THE INTERNATIONALIZATION OF PRODUCTION AND INDUSTRIAL DISTRICTS: AN ANALYSIS OF ITALY'S FOREIGN DIRECT INVESTMENTS

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1.   Introduction

In the last decades, as world markets have become increasingly integrated, many firms have acquired or built plants in foreign countries. This process, usually called 'internationalization of production', is reflected in the upward trend of foreign direct investment (FDI) flows; relative to world GDP they grew from 9 to 20 per cent between 1990 and 2000. The sales of multinational firms' foreign affiliates have also risen strongly; in 2000, they were estimated at over twice the value of world exports (Unctad, 2001).

In many respects, Italian firms' internationalisation of production seems to be quantitatively smaller than that of other advanced countries. In 2001 Italy's outward FDI was only 17.1 per cent of GDP, compared with 25.1 per cent for Germany, 32.5 per cent for Spain and 68.4 for France (Banca d'Italia, 2002). Among the world's 100 largest non-financial firms, ranked by foreign assets, there are only two Italian companies, while 10 firms are from Germany, 13 from France and 14 from the United Kingdom (Unctad, 2002).

This paper studies the determinants of Italy's FDI. The aim is to identify the industrial structure and local characteristics associated with higher levels of FDI. In this way we hope to gain a deeper understanding of why Italy's production internationalization is less marked than in other countries. To this end, we use innovative data on Italy's FDI outflows by sector and source province.[1] While data on FDI by sector or by destination area have often been employed, to our knowledge there are no studies using data by geographical source.

Our data have three more advantages. First, FDI data have been widely used in the literature as a proxy of production internationalization and they cover a wide range of activities abroad, from greenfield investments (i.e. newly built plants) to cross-border M&As (i.e. take-overs of foreign companies). Second, our data include all Italian provinces and almost all manufacturing sectors. By contrast, the previous literature focused only on a few sectors ('Made in Italy' sectors in Conti and Menghinello, 1998, Schiattarella, 1999) or certain regions (Veneto in Gisolo and Iodice, 2002). Finally, thanks to the highly detailed nature of the data (by province and sector) we are able to investigate the role of industrial districts. While the magnitude of their contribution to Italy's exports has often been pointed out, their contribution in terms of FDI is much less clear and has been much less studied.

The structure of the paper is as follows: FDI data are discussed in section 2, while section 3 reviews the related literature. The econometric model and its variables are presented in section 4. Section 5 reports the results of the analysis, and section 6 concludes.

2.   Data on foreign direct investments

2.1   *Source*

The dataset used in this paper reports Italy's outward FDI flows by sector, source province and destination country, between 1997 and 2001. In the balance of payments statistics, an investment is defined as FDI when it reflects "the objective of a resident entity in one economy obtaining a *lasting interest* in an enterprise resident in another economy" (IMF, 1993, italics added). In practice, investments involving 10 per cent or more of a company's shares are assumed to be FDI, otherwise they are portfolio investments. An FDI includes not only the value of the shares held by the foreign investor, but all the financial transactions between the investor and the company that is the object of investment, such as intra-firm loans (from the parent to the affiliated company) or reinvested earnings.

In Italy FDI data are collected by the Italian Foreign Exchange Office (UIC). The main source is monthly reports by resident banks on

their customers' foreign transactions. All resident entities, including firms, are also obliged to report every transaction with foreign counterparts above a given threshold[2] (Banca d'Italia, 1995). This extends the data coverage to transactions executed by non-resident banks. Finally, the UIC conducts an annual survey of Italian multinational firms in order to get estimates of reinvested earnings.

2.2 *FDI as a proxy of production internationalization*

Data on FDI have been widely used in the literature as a proxy of production internationalization. This can be explained in various ways: they are available for a large number of countries; they have a sufficient degree of comparability; alternative sources are seldom available.

FDI data include many activities, from greenfield investments to take-overs of foreign companies, except the so-called non-equity forms of internationalization: this is the case of contractual agreements for technical cooperation and foreign outsourcing. A classical example Nike's production strategy in South-East Asia, where there are about 75,000 people working on the company's productions. Only a few of them, however, are employees; the others work for local sub-contractors, which stipulate various type of contracts with the US firm (Feenstra, 1998).

Apart from non-equity forms, whose implications for our results are discussed later, it has been argued that FDI is not a good measure of production internationalization (Lipsey, 2001). A first issue regards the degree of coverage of FDI data. In the world balance of payments, international financial assets are often smaller than corresponding liabilities. In theory, the values should coincide, as the foreign assets of a given country are automatically liabilities of some other country. This clearly shows that there a problem exists: balance-of-payments data systematically underestimate foreign assets. According to Committeri (1999), in the 1990s a share of Italy's capital outflows did not appear in the official data. This was probably due to the practice of not reporting the proceeds of exports paid on foreign accounts. However, even if estimates of unreported capital flows are included, Italy's international financial position changes little compared with that of advanced countries.

