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FDI in Business Services has general TFP effects : evidence from Italy

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Abstract

This paper studies the effect of FDI in business services on Total Factor Productivity of Italian manufacturing firms, over the period 2003-2008. More precisely, the paper tests the impact of forward inter industry linkages at local level. Our results, robust to different specifications, show that foreign capital inflows improve the performance of domestic manufacturing firms. This relationship is particularly strong in the case of high tech sectors, such as mechanics and machinery. Traditional sectors, on the other hand, seem to be less sensitive to the availability of foreign business services in the same location.

JEL classification: C23, D24, F23

Introduction

The choice of Multinational Corporations (MNCs) to invest in a country can be considered an important indicator of the country's competitiveness. Conversely, MNCs can benefit host economies through knowledge spillovers and several other interaction mechanisms.

Over the past two decades, a large part of the literature has maintained that, for any country, but especially for developing ones, reducing market entry barriers, therefore making foreign firms more likely to invest, could result in significant benefits: higher growth, productivity, technology transfers etc¹. However, to the extent that the literature focussed on productive intra-industry investments, the empirical evidence has been inconclusive (see Hoekman (2006)), shedding doubts about the usefulness of policies to attract foreign direct investment (FDI).

In contrast, more recent evidence on positive spillovers on the host economies resulting from entry of MNCs in services, and from inter-industry FDI, is robust across countries. (Fernandes and Paunov (2012); Giovannetti *et al.* (2010); Lileeva (2010)).

In line with this recent literature, this paper provides new evidence in support of positive spillovers for a country like Italy, where FDI in business services are a fairly new phenomenon. Italy is an interesting case since, compared to other OECD countries, has being long lagging behind in attracting FDI. Only in the last decade its situation has been (slowly) changing; against stable (or decreasing) foreign direct investment in manufacturing, those in "*business services*"² have increased substantially. Between 2001 and 2007, the number of foreign firms investing in professional business services in Italy passed from 1277 to 1700, and the number of their employees from less than 200000 to around 300000 (see ISTAT (2010a)).

Given the relatively small size of Italian firms and a persistent productive specialization in so-called traditional low-tech goods -the most challenged

¹See for all, BarbaNavaretti and Venables (2006); Markusen (1989); Blalock and Gertler (2008)

²Business services include services to other businesses ranging from accounting and legal services to industrial cleaning. For the purposes of this paper the business services sector is statistically defined as a subset of Section K in the national accounts, including computer and related activities, research and development and other business activities' Standard Industrial Classification (sic) codes 72-74 - it also includes elements of telecommunications and services classified in sections I and J.

by globalization- FDI in business services can potentially have a very strong positive impact on Italy's competitiveness. The possibility for manufacturing firms to use (upstream and downstream) services (R&D, post-sales strategies, local legal know etc.), expensive to internalize and often not readily available, may mitigate the negative TFP trends recently recorded in Italy³. In what follows, we confine our attention to FDI in business services in Italy with the aim of assessing their possible role in enhancing manufacturing competitiveness. We cover the period 2003-2008 and use an original database. We depart from the existing approach of Ayyagari and Kosová (2010), by using firm level data and considering the effect of foreign capital on Productivity. Moreover, we perform the analysis at a highly disaggregated level (i.e. Italian provinces). Precisely, we estimate how the foreign presence in business services in a given province, and in a given year, may affect the performance and characteristics of the domestic manufacturing firms operating in the same province, in terms of productivity (measured as Total Factor Productivity - TFP). The results show that TFP of Italian manufacturing firms is positively related to FDI in the business services sector. The relationship is stronger for some high tech firms (mechanics, machinery and equipment) than for the so-called traditional "Made in Italy" products (textiles, footwear etc). This positive correlation underscores the importance of attracting international investments in business services.

The remainder of the paper is structured as follows. Section 1 briefly summarizes the existing literature. Section 2 describes data and summary statistics. The econometric model and results are in section 3. Section 4 concludes. An Appendix provides further descriptive evidence and support tables.

³According to the ISTAT (2010b): *"between 2000 and 2009, Total Factor Productivity (TFP) has declined (-0.9 per cent per year on average), due to a negative trend in the value added (-0.2 percent) and a positive development of the productive inputs (average annual growth of 0.8 per cent). In particular, since 2000 it is possible to recognize three stages corresponding to different trends: a negative trend in 2000-2003 (-1.3 per cent annual average), a moderately positive dynamic in the years 2003-2007 (0.6 per cent annual average) and a marked reduction in the period 2007-2009 (-3.4 per cent annual average)".*

1 The related literature

The literature on the effects of FDI in business services on the host economy is still scarce, despite the boom they experienced since 1990⁴. Furthermore, a gap remains between theoretical and empirical research, with the latter more developed than the former⁵. Until very recently, most studies, especially theoretical ones, have been focusing on FDI on manufacturing. FDI in business services are however more likely to lead to improvements in the quality of services available to manufacturing firms, as well as increase their supply (i.e. their variety) and lower their costs, thereby enhancing manufacturing competitiveness.

There are several ways through which FDI in business services could benefit manufacturing firms⁶: firstly, through standard channels of knowledge spillovers⁷. Furthermore, as Fernandes and Paunov (2012) put it: "Manufacturing firms benefit from pecuniary spillovers if increases in the quality or variety of the services they use due to FDI are not fully appropriated by service providers" (p. 308). Those pecuniary spillovers⁸ might become knowledge spillovers, if downstream users of these (new and possibly improved) services apply the embodied knowledge to improve their own TFP (see Branstetter (2001)).

The impact of FDI on domestic firms, however, depends crucially on the linkages they generate. Kugler (2006) highlighted that one can expect a larger potential, at least for knowledge spillovers, from vertical and inter industry FDI. In the case of horizontal FDI, foreign-owned suppliers are likely to be

⁴According to UNCTAD (2004), FDI in services have been increasing at high rates from the end of the 1990s. Different sub sectors however had different developments. Business sectors have had the highest rate of growth.

⁵See Fernandes and Paunov (2012) and Wang (2010) for recent surveys raising this issue.

