantly along the distributions.¹² Finally, it is not possible to control for export because the dataset does not contain this information. Given these drawbacks, caution is necessary when interpreting the results.

The two specifications are estimated by using conditional quantile regression technique, QR. The descriptive statistics have shown a great amount of heterogeneity between foreign-owned firms and domestic multinationals, so that the OLS technique may not be adequate. To account for some of the heterogeneity in the data, observed firm-level characteristics (i.e. size, sectors, etc.) are explicitly introduced into the regression model. At any rate, heterogeneity may also arise from firm characteristics that cannot easily be observed and accounted for. If unobserved heterogeneity exists, as happened in our estimations, the dependent variable in equation (1) and the error term may be independently, but not identically, distributed across firms. In this case, when the assumption of normality is violated, the coefficients estimated with OLS are not representative of the entire conditional distribution. Particularly in the presence of long tails, the outliers strongly influence the estimations. By contrast, the QR method is considered efficient and robust.¹³ In the presence of heterogeneity this approach seems not only more appropriate but also more interesting, because it yields a more precise picture of the dynamics of the performance measures at different points of the

¹² The results are not reported but are available from the author on request.

¹³ See Dimelis and Louri (2002), Mata and Machado (1996).

conditional distribution, rather than at the conditional mean. For example, if we acknowledge that firms are heterogeneous, we may surmise that the productivity advantage of one group of firms, namely foreign owned firms, compared with another, domestic multinationals, may differ if we consider firms with low productivity levels with respect to firms with high productivity levels. In other words, if we use the OLS method, we assume that the conditional distribution of the dependent variable is homogeneous, which implies that we consider the advantages of a group to be the same at each point of the conditional distribution of the performance. This may be a rather restrictive assumption because we may expect that if there exists a positive performance effect associated with different groups, it will be different for firms with low, medium or high performances.

For comparison, however, in a first step of the econometric analysis, the model is also estimated by OLS.

3. Results

Tables 5-10 report the results for the two specifications of equation (1) using QR at five quantiles, namely 10, 25, 50, 75 and 90. Overall, the statistical significance and the values of the coefficients estimated differ widely across quantiles; and compared to the benchmark results from the OLS regression, they bear out the adoption of the QR technique. Figure 1 in the Appendix plots the coefficients across quantiles for each of the FDI variables in the second specification.¹⁴ Even if interpretation of the results requires caution, as explained in the previous section, the analysis performed is able to shed more light on the relationship between performance and internationalisation.

In regard to productivity, Table 5 shows that the first specification does not find evidence that foreign-owned firms are more productive than domestic MNEs. The FO dummy coefficient is not statistically significant across the entire conditional distribution and the productivity premia for FO prove to be negative at 75th and 90th percentile.

The second specification, with more detailed classification of the firms and with MNE^{D-DC} as the reference group, shows an interesting pattern. In particular, foreign-owned firms do not outperform MNE^{D-DC}; on the contrary, FO^{Europe} and FO^{Other} seem less productive than MNE^{D-DC}. The coefficients of FO^{Europe} are statistically significant only at the upper quantile, 75th and 90th percentile, and the loss ranges between 7% and 11%. This may be interpreted as evidence that if there is any productivity advantage for MNE^{D-DC} it appears to favour only firms with higher productivity. The coefficients of FO^{Other} are statistically significant only at the 25th and 50th percentile, and the value of the coefficient decreases across the conditional distribution. These patterns confirm the prediction that the distinction of foreign-owned firms regardless of nationality is important when evaluating the existence of productivity advantages.

Remarkable results also emerge when distinguishing among domestic MNEs. There is strong evidence that Italian MNEs investing only in less developed countries are less productive than those investing only in developed countries, while there is no

¹⁴ The graphs are useful for illustrating the trend of the variable estimated across the entire conditional distribution. But, they unfortunately are unable to identify whether the coefficients are statistically significant. The graphs also show the values of the coefficients estimated at nine percentiles.

evidence of a positive effect on productivity for MNE^{D_Both} with respect to MNE^{D_DC} . The coefficients of MNE^{D_LDC} are statistically significant across the entire distribution, and the loss ranges between 9% and 14.6%. However, in regard to the value of the coefficients estimated, an F-test of equality is used to determine whether these coefficients are statistically different across quantiles. The prob-values of the test are reported in Table 1 in the Appendix, and they do not provide evidence of differences in the magnitude of the MNE^{D_LDC} dummy coefficients across the distribution; in fact, the null hypothesis of equality between pairwise quantile is not rejected for each pairwise comparison.

