

**Do FDI in Business Services follow FDI in manufacturing?
Evidence from Italian Firm-Level Data**

by

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Abstract

This paper briefly describes location decisions of Italian Business Services firms against the background of the recent phenomenon of international fragmentation of production. It assesses the advantages of business service offshoring, highlighting the role of different typologies of services, and dividing those that need a “face to face” relationships from those that can be provided at a distance, for instance by broad band and are intrinsically “impersonal”. For those services which need a “face to face”, we test the hypothesis that FDI “follow” FDI in manufacturing, going to the same destination markets or to close ones. To this task, we propose a new measure of downstreaming demand, which we construct from input output tables. The econometric results support the view that (i) the likelihood of FDI in business services is higher in high income countries (while that of FDI in manufacturing is related to cost saving investments); (ii) distance matters; (iii) market potential is very relevant in enhancing the likelihood of investing for both firms in manufacturing and in business services; (iv) a part from some specific services that need a face to face, FDI in business services do not seem to follow manufacturing. This last result is at odds with a similar study carried out on French data and can be explained by the peculiar nature of Italian internationalization pattern: small and medium manufacturing firms doing cost saving investment in close markets (European Union or other central European countries). The policy implication of this result are interesting: contrary to the recent theory of “unbundling”, in Italy skilled workers in the business services sector still seem to be sheltered from competition of low costs countries.

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Introduction

Foreign Direct Investments (FDI) in services account for the bulk of global FDI stocks and flows (UNCTAD, 2004 and 2008); their increase as a share of international investments is a recent trend and one of the most striking features of the past ten years.

The internationalization of the service sectors and of tertiary support functions have contributed to the rapid growth of FDI in services. This reflects partly an actual increase in the output of the business services sector and partly an increase in 'outsourcing'. Having the choice between providing business services internally to satisfy the demand for business services generated by their manufacturing operations or 'outsourcing' to external contractors, manufacturing firms have increasingly resorted to the latter. While internally provided business services are often not recorded as business services output but as output of the manufacturing firm, 'outsourced' business services are actually recorded as such if this is the external contractor's main sector of activity. This phenomenon, which increases also skilled workers exposure to international competition, has generated a great deal of attention about the potential negative consequences of firms internationalization, especially in developed countries.

Three questions have been recently addressed against this background. First, some studies have focused directly on the effect of offshoring on labour demand, finding that the effects are quite limited (see for instance Barba Navaretti and Castellani 2004; Amiti and Wei, 2005; Crinò, 2009), or vary depending on the income-level of destination countries (Ekholm and Hakkala, 2006). Second some studies have analyzed whether, as for goods, the remote supply of services remains limited, finding that distance shields workers to a significant extent from the threat of offshoring, but that distance costs have declined over the period of study (Head et al.2008). Finally, recent studies have focused on the location of FDI in services, in order to determinate whether investments are driven by market size and agglomeration effects or by costs (see for instance, Head and Mayer, 2004; Crozet et al., 2004). While location choices in the manufacturing are relatively well understood and broadly studied, location of foreign investments in services is relatively understudied. There is no reason to expect the model driving location choices of services firms to be fundamentally different from the one driving those in manufacturing, even though some determinants of location choices in manufacturing may have a quantitatively different effect in services. Nefussi and Schwellnus (2007) compared location determinants of French firms abroad in the manufacturing and service sectors, finding no basic difference between the determinants of these two types of activities. But they have also shown that the location of business services depends on the French downstream demand generated by manufacturing affiliates, suggesting that domestic services production will decrease together with manufacturing production, unless a country attracts FDI and provides "good" services for foreign firms.

Using input-output tables for OECD countries it is possible to observe the rising importance of services as providers and suppliers for manufacturing; for example UK firms increased their services'

inputs from 25% in 1984 to 44% in 1995. In France the share of services increased by 17% in the period 1995-2000 and at the end of this period services accounted for 28% of all inputs; finally in Italy services represent 11% of manufacturing firms' costs. Traditional sectors such as machinery, equipment or textiles, use services to organize production, sell their output and manage their financial activities and so providing inputs which are strategic for firms' life cycles. Hence, it could be expected that when a manufacturing firm decides to relocate its production in a foreign country through foreign direct investment (FDI), it increases the probability that its services suppliers also engage in FDI in the same foreign country, especially if the supply of services requires geographic proximity and "face to face" relations.

In line with the paper and methodology of Nefussi and Schwelnuess (2009), we carry on a similar analysis investigating the location determinants of Italian FDI in business services over the period 1996-2005. After a brief characterization of Business service firms in Italy, we investigate whether the traditional empirical location choice model for manufacturing firms can be applied to Italian business services firms and to which extent parameter estimates differ between services and manufacturing. To estimate the location determinants we fit several discrete locational choice models to a dataset of Italian multinationals. Secondly, we test whether the location choices of manufacturing firms and business services are interdependent. To do so, we introduce a variable which proxies the downstream demand of Italian manufacturing affiliates. We propose a new indicator, which allows us to measure the downstream demand of Italian manufacturing affiliates for every host country, combining detailed informations on production and sectors of the Italian firm-level data with Italian input-output tables. Contrary to the results of Nefussi et al. (2009), we find that downstream demand of manufacturing sector does not seem to affect the choice probability of Italian business services firms. This result is robust to a number of changes in specification.

In summary, the model explaining location choices of manufacturing firms does reasonably well in explaining location choices of services firms but the location choices of manufacturing firms and services firms don't seem to be interdependent in the sense that the probability of FDI in business services does not increase with the downstream demand generated by FDI in manufacturing. This is likely to be due to the fact that Italian manufacturing firms tend to privilege cost saving FDI.

