Productivity dispersion and its determinants: the role of import penetration

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Abstract

The *new* heterogeneous firm models in international economics suggest a negative impact of trade openness on the within-sector disparities, due to a restructuring process leading to a resources reallocation toward high efficient firms and the exit of less productive ones. I test this hypothesis for the Italian manufacturing sectors making use of both static and dynamic panel data models. Especially, I investigate the existence of heterogeneous effects in terms of origin of imports and I take into account of the regional heterogeneity computing the productivity dispersion indicator within each sector and regional macro-area. The analysis is implemented within a comprehensive framework controlling for other potential determinants, such as the technological factors and the domestic competition. My findings show that the competitive pressure from low income countries reduces the productivity heterogeneity across firms, while an opposing impact is detected for the exposure to trade with high income economies, and I argue that two different mechanisms are at work behind these effects.

Keywords: Productivity, Dispersion, Imports, Firm Heterogeneity
JEL codes: L25, F14, O33, O47

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1 Introduction

Recent firm and plant-level works have found large and persistent differences in productivity levels across firms even within a narrowly defined sector (Bartelsman and Doms, 2000, Haller, 2008 for Ireland, and Escribano and Stucchi, 2008 for Spain). This evidence is confirmed both for labour productivity and total factor productivity, thus the factor intensity is not the unique determinant behind the great disparity in firm productivity. The growing availability of firm and plant level datasets has allowed to investigate the factors affecting the sectoral productivity dispersion; anyway, up to now, the results of the scant existing evidence are not conclusive. Especially, a new strand of literature in international economics has built on firm heterogeneity hypothesis (Melitz, 2003; Bernard et al., 2003) and has pointed at the role of trade liberalization as an important driver behind the within-industry firm dynamics.

With this paper, first of all, I provide new evidence for Italy about the existence of a large within-sector disparity in firm productivity and, secondly, I try to shed some light on its potential determinants exploiting a more comprehensive framework. My main focus is on the role for import penetration, thus I test whether the predictions of the *new* heterogeneous firm models in international trade are supported by data. The period of my analysis, 1998-2004, is interesting in this perspective because Italy has gone through an increase of its imports, especially from less developed countries (e.g., Central-Eastern Europe, China and other emerging countries) following both the EU-enlargement and the increasing involvement of these countries in international markets[1]. The larger import exposure has concerned all sectors, even if some differences can be detected according to the technological level of the activity and the origin of imported goods. Thus, I expect that a restructuring process in the Italian manufacturing sector may have been at work following the growing inflows of foreign goods. As a matter of fact, international trade changes the context where firms operate, gives them the possibility to access to foreign inputs, increases the competitive pressure and opens new business opportunities. For all these reasons the international openness may shape the industry dynamics and the sectoral productivity dispersion. The existing evidence for Italy about the role of internationalisation on within-sector differences in firm efficiency rests on the work of Del Gatto et al. (2008) showing a reduction of the productivity dispersion following the higher trade openness. My main contribution is to look for the existence of heterogeneous effect according to the origin of imports. Also, I present a more comprehensive framework for the investigation of dispersion and, in addition to import penetration, I shed some light on other explanatory factors capturing the technological level of sectors or the domestic competitive context. Finally, I try to take into account of the spatial dimension computing the sectoral dispersion indicators by geographical areas. It is highly documented that local conditions matter for the competition process, firms dynamics and growth (see the contributions of the New Economic Geography literature, Krugman, 1991, and Ottaviano and Puga, 1998), thus the spatial perspective may help to disclose and understand the significant drivers behind the within sector differences in firm productivity.

My results show that imports (in the area/sector) contribute to shape the sectoral distribution of productivity, even if a different role may be detected according to the country of origin. Especially, exposure to low income countries decreases the heterogeneity existing in the sector, while trade flows from developed countries play an opposing impact. I provide some explanations for these heterogeneous effects. Sunk entry costs are related with a higher within-sector dispersion, while technological factors (R&D) reduces productivity differences across firms. No role is instead found out for the domestic concentration degree of sectors.

The work is organized as follows. The next Section gives a brief overview of the related literature. Section 3 describes the data and shows a preliminary statistical analysis on the evolution of firm productivity, its dispersion and the sectoral exposure to imports. Section 4 presents the econometrical investigation of the determinants of sectoral dispersion and Section 5 shows the robustness checks. Section 6 concludes.

2 Review of the related literature

The study of firm heterogeneity is a relatively recent research field: theoretical works rejecting the representative firm hypothesis date back to the end of 70s (see for example Jovanovic, 1982), and first empirical works followed in the 1990s (Kremp and Mairesse, 1991 and Oulton, 1998), nevertheless it has been in the last decade that this topic has incurred a growing interest especially in empirical studies. Even if research is increasing, the existing productivity dispersion and its evolution is still a puzzling topic and the evidence is scant. As a matter of fact, the investigation of the reasons for the existence of large within-sector disparities could provide interesting insights about the productivity growth process.

The productivity heterogeneity can be explained both by supply-side factors, like technology, financial structure, firm management and human capital, and demand-side determinants, such as sectoral elasticity of substitution, market size, institutional framework and trade exposure. One of the first empirical works aiming at the explanation of the co-existence, in the same sector, of firms with different efficiency levels is Syverson (2004), that exploits plant-level data from the 1977 US Census of Manufactures. After showing the presence of high levels of dispersion for the cross-section of manufacturing industries at his hand, he verifies a negative correlation between the product substitutability, that causes stronger competition, and the disparity of producer productivity levels. Also, he finds that sectors more exposed to international trade present higher productivity dispersion. In opposite to this evidence, according to the new international trade literature based on the firm heterogeneity hypothesis (Melitz, 2003 and Bernard et al., 2003[2]) trade openness should cause a resource reallocation toward more efficient firms, the exit of less productive firms and the entry of more productive ones, and, as a consequence, a lower within-sector dispersion should be observed. Ito and Lechevelier (2009) for Japan, as Syverson (2004), show some evidence about the role of internationalization on dispersion contrasting with the theoretical suggestions. Making use of a large firm-level panel dataset, they find a positive impact of both the export intensity and the import penetration on sectoral dispersion. Additionally, they analyse the role of technology adoption testing the conclusions of Neo-Schumpeterian models (Caselli, 1999), but any significant effect is detected. In opposite, using data on Italian firms for the period 1983-99, Del Gatto et al. (2008) support the theoretical hypothesis that openness to trade contributes to lower the within-sector dispersion, in addition to increase the productivity median level. Thus, the existing mixed findings call for additional evidence.

All the reviewed works are strictly related to the literature dealing with the Schumpeterian mechanism of "creative destruction" in the industry dynamics and the importance of the between-component[3] for sectoral productivity growth. Many studies have verified the existence of a within-sector reallocation process and have linked this process to a number of determinants, such as market regulations (see, for instance, Arnold et al., 2008), the presence of foreign firms (Maliranta and Nurmi, 2004), the changing of the international environment and the increasing foreign pressure from imports (Maliranta, 2005 and Eslava et al., 2009).