⁶To see better this point, think of a country with inadequate services that negatively affect firms' performance. Arnold *et al.* (2008) provide several examples of dysfunctional services and their impact on African firms. Unstable telecommunication services affect coordination with clients and suppliers; inadequacies of banking services may prevent a firm from investing; power cuts can disrupt production etc.

⁷By knowledge spillovers, we mean "knowledge" created by a multinational, used by the domestic firm and not necessarily entailing full compensation to the MNC. We include managerial skills, organization of production; know how, better marketing and distribution, transfer of technical skills etc.

⁸By pecuniary spillover, we mean nominal gains resulting from quality increases not necessarily reflected in prices.

less interested in transferring knowledge, because of stronger competition. FDI in business services are however more likely to be vertical (both backwards and forward). Foreign suppliers can provide inputs, assistance and after sales services to domestic firms, allowing them to access better (and possibly previously unavailable) services and competencies. Rodriguez-Clare (1996), formalizing the effects of the different linkages, assumes that production benefits from the use of specialized inputs, and that proximity of suppliers is key for all those services that need a "face to face" interaction: auditing, consulting, wholesale services, machine repair, after sales services etc. Proximity improves the quality of information, as well as the strength of signalling, therefore decreasing or avoiding that "wait and see" attitude that disrupts investments in situations of uncertainty.

If there are no adequate domestic providers for the services needing a "face to face" interaction, firms have to rely on foreign inflows and there is room for foreign investors to exploit profit opportunities. Only recently, the (few) theoretical models developed along these lines started receiving empirical support. The use of better and more detailed data, as well as of models highlighting vertical (inter-industry) linkages⁹, has indeed allowed finding some positive correlations. According to Eschenbach and Hoekman (2006), countries where services are liberalized tend to grow faster due to the increase in the number and quality of business services available for manufacturing users. Francois and Woerz (2008) maintain that the increased openness of business services between 1994 and 2004 had strong positive effects on exports, value added and employment in OECD countries. Fernandes and Paunov (2012) claim that 7 per cent of the increase in TFP of Chilean firms can be traced back to FDI in services; furthermore capital inflows in services also foster innovation activity in manufacturing, allowing "laggard to catch up with leaders" (p. 305). Fernandes (2009) finds positive and significant effects of liberalization of financial services and improvement in infrastructures on labor productivity of downstream manufacturing industries in Eastern European countries. Using firm-level data, Arnold *et al.* (2011) find significant

⁹It has also been suggested that FDI spillovers (both positive and negative) have a limited geographical dimension or, at least, that they decrease with (physical) distance (Audretsch and Feldman (1996); Audretsch (1998); Keller (2002); Madariaga and Poncet (2007)), as channels of technological diffusion are reinforced at the regional level (Girma and Wakelin (2001);Girma (2005); Ayyagari and Kosová (2010)). We do not deal with the issue of distance, but some empirical evidence for Italy can be found in Mariotti *et al.* (2011).

and positive effects of services liberalization on manufacturing firms' TFP in the Czech Republic; Arnold *et al.* (2010) have similar results for manufacturing in India; Blalock and Gertler (2008) find a positive impact for Indonesia; Javorcik (2004) for Lithuania; Li and Javorcik (2008) provide evidence of a positive effect on the TFP of manufacturing suppliers to the retail sector for Romania; and Lileeva (2010) finds that an increase in US FDI to Canada increases productivity growth in domestically controlled plant and that the effects are more pronounced for plants that buy more science-based intermediate inputs.

In line with this literature, in what follows, we explore the impact of business services capital inflows on the productivity of Italian firms, with a specific focus on forward linkages¹⁰.

2 Data and Summary Statistics

We constructed an original database by merging information from different data sources. We match and merge firm level data balance sheets information from the Bureau Van Djick "AIDA" dataset¹¹, for the period 2003-2008, with information on the location of foreign direct investment in Italy from ICE-REPRINT¹².

This dataset, not publicly available, contains information on foreign affiliates' employment and sector activities as well as on date, province of the location choice and investors' country. Data from the Bureau Van Djick "AIDA" are used to get a measure of productivity of Italian firms over the same period.

Over 75 per cent of firms in our sample are small or medium (below 50 employees); only 3.3 per cent are large (over 250). After excluding firms without balance sheets, and possible measurement errors, we end up with an unbal-

¹⁰To our knowledge, the study of the impact of FDI in business sector in Italy is limited to Nicolini and Piscitello (2009), Mariotti *et al.* (2011).

¹¹AIDA data set reports the balance sheets of firms with a value added of more than 800.000 euro.

¹²REPRINT is the census of the foreign affiliates with a turnover higher than 2.5 million euros per year and provides information on the starting date of the operations for all manufacturing and business services affiliates, see Mariotti and Mutinelli (2010). We consider as business services FDI: Logistics, ICT and professionals services; GDP data come from ISTAT.

anced panel of 63773 firms¹³. A comparison of the distribution of firms from our database for different years, sectors and Provinces (NUTS3) with the distribution of firms registered by Chambers of Commerce shows a strong correlation¹⁴. Hence, firm level data used in constructing our productivity measure seems to be a good approximation of the true population of firms across provinces and sectors.

We measure manufacturing firms' TFP, defined as a non parametric measure, using a multilateral index approach based on the Tornquist index proposed by Caves *et al.* (1982)¹⁵.

Projecting the average TFP of manufacturing firms on the Italian province map gives an idea of the productivity differences and dynamics within the country (see Figure 1): firms operating in the North of Italy are, on average, more productive than those South of Rome. Over time, only firms in the center improve their productivity.

Also the location choice of foreign investors is polarized. Projecting the Province share¹⁶ of foreign business services firms on the Italian map (Figure 2) suggests that the North is preferred by foreign investors, relatively to the Center, and especially to the South of Italy.

A comparison between the productivity of firms belonging to a province with a presence of foreign investors in business services and that of firms producing in a province with no foreign presence (see Figure 3) suggests a positive relation between business services presence and firm productivity.