The remainder of the paper is structured as follows. Section 2 briefly describes the data and the basic statistics of FDI in business sector in Italy and in our original dataset. It also presents descriptive statistics on correlations between location choices in manufacturing and business services and input-output linkages between these two sectors. Section 3 sets out the model underlying our empirical analysis: the geographical location model, first proposed by Head and Mayer (2004). Section 4 describes the empirical implementation and the econometric methodology. The econometric results are presented in section 5. Section 6 tests whether FDI in business services are activated by FDI in manufactures and Section 7 concludes.

2 A brief description of business services in Italy according to our dataset

Over the period 1995-2005, we are able to identify 3000 foreign investments in 150 different countries. The bulk of FDI is in manufacturing, 1800, while around one fifth is in business services¹, 655. Table 1 shows that most Italian FDI are directed to the EU and Eastern Europe.

¹ Business services primarily provide 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, comprising computer and related activities, research and development and other business activities –

The weight of business services in Italian GDP is increasing. This trend towards increased 'outsourcing' of business services is also reflected in the Italian FDI data. The service sector accounts for around 70% of the Italian firms internationalization activities but only 33 per cent of the foreign affiliates employment and less than half of the fifty per cent of value added. Around one fifth of foreign affiliates is in the business services, and the weight has slightly increased between 2000 and 2006. Among sub sectors, logistic and transport have had a more dynamic trend (see figure 1). Figure 2 shows that the correlation between the share of Italian affiliates in business services in any country and the share of affiliates in manufacturing is not very high.

Description of destination markets for business services FDI and FDI in manufacturing to be added.

Mainly manufacturing FDI are cost saving and reflect the small size of Italian firms (close, in EU15 or Eastern Europe).

Looking at the different sub sectors included in the business services aggregate, we can note:

- 1) The scarce and decreasing presence, especially in terms of employees and value added, of foreign affiliates in logistic and transports in Eastern Europe, despite the modest growth of affiliates (in 2006 overtook those in manufacturing in EU15) and employees in manufacturing. The presence of important hubs in other EU15 countries and the strong integration of European markets have certainly affected the location choices of Italian firms. It is likely that this type of services does not require a high degree of familiarity between buyers and sellers and therefore demand of foreign affiliates in manufacturing can go to foreign or Italian providers, depending on cost and quality considerations.
- 2) Professional services are around 5% of Italian participations in foreign firms. Mostly firms are located in EU15; in 2006 more than 70% of the value added was due to firms located in EU15. The fall in the share of EU15 on employees of foreign affiliates corresponded to an increase of employees in affiliates in Eastern Europe, Central America and East Asia. The fact that the geographical distribution of foreign affiliates providing professional services remained constant, suggests that the average dimension of firms located in those areas increased. Even though professional services could be considered an activity where "face to face" relationships matter more than for logistic and transports, there is no clear evidence of a causality nexus with FDI in manufacturing. This could be due to the fact that in these type of activities there is the need of a good local knowledge, so that "local" actors may be privileged.
- 3) At the end of 2006, FDI in telecommunications were about 2,5% of internationalization activities of Italian firms, a share which has been constant since 2000. On the contrary, in the same time span, the weight of foreign affiliates in telecommunication on value added and employees substantially shranked. The bulk of telecommunication affiliates is in EU15; however, the number of employees and the value added of foreign affiliates are substantially higher in South America. This fact is affected by important operations by the main Italian telecommunication firm. This seems to have operated more to exploit the potentiality of the South American market than to serve in a more efficient way Italian manufacturing firms.

Standard Industrial Classification (SIC) codes 72-74 - but include elements of telecommunications and services included in sections I and J.

Business Service FDI by geographical

Destination Market	Freq.	Percent	Cum.
Central Asia	13	1.98	1.98
North Africa	11	1.68	3.66
Sub-saharan Africa	4	0.61	4.27
Latin America	78	11.91	16.18
North America	63	9.62	25.8
East Asia	24	3.66	29.47
Eastern Europe	96	14.66	44.12
Middle East	5	0.76	44.89
Oceania	6	0.92	45.8
EU + EFTA	355	54.2	100
Total	655	100	

Table 1

FDI of Italian firms in Business Services: different sub sectors

ANNO	INFO	INGE	LOGI	NOLE	R&S	SERP	SOFT	TLC	Total
1995	0	4	9	0	0	3	1	4	21
1996	0	4	5	0	0	3	2	1	15
1997	1	2	5	1	0	4	0	2	15
1998	2	1	6	0	0	10	2	16	37
1999	1	25	9	0	3	10	9	4	61
2000	3	17	9	0	3	31	21	54	138
2001	0	23	16	0	3	39	23	42	146
2002	2	15	11	1	1	17	23	4	74
2003	3	14	10	0	1	21	8	14	71
2004	3	7	10	0	0	0	7	1	28
2005	3	7	9	0	4	10	8	8	49
Total	18	119	99	2	15	148	104	150	655

Table 2

Foreign affiliates employment in manufacturing and number of investments in Business services
(var. % 2007 - 2000)