The work is also related to the wide literature studying the impact of trade openness on productivity at sector and firm level. There are many theoretical and empirical contributions supporting the beneficial effects of the international integration and both the channels of easier access to foreign market and higher competition have been investigated. Good examples of this strand of literature are the studies of Pavcnik (2002), Muendler (2004), Topalova (2004), Amiti and Konings (2007), Fernandes (2007) and Eslava et al. (2009) for Chile, Brazil, India, Indonesia and Colombia, respectively. Empirical contributions on developed countries are more scant and they focus on the effects of the increased flow of imports, see for example the work of Dovis and Milgram-Baleix (2009) showing the positive impact of tariff reduction and import penetration on Spanish sectoral and within-firm productivity. Concerning the target country of the present work, Italy, Bugamelli and Rosolia (2006) find that competition from non developed and emergent countries has positively affected the productivity of 3-digit sectors (in large part attributable to a creative destruction process), while, moving at the firm level, Altomonte et al. (2008) explore both horizontal and vertical (from upstream and downstream sectors) import flows disclosing positive correlations with the firm efficiency, even if the vertical channel seems to play a more important role.

Even if a great part of research shows that trade is usually beneficial for sectoral and firm productivity, there are also models shedding light on the potential negative effects of import competition for the firm efficiency. Rodrik (1991) and Traga (1997) find that lower trade protection or higher import competition reduce a firm's investments in productivity improvements when the incentives to invest depend on the firm's output or market share that are reduced by trade openness. Thus, higher international involvement may result in either productivity gains or losses, and empirical investigation is essential.

Finally, a recent strand of literature, working with firm level datasets, investigates the potential asymmetrical impact of sectoral factors and external shocks on firm productivity. Chevalier et al. (2009) investigate the potential determinants of the convergence process among firms in France during the period 1992-2004: globalisation, R&D and competition turn out to affect positively the productivity growth, and the gains are asymmetric according to the firm position in the productivity distribution, being larger for leading firms. Griffith et al. (2003), Sabirianova et al. (2005) and Bekes et al. (2006) analyse the role played by FDI spillovers and foreign ownership testing heterogeneous effects for firms with different efficiency levels. Konings and Vandenbussche (2008) display the firms' heterogeneous response, in terms of productivity, to antidumping protection. Schor (2004) and Dimova (2008) allow for the impact of liberalization in Brazil and Bulgaria to be heterogeneous across firms. Both works show that the reduction of nominal tariffs and the increased competitive pressure have led firms at the lower tail of productivity distribution to increase their efficiency in order to survive in the liberalized market. The same does not happen to firms with higher productivity that do not face the failure risk (Muendler, 2004). Different conclusions are presented in Iacovone (2009) that, building on the predictions of neo-Schumpeterian growth theories (Aghion et al., 2005), model and test a positive impact of the liberalization in Mexico during NAFTA, shedding light on weaker effects for plants more distant to the production technology frontier. Only firms close to the productive frontier increase their innovative efforts in order to prevent entry of potential foreign competitors, in opposite less efficient firms are not able to compete successfully with foreign entrants at the frontier.

Thus, if technological factors, international trade flows or other external shocks display heterogeneous effects on firm productivity, some significant consequences may emerge for the within-sector dispersion.

3 Sample construction and descriptive statistics

3.1 Data

For the empirical analysis I make use of the commercial database AIDA[4], the online version, produced by the private company Bureau Van Dijk. This database contains unconsolidated balance sheet information of Italian firms and I recover data for the period 1998-2004. I only focus on manufacturing firms. Bureau van Dijk updates regularly the dataset, especially it keeps in the sample firms that exit or stop reporting their financial statements for four years, but after the fifth year of non-reporting these firms are removed. Additionally, through the analysed time period, the criteria for firm inclusion have been changed. All firms with a turnover higher than a fixed threshold are recorded but this threshold has lowered over time: in 1998 and till 2000 firms were included in the database if they had a turnover higher than 1 million euros, in 2002 the threshold was set to 500,000 euros and in 2004 to 100,000 euros. In order to take into account of these database characteristics I have retrieved data for deleted firms (the potentially exited firms) using the different releases of AIDA CD-ROMs for the years in my sample[5]. Then I have dropped firms having a turnover lower than 1 million of euros[6], the 1998 threshold, in order to focus on a uniform sample. Data tend to be more representative of larger firms, anyway also medium and small firms are recorded. Table 7 in the Appendix shows the firm distribution across size classes. I use the value of operating revenues as a proxy for output, the value of firm level tangible fixed assets as a proxy for fixed capital, and the number of employees[7] and materials and services costs, as proxies for inputs. I obtain the information about the firm sector of activity at 2-digit NACE and the region. I deflate the variables using sectoral price indexes for output, value added, materials and capital stock from Istat[8]. Observations with missing values for the variables of interest (output, inputs), or with implausible figures (for example, negative values), or which present some gaps over the sample period are dropped. After this cleaning procedure I have information about more than 30,000 firms over the analysed period. The firm Total Factor Productivity (TFP) measure is computed making use of the multilateral index suggested by Caves et al. (1982)[9]. The investigated sectoral dispersion indicators are the following: the interquartile range (D2575), that is my favourite indicator, and, as robustness check, the standard deviation, STD (as in Oulton, 1998), at 2-digit NACE disaggregation and for each of the 3 geographical areas, North, Centre and South[10]. Also, I have used in the empirical strategy the Labour Productivity (LP)[11]. In this latter case, the dispersion measure is calculated on the relative labour productivity (relative to the area-sector average) to take into account of the scale differences between sectors (see Syverson, 2004).

Concerning the explanatory factors in the analysis, making use of the AIDA database I have computed the concentration ratios (C10, the sectoral output share of the ten firms with the greatest market share) for 2-digit NACE industries and across the 3 different areas. This index is used as a proxy for the sectoral degree of domestic competition. The import penetration ratios have been built as:

$$IMP\_PEN_{jat} = \frac{M_{jat}}{M_{jat}+Y_{jat}-X_{jat}}$$

where j indexes a 2-digit sector and a each of the three Italian regional areas (North, Centre and South), M_{jat} and X_{jat} are, respectively, the total import and export of the area a and sector j in the year t, and Y_{jat} is the total sector-area output. Also, import penetration ratio have been split according to the development level of the partner country. I used the classification between high, medium and low income countries from the World Bank, and I obtained the import penetration from low and medium income countries, $IMP\_pen_{jat}^{LMC}$, and from high income countries, $IMP\_pen_{jat}^{High}$. Trade data are from the database COE of ISTAT (flows by province), while sector-area output data are from the Firm Economic Accounts (ISTAT).

I'm aware that the under-representation of small firms could prevent me to analyse an important part of the story. This is a drawback that a lot of analysis has to cope with because it is difficult to have reliable economic information for small firms. Anyway, I am trustful that the bias in the results is not so severe: I find that the median firm size, in terms of number of employees, is 29 employees (see Table 7 in Appendix). Also, in the Appendix I show the distribution of manufacturing output across 2-digit NACE sectors for the universe and the analysed sample. Table 8 displays that the two distributions are very similar and, at this point of view, the sample may be considered representative of the population.