Moreover, the difference of productivity between firms (of the same industry) operating in province with presence of foreign professionals tend to

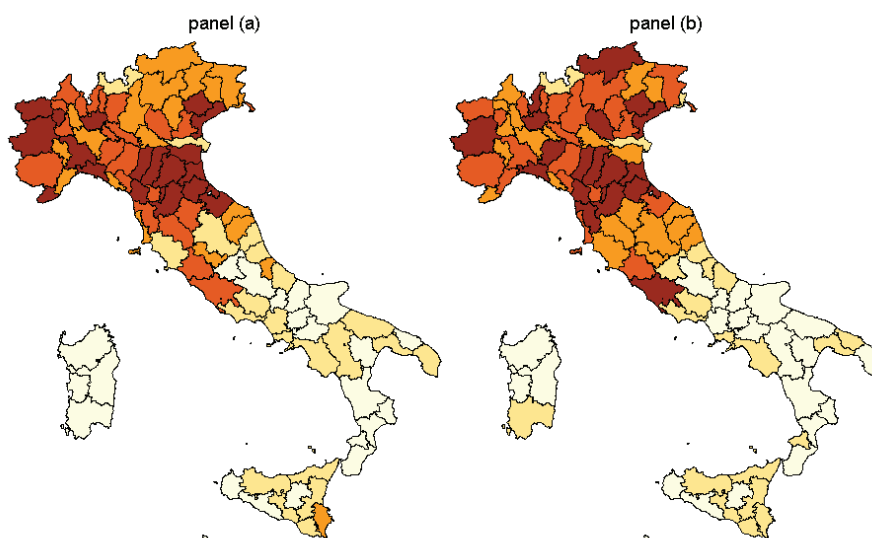
¹³We exclude observations for which value added, employment and capital are missing, negative or null. Furthermore we "clean" our sample from outliers, dropping the extreme 1% values for the distribution of the following variables: capital intensity, yearly capital intensity growth rate, yearly capital growth rate and yearly employment growth rate.

¹⁴The Unioncamere (Chambers of Commerce) dataset covers all the active firm in a given year and province, by 2 digit Ateco 2002, but does not contain any further information about the firms. The correlation with our dataset, calculated with Pearson and Spearman Indices, spans from 0.82 for sector/year/province (Person) to 0.97 for year/province (Spearman). Complete results are available on request.

¹⁵This index allows a comparison of firms performance within a specific sector without imposing a common technology to the firms belonging to the same sector. To compare productivity within industries and between firms, the index expresses individual firm productivity as a deviation from the benchmark with average production (Y), average technology s_t^l , and average level of inputs K, L .

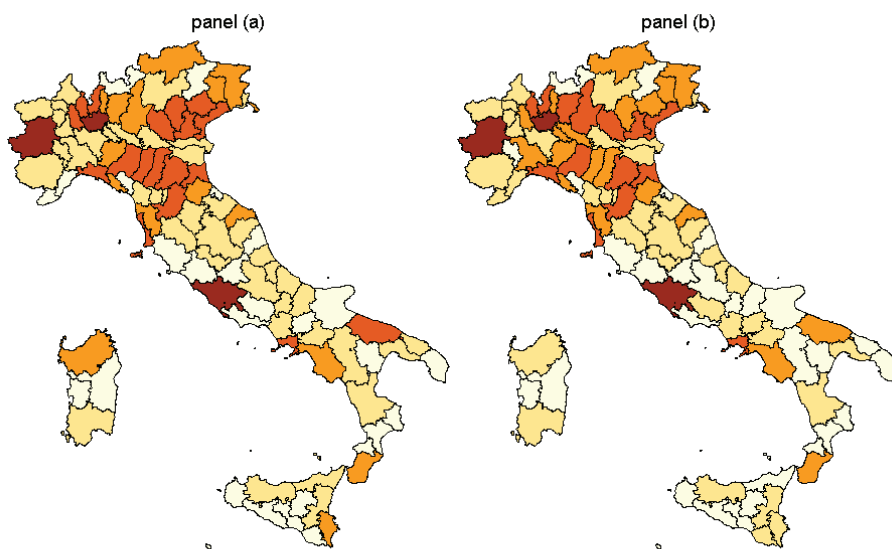
¹⁶The share is computed as the number of business services FDI in province j at time t over the total number of business services FDI in Italy at time t .

Figure 1: Mean TFP of manufacturing firms by Province



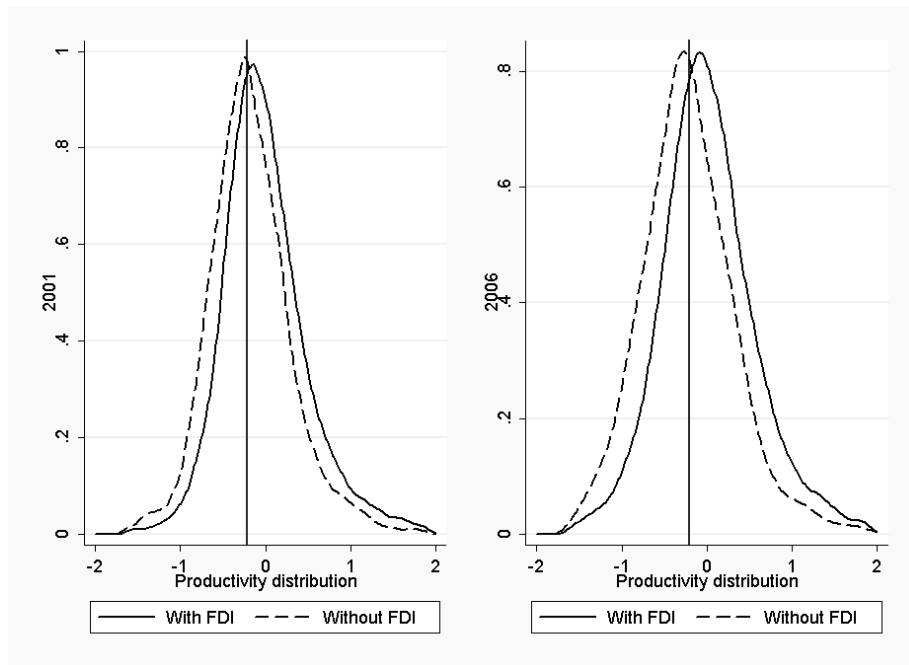
Note: year 2001 is reported in panel (a), year 2006 in panel (b); higher data values are darker, each cluster contains 20 per cent of the distribution. The distribution refers to manufacturing sectors, since each firm productivity is computed with respect to an hypothetical firm (given by the sector average, in inputs, outputs and technology) we do not need to control for the sectoral composition of the province manufacturing sectors.