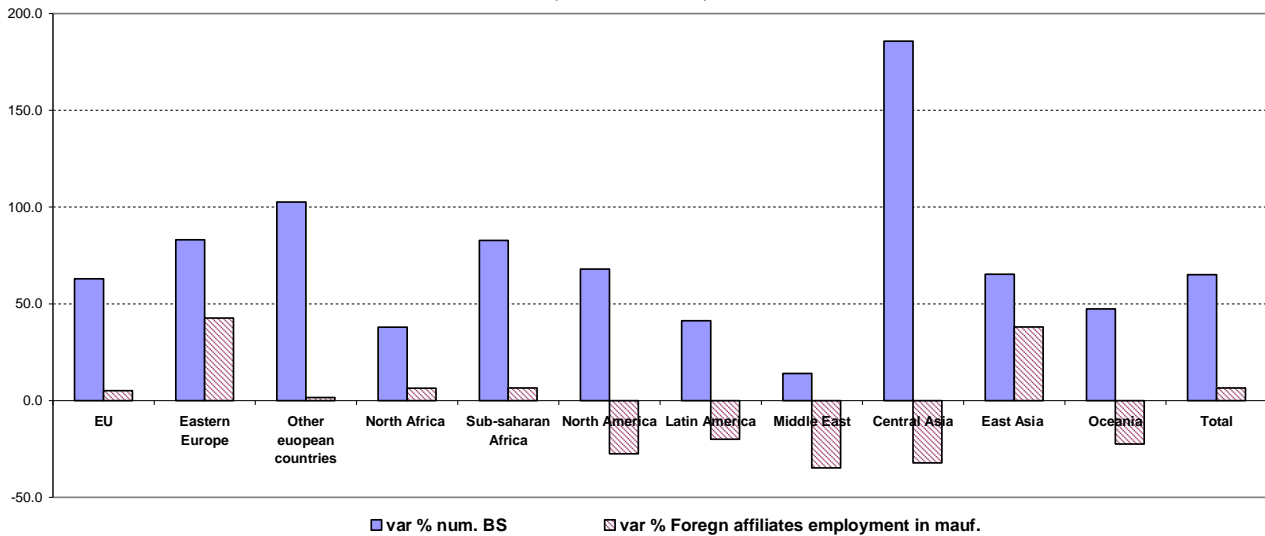


Figure 1

3. The Theoretical Framework and the Econometric model

The existing literature has largely benefited from recent developments in the New Economic Geography suggesting that horizontal FDI (Markusen, 1984) are becoming more relevant than the vertical FDI (Helpman, 1984). According to several empirical studies focusing on the manufacturing sector, market access is the core determinant in location decisions (see for instance Head and Mayer, 2004; Amiti and Javorcik, 2006). This criterion is crucial in location decisions of service sectors (Nefussi and Schwellnus, 2007). But while the rationale is clear on the theoretical side, with the international fragmentation of the value chain, the frontier becomes less clear on the empirical side. The location of some service activities, in particular those that surround production can be less sensitive to market size. Studies by Sachwald and Chassagneux (2007) and Kuemmerle (1997) show that R&D centers specialized in adapting products have a strong propensity to locate close to their final markets, while this particular criterion does not justify FDI in the case of fundamental R&D. Nor it seems important in the case of call centers and on-line services (Hatem 2005), or with respect to the location of headquarters (Strauss-Kahn and Vives, 2005).

Agglomeration forces are also central in location decisions, for instance the location of Japanese firms in the United States appears to be strongly influenced by the presence of firms of the same nationality and belonging to the same sector (Head et al., 1995, 1999). Similar effects have been observed in France (Crozet et al., 2004). These sectoral or industry influences have recently been confirmed by the work of Head and Mayer (2004). Agglomeration effects can, however, differ in intensity depending on the type of activity. They can also obey functional arguments. Recent urban economy studies (Duranton and Puga, 2005) point to the existence of a functional specialisation dynamic at work in numerous metropolitan areas. Strauss-Kahn and Vives (2005) show that headquarters relocation in the United States is greatly influenced by the above phenomenon, firms

preferring to set up in urban areas where there are already large numbers of headquarters, preferably in the same sector of activity.

Recent developments of the New Economic Geography Theory guide the derivation of the reduced form we are going to estimate (see Head and Mayer, 2004). Take a firm which locates its production in region i , $i=1,\dots,R$ where R is the number of regions. The firm uses labor and other inputs available in the region in order to produce. Each firm produces a variety of a differentiated good in an industry assumed to be representative. Consumers (who may be firms or individuals) allocate their expenditures across differentiated varieties in the representative industry. They have constant elasticity of substitution sub-utility functions for each industry and maximise this utility function in relation to their expenditure. Demand emanating from a representative consumer in region j for a firm located in region i is given by:

$$q_{ij} = \frac{p_{ij}^{-\sigma}}{\sum_{r=1}^R n_r p_{rj}^{1-\sigma}} E_j \quad (1)$$

where E_j is the expenditure by a representative industry (we omit industry subscripts for notational simplicity) in region j ; σ is the elasticity of substitution between varieties and p_{ij} is the delivered price faced by consumers in region j (destination) for goods from region i (origin). The above delivery price is a combination of the mill price and the iceberg-type transport costs τ . If it is assumed that the representative industry is in a monopolistic competition a la Dixit – Stiglitz (1977), to obtain the optimum price the firm sets a constant mark-up over costs:

$$p_i = \frac{\sigma}{\sigma - 1} c_i \quad (2)$$

where c_i is the marginal cost of production of the representative firm located in region i . By substituting (2) into (1), we obtain the quantity that a firm in region i can supply in each destination j :

$$q_{ij} = \frac{\sigma - 1}{\sigma} \frac{(c_i \tau_{ij})^{-\sigma}}{\sum_{r=1}^R n_r (c_r \tau_{rj})^{1-\sigma}} E_j$$

The gross profit earned in each destination region j for a firm producing in region i is:

$$\pi_{ij} = (p_i - c_i) \tau_{ij} q_{ij} = \frac{(c_i \tau_{ij})^{1-\sigma}}{\sigma G_j} E_j$$

where

$$G_j \equiv \sum_r n_r (c_r \tau_{rj})^{1-\sigma}$$

This gross profit is an increasing function of the expenditure of country j on the considered industry. The fraction multiplying E_j depends on the costs of the representative firm relative to its competitors from all R regions. In the numerator, we see that profits are decreasing in local (region i) production costs. Lower trade costs to reach region j , i.e. a low τ_{ij} , also raise profits. Since the effect of trade costs is always moderated by the elasticity of substitution, we introduce the notation of $\varphi_{ij} = \tau_{ij}^{1-\sigma}$ to measure exporters' from i 's access to market j . The denominator contains the corresponding characteristics of competing suppliers. Note that the denominator term is multiplied by σ , capturing the

idea that competition is fiercer and profits are therefore lower when varieties are less differentiated from each other.