The results on productivity premia point to two interesting conclusions. Firstly, the empirical analysis provides further insights into the productivity and multinationality status relationship, and its findings are substantially in line with other evidence on Italian firms (Castellani and Zanfei, 2006) pointing out that foreign-owned firms and domestic MNEs differ only marginally.¹⁵ In fact, the estimated coefficients do not show a foreign ownership advantage in favour of FO^{US} compared with domestic MNEs investing only in DC. On the contrary, MNE^{D_DC} tend to outperform FO^{Europe} at the upper quantile, and FO^{Other} at the lower quantile, and in the middle of the labour productivity distribution. This finding confirms the large amount of heterogeneity even within foreign-owned firms. Secondly, and more interestingly, the results are in line with the hypothesis put forward by Head and Ries (2003) that least productive firms are more likely to invest in less developed countries characterised by low factor costs.¹⁶

Finally, the coefficients of the capital intensity are positive and statistically significant, indicating a contribution to enhancement of labour productivity. The size dummies, included to capture some differences in productivity by scale of plant, exhibit a noteworthy result. The small firms have higher labour productivity than the large ones at the 50th, 75th and 90th percentile, while the coefficients of medium firms are positive and statistically significant at the 75th and 90th percentile. At the 10th percentile the pattern is reversed: the coefficients are negative. This indicates that if we focus attention on the most productive firms, small and medium firms achieve better performances than large ones. The result is not surprising if we consider that the Italian economy is characterized by small and medium firms which adopt the strategies of investing abroad and becoming multinational.

¹⁵ Temouri et al. (2008) reach similar conclusions when comparing German MNEs and foreign-owned affiliates.

¹⁶ The low-productivity firms may be more attracted to relocating production to low-cost foreign countries because they make more intensive use of the factor whose overseas price is low.

Table 5 Dependent variable: log Labour Productivity

	QR					OLS
	10	25	50 (Median)	75	90	Mean
Specification 1 (Reference group: MNED)						
FO	0.009 (0.021)	0.006 (0.019)	0.014 (0.018)	-0.0007 (0.023)	-0.040 (0.041)	0.001 (0.011)
Specification 2 (Reference group: MNED_DC)						
MNED_LDC	-0.146** (0.071)	-0.089*** (0.034)	-0.089** (0.037)	-0.130*** (0.049)	-0.118* (0.068)	-0.114*** (0.035)
MNED_Both	-0.005 (0.064)	-0.013 (0.043)	0.007 (0.037)	-0.005 (0.054)	0.025 (0.098)	0.001 (0.042)
FOUS	0.012 (0.063)	-0.001 (0.029)	0.020 (0.034)	0.047 (0.040)	0.095 (0.062)	0.039 (0.031)
FOEurope	-0.055 (0.053)	-0.040 (0.026)	-0.028 (0.027)	-0.071** (0.035)	-0.112** (0.044)	-0.064** (0.026)
FOOther	-0.195* (0.106)	-0.163*** (0.058)	-0.104* (0.056)	0.002 (0.066)	0.036 (0.081)	-0.094* (0.051)
ln(K/L)	0.122*** (0.021)	0.136*** (0.011)	0.140*** (0.011)	0.142*** (0.013)	0.142*** (0.017)	0.132*** (0.011)
Small	-0.117** (0.052)	-0.011 (0.030)	0.074*** (0.026)	0.197*** (0.035)	0.300*** (0.042)	0.081*** (0.025)
Medium	-0.083** (0.041)	-0.035 (0.022)	0.002 (0.020)	0.076** (0.030)	0.111*** (0.041)	0.003 (0.021)
Medium- Large	-0.059 (0.037)	-0.037 (0.023)	-0.176 (0.021)	0.011 (0.029)	0.013 (0.040)	-0.035* (0.020)
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2981	2981	2981	2981	2981	2981

Note: Standard error bootstrapped with 500 replications in parentheses. Robust standard error for the OLS method.

*, **, *** denote statistical significance at 10, 5, 1 percent level.

Turning to other characteristics of firms, such as average wages, the estimated coefficients reported in Table 6 confirm that FO pay higher wages, around 3-6 percent, than domestic MNEs. The second specification suggests that US- and European-owned firms pay higher wages than $MNE^{D_{DC}}$. By contrast, among domestic multinationals, $MNE^{D_{LDC}}$ exhibit a different trend: the coefficients are negative and statistically significant across the entire distribution, except for the 10th percentile. The results on firm size show that large firms pay the highest average wages. However, this

characteristic is more pronounced at the lower tail and in the middle of the distribution where the coefficients are negative and statistically significant.

Table 7 shows the results of capital intensity. These give no evidence of significant differences between FO and MNE^D. Focusing on specification (2), the coefficients associated with the different groups of foreign-owned firms and domestic multinationals are not statistically significant across quantiles, which suggests that there are no differences among firms in terms of capital intensity. Finally, small firms seem to be less capital intense than large ones, but only at the lower tail and in the middle of the distribution; while at the upper percentile, the value of the coefficient is positive and statistically significant. A similar pattern is confirmed for medium firms.