Because of my interest in within-sector dynamics I require a firms' sample enough large for each investigated sector, thus I have discarded those area-sector pairs with a low number of firms by year in order to obtain reliable measures for sectoral dispersion[12]. Additionally, the analysis does not include some sector/area/year observations for which I could not construct the relative trade indicators due to the missing values for sector-regional output (for confidentiality reasons) in the Firm Economic Accounts,[13].

3.2 Descriptive statistics

Before moving to the econometrical analysis it is useful to investigate the trends in the variables of interest. First of all, my productivity estimations confirms that in the target time period the firm efficiency performance has been unsatisfying[14] (Figure 1), an issue that has drawn the attention of both economists and policy makers in Italy. For the whole manufacturing sector, after a little efficiency gain in 1999 the productivity has fallen down till 2003, then in 2004 firms have gone through a slight improvement. This evidence found at micro-level confirms the studies at sector level in Italy (see for example Daveri and Jona-Lasinio, 2005) and reproduce the results presented by Altomonte et al. (2008). The poor productivity evolution is a common feature of all industries. Focusing the attention on within-sector productivity heterogeneity, Table 1 shows the average values of dispersion by sectors at 2-digit level[15]. Some differences exist across industries. The more heterogeneous sectors are *Manufacture of wearing apparel* (NACE 18) and *Office machinery and computers*(NACE 30), while *Manufacture of fabricated metal products* (NACE 28) and *Electrical machinery and apparatus* (NACE 21) sectors present the lower dispersion. The analysis of the time evolution does not show a monotonic trend in dispersion, but it is interesting to notice in Figure 1 that during the expansion periods, when the average productivity grows, the within-sector heterogeneity increases, while disparities decrease together with a downturn in the average productivity[16]. The values found out for sectoral dispersion in Italy are similar to the ones presented in Syverson (2004) for USA[17].

[Figure 1: TFP evolution and dispersion]

Focusing on the linkages between import penetration and domestic efficiency, it is important to keep in mind that two different effects could be at work behind the inflows of foreign goods. First of all, imports drive to a tougher competition in the domestic market. Secondly, the openness to foreign supply markets increases the availability of intermediates that may be cheaper than the domestic ones or characterised by a higher quality and a higher technological content[18]. Thus, the same import flow may represent a threat for firms operating in that same sector and an opportunity for the downstream firms. It is difficult to separate the effect coming from the stronger competitive pressure and the effect related to the firms' offshoring strategies. As displayed in the National Input-Output tables, the narrow input share, that is the share of inputs coming from the same sector at 2-digit level, is not so high. I find, for example, an average narrow share of 25% in the manufacturing sectors and a narrow import share of 11% for the year 2004. Even if these shares are not so high, I'm not able to distinguish the imports of intermediates from imports of final goods, and, additionally, intermediate imports may, in any case, represent an increase of competition for firms in downstream sectors. However, it is difficult to detect which mechanism is at work behind the import effects on productivity and on dispersion. Only a very high disaggregation of sectors may allow to mitigate this problem. As a consequence, in all the analysis it is important to keep in mind the problem of the identification of the mechanism at work when an effect from imports is disclosed.

Looking at the exposure to imports, it is evident that, even if developed countries are always the main trade partners of Italy, the role of low and medium income countries has increased over time and this phenomenon is common to all the sectors (Table 1). The import share from low and medium income countries (henceforth, LMCs) differs across industries: the largest shares are, as expected, recorded by traditional sectors, NACE 18 and 19 (*Manufacture of wearing apparel* and *Manufacture of leather and leather products*) sectors, while the lowest share concerns NACE 22 sector (*Publishing, printing and reproduction of recorded media*). Anyway, all sectors have gone through a growing competition from LMCs (see Table 1 in the Appendix). For the whole manufacturing sector the import penetration from LMCs countries has enhanced from more than 4.7% in 1998 to 7.7% in 2004 (thus, an increase of about 63.8%). This surge is in great part attributable to the industrial development and liberalization strategies of these countries, as a matter of fact it came with an increase of their total world export share and their share in the total imports of developed countries (see Table 5 in the Appendix). The importance of Italian imports from industrialized countries has been, in opposite, quite constant for the total manufacturing sector over the sample period. The average increase of imports from high income countries is 4.6%, even if also in this case there are heterogeneous trends across sectors[19].

[Table 1: TFP evolution and dispersion]

4 The determinants of sectoral dispersion

In this section I present the results of a comprehensive analysis about the factors affecting the within-industry productivity differences across firms. Building on previous empirical studies I take into account of the following determinants: the competitive environment, the technology level and the international involvement of the sector. First, I expect that sectors characterized by a high degree of domestic competition present low dispersion. In a more contendible market it is likely that inefficient firms could not survive a long time, firms make efforts in order to improve their efficiency and stay in the market and competitive pressures lead to the flattening of any difference. I have used the concentration ratio (C10) to capture the competitive context. Also, I add a variable for the sunk entry cost, measured with the average amount of firm capital intensity in the sector.

Second, I test the role of R&D. The technology adoption may have an ambiguous impact on dispersion according to the dominance of innovation or knowledge spillovers. New technologies are employed only gradually and represent an important source of heterogeneity among firms in the same industry, thus, the technology diffusion may increase the within-sector heterogeneity. As shown by Jovanovic and Lach (1997) the diffusion of technologies takes often a long time[20], and this gradual process may explain persistent within-industry productivity differences across firms. Anyway, the expected role of technology for dispersion is not so obvious, and also spillover effects may play an important role positively affecting the efficiency of all firms. In order to capture the technology effects I rely on the ratio between the sectoral R&D expenses on the total sectoral production[21].

Additionally, I include in the investigation an indicator of the average debt share on the total assets. This indicator is calculated making use of AIDA dataset separately for each 2-digit sector and area. A high leverage, even if it could point out the risk of bankruptcy, also reveals the access to external financial funds, that could affect the firm productivity and the within-sector dispersion. In fact, the lack of external financial resources could prevent firms to improve their efficiency, make investments and start new projects. As a consequence, I can expect that the availability of external resources reduces the productivity differences across firms caused by the different internal financial health[22]. Anyway, the effect of this variable mainly remains an empirical issue.

My main focus stays on the sectoral international involvement[23]. As already said in the literature review, the new heterogeneous firm models in international economics suggest a reduction of the dispersion following trade liberalisation and the increased trade openness. I deal with both import penetration from low-medium and high income economies with the idea that flows from the two country groups present different characteristics and different reasons, and an heterogeneous impact may be displayed.