Summing the gross profits earned in each market and subtracting the fixed costs F_r necessary to establish a plant in region r , we obtain the aggregate net profit, Π_r to be earned in each potential location r :

$$\Pi_r = \frac{c_r^{1-\sigma}}{\sigma} \sum_{j=1}^R \phi_{rj} \frac{E_j}{G_j} - F_r = \frac{c_r^{1-\sigma}}{\sigma} M_r - F_r,$$

where

$$M_r \equiv \sum_j \frac{\phi_{rj} E_j}{G_j}$$

In line with Krugman (1992), we will refer to M_r as the “Krugman market potential”. The profit equation suggests that firms face a trade-off between low production costs and high market potential. When a firm chooses its location, the only relevant information is the ordering of the profits. To derive a profit equation which is easier to manipulate at the estimation stage, Head and Mayer (2004) propose to perform a number of transformations. We follow their methodology. The begin by assuming that the fixed production cost is the same everywhere and they then add it to profits; next they multiply the expression obtained by σ , and lastly they write this expression to the power of $1/(\sigma - 1)$, and thus they obtain V_r :

$$V_r = [\sigma(\Pi_r + F_r)]^{\frac{1}{\sigma-1}}$$

which, after a transformation on logarithms becomes:

$$U_r \equiv \frac{\ln \sigma + \ln(\Pi_r + F_r)}{\sigma - 1} = -\ln c_r + (\sigma - 1)^{-1} \ln M_r$$

The above equation shows that profits increase with Market Potential (M_r) and decrease with variable costs (C_r). Where costs as in Mayer et al. (2007), depend on transaction costs (tc_r) and on production costs. Let's assume that the production function is Cobb Douglas with constant returns, that it uses work (w_r) and other inputs (v_r) such as intermediate goods or land. Taking α as the share allocated to work and A_r as total factor productivity, we obtain:

$$\ln c_r = \alpha \ln w_r + (1 - \alpha) \ln v_r - \ln A_r$$

Substituting (3) into (4) and rearranging, we have

$$U_r = -\alpha \ln w_r + (\sigma - 1)^{-1} \ln M_r - (1 - \alpha) \ln v_r + \ln A_r$$

We do not observe v_r and A_r and a random term observed by firms but not by the econometrician. At this point of the analysis, we depart from the literature by assuming that even if the underlying model of location decisions is likely to be quite similar for manufacturing and service, there might be huge variation in the importance of determinants according to the activity i considered. The reduced form that we estimate is then given by:

$$\Pi_{ij} = \beta_0 + \beta_1 c_{ij} + \beta_2 mp_j \quad (5)$$

Π_{ij} denotes operational profits of an affiliate from market i locating in market j , β_0 is a constant, c_{ij} its marginal cost and mp_j the market potential faced by the affiliate. All variables are expressed in natural logarithms. For ease of exposition, in the following we will denote country i as Italy and consider the example of a business services affiliate.

Following Nefussi et al. we split market potential in market j for an Italian business services affiliate into demand from Italian firms and consumers and demand from firms and consumers of other countries. This split allows us to take into account that Italian firms or consumers may have a consumption bias in favour of Italian affiliates located in their country of establishment, which may be particularly relevant for the business services demand of Italian manufacturing affiliates located abroad. Instead of consuming business services from foreign providers or importing business services from Italy, they may prefer to consume business services from Italian providers that are located in the same foreign country. The rationale is that business services are often specifically tailored to the manufacturing firms' demands and often require a high level of complex 'face to face' communication. The standard market potential measure can be therefore decomposed into a component which accounts for the demand of final consumers and firms from all countries except Italy (mp_j^{-i}) and a component accounting for Italian final consumers and firms (mp_j^i):

$$mp_j = mp_j^i + mp_j^{-i}$$

The corrected market potential measure may thus be written as:

$$m\tilde{p}_{ij} = mp_j^{-i} + (1 + \lambda)mp_j^i$$

Only a small part of business services production is consumed by final consumers so that it appears plausible to interpret mp_j^{-i} as a measure of downstream demand of Italian manufacturing affiliates for the output of Italian business services affiliates located in their country of establishment.

It is thus convenient to re-label mp_j^{-i} as dd_{ij} , a mnemonic for downstream demand. Substituting the consumption bias corrected measure of market potential for the standard measure of market potential in equation (1) then yields:

$$\Pi_{ij} = \beta_0 + \beta_1 c_{ij} + \beta_2 mp_j + \gamma dd_{ij} \quad (6)$$

where $\gamma = \beta_2 \lambda^2$.

4 Empirical implementation and Econometric methodology

The model in Section 3 generates the prediction that (Italian) business services affiliates tend to locate close to (Italian) manufacturing affiliates, independently of whether they form part of the same group or not. The underlying mechanism is that (Italian) manufacturing affiliates have a consumption bias in favour of domestic business services affiliates located in their country of establishment, due to a

² Equation (6) is a generalisation of equation (5), in the sense that the latter is a special case of equation (2) with $\beta_2 \lambda = 0$. For $\lambda > 0$ profits of a Italian business services affiliate from locating in market j decrease not only with marginal costs of production and increase with market potential but also increase with downstream demand from Italian manufacturing affiliates located in market j .

high degree of specificity of business services and to the complexity of interactions between provider and customer.