Table 6. Dependent variable: log Average Wage

	QR					OLS
	10	25	50 (Median)	75	90	Mean
Specification 1 (Reference group: MNED)						
FO	0.055** (0.022)	0.064*** (0.011)	0.064*** (0.012)	0.046*** (0.012)	0.033 (0.023)	0.054*** (0.011)
Specification 2 (Reference group: MNED_DC)						
MNED_LDC	-0.064 (0.041)	-0.070*** (0.021)	-0.057*** (0.020)	-0.068*** (0.022)	-0.096*** (0.036)	-0.073*** (0.020)
MNED_Both	-0.048(0.039)	0.022 (0.022)	0.040*(0.023)	0.051* (0.029)	0.094** (0.048)	-0.073*** (0.020)
FOUS	0.022 (0.041)	0.056*** (0.017)	0.079*** (0.019)	0.080*** (0.023)	0.102*** (0.037)	0.083*** (0.018)
FOEurope	0.053 (0.034)	0.044*** (0.014)	0.047*** (0.016)	0.025 (0.015)	-0.009 (0.030)	0.033** (0.015)
FOOther	-0.116* (0.067)	-0.027 (0.049)	0.009 (0.027)	-0.001 (0.030)	0.028 (0.053)	-0.048 (0.032)
Small	-0.117** (0.052)	-0.085*** (0.017)	-0.039** (0.016)	0.004 (0.015)	0.056* (0.030)	-0.029* (0.016)
Medium	-0.083** (0.041)	-0.043*** (0.013)	-0.034** (0.013)	-0.009 (0.016)	0.006 (0.025)	-0.020 (0.013)
Medium- Large	-0.059 (0.037)	-0.032** (0.014)	-0.039*** (0.012)	-0.017 (0.016)	-0.0001 (0.022)	-0.025* (0.013)
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2981	2981	2981	2981	2981	2981

Note: Standard error bootstrapped with 500 replications in parentheses. Robust standard errors for the OLS method. *, **, *** denote statistical significance at 10, 5, 1 percent level.

Table 7. Dependent variable: log Capital Intensity

	QR					OLS
	10	25	50 (Median)	75	90	Mean
Specification 1 (Reference group: MNED)						
FO	-0.105 (0.067)	-0.018 (0.054)	-0.015 (0.041)	-0.018 (0.046)	-0.079 (0.060)	-0.073* (0.039)
Specification 2 (Reference group: MNED_DC)						
MNED_LDC	0.118 (0.137)	-0.029 (0.104)	0.036 (0.086)	-0.140* (0.083)	-0.033 (0.114)	0.021 (0.077)
MNED_Both	0.172(0.139)	-0.021 (0.098)	0.004 (0.089)	0.037 (0.101)	0.234 (0.147)	0.083(0.083)
FOUS	0.037 (0.134)	-0.096 (0.097)	-0.013 (0.070)	-0.150** (0.069)	-0.016 (0.082)	-0.091 (0.067)
FOEurope	-0.033 (0.106)	-0.045 (0.087)	-0.009 (0.065)	-0.043 (0.057)	-0.071 (0.065)	-0.048 (0.056)
FOOther	0.022 (0.316)	0.085 (0.115)	0.202** (0.096)	0.026 (0.125)	0.235 (0.224)	0.079 (0.114)
Small	-0.750*** (0.103)	-0.412*** (0.090)	-0.191*** (0.061)	0.239*** (0.078)	0.585*** (0.091)	-0.143** (0.057)
Medium	-0.418*** (0.101)	-0.099 (0.065)	0.009 (0.046)	0.174*** (0.051)	0.310*** (0.059)	-0.060 (0.047)
Medium-Large	-0.185** (0.085)	-0.072 (0.055)	-0.087* (0.044)	-0.029 (0.047)	0.042 (0.064)	-0.095** (0.041)
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2981	2981	2981	2981	2981	2981

Note: Standard error bootstrapped with 500 replications in parentheses. Robust standard error for the OLS method. *, **, *** denote statistical significance at 10, 5, 1 percent level.

The results for non-financial and financial indicators – ROS, ROI and leverage – are reported in Tables 8, 9 and 10.

As regards the return on sales (ROS) dependent variable, the empirical evidence does not support the concern that FO firms perform better than domestic MNEs: in fact, the coefficient of FO dummy variable is significant, but negative, only at 10th. By contrast, evidence of significant differences in ROS is provided by the second specification. The results suggest that foreign-owned firms are less profitable than MNE^{D_DC} but only at the lower quantiles, which is indicative that the profitability premia in favour of MNE^{D_DC} affect only firms with low levels of ROS. Among

domestic multinationals, those investing only in LDC exhibit a lower ROS than those investing only in DC. The dummy variable coefficient is always significant and negative, except for the 90th percentile, and it varies from -29.7 to -14.6 percent. Overall, the negative value of the coefficients with respect to each group of firms decreases as we move from the lower tails to the upper tails of the ROS distribution; and for foreign-owned firms it becomes positive but not significant. However, as shown by Table 2.A in the Appendix, the null hypothesis of equality of the coefficients of MNE^{D-LDC} is not rejected for all pairwise comparisons except in one case, which suggests that the profitability loss of MNE^{D-LDC} does not vary significantly across the conditional distribution. On the contrary, there is strong evidence that the value of the coefficients of FO firms varies across the distribution: the null hypothesis, in fact, is often rejected. Finally, small and medium firms exhibit a higher ROS than large ones but only at the lower percentile.