Figure 2: Province share of total foreign business services firms operating in Italy



Note: year 2001 is reported in panel (a), year 2006 in panel (b); higher data values are darker, the first group contains the provinces with No foreign firms. Note that in 2001, 26 provinces have no foreign investments in business services; in 2006, 28. The first positive break point contains 50 per cent of the distribution, the second 75 per cent, the third 95 per cent, and the darker regions encompass provinces with a share higher than 95 per cent of the distribution.

Figure 3: Productivity distribution with and without business services FDI



Note: year 2001 is reported on the left panel, year 2006 on right panel; the vertical line refers to the median productivity of manufacturing firms in 2001 operating in a province with no foreign investors in Business Service.

increase over time.

Figure 1 and Figure 2 suggest the presence of common pattern between TFP and FDI concentration distributions; specifically, manufacturing firms located in Northern provinces seem to have an higher productivity level as well as an higher concentration of foreign multinationals. The higher average productivity in the North of the country could be due to differences in internal firms' factors (managerial ability, workers skills, innovation) as well as external factors (better infrastructures, financial deepening, better trained human capital etc)¹⁷; furthermore, the access to foreign professional services could play an important role. The preference for the North is likely to be correlated with the relative size of the local market, general business conditions and presence of (better) infrastructures. Another important determinant of this "cluster structure" could be the relative higher efficiency of firms in the North. But the causal relation could also go in the opposite direction, namely a larger presence of logistics, ICT and other kind of services and professionals in a specific location may have a positive impact on production. We now turn to estimate an econometric model.

¹⁷For a review of the impact on productivity of internal and external factors see Syverson (2010).

3 Empirical Strategy and main results

3.1 The empirical model

Theoretical and empirical work on the effects of FDI suggests that domestically controlled plants are more likely to benefit from supplier or customer linkages with foreign producers than from intra-industry knowledge spillovers from foreign competitors. As pointed out by Rodriguez-Clare (1996), a firm producing final goods would benefit from having access to the wide variety of specialized inputs produced; furthermore, foreign business services multinationals are likely to expand the supply of intermediate inputs locally available. We consider a standard Cobb-Douglas production function¹⁸:

$$Y_{it} = \Phi_{it} K_{it}^{\alpha} L_{it}^{\beta} \quad (1)$$

where Y_{it} is the value added for firm i at time t , Φ_{it} is the Total Factor Productivity, K_{it} the capital stock and L_{it} the labor force of plant i at time t . We assume that TFP of firm i depends on firm characteristics X_{it} , on the local business environment Γ_{jt} and on an error term ϵ_{it} .

Given the very high spatial heterogeneity of the Italian economy, the variables on the local business environment are measured at the Province level j (NUTS3). Since the size effect of the Modifiable Areal Unit Problem (MAUP) might be important, especially at large scales, we use the smallest geographical and administrative unit available for both FDI and TFP¹⁹ :

$$\Phi_{it} = (\Gamma_{jt})^{\gamma} (X_{it})^{\delta} \epsilon_{it} \quad (2)$$

Taking natural logarithms of equations 1 and 2 gives:

$$y_{it} = \alpha k_{it} + \beta l_{it} + \Phi_{it} \quad (3)$$

$$\Phi_{it} = \gamma \Gamma_{jt} + X_{it} \delta + \epsilon_{it} \quad (4)$$

¹⁸We follow Martin *et al.* (2011) specification.

¹⁹On the issue see Briant *et al.* (2010). Note that the mean area of Italian provinces is 2,816 km² with a coefficient of variation at 0.17; American states are around 162,176 km², when Alaska and Washington DC are included, French metropolitan departements mean area is 5,666 km² with a coefficient of variation at 0.33 (when Corsica and overseas French regions are excluded); Spanish provinces are 10,118 km² with a standard deviation at 0.47 (excluding Ceuta and Melilla).

Our specification can be then re-write as:

$$\Phi_{it} = \alpha_i + X'_{it}\delta_1 + \Gamma'_{jt-2}\delta_2 + \eta_t + \epsilon_{it} \quad (5)$$

where subscripts i , j , t and s refer to firm, province, year and industry, respectively. Φ_{it} is (in logs) the TFP productivity index of the manufacturing firm i at time t .

The vector Γ_{jt-2} contains variables describing the local business environment: the relative industry size, the factor endowment, a measure of the foreign direct investments in business services and a measure in the manufacture sector.

Relative industry size ($IndSize_{jts}$) is proxied by the ratio of firms belonging to industry s over the total number of firms in the province j (as reported by the local Chamber of Commerce). We use the deviation of the per capita GDP by province from the national per capita GDP ($LRFC$)²⁰ along the lines of Baltagi *et al.* (2003), to capture the extent of the relative factor endowment of province j . In order to avoid simultaneity, we construct this deviation for the period 1998-2003, i.e. with a five years lag with respect to the foreign measures (2001-2006), and seven year lag with respect to the TFP index (2003-2008).

The foreign presence in business services in a given province is measured by the share of the turnover (in logs) of the foreign business services firms over the GDP of the service sector in province j at time $t - 2$, $ForeignBS_{jt-2}$. This measure allows us to identify potential vertical influences arising from the foreign presence in business services, considering foreign firms as suppliers of specialized inputs for domestic final good producers.