In the following we test the hypothesis that the probability of FDI in business services increases with an increase of the demand of Italian affiliates in a given country, for our original dataset of Italian firms. To this aim we need to proxy the three main profit determinants in equation (2). We assume that marginal costs of production in business services depend on the level of economic development, proxied by GDP per capita. Further, they may depend on transaction costs with the parent company in Italy which can be proxied by geographical distance, indicator variables for common border and other indicator variables such as, for instance, being landlocked. Market potential for business services is proxied by the Head and Mayer (2004) market potential variable. It is, essentially, a weighted sum of expenditures in all markets, where the weights are given by market access and the inverse of the degree of competition. The second term in equation (2), the downstream demand from Italian manufacturing firms is proxied, according to Nefussi et al. (2009) by the following variable:

$$dd_j = \frac{\beta^b}{\tau_{jj}} \sum_{m=1}^M a^m y_j^m$$

where β^b is the share of business services output that is used as intermediate input in other sectors, τ_{jj} is the internal distance in country j as reported in CEPIIs distance database, a^m is the share of manufacturing sector m in intermediate demand for business services, and y_i^m is output of manufacturing sector m in country i . The coefficients β^b and a^m are obtained for every year from input-output tables. This amounts to assuming that the unit input demands of Italian manufacturing affiliates abroad are similar to the input demands of manufacturing establishments located in Italy. Production of foreign manufacturing affiliates is not available in the Italian firm-level data so that it is chosen to proxy production by employment³.

Given the fact that the links between intermediate inputs and production can be weighted directly through the expenditure coefficients, which correspond to the weight of intermediate input i on production of manufacturing m , we substitute the coefficient a^m proposed by Nefussi et al. (2009) with the expenditure coefficient s^m .

The *downstream demand* also includes a coefficient weighting the degree of utilization of business services production as intermediate inputs in other sectors or branches, which shifts the focus on the supply of business services. Since the aim of the variable dd is to describe the role of business services in manufacturing, it seemed more appropriate to confine the construction of the index to manufacturing branches. We also tested the case where the only relevant aspect is the demand of business services activated by the production processes in different manufacturing sub sector, according to the expenditure coefficients.

As proxy for the production of foreign affiliates in manufacturing, we also tried value added. We maintain that employees and value added capture two different aspects of the possible pulling role of FDI in manufacturing for FDI in business services. More precisely, the number of employees is more likely to be a good proxy of production when FDI are vertical or cost saving and therefore when the activating effect of FDI in manufacturing is linked to standard logic. In other words, FDI in business services are activated when volumes are above some threshold level. On the other hand, value added is more likely to be the right proxy if FDI are horizontal or market seeking and therefore the activating effect follow logic based on prices, i.e. FDI in business service would be activated if production in monetary terms passes some threshold level. It could be possible for these two effects to

³ In order to allow for some local trade in business services, y_i actually includes both employment of Italian manufacturing affiliates in country i and in its immediately neighbouring countries.

act simultaneously. It is possible that the two effects are non exclusive, but act simultaneously with different weight in different areas.

Finally one concern with the downstream manufacturing variable is endogeneity: An unobserved variable may determine both profits in business services and employment in downstream manufacturing. In a first attempt to address potential endogeneity concerns we choose to lag the downstream demand variable by one period so that transitory shocks that affect simultaneously profits in business services and employment in downstream manufacturing do not bias our estimated coefficients.

We test the reduced form (equation 6) using the conditional logit model. The underlying logic is to assume that firm's location decisions are based on the maximization of a profit function subject to uncertainty. But it is not possible to observe each country's potential profitability; instead, it's possible to observe the location choices made by firms in countries with characteristics that can be observed. In the conditional logit model the dependent variable is a binary variable that takes the value of one if FDI is observed to take place in a particular location and a value of zero if it does not take place.

Let $R = (1, \dots, r, \dots, N)$ be all the potential locations, at time t . Each potential location offers to firm i a profit Π_{ir} given by:

$$\Pi_{ir} = V_{ir} + \varepsilon_{ir}$$

with $V_{ir} = \beta X_{ir}$, that is a function of observable characteristics X_{ir} of each location choice r , and a vector of coefficients β to be estimated and ε_{ir} the unobservable advantage of location r . At time t , firm i chooses the location which provides it with the highest profits. In other words, the probability of firm i choosing region r is expressed as:

$$P_{ir} = \text{prob}(\pi_{ir} > \pi_{ik}) = \text{prob}(\varepsilon_{ik} < \varepsilon_{ir} + V_{ir} - V_{ik})$$

McFadden (1974) has shown that under the Independence of Irrelevant Alternatives (IIA) assumption the expected probability of investing in a particular location can be restricted to a value between zero and one by expressing it in the form of a conditional logit:

$$P_i = \frac{e^{\theta X_i}}{\sum_{n=1}^N e^{\theta X_n}}$$

This type of model is then estimated by means of the maximum likelihood method⁴.

5 Determinants of FDI in manufacturing and Services: results

Tables 1 report the results of conditional logit model, obtained to compare the estimated coefficients on the determinants of FDI in services to those of FDI in manufacturing. Location choices in services appear to be reasonably well explained by a standard location choice model. The likelihood ratio index (pseudo R2) is higher in services than in manufacturing.