Turning to ROI, the foreign-owned firms show a higher return on investment than domestic MNEs at the top of the distribution, 75th and 90th quantile, where the coefficients become statistically significant and positive, with a profitability advantage that ranges from 22.6 to 26 percent.¹⁷ A more interesting pattern is found on looking at the second specification and, in particular, its results regarding FO^{Europe} . In this case, the estimated effect of European foreign ownership on ROI is negative at the lower quantiles and becomes positive as we move to the upper tail of the conditional distribution: the coefficients vary significantly from -38 to -12 percent. FO^{US} and FO^{Europe} tend to be more profitable than MNE^{D-DC} at the top of the distribution, 75th and 90th quantile, where the coefficients are positive and statistically significant. By contrast, there is no strong evidence of differences within domestic multinationals. Finally, small and medium firms achieve better performances than large ones.

Overall, the results show that there are profitability gaps across and within multinationals, and they evidence two patterns across the conditional distribution of the dependent variables. In particular, if there is any difference between ROS and ROI, it appears to favour domestic MNEs investing only in DC at the bottom of the distributions; while at the top of the distributions the advantage is in favour of the subgroups of foreign-owned firms, especially European and US foreign ones. Within domestic multinationals, MNE^{D-LDC} confirm their worst performance at least in terms of ROS.

Finally, in regard to the measure of debt leverage, the results reported in Table 10 show a significantly lower level of debt in favour of foreign-owned firms. The value of the coefficients is quite high, but decreases along the distribution. This corroborates the widespread contention that Italian firms are highly leveraged, with a growing risk of bankruptcy if they are unable to make payments on their debt, and with difficulties in finding new lenders in the future.¹⁸ The better performance of FO is confirmed for all the foreign-owned firms regardless of nationality, as shown in specification (2). The value of the coefficients estimated varies widely across quantiles: for example, we find

¹⁷ The signs of the coefficients confirm the results of the K-S tests.

¹⁸ However, leverage is not always bad, for it allows tax savings due to paid interests and increases the shareholders' return on their investment.

that FO^{Europe} are about 47-24 percent less in debt than MNE^{D_DC} , and, as shown in Table 2 in Appendix, the null hypothesis of equality of the coefficients is rejected in many pairwise comparisons. MNE^{D_LDC} exhibit a higher level of leverage, which ranges from 16 to 23 percent, but the coefficient is statistically significant only at the 25th and 50th quantile; MNEs with higher international involvement, MNE^{D_Both} , show better financial stability than MNE^{D_DC} . Finally, small firms are more indebted than large ones: the coefficient is statistically significant only at the median and at the upper quantile, but the effect is more pronounced at the upper tail of the conditional distribution.

Table 8. Dependent variable: log ROS

	QR					OLS
	10	25	50 (Median)	75	90	Mean
Specification 1 (Reference group: MNED)						
FO	-0.317*** (0.089)	-0.088 (0.057)	-0.026 (0.036)	0.046 (0.046)	0.084 (0.061)	-0.044 (0.041)
Specification 2 (Reference group: MNED_DC)						
MNED_LDC	-0.247* (0.130)	-0.297*** (0.101)	-0.146** (0.073)	-0.176** (0.070)	-0.153 (0.114)	-0.224*** (0.069)
MNED_Both	-0.302 (0.341)	-0.210* (0.117)	-0.030 (0.098)	0.019 (0.101)	0.060 (0.167)	-0.158 (0.100)
FOUS	-0.313** (0.153)	-0.197** (0.083)	-0.003 (0.076)	0.028 (0.076)	0.003 (0.102)	-0.089 (0.068)
FOEurope	-0.461*** (0.120)	-0.273*** (0.070)	-0.094* (0.054)	-0.050 (0.064)	0.026 (0.091)	-0.186*** (0.055)
FOOther	-0.583** (0.255)	-0.314** (0.146)	-0.052 (0.171)	0.126 (0.117)	-0.033 (0.152)	-0.141 (0.113)
Small	0.313** (0.156)	0.158** (0.074)	0.076 (0.069)	0.121* (0.066)	0.052 (0.093)	0.132** (0.060)
Medium	0.242* (0.141)	0.161** (0.078)	0.072 (0.062)	0.115* (0.066)	0.056 (0.085)	0.118** (0.055)
Medium-Large	0.198 (0.139)	0.101 (0.076)	0.073 (0.064)	0.069 (0.062)	0.069 (0.086)	0.110* (0.058)
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2445	2445	2445	2445	2445	2445

Note: Standard error bootstrapped with 500 replications in parentheses. Robust standard errors for the OLS method. *, **, *** denote statistical significance at 10, 5, 1 percent level.