In this comprehensive framework, I run the following regression:

$$\begin{aligned} DISP_{jat} &= \alpha + \beta IMP\_pen^{LMC}_{jat} + \delta IMP\_pen^{High}_{jat} + \phi R\&D_{jt} + \gamma LEV jat + \\ &+ \eta dom\_comp_{jt} + d_{ja} + d_t + \epsilon_{jt} \end{aligned} \tag{1}$$

where $DISP_{jat}$ is the dispersion indicator that could be the interquartile range ($D2575_{jat}$) or the standard deviation (STD_{jat}) for TFP index (or labour productivity) in each j-sector and a-area pair. $IMP\_pen^{LMC}_{jat}$ and $IMP\_pen^{High}_{jat}$ are the import penetration ratio in the sector j and area a from low and medium income countries and from high income countries, respectively; $R\&D_{jt}$ is the $R\&D$ share in the j sector; LEV_{jat} is the average firm debt share on the total assets in sector-area and dom_comp_{jat} represents the variables capturing the domestic competitive pressure in the sector-area, that is the $C10$ ratio and the average firm capital intensity KL[24]. All variables refer to 2-digit NACE sectors and the three geographical areas North/Centre/South (with the exception of $R\&D_{jt}$). Every regression includes sector-area fixed effects and time dummies[25].

Before estimating the model, I investigate the strict exogeneity of the regressors with the test suggested by Wooldridge (2002, p. 285). Using fixed effects, this test involves regressing the dependent variable on current independent variables X_{it} and on their leading values, $X_{i,t+1}$[26]. The null hypothesis of strict exogeneity is rejected if the leading values are jointly statistically significant. I have applied this test including the forward values for all my regressors and a F-test can not reject the null hypothesis (P-Value=0.293 for the TFP interquartile range[27]). This confirms that my right-side variables are strict exogenous and estimates are consistent.

Table 2 shows the results for Equation 1 from FE (fixed effect) estimations. One can notice that imports from high and low-medium income countries play different roles. While the exposure to less developed countries reduces the within-sector heterogeneity, the opposing effect is detected for the import penetration from developed countries and this evidence is confirmed for both the dispersion indicators, standard deviation and interquartile range, and for both the productivity indicators, TFP and LP. In opposite to expectations, the domestic competitive context captured by the concentration ratio ($C10$) does not display any significant effect on the sectoral dispersion. The capital intensity contributes instead to shape the sectoral productivity distribution. A high capital/labour ratio (KL) could mean higher sunk costs and, thus, represents an entry barrier that reduces the competition in the sector and allows the surviving of low efficient firms. For the other two explanatory variables (LEV and RD) I find different results making use of the two dispersion indicators. Interquartile range seems to be negatively and significantly affected by the firm access to debt capital in the sector and by the R&D intensity. The availability of external resources may allow firms (especially small firms that may face a lack of internal resources) to invest in order to improve their efficiency, thus, reduces the productivity differences across firms caused by different internal financial conditions that may especially be related to the firm size. R&D expenses also lower the within-sector heterogeneity. Innovation increases the competitiveness in the sector and firms that are not able to make efforts and engage in R&D activity can not survive in the market. Additionally, it may also be possible that domestic technology is relatively cheaper, if compared with foreign technology, and firms may take advantage from domestic new technologies in order to improve their efficiency. In opposite, in my findings the imports from high income countries, that can represent imports of foreign technology, bear a positive effect. While domestic technology seems to be accessible to all firms, foreign technology access is restricted to a part of firms' population. Finally, knowledge spillovers could be at work and these externalities could remove the disparities across firms. Anyway, in the estimations for the standard deviation these latter factors, debt share and R&D, preserve the negative sign, but are not significant.

[Table 2: TFP evolution and dispersion]

Up to now, I have not dealt with the problem of the potential first-order serial correlation in the dispersion indicators. Since in my dataset I have more panels than time series, the generalized least squares (GLS) estimator can not be used to correct for autocorrelation in time series (Beck and Katz, 1995). On the other hand, the cross-sectional dimension of the panel is small (I have only 56 sector-area pairs) and GMM estimator does not perform well in small samples as mine. For these reasons I have applied the LSDV (Least Squares Dummy Variable) estimator with the correction suggested by Kiviet (1995, 1999) and extended to unbalanced panels with strictly exogenous variables by Bruno (2005). Bun and Kiviet (2001) shows, through Monte Carlo experiments, that LSDV technique performs well if compared with GMM when the time-series and cross-section dimensions are small. Table 3 displays the results when I deal with the serial correlation. LSDV estimator seems to perform better for the interquartile range than for standard deviation. As a matter of fact, the lag of the dependent variable is not significant for the standard deviation. Anyway, main effects of my previous analysis are confirmed and no great changes are displayed either for the significance or coefficient of explanatory factors[28].

[Table 3: TFP evolution and dispersion]

It is confirmed the significant coefficient for the average firm capital intensity and no significance for the concentration ratio ($C10$). Moving to trade variables, again it is clear that imports from LMCs contribute to reduce differences across firms and lower sectoral dispersion. A positive effect is, in opposite, detected for flows from high income countries. A possible explanation for these findings is that the foreign competition from LMCs is a threat that domestic firms have to cope with, but, being a competition on price, it is difficult for firms to react successfully because their rivals can benefit from lower labour and material costs. Additionally, as shown in the descriptive statistics, the deeper international integration of low income countries is a recent event, thus domestic firms may be unready to successfully compete with the growing flow of foreign goods. The foreign competitive pressure reduces the market shares and the expected profits for domestic firms, and drives some less efficient firms out of the market. Also, firms at the lower tail of the distribution may make some efforts in order to survive and stay in the market. Due to the increased import penetration the competition is tougher and less productive firms might have more incentives to reduce costs of production and increase their efficiency coping with the import flows since they are the main candidates to exit the market[29]. As a consequence, the dispersion will lower because of the exit of low efficient firms and the productivity improvements of surviving firms.

In opposite, imports from industrialised countries is not a new fact, domestic firms are used to face these flows of goods that have been quite constant over the analysed time period if compared with imports from low and medium income countries. Thus, firms are not displaced by this competition. Instead, a different effect could be at work. Imports from developed countries means also the opportunity to exploit higher quality inputs and intermediates with a higher technological content that allow firms to increase their efficiency and competitiveness. Anyway, this opportunity may not be available to all firms, because the entry in foreign markets involves additional costs that only some firms are able to cope with (see for example Vogel and

Wagner, 2010, for the self-selection in importing). This hypothesis will be tested in the following section.

5 Robustness checks

In this section I present some tests to prove the robustness of my previous findings. First of all, a criticism may concern the geographical breakdown. The breakdown by the three regions (North, Centre and South) is typically used in studies on Italian economy because of geographical reasons and development issues. A more disaggregated analysis, for example by region (that is EU NUTS 2 level), would be interesting and may help to capture regional specificities, unluckily it is prevented by sample size constraints[30]. Anyway, a check is necessary. If the geographical dimension is important in shaping the dispersion and affecting the competition, the region of Sardinia may lead to biased results. Even if this region is included in the South area, it is geographically distant from the rest of Italy and there is no reason (from a geographical point of view) to hypothesize that its firms are in competition and are more affected by other firms in the South of Italy than firms in the rest of Italy. Thus, I have tried to exclude from my analysis this region and I have constructed again the area-sectoral variables for the South of Italy without Sardinia. Results for this test are presented in the Appendix (Table 10). There are no significant difference in comparison with previous findings, thus, the results presented above prove robust to this correction. The following analysis is run on this new sample definition[31].