As further control on the provinces' attractiveness, which could determine the distribution of multinationals, we use a measure of the extent of foreign presence also in the manufacturing sectors: $ForeignMS_{jst-2}$ (i. e. the foreign presence in manufacturing sector s , in province j , at time $t - 2$) is computed as the turnover of foreign firms in industry s and province j at time $t - 2$ over the turnover of sector s in province j at time $t - 2$ ²¹. This

²⁰The measure is constructed as:

$$LRFC_{jt} = \log\left(\frac{GDP_{jt}}{capita_{jt}}\right) - \log\left(\frac{GDP_{ITAt}}{capita_{ITAt}}\right)$$

²¹The overall turnover of the sector s , province j and time t is computed using firm level data from the AIDA dataset.

variable possibly allows the identification of horizontal externalities. Table 1 shows the summary statistics for the main variables used²². Note

Table 1: Summary statistics, 2003-2008

Variables	Obs	Mean	Std. Dev	Min	Max
Industry share	12360	.0062	.0087	0	.1866
ForeignBS (over GDP in services)	456	.0744	.1588	0	.8670
ForeignBS (over total GDP)	456	.0542	.1217	0	.7003
Foreign Business Services firms	9864	21.63	103.02	1	897
Domestic Manufacturing firms	63733	1081.33	1071.79	7	4328

Note: industry share refers to manufacturing firms (20, 2-digit ateco 2002) over the total number of firms in the province (103 NUTS3) by year. ForeignBS is referred to year and province, in provinces with at least one foreign firm in business services. 83 provinces have at least one FDI in business services (68 for the whole period). Source for foreign business services firms refers to the number of firms in ICE-REPRINT. Source for domestic firms refers to the number of firms in AIDA.

that the local business environment variables (in vector Γ'_{it-2}) are lagged two years to avoid endogeneity. This seem to be consistent also with the idea that, even if a firm becomes aware of a new specialized input, it may take time to incorporate it in its production process.

The vector X'_{it} contains control variables for the firm²³. Italy's peculiar productive structure requires additional controls. The geographical distribution of some variables of interests highlights the gap of Southern Italy, especially

²²Most provinces have an average manufacturing industries share relatively small, less than 1%, even if there are some remarkable exceptions, such as Prato, where the economic structure is skewed towards Textiles. It is worth noting that in Prato textiles represented over 18% of the economic activity in 2001 (and has had a declining trend, to 12% in 2006), and more than 56% of total manufactures. In Lecco, metallurgy represents around 7.5% of the whole economic activity of the province, and nearly 35% of manufacturing.

²³The variables used as control are: age, age squared, size, size squared, all in logs and contemporaneous to the TFP measure; size is proxied by the number of employees. Depending on the specification, we include also industry average service intensity (*ServIntensity*) measured as the average service bill over the value added by industry s and t again calculated using balance sheet information.

with respect to TFP and "Foreign shares". In order to single out this effect we use a dummy, *South*, equal to one for provinces south of Rome (see Guiso *et al.* (2004)) interacted with our main variable of interest *ForeignBS*.

Finally ϵ_{it} is a stochastic error term capturing the determinants of TFP omitted from the model, and since the relevant investment choices are not independent at the firm level, we clustered the robust standard errors at the firm level not imposing homoscedasticity in the error-structure, and controlling for potential autocorrelation in the error structure.

3.2 Regression Results

Since explanatory variables in our estimation are potentially correlated with time invariant firm characteristics, we estimate our baseline equation by using firms fixed effects. Results for the benchmark model²⁴, reported in Table 2 column (1), show that firm controls have the expected sign and are statistically significant. The firm age positively affects productivity: the older the investment, the more linkages exist. However, "age" has diminishing returns. In particular, over time, the gain in productivity reaches the maximum at $X^* \approx 2.21$ ²⁵; since the variable is expressed in log, the maximum gain in productivity related to the age of the firm is around 9 years. This result appears to be consistent with Branstetter (2001).

The impact of the foreign presence in the same manufacturing sector is not significant; this is consistent with previous findings (Javorcik (2004), Kugler (2006)) underlying how spillovers from foreign presence do not act horizontally, since foreign multinationals tend to prevent information leakages to their domestic competitors. Our measure of forward vertical linkages (*ForeignBS*) is positive and statistically significant. This means that more foreign firms in an area could support the improvement of the overall production process for a domestic firm, via the optimization of logistics or the improvements in ICT and R&D, as well as professional consulting.

²⁴Estimates using OLS with a full set of industry, year and province dummies to control for potential endogeneity bias, reported in Table 6 in the Appendix, are likely to be biased because both the TFP and the location choice of the foreign investors may be related to unobserved heterogeneity. As a preliminary check, we regress the firm-level TFP on year dummies and firm fixed effects (see Table 5 in the Appendix).

²⁵We find that the diminishing marginal effect of age on productivity is reached at $X^* = \frac{\gamma_1}{(-2\gamma_2)}$.

INSERT TABLE 2 here

Columns (2) and (3) in Table 3 include a control for service intensity (industry average). Including this additional control - which has the expected sign and is significant, also when interacted with Foreign Business share (column 3) - does not affect neither the significance nor the magnitude of the foreign business services measure, confirming that results are not driven by sectoral composition at province level.

Given the spatial heterogeneity that characterizes Italy, highlighted also in Figure 1 and Figure 2 above, we decided to check whether our results are driven by the joint distribution of the variables, skewed towards higher values in the North. Hence, we interact our variable of interest (*ForeignBS*) with the dummy *South*²⁶. Result, reported in Table 3, do not change. Our measure of foreign business services is significant, while the interaction with *South* is not. This seems to confirm that the results are not affected by the common geographical pattern of the variables of interest. Local availability of services (such as transportation, trade financing, as well as insurance and accounting) has a positive impact on domestic manufacturing firms productivity. There are at least two ways for a firm to obtain such services: buy them from service providers (often foreign) or internalize them. Internalizing may involve a fixed cost associated with operating an own service department or with identifying and communicating with foreign service providers. It might be the case that only the more productive firms may be able to pay the fixed cost. In Table 3, column (2) we test if the impact of local business services availability is different across firms. To do this, we interact our variable of interest with the firm size, measured as number of workers²⁷. The coefficient for the interaction is negative and highly significant implying that the impact of local provision of specialized inputs, i.e. of business services, is decreasing in firm size²⁸.