Table 9. Dependent variable: log ROI

	QR					OLS
	10	25	50 (Median)	75	90	Mean
Specification 1 (Reference group: MNED)						
FO	-0.155 (0.110)	-0.055 (0.053)	0.074 (0.047)	0.226*** (0.050)	0.260*** (0.061)	0.076* (0.044)
Specification 2 (Reference group: MNED_DC)						
MNED_LDC	-0.207 (0.150)	-0.034 (0.076)	-0.135* (0.077)	-0.070 (0.081)	-0.172* (0.100)	-0.128* (0.070)
MNED_Both	-0.422 (0.325)	-0.174 (0.129)	-0.023 (0.119)	0.002 (0.109)	-0.165 (0.129)	-0.199* (0.111)
FOUS	-0.270* (0.162)	0.046 (0.093)	0.079 (0.079)	0.242*** (0.083)	0.185* (0.105)	0.061 (0.073)
FOEurope	-0.381*** (0.117)	-0.119* (0.067)	0.008 (0.065)	0.151** (0.071)	0.160* (0.082)	-0.030 (0.060)
FOOther	-0.632 (0.419)	-0.195 (0.162)	-0.154 (0.172)	0.283** (0.139)	0.275 (0.230)	-0.084 (0.129)
Small	0.293* (0.160)	0.278*** (0.081)	0.155** (0.068)	0.170** (0.075)	0.111 (0.087)	0.223*** (0.064)
Medium	0.235 (0.153)	0.221** (0.088)	0.179*** (0.067)	0.174** (0.070)	0.121 (0.081)	0.203*** (0.060)
Medium-Large	0.250 (0.159)	0.156* (0.086)	0.100 (0.064)	0.093 (0.072)	0.103 (0.082)	0.172*** (0.062)
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2446	2446	2446	2446	2446	2446

Note: Standard error bootstrapped with 500 replications in parentheses. Robust standard errors for the OLS method. *, **, *** denote statistical significance at 10, 5, 1 percent level.

Table 10. Dependent variable: log Leverage

	QR					OLS
	10	25	50 (Median)	75	90	Mean
Specification 1 (Reference group: MNED)						
FO	-0.527*** (0.073)	-0.479*** (0.049)	-0.275*** (0.057)	-0.243*** (0.073)	-0.108 (0.094)	-0.322*** (0.048)
Specification 2 (Reference group: MNED_DC)						
MNED_LDC	0.204 (0.149)	0.164* (0.085)	0.228** (0.093)	-0.128 (0.141)	0.041 (0.184)	0.107 (0.087)
MNED_Both	-0.382 (0.267)	-0.253** (0.126)	-0.159 (0.118)	-0.362** (0.182)	-0.315* (0.182)	-0.404*** (0.103)
FOUS	-0.563*** (0.127)	-0.494*** (0.081)	-0.239** (0.097)	-0.255 (0.166)	0.292 (0.182)	-0.246*** (0.089)
FOEurope	-0.472*** (0.105)	-0.410*** (0.074)	-0.240*** (0.079)	-0.437*** (0.126)	-0.307** (0.142)	-0.386*** (0.068)
FOOther	-0.754*** (0.150)	-0.599*** (0.179)	-0.299 (0.185)	-0.440** (0.175)	-0.141 (0.245)	-0.504*** (0.131)
Small	0.072 (0.102)	0.068 (0.086)	0.166** (0.077)	0.447*** (0.118)	0.934*** (0.181)	0.263*** (0.074)
Medium	0.089 (0.079)	0.026 (0.072)	0.035 (0.068)	0.130 (0.090)	0.132 (0.128)	0.056 (0.062)
Medium- Large	0.096 (0.105)	0.039 (0.068)	-0.067 (0.068)	0.014 (0.087)	-0.136 (0.128)	-0.045 (0.063)
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2978	2978	2978	2978	2978	2978

Note: Standard error bootstrapped with 500 replications in parentheses. Robust standard errors for the OLS method. *, **, *** denote statistical significance at 10, 5, 1 percent level.

4. Conclusion

This paper relates to the recent literature on differences among different types of firms in terms of their international involvement. Using Italian firm-level data, it first distinguishes between domestic multinational and foreign-owned firms and then performs econometric analysis taking account of the source of inward FDI and the location of outward FDI. Identification of the nationality of foreign firms enables discussion of the differences among US, European and Other foreign-owned firms (FO^{US} , FO^{Europe} and FO^{Other}); and information on the country of localisation of foreign subsidiaries makes it possible to compare the differences among domestic

multinationals investing only in developed countries, investing only in less developed countries and investing in both (MNE^{D-DC} , MNE^{D-LDC} , MNE^{D-Both}).