⁴ The major problem with this type of model is the assumption of the independence of irrelevant alternatives (IIA): the probability of region r being chosen in preference to region k has to depend solely on the characteristics of the said two locations and in no way on the characteristics of a third location. What this means, in other words, is that if two regions appear to investors to be close substitutes, the error terms will be positively correlated and the parameters estimated will be distorted (Hess 2002). In future versions of the paper, we plan to estimate nested logit models to overcome this problem.

With respect to the estimated coefficients, it can be shown that with explanatory variables expressed in logarithms and a large number of potential choices the estimated coefficients in the conditional logit model can be interpreted as elasticities of the choice probability with respect to the explanatory variables. The differences in coefficients between the conditional choice models for manufacturing and for services can thus be interpreted as differences in elasticities. Overall, the coefficients on the determinants of location choice in services are similar to those in manufacturing: Distance has a significant negative effect on the probability of investing; the existence of a common border has a significant positive effect, as well as market potential. It is worth noting that common borders appear to have a larger positive effect on the probability of investing in manufacturing than in services. This could be due to the fact that a large part of Italian BS does not require face to face communication but can be provided at a distance. Hence, even if Italian firms have a domestic bias, FDI in Business Services do not need to follow FDI in manufactures.

The only noticeable differences between location choices in manufacturing and services appear to be on the estimated coefficients on per capita GDP. This takes a negative value for manufactures, suggesting that FDI tend to go to countries with lower GDP per capita because they are mostly motivated by cost saving considerations. In the case of business services, the coefficient of GDP is significant and positive; this seems to suggest that countries with higher levels of economic development, as measured by per capita GDP, tend to have a larger relative demand for services.

Dependent Variable: FDI Localization choice in manufacture sector

	<i>no</i>	<i>no</i>	<i>no</i>	<i>si</i>	<i>si</i>	<i>si</i>
Ln_distance	-0.302 (0.02)***	-0.775 (0.03)***	-0.7694 (0.03)	-0.269 (0.03)***	-0.7864 (0.03)***	-0.785 (0.03)***
Common Border	0.418 (0.09)***	0.344 (0.0811)***	0.467 (0.08)***	0.207 (0.08)***	0.421 (0.08)***	0.516 (0.08)***
Ln_gdp_procapite	-0.051 (0.03)*	-0.177 (0.03)***	-0.173 (0.03)***	-0.056 (0.02)***	-0.077 (0.0330)***	-0.079 (0.0331)***
Ln_Market Potential	0.247 (0.01)***	0.632 (0.03)***	0.604 (0.03)***	0.156 (0.02)***	0.697 (0.0297)***	0.667 (0.0302)***
Ln_area		0.5794 (0.02)***	0.556 (0.02)***		0.604 (0.02)***	0.582 (0.02)***
Landlocked			-0.513 (0.1)***			-0.479 (0.1)***
Dummy OECD	<i>no</i>	<i>no</i>	<i>no</i>	<i>si</i>	<i>si</i>	<i>si</i>
Number of obs	165432	165432	165432	165432	165432	165432
Pseudo R2	0.04	0.13	0.14	0.05	0.14	0.14

*N.B: dummy OECD is a dummy for high income countries; in the brackets there are standard errors; * p<0.05; ** p<0.01; *** p<0.001*

Table 1a

Dependent Variable: FDI Localization choice in Business Services

Ln_distance	-0.3623 (0.05)***	-0.7629 (0.06)***	-0.762 (0.06)***	-0.267 (0.05)***	-0.752 (0.06)***	-0.752 (0.06)***
Common Border	0.348 (0.13)***	0.343 (0.13)***	0.471 (0.13)***	0.473 (0.13)***	0.353 (0.13)***	0.471 (0.13)***
Ln_gdp_procapite	0.5545 (0.05)***	0.2473 (0.05)***	0.254 (0.051)***	0.208 (0.05)***	0.199 (0.05)***	0.215 (0.05)***
Ln_Market Potential	0.2013 (0.03)***	0.587 (0.03)***	0.586 (0.05)***	0.177 (0.05)***	0.587 (0.05)***	0.567 (0.05)***
Ln_area		0.587 (0.03)***	0.565 (0.03)***		0.57 (0.03)***	0.553 (0.03)***
Landlocked			-0.494 (0.1770)**			-0.466 (0.18)**
Dummy OECD	<i>no</i>	<i>no</i>	<i>no</i>	<i>si</i>	<i>si</i>	<i>si</i>
Number of obs	90879	90879	90879	90879	90879	90879
Pseudo R2	0.1542	0.2478	0.2492	0.1831	0.2482	0.2495

N.B: dummy OECD is a dummy for high income countries; in the brackets there are standard errors; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 1b

6 Does the Location of Manufactures Determine Location Choices for Business Services?

Table 2 reports the result of the estimation of whether business services FDI follow manufacturing FDI. In columns (1)-(4) the parsimonious conditional choice model for business services of Table 2 is augmented by a lagged downstream manufacturing demand index, elaborated firstly with the Nefussi's methodology and then (5)-(8) with a new one we propose to better represent the Italian situation. Lastly columns (9)-(12) check the robustness of the obtained results by estimating our model with downstream demand indicators constructed with profits as a proxied for the manufacture demand of Italian affiliates.

Columns (1)-(4) shows that downstream manufacturing demand of Italian affiliates appears to have a negative effect on the probability of business affiliates of choosing a particular location. Similar results are obtained when we test our downstream indicator. The estimated elasticity of the choice probability with respect to the our downstream manufacturing demand index is around -0.1 and statistically significant at the 10% level. Instead, the specification in column (9-12) of Table 2 includes the profits of manufacturing as a proxy of the manufacturing production in a particular location. In this case we obtain a positive sign of the variable but only when we don't use high income countries dummy.