I have already highlighted the different impact of imports split by origin countries and I have also supposed that this evidence could be explained with different mechanisms behind the displayed effects. If the higher dispersion caused by trade flows from high income countries is due to the easier access to a large variety of inputs I may expect a specific indicator of international outsourcing to be significant in explaining the firm productivity heterogeneity. Thus, I have tried to include offshoring at 2-digit sector level in the analysis (an indicator capturing also the geographical dimension is not available). When this indicator for the access to foreign inputs is included in the specification together with the import penetration from developed economies, it is not significant (these regressions are shown in the Appendix, Table 11). This result is due to the high correlation between these two variables, being more than 73%[32]. When I simply replace the exposure to high income countries (IMP^{High}) with the sectoral offshoring indicator (OFF), as shown in Table 4, previous findings are confirmed: a negative and significant impact is found for imports from low wage countries, while, now, foreign intermediate purchases contribute to increase the efficiency disparities across firms. Thus, the explanation suggested for the role of imports from high income countries is not rejected.

[Table 4: TFP evolution and dispersion]

6 Conclusions

During the last decade, Italy has gone through a rapid growth in import penetration, especially from low and medium income countries. This phenomenon has been common to all developed countries, and it is in great attributable to the implementation of liberalization strategies by emerging countries and to their industrial development. Aware of this evidence, I have analysed whether this foreign competition contributes to shape the sectoral productivity distribution. The existence of large and persistent differences in productivity levels across firms, even within a narrowly defined sector, is a stylised fact confirmed by different works and for different countries. Taking into account of the importance of the geographical perspective for competition and spillovers effects, as also suggested by the New Economic Geography literature, I construct the dispersion indicators separately for each sector and three geographical areas. I verify that, within a comprehensive framework, the exposure to LMCs is negatively related with the productivity dispersion at sector level. In opposite, imports from high income countries contribute to widen the within-sector heterogeneity. Two different mechanisms may be at work behind these flows of foreign goods: imports from low wage economies may have tightened up the competitive pressure and, especially, it is likely that goods from developing countries directly compete with the production of less efficient firms. The role of flows from high income countries may instead lie on the easier access of a larger variety of inputs. The within-sector disparities across firms are also significantly related to the presence of sunk costs, captured by the capital intensity.

The analysis of the evolution of the productivity distribution is an interesting topic ad may provide important insights about the growth process. Especially, studies at sector level should not focus only on the mean effect and firm level investigations should allow for an heterogeneous impact of the analysed phenomenon. An average outcome can hide different forces and dynamics at work according to the firm position in the efficiency distribution. Consequently, the availability of longitudinal datasets covering the whole firm population, especially the small firms, may be valuable in order to highlight the firm dynamics over time and the differences existing across firms. The use of a larger sample would also give the opportunity to focus on the dynamics within more disaggregated regions, and this may disclose the importance of the geographical dimension in the productivity studies. Future research should try to pay more attention on the geographical perspective in the investigation of firm efficiency.

Notes

[1]The growing role of developing countries in the international arena is related both to their industrial development and their implementation of liberalization strategies

[2]Melitz (2003) and Bernard et al (2003) highlight two different mechanisms for the same outcomes. In Melitz (2003), falling trade costs increase the profits for exporters, and the growing factor demand by new entrants, caused by the expectation of higher profits and by exporters, pushes upward the real factor prices, and this drives the least productive firms out of the market. In Bernard et al. (2003), low productivity plants exit because of the growing competitive pressure from foreign firms.

[3]The between-component labels the resource reallocation process among firms, especially from less efficient firms to more productive ones.

[4]This database is the version for Italy of the more known AMADEUS database, covering different European countries.

[5]The inclusion of exited firms is essential in my analysis because the explanatory variables, especially the import penetration, could affect the within-sector productivity dynamics through the firm exit process.

[6]In opposite to many micro-level datasets having a threshold on the firms' number of employees, this database has a threshold on the total turnover.

[7]The number of employees is in some cases missing because firms have not the duty to declare this information to the Chambers of Commerce. Anyway, I have always the information about the personnel costs. In order to keep the largest sample as possible I have replaced missing data for the number of employees with the product between the firm personnel cost of that year and the average unit labour cost of the firm in the previous year, in the belief that the unit labour cost is quite constant in the short-term for the firm. The correlation between labour costs and number of employees is very high and significant, more than 92%. Anyway, the share of observations on labour that have been imputed with this strategy is less than 10% of the whole sample.

[8]The use of sectoral deflators instead of firm level prices has become a standard method in literature, even if it may lead to biased estimation of production function coefficients. A paper by Mairesse and Jaumandreu (2005), making use of a firm-level dataset, finds that whether value added is deflated with an industry output-price index, with an individual firm-output price index or not at all makes little difference for the estimation of the coefficients in the production function. Anyway it is important to keep in mind that the productivity indicator may reflect both true efficiency and mark-up.

[9]The choice of this index is motivated by its robustness. Van Biesebroeck (2007) shows that, apart the case of large measurement errors in the data, the index produces consistently accurate productivity growth estimates, even when firms are likely to employ different technologies. I have also estimated the productivity using the Levinshon-Petrin (2003) approach. Main results for the following analysis are very similar, but not shown for the sake of brevity.

[10]I have also tried to use the interdecile range (D1090), but this indicator is more affected and biased by the presence of outliers. In fact, I found some changes in the significance of the explanatory variables between the TFP index and the TFP measure calculated with the semiparametric approach suggested by Levinshon and Petrin (2003), even if the coefficient signs do not change. Thus, I have preferred to focus on interquartile range (and standard deviation) that gives consistent results between TFP index and semiparametric TFP.

[11]Labour Productivity is defined as value added per employee.

[12]Dispersion indicators calculated on too much small samples are not reliable. This problem concerns only some high or medium-high tech sectors in the South of Italy: the NACE sectors 30, 32, 33 and 35 in South.

[13] The excluded observations are: in 1999 the sectors 15, 34 and 35 in North and South; in 2001 the sectors 19 and 35 in North and South; in 2002 the sector 19 in North and South; in 2003 the sectors 15 and 19 in North and South

[14]I show the evolution of the unweighted TFP mean for the whole manufacturing sector.

[15]These dispersion indicators have been constructed for each sector-area pair and then averaged on 2-digit level sectors.

[16]This is consistent with the analysis of Escribano and Stucchi (2008) that shows lower persistence and faster convergence in TFP during recessions and higher persistence and non convergence in TFP during expansions.

[17]He finds an average interquartile range of logged plant-level labor productivity values of 0.66.

[18]A recent strand of literature points at the positive efficiency impact of firm imported inputs, see for example Halpern et al (2005) for Hungary and Kasahara and Rodrigue (2008) for Chile.