In addition, the study focuses the attention on several performance indicators, some of them hitherto unexplored, such as labour productivity, average wages, capital intensity, ROS, ROI and leverage.

The econometric analysis is performed using Kolmogorov-Smirnov tests of stochastic dominance and by applying quantile regression technique that enables to observation of the gaps at different points of the conditional distribution of the dependent variable. This yields a more precise picture of the heterogeneity existing among types of firms.

The empirical evidence provided by our estimation do not support the hypothesis that foreign-owned firms outperform domestic multinationals in terms of productivity, and this result is in line with the existing literature on Italian firms (Castellani and Zanfei 2006). On the contrary, the domestic multinationals investing only in developed countries are more productive than foreign-owned firms from Europe and Other countries, but the pattern is not stable across the entire conditional distribution.

Turning to the other performance measures, foreign-owned firms pay higher wages than domestic MNEs, and they are less indebted. In regard to the profitability indicators, ROS and ROI, the results are quite mixed and suggest that foreign-owned firms, especially from US and Europe, are more profitable than domestic MNEs investing only in developed countries; but this is so only at the upper quantile, while at the bottom of the distribution the pattern seems reversed.

Finally, a significant result concerns domestic multinationals. Firms that establish foreign subsidiaries only in less developed countries perform worse than those investing only in developed countries, and this trend seems confirmed by every performance indicator used except for capital intensity and ROI, in which cases the coefficients are usually not significant. MNEs are less productive, pay lower average wages, are less profitable and more indebted than their counterparts investing only in DC.

Given the Helpman et al. (2004) assumption that firms choose different internationalisation strategies according to their ex ante productivity, the empirical analysis performed may suggest that domestic MNEs self-select into markets with different characteristics, or in other words, that the location choices of domestic MNEs are related to their performance. It is possible that firms with low levels of productivity can only afford to operate in less developed countries where competition is likely to be lower; or it may be that investing abroad in LDC is their only chance of survival.

The paper does not explore the origins of performance advantages. Instead, it simply seeks to provide a detailed picture of the performance differences existing across and within multinationals and showing a large amount of heterogeneity. It suggests that not all multinationals are similar. This analysis is another step towards better understanding of multinational characteristics and invites the theoretical and empirical literature to investigate these issues in greater detail.

References

- Bernard A.B., Jensen J.B. (1999), 'Exceptional exporter performance: cause, effect, or both?', *Journal of International Economics*, **47**, 1-25
- Castellani D., Zanfei A. (2006), *Multinationals, Innovation and Productivity*, Cheltenham, Edward Elgar
- Castellani D., Zanfei A. (2007), 'Internationalisation, innovation and productivity: how do firms differ in Italy?', *The World Economy*, **30**, 156-176
- Caves R.E. (1996), *Multinational Enterprise and Economic Analysis*, Cambridge, Cambridge University Press
- Clerides S., Lach S., Tybout J.R. (1998), 'Is learning by exporting important? Microdynamic evidence from Colombia, Mexico and Morocco', *Quarterly Journal of Economics*, **113**, 903-947
- Criscuolo C., Martin R. (2009), 'Multinationals and US productivity leadership: evidence from Great Britain', *The Review of Economics and Statistics*, **91**, 263-281
- Delgado M.A., Farinas J.C. and Ruano S. (2001), 'Firm productivity and export markets: a non-parametric approach', *Journal of International Economics*, **57**, 397-422
- Dimelis S., Louri H. (2002), 'Foreign ownership and productivity efficiency: a quantile regression analysis', *Oxford Economic Papers*, **54**, 449-469
- Doms M.E., Jensen J.B. (1998), 'Comparing wages, skills, and productivity between domestically and foreign owned manufacturing establishments in the United States', Baldwin R., Richardson J.D. (eds), *Geography and Ownership as Bases for Economic Accounting*, Chicago, Chicago University Press
- Girma S., Gorg H., Strobl E. (2004), 'Exports, international investment, and plant performance: evidence from a non-parametric test', *Economics Letters*, **83**, 317-324
- Girma S., Kneller R., Pisu M. (2005), 'Exports versus FDI: An empirical test', *Review of World Economics*, **141**, 183-218
- Head K., Ries J. (2003), 'Heterogeneity and the FDI versus export decision of Japanese manufacturers', *Journal of the Japanese International Economics*, **17**, 448-467
- Helpman E., Melitz M.J., Yeaple S.R. (2004), 'Export versus FDI with heterogeneous firms', *American Economic Review*, **94**, 300-316
- Koenker R., Basset G. (1978), 'Regression quantiles', *Econometrics*, **46**, 33-50
- Kosteas V.D. (2008), 'Foreign direct investment and productivity spillovers: a quantile analyses', *International Economic Journal*, **22**, 25-41
- Markusen J. (1995), 'The Boundaries of Multinational Enterprises and the Theory of International Trade', *Journal of Economic Perspectives*, **9**, 169-189
- Mata J., Machado J.A.F. (1996), 'Firm start-up size: a conditional quantile approach', *European Economic Review*, **40**, 1305-1323
- Merino F. (2004), 'Firms' productivity and internationalization: a statistical dominance test', *Applied Economics Letters*, **11**, 851-854
- Tangen S. (2003), 'An Overview of Frequently Used Performance Measures', *International Journal of Productivity and Performance Management*, **52**, 347-354
- Temouri Y., Driffield N. L., Higon D. A. (2008), 'Analysis of Productivity Differences among Foreign and Domestic Firms: Evidence from Germany', *Review of World Economics*, **144**, 32-54