Note that the specifications in column may suffer from omitted variable bias. The econometrician may fail to observe a variable that jointly determines the profitability of investing in business services and downstream manufacturing employment and erroneously attribute the effect on business services investment to downstream manufacturing demand. Since the time dimension of our panel is short, variation in the downstream demand variable is predominantly cross-sectional so that we cannot include a full vector of country fixed effects to address this issue. A further reason is that our sample of investments in business services is also relatively small (655 investments over the 1996-2004 period). Out of the 134 possible destination countries 52 are never chosen, 12 are chosen once and

another 12 are chosen twice. For these countries we would use only a fraction of the available time variation in the downstream manufacturing variable if we were to include country fixed effects.

The fact that the estimated coefficients on the downstream manufacturing demand index are very robust with respect to the specification of the econometric model is an indication that its positive effect on the location choice probability of business services affiliates is not a simple artifact of the IIA assumption.

Variable	Dependent Variable: FDI choice in business services											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Ln_distance	-0.5 (0.06)***	-0.551 (0.06)***	-0.275 (0.07)***	-0.364 (0.07)***	-0.511 (0.06)***	-0.561 (0.06)***	-0.282 (0.07)***	-0.371 (0.07)***	-0.42 (0.05)***	-0.47 (0.05)***	-0.31 (0.07)***	-0.42 (0.07)***
Common Border	0.796 (0.13)***	1.267 (0.14)***	0.517 (0.14)***	0.899 (0.14)***	0.789 (0.13)***	1.265 (0.14)***	0.509 (0.14)***	0.895 (0.14)***	0.83 (0.13)***	1.26 (0.14)***	0.14 (0.14)	0.76 (0.14)***
Ln_gdp_procapite	0.128 (0.05)*	0.221 (0.05)***	0.172 (0.06)**	0.226 (0.06)***	0.128 (0.05)*	0.222 (0.05)***	0.17 (0.06)**	0.225 (0.06)***	0.13 (0.05)***	0.22 (0.05)***	0.21 (0.06)***	0.28 (0.06)***
Ln_potential market	0.53 (0.03)***	0.512 (0.03)***	0.261 (0.04)***	0.253 (0.04)***	0.538 (0.03)***	0.519 (0.03)***	0.264 (0.04)***	0.256 (0.04)***	0.45 (0.03)***	0.44 (0.03)***	0.26 (0.04)***	0.22 (0.04)***
landlocked		-1.344 (0.18)***		-1.144 (0.19)***		-1.348 (0.18)***		-1.146 (0.19)***				-1.48 (0.19)***
Ln_downstream demand_NF	-0.063 (0.03)*	-0.078 (0.03)*	-0.024 (0.04)	-0.062 (0.04)								
Ln_downstream demand_cing_addetti					-0.079 (0.03)*	-0.092 (0.03)**	-0.032 (0.04)	-0.069 (0.04)				
Ln_downstream demand_cing_fatturato									0.07 (0.03)**	0.05 (0.03)*	-0.05 (0.03)	-0.09 (0.04)
Dummy_OECD	no	no	si	si	no	no	si	si	no	no	si	si
Observations	82034	82034	82034	82034	82034	82034	82034	82034	82034	82034	82034	82034
Pseudo R2	0.13	0.15	0.13	0.14	0.1366	0.1498	0.15	0.16	0.14	0.15	0.19	0.2

N.B. per dummy OECD si intende la dummy per gli high income countries; tra parentesi vi sono gli standard error; * p<0.05; ** p<0.01; *** p<0.001

table 2

To better understand the peculiarity of the negative coefficient of the downstream demand, which means that the probability that business services “follow” manufacturing affiliates is reduced with an increase in the demand from manufacturing affiliates, we have decided to run the model also on subsector. The underlying assumption we want to test is that FDI in Business Services can follow different logic and in particular will “follow” FDI in manufacturing only if there is need of a face to face service.

Econometric estimates (see Table 3) support the view of different behaviour in different sub sectors. In particular, the probability of foreign direct investment in telecommunications seems to be positively and significantly increased by the demand of domestic manufacturing. On the other hand, professional services, logistic, R&D, informatics at the first test do not appear to be attracted by manufacturing foreign affiliates demand.

How can this be? Given the way we constructed the variable dd it is possible to suppose that the level of demand of manufacturing affiliates is below a certain threshold and does not succeed in activating investment in business services.

It is possible that only for investment in telecommunication this threshold is passed.

TO BE COMPLETED

Variabile dipendente: Localizzazione investimento								
	TLC		SERP&INGE		NOLE&LOGI		SOFT&INFO	
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Ln_lag_dd_tlc_L	0.10 (0.0623)*	0.08 (0.0628)	-0.08 (0.0447)**	-0.09 (0.0445)**	-0.11 (0.0931)	-0.11 (0.0925)	-0.15 (0.0652)**	-0.17 (0.0662)**
Ln_distance	-0.13 (0.1133)	-0.19 (0.1154)*	-0.40 (0.0901)***	-0.44 (0.0911)***	-1.01 (0.1969)***	-1.03 (0.1967)***	-0.35 (0.1367)***	-0.43 (0.1416)***
Contiguity	0.73 (0.2623)***	1.29 (0.2689)***	0.20 (0.2219)	0.61 (0.2382)***	-0.11 (0.4206)	0.13 (0.4458)	0.39 (0.3019)	1.10 (0.3084)***
Ln_gdp_procapite	0.73 (0.1035)***	0.72 (0.1055)***	0.56 (0.0743)***	0.54 (0.0748)***	0.30 (0.1497)**	0.28 (0.1494)**	0.87 (0.1309)***	0.89 (0.1360)***
Ln_mp_hm	0.10 (0.0715)*	0.10 (0.0719)*	0.23 (0.0574)***	0.23 (0.0573)***	0.18 (0.1328)	0.18 (0.1317)	0.32 (0.0818)***	0.33 (0.0825)***
Landlocked		-1.59 (0.3990)***		-0.95 (0.2804)***		-0.54 (0.4173)		-1.78 (0.4742)***
Observations	20964	20964	34605	34605	9397	9397	16912	16912
Pseudo R2	0.18	0.19	0.15	0.16	0.14	0.14	0.23	0.25