²⁶In specifications with the interaction terms, the interacted variables are always centered (zero mean).

²⁷As firm productivity is likely to map into firm size.

²⁸Since the variables of interest of foreign presence vary at aggregate level (province by year) while the dependent variable is at firm (year) level we are aware of the possible distortion in the Standard errors, see Moulton (1986). There are number of ways to correct for this, the most widely used is to apply an arbitrary variance-covariance matrix at an higher cluster level (cluster command in Stata). Given the structure of our data,

INSERT TABLE 3 here

3.3 Sectoral Analysis

Different manufacturing sectors are likely to be affected in different ways by foreign investments in business services (as also by the simple availability of some specific Business Services). To check to what extent the presence - if any - of foreign firms in business services affects firm efficiency differently across sectors, as a first approximation and exploiting the information of our database, we split our sample into two subgroups, characterized by different technology level and use of services as intermediate inputs: "*Textiles and Furniture*" and "*Machinery and equipment*". The former is a typical "*Made in Italy*", mature, low technology sector, characterized by a relative intensity of unskilled labor force. The latter, on the other hand, is a good representation of an high tech sector.

INSERT TABLE 4 here

Results for sectoral estimates are reported in Table 4. All the main results hold for the two subgroups, but with some interesting differences. The coefficient of L2 (squared labor) has a positive though not significant numerical value for the traditional sector (confirming the results of the aggregate case) but a significant and negative value for the high tech sector, suggesting that the negative impact of the size (proxied by number of workers) is strengthened. Furthermore, our main variable of interest *ForeignBS* is strongly significant only for the high tech sector and insignificant (though with the expected positive sign) for the traditional, low tech Made in Italy sector. This suggests that vertical linkages are likely to be stronger in the case of high tech sectors, when firms are better equipped to exploit the positive externalities. While the interaction with the South dummy does not seem to affect neither traditional nor high tech sectors, the interaction with firm size does, confirming previous results.

with an high variability in the number of firms by cluster (province-year) the asymptotic properties of the variance estimator needed are not verified. Angrist and Pischke (2008) and Wooldridge (2008) suggest using a two step estimator. We followed this procedure and our results do not change.

4 Conclusions

Business services are an important component of the competitiveness of a country, not only because of their direct effect on the economy, but also for their impact on manufacturing. This paper suggests that the service sector may turn out to be an important source of positive externalities (especially through FDI). The paper analyzes the effect of foreign direct investment in business services on the TFP of Italian manufacturing firms, to see to what extent these investments improve firms' productivity. Our results, consistent across provinces and sectors and several econometric specifications, show that FDI in business services have a positive impact on TFP. Manufacturing firms seem to be able to concentrate on the production process and a more efficient management to the extent that they can rely on services provided in the province where they produce.

The development of the business services sector allows manufacturing firms to outsource tasks and activities to specialists, that can perform them at lower costs and possibly better. While this is true in general, for Italy the business services sector depends crucially on foreign inflows and, at the same time, the reduced size of Italian firms means that for them to outsource is much more feasible than trying to internalize the services (too costly).

FDI in business services are indeed important to enhance firms' economic performance, but their effect differs depending on the level of technology of the sectors and on the availability of skilled labor in the province. At firm level, outsourcing business services activities indirectly increases the efficiency of the production process. More importantly, at national level, the presence of increasing FDI in business services could enhance the competitiveness of the economic system. The overall effects, however, depend on the industry composition. For a province, it is crucial to be able to attract foreign investors in business services. The improvement in TFP, due to the availability of improved and possibly new services, allows to better respond to the highly competitive environment firms have to face. Hence, to reduce the barriers still protecting FDI in services may turn out to be a positive sum game: foreign service providers can bring in new technologies and know how providing services needed by Italian manufacturing firms to keep (or enhance) their competitiveness. To attract these investments, however, the Italian system should improve the overall business environment, reducing the number of cumbersome bureaucratic practices. Furthermore, provinces must make sure to have skilled labor not to lose opportunities.

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Table 2: Fixed Effects Results, dependent variable TFP

	(1)	(2)	(3)
Age	0.572*** (0.0263)	0.572*** (0.0263)	0.572*** (0.0263)
Age2	-0.129*** (0.0105)	-0.129*** (0.0105)	-0.129*** (0.0105)
L	-0.296*** (0.0133)	-0.296*** (0.0133)	-0.296*** (0.0133)
L2	-0.00183 (0.00208)	-0.00187 (0.00208)	-0.00187 (0.00208)
IndSize	-0.289 (0.524)	-0.336 (0.525)	-0.334 (0.525)
ForeignBS	0.303*** (0.0626)	0.304*** (0.0626)	0.300*** (0.0639)
Serv Intensity		0.0561** (0.0263)	0.0561** (0.0263)
Serv Int*ForeignBS			0.0358 (0.170)
Foreign MS	0.106 (0.303)	0.0956 (0.303)	0.0957 (0.303)
LRFC	0.0437 (0.0390)	0.0443 (0.0390)	0.0444 (0.0390)
Year dummies	yes	yes	yes
Time Trend	yes	yes	yes
N. observations	201,815	201,815	201,815
R squared	0.098	0.099	0.098
N. of identifier	63,773	63,773	63,773

*, **, *** statistically significant at the 10, 5 and 1 percent level, respectively.

Note. In all specifications with interaction terms variables are mean centered (zero mean) before computing the interactions. The *ForeignBS* and *ForeignMS* are expressed as natural logarithm of $(1 + x)$ so parameters can be interpreted as elasticities. Standard errors are clustered by plant identifier. The period covered is 2003–2008.