Appendix

Figure 1: Coefficients estimated across percentiles for each type of firm.

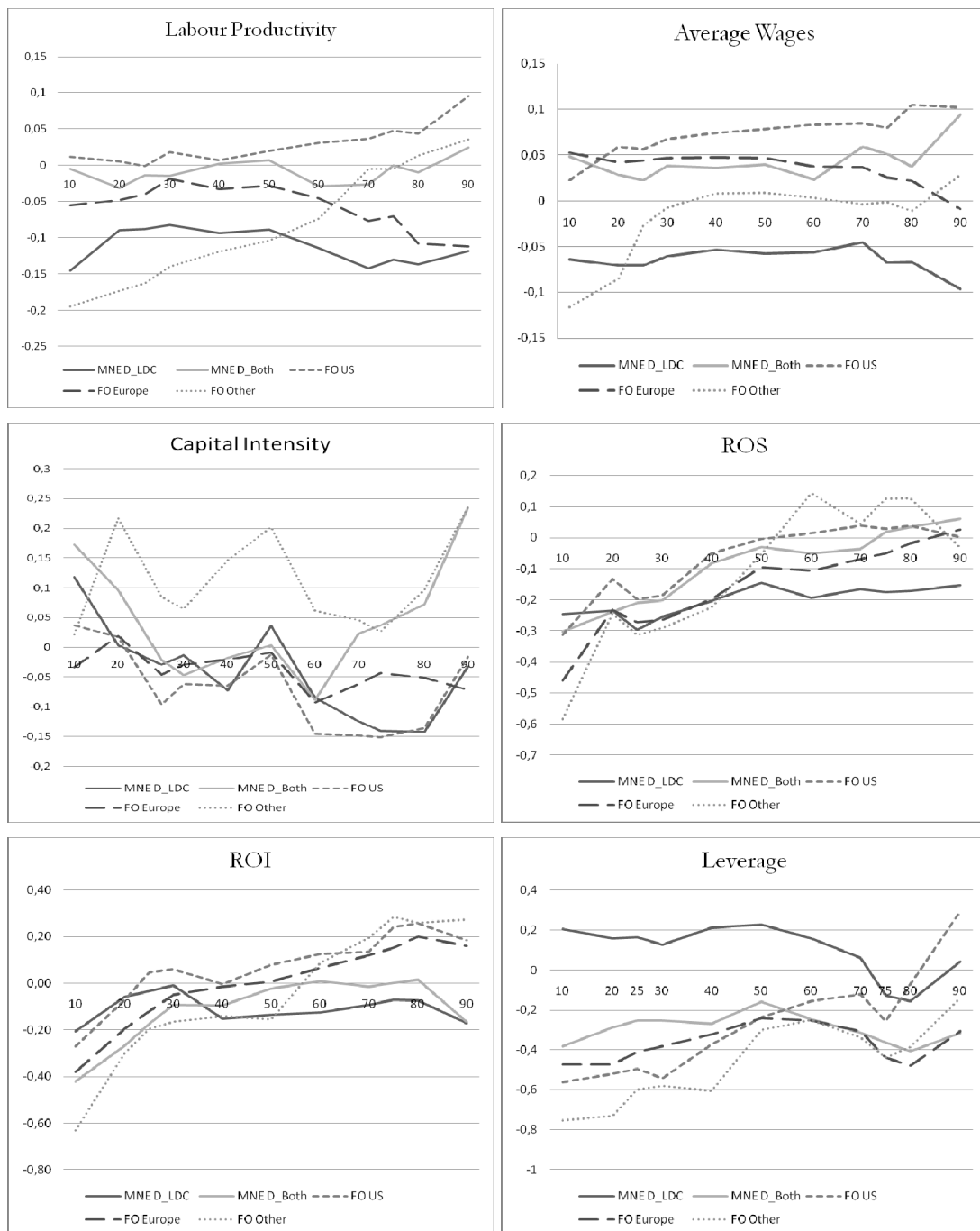


Table 1 Tests of equality between coefficients at different quantiles in Tables 5-7