[19]These indicators have been constructed excluding the area-sector pairs listed in the endnotes 13 and in the Appendix I also show the import shares calculated for 2-digit sectors instead that at sector-area level (Table 6) without any exclusion. Even if there are some differences between the two tables (Table 1 and 6), both of them display similar evolution for imports by origin country group.

[20]Jovanovic and Lach (1997) show that a new technology takes, on average, 15 years to go from 10% usage to 90% usage.

[21]The R&D variable comes from the National IO Tables, and it is calculated as the sectoral purchases from the sector 73 *Research and Development* on the total sectoral production. I construct this indicator at 2-digit NACE sectors without any geographical breakdown. The use of an alternative indicator of ICT capital stock, retrieved from National Accounts, bears similar results.

[22]For example, Becchetti and Trovato (2002) have found that firms with a high leverage grow more.

[23]Because of my interest in testing especially the role of competition coming from imports, I have not included in the main analysis the export openness due to collinearity problems. In particular, export openness indicators present a high and significant correlation of more than 72% with the import penetration from developed economies. However, when I also control for the export openness results do not change a lot and this variable is not significant.

[24]The pairwise correlations are shown in the Appendix.

[25]I have tested different specifications for Equation 1, for example substituting the R&D intensity with an indicator of sectoral ICT capital stock, or excluding some variables, and main results are preserved.

[26]The included leading values are for the variables I'm testing the strict exogeneity.

[27]This test has been implemented for each regression I have run, both for TFP and LP, and always F-test can not reject the null hypothesis.

[28]Instead of using the LSDV estimator with the Kiviet correction I can apply the Panel Corrected Standard Errors (PCSE) estimator (Beck & Katz, 1995) that allows for autocorrelation within panels. The implementation of PCSE estimator leads to similar results for the regressors than ones shown in the text.

[29]Bernard et al. (2006) show that the exposure to low wage countries reduce the firms' survival probability.

[30]There is a trade-off in the choice of the disaggregating level, between having the most detailed picture, and having a sufficient number of observations in each cell

[31]Results do not change when I use the initial sample including Sardinia.

[32]The correlation between the import penetration from low income countries and sectoral offshoring is low, 10%, and only significant at 5%. Anyway it is important to notice that the large amount of input flows comes from developed countries and the role of the offshoring to low wage economies may be hidden in an indicator capturing the total flows. An offshoring measure split by the origin country should help to identify the different effects, but unluckily it is not available at sectoral level.

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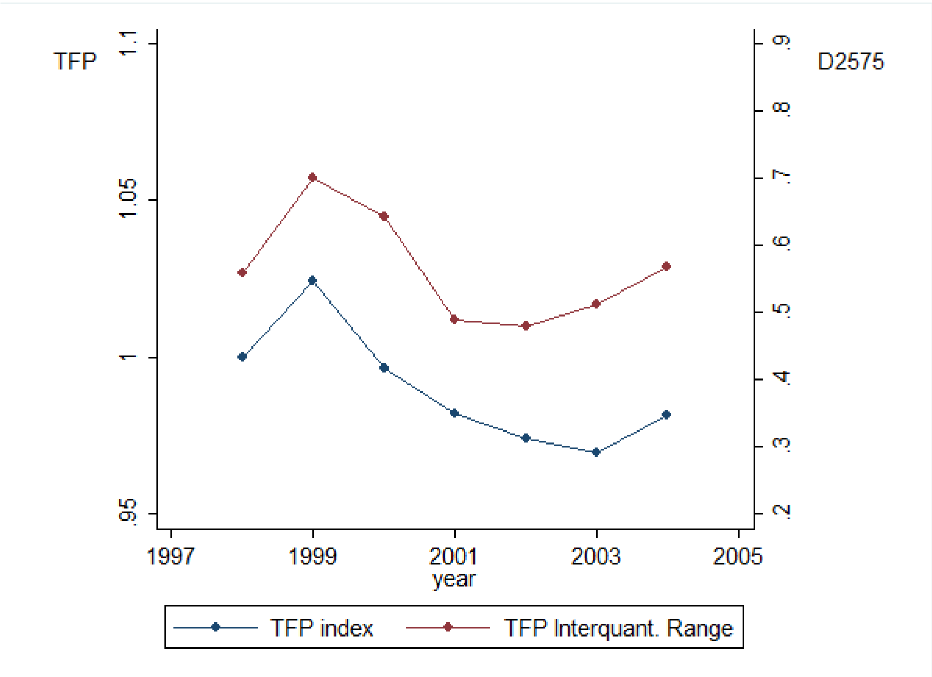
APPENDIX

A Tables and Figures

Figure 1: TFP evolution



Source: my elaborations from AIDA. TFP: unweighted TFP mean for the whole manufacturing sector. D2575: TFP interquantile range.

Table 1: Dispersion and import penetration by sector

NACE	TFP 2004 D2575	TFP 2004 STD	% 2004 IMP^{LMC}	% 2004 IMP^{High}	Δ% 1998-2004 IMP^{LMC}	Δ% 1998-2004 IMP^{High}
15	0.641	0.652	3.10	10.47	40.81	-2.04
17	0.620	0.623	15.42	10.61	94.03	-22.14
18	0.686	0.709	16.68	5.69	50.95	-17.52
19	0.575	0.593	25.57	9.30	68.72	41.66
20	0.476	0.500	6.21	8.63	-6.41	-18.16
21	0.427	0.524	3.50	19.98	50.60	-9.12
22	0.604	0.615	0.15	2.41	8.82	1.50
24	0.671	0.668	4.03	43.40	20.00	24.85
25	0.525	0.561	3.39	15.11	50.31	5.35
26	0.529	0.505	2.29	5.19	52.38	-30.51
27	0.463	0.491	19.73	25.39	64.51	-3.40
28	0.452	0.499	1.44	3.37	100.54	-22.33
29	0.539	0.549	5.24	25.93	235.66	-9.62
30	0.827	0.726	8.92	76.94	238.47	26.57
31	0.533	0.556	5.82	19.46	81.76	4.40
32	0.575	0.664	12.31	58.17	257.74	65.04
33	0.565	0.521	4.01	44.28	86.72	20.85
34	0.584	0.566	6.75	54.67	565.91	36.33
35	0.544	0.676	2.44	41.45	44.20	16.50
36	0.599	0.626	7.30	7.36	36.04	-15.53

Source: my elaborations from AIDA, COE Database and Firms Economic Accounts (ISTAT)
IMP^{High} and IMP^{LMC} are Italian import penetration ratios from high income countries and LMCs. All variables are calculated at 2-digit sector-area level and then averaged on 2-digit sectors.