Table 3: Results including interaction terms, dependent variable TFP

	(1)	(2)
Age	0.572*** (0.0263)	0.573*** (0.0263)
Age2	-0.129*** (0.0105)	-0.130*** (0.0105)
L	-0.296*** (0.0133)	-0.297*** (0.0134)
L2	-0.00186 (0.00208)	-0.00148 (0.00209)
IndSize	-0.341 (0.525)	-0.359 (0.524)
ForeignBS	0.320*** (0.0648)	0.304*** (0.0627)
Serv Intensity	0.0566** (0.0263)	0.0560** (0.0263)
Foreign MS	0.0947 (0.304)	0.0991 (0.304)
South*ForeignBS	-0.340 (0.240)	
L*ForeignBS		-0.165*** (0.0499)
LRFC	0.0427 (0.0390)	0.0354 (0.0391)
Year dummies	yes	yes
Time Trend	yes	yes
N. observations	201,815	201,815
R squared	0.098	0.099
N. of identifier	63,773	63,773

*, **, *** statistically significant at the 10, 5 and 1 percent level, respectively.

Note. In all specifications with interaction terms variables are mean centered (zero mean) before computing the interactions. The *ForeignBS* and *ForeignMS* are expressed as natural logarithm of $(1 + x)$ so parameters can be interpreted as elasticities. Standard errors are clustered by plant identifier. The period covered is 2003–2008.

Table 4: Sectoral Heterogeneity, dependent variable TFP

	Textiles and Furniture	Textiles and Furniture	Textiles and Furniture	Machinery and equipment	Machinery and equipment	Machinery and equipment
Age	0.570*** (0.0540)	0.570*** (0.0540)	0.570*** (0.0540)	0.646*** (0.0627)	0.646*** (0.0627)	0.646*** (0.0628)
Age2	-0.128*** (0.0213)	-0.128*** (0.0213)	-0.128*** (0.0213)	-0.158*** (0.0259)	-0.158*** (0.0259)	-0.159*** (0.0260)
L	-0.286*** (0.0237)	-0.286*** (0.0237)	-0.290*** (0.0238)	-0.257*** (0.0327)	-0.257*** (0.0327)	-0.258*** (0.0324)
L2	0.000332 (0.00362)	0.000349 (0.00362)	0.000414 (0.00364)	-0.00932* (0.00537)	-0.00932* (0.00537)	-0.00890* (0.00524)
IndSize	-0.330 (0.581)	-0.334 (0.581)	-0.356 (0.581)	-9.149 (5.990)	-9.127 (5.990)	-8.148 (6.056)
ForeignBS	0.0200 (0.137)	0.0383 (0.140)	0.0267 (0.137)	0.654*** (0.168)	0.661*** (0.170)	0.651*** (0.168)
Foreign MS	2.071 (2.776)	2.066 (2.777)	2.054 (2.776)	-1.237 (0.984)	-1.231 (0.984)	-1.242 (0.972)
South*ForeignBS		-0.476 (0.662)			-0.659 (0.822)	
L*ForeignBS			-0.171* (0.0918)			-0.161* (0.0894)
LRFC	0.000621 (0.0814)	-0.000716 (0.0814)	-0.00191 (0.0814)	0.0411 (0.106)	0.0402 (0.106)	0.0250 (0.106)
Year dummies	yes	yes	yes	yes	yes	yes
Time Trend	yes	yes	yes	yes	yes	yes
N. observations	48,701	48,701	48,701	29,764	29,764	29,764
R squared	0.087	0.087	0.087	0.105	0.105	0.106
N. of identifier	15,802	15,802	15,802	9,287	9,287	9,287

*, **, *** statistically significant at the 10, 5 and 1 percent level, respectively.

Note. In all specifications with interaction terms variables are mean centered (zero mean) before computing the interactions. Standard errors are clustered by plant identifier. The period covered is 2003–2008.