Dependent Variable: FDI choice in business services												
Variable	NOLE	NOLE	NOLE	SOFT	SOFT	SOFT	TLC	TLC	TLC	SERP	SERP	SERP
Ln_distance	-1.037 (0.18)***	-1.128 (0.2)***	-1.154 (0.2)***	-0.29 (0.13)**	-0.29 (0.17)*	-0.5 (0.18)***	-0.161 (0.1)	0.169 (0.13)	0.041 (0.14)	-0.441 (0.08)***	-0.302 (0.1)**	-0.384 (0.1)***
Common Border	0.181 (0.4)	-0.11 (0.42)	0.17 (0.45)	0.39 (0.3)	0.09 (0.32)	0.82 (0.3)***	1.224 (0.25)***	1.201 (0.26)***	1.463 (0.26)***	0.661 (0.21)**	0.325 (0.22)	0.696 (0.23)**
Ln_gdp_procapite	0.001 (0.13)	-0.031 (0.14)	0.022 (0.15)	0.91 (0.13)***	0.25 (0.14)*	0.27 (0.16)*	0.101 (0.1)	0.239 (0.12)*	0.273 (0.12)*	0.21 (0.09)*	0.252 (0.1)**	0.3 (0.1)**
Ln_potential market	0.413 (0.11)***	0.239 (0.13)	0.225 (0.13)***	0.27 (0.07)***	0.32 (0.09)***	0.31 (0.1)***	0.319 (0.06)***	0.096 (0.07)	0.101 (0.07)	0.47 (0.05)***	0.275 (0.06)***	0.27 (0.06)***
landlocked			-6.16 (0.44)			-1.97 (0.48)**			-1.238 (0.4)**			-1.018 (0.28)***
Ln_dd_fatturato	-0.117 (0.1)	-0.191 (0.11)	-0.202 (0.11)	-0.08 (0.07)	-0.21 (0.09)**	-0.3 (0.1)**	0.298 (0.07)***	0.299 (0.07)***	0.236 (0.07)**	0.019 (0.05)	-0.04 (0.05)	-0.077 (0.05)
Dummy_OECD	no	si	si	no	si	si	no	si	si	no	si	si
N	9397	9397	9397	16912	16912	16912	20964	20964	20964	34605	34605	34605
Pseudo R2	0.1327	0.1446	0.1546	0.2315	0.29	0.31	0.1542	0.2166	0.2252	0.1242	0.1737	0.1804

N.B: per dummy OECD si intende la dummy per gli high income countries; tra parentesi vi sono gli standard error; * p<0.05; ** p<0.01; *** p<0.001

table 3

7 Conclusions

This paper provides empirical evidence on the location choices in business services using an Italian firm-level dataset. We show that the parameter estimates of a standard location choice model for services are fairly close to the ones in manufacturing. Location choice probabilities in services decrease with distance but increase with shared border and market potential. The effects of GDP per capita and human capital vary across services subsectors but are generally weaker than those for manufacturing. The less negative coefficient on GDP per capita may reflect the stylised fact that demand for services tends to increase with the level of economic development and the less positive coefficient on human capital may reflect the lower reliance of foreign direct investors on local workers in some services sectors.

We then examine whether manufacturing location choices may influence location choices in services. Starting by the Nefussi and Schwellnuss analysis we have elaborated a new indicator of the demand coming from manufacturing which is able to capture better the input-output linkages of the

business services with the manufacturing sector. We find that the downstream demand of Italian manufacturing affiliates does not have a positive effect on the location choice probabilities of Italian business services affiliates. The only business service sub-sector in which we find a positive effect is the Telecommunication. This lends further plausibility to the proposed mechanism underlying the complementarity between manufacturing and business services that depends critically on strong input-output linkages between the two sectors. Robustness checks support the view that the obtained results are not driven by unobserved country heterogeneity or by endogeneity of the downstream manufacturing demand variable.

We believe that location choices of BS can be correlated to those of manufacturing in different ways. The probability that FDI follow those in manufactures is a continuum. It is higher for services which need a “face to face” and lower for those services that need a deep knowledge of the local environment and legal system.

In the model most likely the relationship is not linear but FDI in Business Services are only triggered when a certain threshold of demand is reached. The attempt to divide Business Services in sub sectors provides some interesting hints, but the number of observations and the actual occurrence of events is too low to draw convincing conclusions. Furthermore, lack of appropriate data results in impossibility to convincingly split business services into those that need a “face to face” and the rest.

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Appendix

The database and variables used

Informations on date and destination country of FDI come from the survey ICE - REPRINT, which contains information on affiliates' employment and sector of activities.

The independent variables were constructed on the basis of the information available on host country characteristics for the period 1996-2005 and were gathered from different sources. GDP per capita in current dollars is from the World Bank World Development Indicators and the trade cost proxies (distance, common language, common border, former colony) from CEPII's distance database. While the potential market measures is obtained directly from Thierry Mayer (2005). In line with the theoretical framework presented earlier, these variables are converted into logarithmic form to carry out the estimations, the exception being the qualitative variables.