Table 2: Determinants of sectoral dispersion

VARIABLES	LP D2575	LP STD	TFPIND D2575	TFPIND STD
IMP^{LMC}	-0.954***	-0.763***	-0.763***	-0.910***
	[0.27]	[0.272]	[0.220]	[0.298]
IMP^{High}	0.285***	0.142***	0.163***	0.144
	[0.050]	[0.047]	[0.057]	[0.090]
KL	0.0536***	0.128***	0.0325**	0.0912***
	[0.017]	[0.028]	[0.014]	[0.023]
LEV	-0.842***	-0.260	-0.801***	-0.162
	[0.245]	[0.619]	[0.282]	[0.663]
$C10$	-0.009	-0.008	-0.066	0.036
	[0.051]	[0.070]	[0.049]	[0.072]
RD	-0.106**	-0.0993	-0.132*	-0.125
	[0.052]	[0.077]	[0.075]	[0.081]
$Const$	0.387	-0.262	0.312	-0.363
	[0.285]	[0.741]	[0.410]	[0.835]
$Obs.$	378	378	378	378
R^2	0.646	0.623	0.592	0.53
$Ngroups$	56	56	56	56

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1
Fixed Effect Estimations. Every regression controls for time dummies. Dependent Variable is the Interquartile Range (D2575) or Standard Deviation (SD) for Total Factor Productivity (TFP) and Labour Productivity (LP).

Table 3: Determinants of sectoral dispersion

	LP		TFPIND	
VARIABLES	D2575	STD	D2575	STD
IMP^{LMC}	-1.014***	-0.512*	-1.102***	-0.853***
	[0.277]	[0.308]	[0.294]	[0.301]
IMP^{High}	0.294***	0.219**	0.179**	0.252***
	[0.083]	[0.092]	[0.088]	[0.089]
KL	0.0592***	0.115***	0.0382**	0.0820***
	[0.016]	[0.018]	[0.017]	[0.017]
LEV	-0.530	-0.641*	-0.827**	-0.559
	[0.347]	[0.369]	[0.346]	[0.358]
$C10$	-0.039	-0.016	-0.054	0.018
	[0.107]	[0.121]	[0.114]	[0.118]
RD	-0.111**	-0.034	-0.117**	-0.084
	[0.052]	[0.058]	[0.056]	[0.057]
$D2575(-1)$	0.210***		0.193***	
	[0.076]		[0.074]	
$STD(-1)$		0.001		0.029
		[0.053]		[0.052]
$Obs.$	312	312	312	312
$Ngroups$	56	56	56	56

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1
LSDV estimation with the Kiviet correction. Every regression controls for time fixed dummies. Dependent Variable is the Interquartile Range (D2575) or Standard Deviation (SD) for Total Factor Productivity (TFP) and Labour Productivity (LP).

B Additional Tables

Table 4: Determinants of sectoral dispersion: Offshoring

	TFPIND				LP			
	D2575		STD		D2575		STD	
VARIABLES	FE	LSDV-KIV	FE	LSDV-KIV	FE	LSDV-KIV	FE	LSDV-KIV
IMP^{LMC}	-0.560**	-0.796***	-0.764**	-0.576*	-0.833***	-0.840***	-0.650**	-0.321
	[0.260]	[0.290]	[0.301]	[0.304]	[0.257]	[0.285]	[0.284]	[0.316]
KL	0.0230*	0.0294*	0.0849***	0.0758***	0.0436***	0.0514***	0.123***	0.110***
	[0.013]	[0.017]	[0.020]	[0.018]	[0.015]	[0.017]	[0.027]	[0.018]
$C10$	-0.071	-0.047	0.049	0.038	-0.043	-0.068	-0.014	-0.006
	[0.045]	[0.116]	[0.072]	[0.122]	[0.051]	[0.113]	[0.069]	[0.126]
RD	-0.127	-0.089	-0.112	-0.060	-0.119*	-0.116**	-0.096	-0.021
	[0.089]	[0.060]	[0.090]	[0.060]	[0.060]	[0.057]	[0.085]	[0.062]
LEV	-1.056***	-1.156***	-0.218	-0.528	-0.910***	-0.677**	-0.438	-0.794**
	[0.298]	[0.338]	[0.597]	[0.354]	[0.236]	[0.343]	[0.593]	[0.371]
OFF	0.349	0.465**	0.366	0.441**	0.449**	0.371**	0.241	0.311
	[0.216]	[0.195]	[0.276]	[0.210]	[0.189]	[0.188]	[0.252]	[0.217]
$D2575(-1)$		0.277***				0.273***		
		[0.082]				[0.083]		
$STD(-1)$				0.061				0.018
				[0.053]				[0.054]
$Cons$	0.511		-0.292		0.370		-0.122	
	[0.488]		[0.820]		[0.362]		[0.765]	
Obs.	378	312	378	312	378	312	378	312
R^2	0.604		0.52		0.641		0.616	
$Ngroups$	56	56	56	56	56	56	56	56

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1
FE: Fixed Effect Estimation. LSDV-KIV: Least Square Dummy Variable Estimation with the Kiviet correction.
Every regression controls for sector and fixed time effects.

Table 5: Export Share of LMCs to Developed Countries

	Δ% 1998-2004	
NACE	IMP^{LMC}_{World}	IMP^{LMC}_{High}
15	26.03	4.44
17	18.28	31.16
18	9.98	12.40
19	9.73	11.68
20	33.61	22.35
21	66.39	66.28
22	90.79	79.83
24	60.20	25.66
25	40.05	34.37
26	62.68	41.07
27	30.34	24.71
28	48.18	54.73
29	126.93	86.98
30	45.17	92.71
31	47.16	34.77
32	38.35	66.42
33	67.68	22.46
34	96.74	43.14
35	113.96	51.03
36	22.84	27.66

Source: My elaborations on Comtrade (WITS) dataset.
IMP^{LMC}_{World} is the World import share from low income countries, while IMP^{LMC}_{High} is the import share of High income economies from low income countries.

Table 6: Import Penetration Ratios by 2digit sectors

	% 2004		Δ% 1998-2004	
NACE	IMP^{Low}	IMP^{High}	IMP^{Low}	IMP^{High}
15	2.77	12.40	46.76	-0.95
17	13.54	10.57	93.80	-11.68
18	19.94	7.38	38.00	-3.41
19	24.94	10.17	59.82	28.98
20	6.39	10.24	-3.60	-15.71
21	3.75	24.52	30.70	-0.93
22	0.19	3.08	29.48	-4.74
24	3.98	42.50	26.40	19.55
25	3.46	15.82	59.91	1.25
26	2.68	6.35	69.69	-25.27
27	15.89	28.07	40.94	-5.02
28	1.49	4.29	87.91	-15.99
29	5.55	26.12	188.17	-2.77
30	7.23	71.23	119.12	29.90
31	5.81	20.71	99.73	-9.08
32	12.91	54.72	209.06	13.90
33	4.91	41.77	96.88	2.02
34	6.83	50.59	77.82	8.45
35	4.70	39.77	8.44	13.28
36	7.87	9.87	50.55	-7.76

Source: My elaborations from COE Database and Firms Economic Accounts (ISTAT)
IMP^{High}_{jt} and IMP^{LMC}_{jt} are Italian import penetration ratios from high income countries and LMCs for 2-digit sectors.