Appendix

Foreign-Owned Business Service Firms in Italy: some graphs

Figure 4: Share of Foreign controlled firms (% , 2007). Source ISTAT

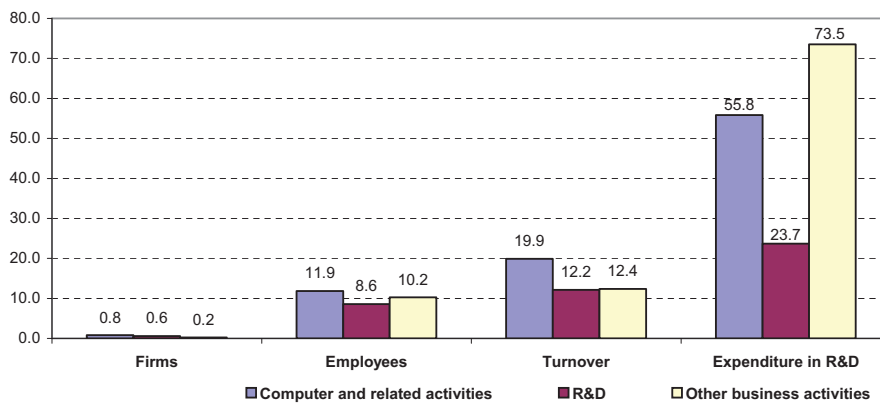


Figure 5: Number of employees in Foreign owned firms. Source ISTAT

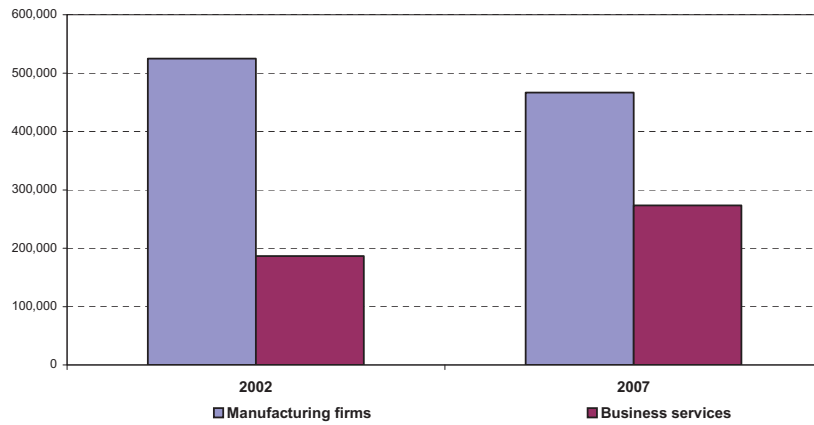


Figure 6: Value added per person employed (thousands euro, 2007). Source ISTAT

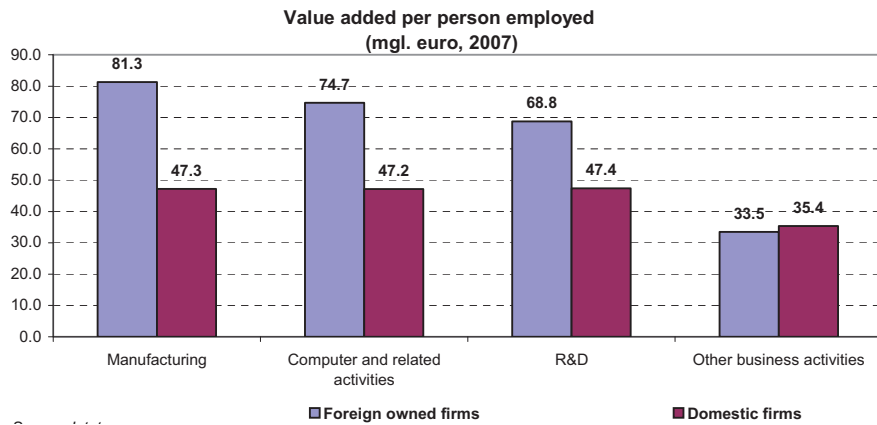


Figure 7: Profitability (% , 2007). Source ISTAT

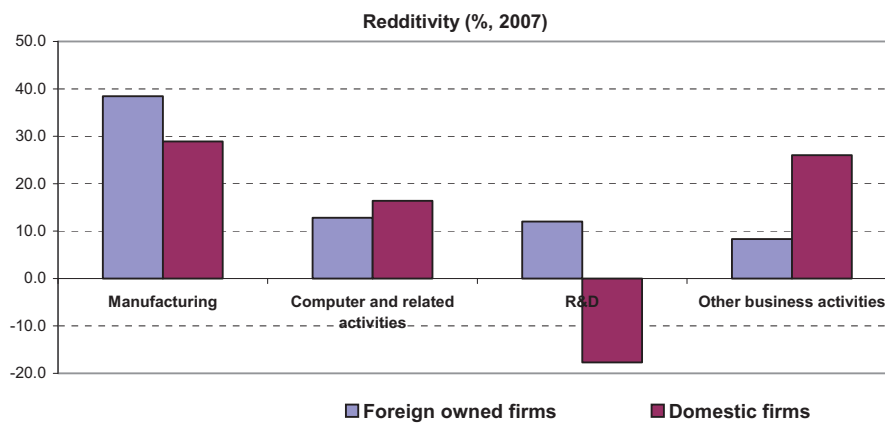


Figure 8: Share of Foreign controlled firms' R&D expenditure. Source ISTAT

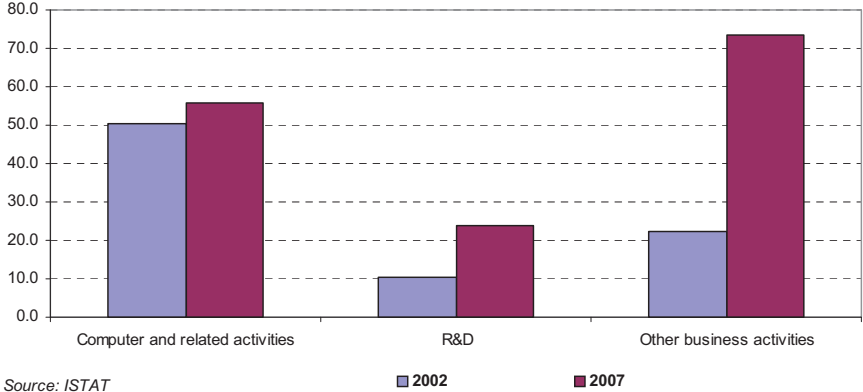


Table 5: Variance decomposition of TFP

	Std. Dev.	Corr with firm TFP
Firm TFP	.525	1.000
Firm Fixed Effect	.482	0.918
Firm residual	.208	0.397

Source: own elaboration on ICE-Reprint-Aida dataset.

Table 6: OLS Baseline Results, dependent variable TFP

	(1)	(2)	(3)	(4)
Age	0.155*** (0.0126)	0.155*** (0.0126)	0.245*** (0.0112)	0.245*** (0.0112)
Age2	-0.0336*** (0.00251)	-0.0336*** (0.00251)	-0.0341*** (0.00222)	-0.0341*** (0.00222)
L	-0.198*** (0.00673)	-0.198*** (0.00673)	-0.323*** (0.00722)	-0.323*** (0.00722)
L2	0.0224*** (0.000946)	0.0224*** (0.000946)	0.0417*** (0.00111)	0.0418*** (0.00111)
IndSize	0.961*** (0.186)	0.961*** (0.186)	0.881*** (0.153)	0.879*** (0.153)
ForeignBS	0.293*** (0.0830)	0.293*** (0.0829)	0.453*** (0.0709)	0.454*** (0.0708)
Serv Intensity		-0.0154 (0.0365)		0.0616* (0.0333)
Foreign MS	0.251 (0.520)	0.253 (0.520)	0.147 (0.515)	0.141 (0.515)
LRFC	-0.0283 (0.0490)	-0.0284 (0.0490)	-0.195*** (0.0445)	-0.195*** (0.0445)
Industry, Province, Year dummies	yes	yes	yes	yes
Time Trend	yes	yes	yes	yes
N. observations	201,815	201,815	201,815	201,815
R squared	0.105	0.105	0.182	0.182

*, **, *** statistically significant at the 10, 5 and 1 percent level, respectively.

Note. The dependent variables in column (3) and (4) is the $\ln(\text{labor productivity})$ measured as value added per worker. The *ForeignBS* and *ForeignMS* are expressed as natural logarithm of $(1 + x)$ so parameters can be interpreted as elasticities. Standard errors are clustered by plant identifier. The period covered is 2003–2008.