Variables:	Dependent variable: log Labour Productivity						Dependent variable: log Average Wage						Dependent variable: log Capital Intensity					
	FO	MNED_LDC	MNED_Both	FOUS	FOEurope	FOOther	FO	MNED_LDC	MNED_Both	FOUS	FOEurope	FOOther	FO	MNED_LDC	MNED_Both	FOUS	FOEurope	FOOther
Quantiles:																		
10-25	0.91	0.34	0.89	0.81	0.73	0.73	0.63	0.86	0.44	0.33	0.77	0.11	0.13	0.21	0.10	0.25	0.90	0.82
25-50	0.66	0.98	0.61	0.51	0.65	0.28	0.97	0.53	0.42	0.19	0.86	0.39	0.95	0.46	0.78	0.31	0.62	0.28
50-75	0.49	0.34	0.80	0.44	0.18	0.07	0.12	0.61	0.65	0.95	0.15	0.72	0.93	0.02	0.72	0.03	0.57	0.12
75-90	0.27	0.84	0.72	0.36	0.29	0.64	0.52	0.38	0.31	0.49	0.20	0.53	0.24	0.28	0.15	0.06	0.64	0.28
10-50	0.91	0.44	0.85	0.90	0.60	0.39	0.68	0.86	0.83	0.14	0.85	0.05	0.17	0.54	0.21	0.71	0.82	0.56
10-75	0.78	0.84	0.99	0.60	0.79	0.08	0.69	0.94	0.94	0.19	0.43	0.09	0.25	0.07	0.39	0.17	0.93	0.99
10-90	0.33	0.77	0.79	0.31	0.38	0.07	0.45	0.54	0.43	0.13	0.16	0.07	0.75	0.36	0.77	0.72	0.75	0.58
25-75	0.77	0.40	0.88	0.24	0.42	0.02	0.17	0.91	0.35	0.32	0.27	0.61	0.99	0.30	0.63	0.58	0.98	0.67
25-90	0.26	0.67	0.71	0.12	0.12	0.03	0.19	0.52	0.15	0.20	0.09	0.39	0.40	0.98	0.13	0.48	0.79	0.52
50-90	0.17	0.67	0.85	0.20	0.05	0.09	0.17	0.31	0.25	0.52	0.07	0.72	0.27	0.56	0.13	0.97	0.44	0.88

P-value of F-tests.

Table 2 Tests of equality between coefficients at different quantiles in Tables 8-10

Variables:	Dependent variable: log ROS						Dependent variable: log ROI						Dependent variable: log Leverage					
	FO	MNED_LDC	MNED_Both	FOUS	FOEurope	FOOther	FO	MNED_LDC	MNED_Both	FOUS	FOEurope	FOOther	FO	MNED_LDC	MNED_Both	FOUS	FOEurope	FOOther
Quantiles:																		
10-25	0.01	0.67	0.77	0.38	0.06	0.22	0.29	0.19	0.38	0.02	0.01	0.21	0.46	0.75	0.56	0.51	0.50	0.33
25-50	0.21	0.07	0.09	0.01	0.00	0.09	0.01	0.18	0.21	0.70	0.05	0.81	0.00	0.46	0.41	0.00	0.02	0.11
50-75	0.09	0.67	0.61	0.67	0.44	0.24	0.00	0.37	0.82	0.03	0.02	0.00	0.64	0.00	0.19	0.90	0.06	0.42
75-90	0.49	0.80	0.76	0.77	0.34	0.25	0.51	0.27	0.15	0.51	0.91	0.97	0.11	0.32	0.79	0.00	0.33	0.19
10-50	0.00	0.44	0.41	0.04	0.00	0.04	0.03	0.63	0.18	0.03	0.00	0.24	0.00	0.88	0.34	0.02	0.04	0.02
10-75	0.00	0.61	0.34	0.03	0.00	0.00	0.00	0.38	0.19	0.00	0.00	0.03	0.00	0.08	0.95	0.11	0.81	0.14
10-90	0.00	0.58	0.32	0.07	0.00	0.05	0.00	0.83	0.45	0.01	0.00	0.05	0.00	0.47	0.82	0.00	0.33	0.03
25-75	0.03	0.25	0.07	0.01	0.02	0.02	0.00	0.69	0.22	0.06	0.00	0.01	0.00	0.03	0.56	0.14	0.83	0.46
25-90	0.03	0.31	0.14	0.09	0.00	0.15	0.00	0.23	0.96	0.26	0.00	0.08	0.00	0.51	0.75	0.00	0.49	0.11
50-90	0.08	0.95	0.60	0.95	0.17	0.92	0.00	0.73	0.34	0.32	0.08	0.07	0.09	0.31	0.41	0.00	0.64	0.56

P-value of F-tests.