Table 7: Firm Distribution across Size Classes

Size Class	1998	2004
$<$ 20 employees	37.11	38.06
20-49 employees	36.03	36.54
50-249 employees	23.46	22.16
$\geq$ 250 employees	3.41	3.25
Total	100.00	100.00

Source: My elaborations on AIDA dataset.
The sample includes 20.394 firms in 1998 and 25.284 firms in 2004.

Table 8: Output Distribution across 2-digit NACE Sectors

NACE	Description	2004	
		Universe	Sample
15	Food and beverages	14.13	12.00
17	Textiles	4.43	4.45
18	Wearing Apparel	3.84	2.80
19	Leather Products and Footwear	2.91	1.95
20	Wood Products	2.29	1.34
21	Paper and Paper Products	2.25	1.94
22	Printing and Editing	3.32	3.33
24	Chemical Products	8.70	10.05
25	Rubber and Plastics	4.44	5.22
26	Non Metallic mineral Products	4.79	5.99
27	Basic metals	5.70	5.34
28	Fabricated metal products	10.41	10.06
29	Mechanical Machineries	12.54	13.28
30	Office Machines and Equipment	0.51	0.25
31	Electrical Machines and Appliances	3.85	5.01
32	Radio, TV and Communication Appliances	1.66	2.50
33	Medical, Optical and Precision Appliances	1.87	1.40
34	Motor vehicles and Transport Equipment	5.95	7.33
35	Other Transport Equipment	1.97	1.74
36	Furniture and Other manufacturing	4.45	4.01
	Total	100.00	100.00

Source: My elaborations on AIDA dataset and Firms' Economic Accounts.

Table 9: Correlation Ratios

	IMP^{LMC}	IMP^{High}	KL	$C10$	LEV	RD	OFF
IMP^{LMC}	1						
IMP^{High}	-0.003	1					
KL	-0.180*	-0.217*	1				
$C10$	0.064	0.487*	0.110^{+}	1			
LEV	0.155*	0.216*	-0.563*	-0.117^{+}	1		
RD	-0.238*	0.265*	-0.258*	-0.077	0.141*	1	
OFF	0.103^{+}	0.734*	-0.071	0.460*	0.018	0.217*	1

* Correlations are significant at 1%. $^{+}$ Correlations are significant at 5%

Table 10: Determinants of Dispersion: Without Sardinia

	LP				TFPIND			
	D2575		STD		D2575		STD	
VARIABLES	FE	LSDV-KIV	FE	LSDV-KIV	FE	LSDV-KIV	FE	LSDV-KIV
IMP^{low}	-0.971***	-1.027***	-0.716**	-0.453	-0.623**	-0.879***	-0.817**	-0.716**
	[-0.267]	[-0.275]	[-0.271]	[-0.311]	[0.266]	[0.291]	[0.317]	[0.300]
IMP^{high}	0.276***	0.289***	0.137***	0.222**	0.147**	0.163*	0.134	0.245***
	[-0.050]	[-0.083]	[-0.047]	[-0.095]	[0.059]	[0.089]	[0.092]	[0.091]
KL	0.0510***	0.0566***	0.126***	0.114***	0.0269**	0.0325*	0.0885***	0.0797***
	[-0.016]	[-0.017]	[-0.028]	[-0.018]	[0.013]	[0.017]	[0.022]	[0.018]
LEV	-0.803***	-0.624*	-0.382	-0.724**	-0.988***	-1.033***	-0.151	-0.427
	[-0.219]	[-0.334]	[-0.599]	[-0.366]	[0.292]	[0.339]	[0.634]	[0.350]
$C10$	-0.025	-0.056	-0.005	0.007	-0.060	-0.035	0.061	0.055
	[-0.051]	[-0.108]	[-0.071]	[-0.125]	[0.047]	[0.116]	[0.076]	[0.121]
RD	-0.120**	-0.124**	-0.098	-0.026	-0.135*	-0.109*	-0.123	-0.075
	[-0.048]	[-0.053]	[-0.077]	[-0.060]	[0.076]	[0.057]	[0.082]	[0.0576]
$D2575(-1)$		0.216***				0.247***		
		[-0.078]				[0.079]		
$STD(-1)$				0.023				0.062
				[-0.054]				[0.053]
$Cons$	0.301		-0.160		0.447		-0.361	
	[-0.266]		[-0.721]		[0.436]		[0.805]	
Obs.	378	312	378	312	378	312	378	312
R^2	0.656		0.618		0.607		0.521	
$Ngroups$	56	56	56	56	56	56	56	56

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1
FE: Fixed Effect Estimation. LSDV-KIV: Least Square Dummy Variable Estimation with the Kiviet correction.
Every regression controls for sector and fixed time effects.

Table 11: Determinants of sectoral dispersion: Offshoring

	TFP				LP			
	D2575		STD		D2575		STD	
VARIABLES	FE	LSDV-KIV	FE	LSDV-KIV	FE	LSDV-KIV	FE	LSDV-KIV
IMP^{LMC}	-0.636**	-0.875***	-0.831**	-0.719**	-0.984***	-1.022***	-0.724**	-0.450
	[0.264]	[0.291]	[0.313]	[0.300]	[0.265]	[0.277]	[0.274]	[0.313]
IMP^{High}	0.128**	0.133	0.114	0.224**	0.257***	0.271***	0.127**	0.208**
	[0.059]	[0.092]	[0.090]	[0.094]	[0.054]	[0.087]	[0.059]	[0.098]
KL	0.0264**	0.0316*	0.088***	0.079***	0.051***	0.056***	0.126***	0.113***
	[0.013]	[0.017]	[0.021]	[0.018]	[0.015]	[0.017]	[0.027]	[0.019]
$C10$	-0.066	-0.043	0.054	0.048	-0.032	-0.061	-0.008	0.003
	[0.048]	[0.116]	[0.075]	[0.121]	[0.053]	[0.109]	[0.072]	[0.126]
RD	-0.120	-0.085	-0.106	-0.051	-0.104**	-0.110**	-0.089	-0.012
	[0.082]	[0.059]	[0.085]	[0.060]	[0.048]	[0.056]	[0.081]	[0.062]
LEV	-1.017***	-1.160***	-0.183	-0.516	0.833***	-0.699**	-0.399	-0.781**
	[0.294]	[0.337]	[0.629]	[0.351]	[0.222]	[0.335]	[0.607]	[0.369]
OFF	0.255	0.391*	0.283	0.318	0.261	0.224	0.148	0.200
	[0.241]	[0.202]	[0.267]	[0.215]	[0.183]	[0.191]	[0.280]	[0.224]
$D2575(-1)$		0.253***				0.219***		
		[0.081]				[0.079]		
$STD(-1)$				0.067				0.027
				[0.053]				[0.054]
$Cons$	0.506		-0.296		0.361		-0.126	
	[0.454]		[0.802]		[0.269]		[0.736]	
$Obs.$	378	312	378	312	378	312	378	312
R^2	0.608		0.523		0.658		0.619	
$Ngroups$	56	56	56	56	56	56	56	56

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

FE: Fixed Effect Estimation. LSDV-KIV: Least Square Dummy Variable Estimation with the Kiviet correction.

Every regression controls for sector and fixed time effects.