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[2]   The threshold was slightly more than 10,000 euro until December 2001, and 12,500 afterwards.

Second, FDI stocks are usually obtained by simply cumulating past flows.[3] In this way no account is taken of changes in exchange rates or asset prices. This problem should be a minor one for this study. Large variations in prices are indeed less likely for short periods and our data cover only five years (1997-2001). Instead there is another question: is the time-period too short or, in other words, are flows between 1997 and 2001 a good proxy for stocks? A positive answer comes from the strong FDI expansion that took place in that period. The cumulative value of industrial FDI flows in those five years is almost 80 per cent of the 2001 stock.

Third, it has been observed that details regarding FDI destination country or sectors are not always reliable. This reflects the fact that FDI data usually report only the immediate recipient of a given transaction, which may not be the same as the ultimate recipient. Investments intended for an industrial affiliate may for example be channelled through a holding company located abroad, which then appears as the immediate recipient.[4] The same can happen for the country of destination: if there is a chain of transactions, the immediate recipient may be different from the ultimate destination country.[5]

2.3   *FDI and Italian multinational firms*

A way to see whether our data suffer from the potential distortions outlined above is to compare them with data from a different source. As has been said, alternative sources on production internationalization are rarely available. For Italy, the most complete one is the Reprint database, which since the early 1980s collects data on Italian firms' foreign affiliates (Cominotti *et al.*, 2002). The main source is a survey which takes place every two years, mainly by questionnaires. Information on non-responding companies is given by other sources, such as firm or sector reports, and documentation provided by various agencies (chambers of commerce, embassies etc.). Although this database does not include the universe of Italian multinational firms, it does include a large number of companies and so it provides a useful benchmark.

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[3]   The United States are among the rare exceptions (Lipsey, 2001).

[4]   Sector classification is based on the activity of the recipient company.

[5]   This should be a minor problem in our data. FDI flows to Luxembourg and other small countries with favourable taxation or less strict financial regulations (and so less likely to be final destinations of industrial investments) are only 9 per cent of total FDI.

Table 1

Correlation between FDI and employment in foreign affiliates

	Obs.	Pearson correlation	Spearman correlation
All sectors	54	0.68	0.72
Without:			
Food and beverages	48	0.68	0.71
Textiles, clothing and leather	48	0.73	0.76
Paper and printing	48	0.66	0.64
Chemicals, plastic and rubber	48	0.65	0.74
Primary and fabricated metal products	48	0.67	0.70
Industrial machinery	48	0.62	0.71
Electronic products	48	0.67	0.70
Transport equipment	48	0.70	0.73
Other manufacturing	48	0.70	0.74

Source: Author's calculations based on UIC and Cominotti *et al.* (2002). The Table reports the correlation coefficients between Italy's cumulative industrial FDI outflows (1997-2001) and employment in foreign affiliates of Italian firms (2000), by nine sectors and six areas (Western Europe, Eastern Europe, North America, Latin America, Asia, rest of the world).

The correlation between FDI flows and foreign affiliates' employment, for nine sectors and six destination areas, is quite high (around 0.70; Table 1). Dropping one sector at a time, we get similar results. This means that the correlation is not driven by a single sector and that the two distributions are similar for every sector. A further check involves the detail on the source province.[6] This corresponds to the bank branch for the reports made by resident banks, and to the firms' headquarters for the reports made by resident entities. Comparing the distribution of FDI and that of foreign affiliates by four aggregate macro-

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[6]   For some observations, the detail on the source province is not available; however, they represent only less than 10 per cent of FDI.

areas, one gets very similar results. Both sources point to the same picture, where the North-West of Italy has the leading share; in both cases the South's share is almost negligible (Table 2).

Summing up, the potential distortions discussed in the literature do not seem to affect our FDI data, which are strikingly close to data on foreign affiliates of Italian multinational firms. Therefore, they can safely be taken as a proxy of Italy's equity internationalization of production.

Table 2

FDI and employment in foreign affiliates by source area

	FDI	Employment in foreign affiliates
North West	73.2	67.6
North East	15.4	20.6
Centre	9.3	7.5
South and Islands	2.0	4.2
Italy	*100.0*	*100.0*

Source: Author's calculations based on UIC and Cominotti *et al.* (2002). The Table reports the distribution of cumulative industrial Italy's FDI outflows (1997-2001) and employment in foreign affiliates of Italian firms (2000), by source area (parent company's headquarters for employment).

3.   Related literature

3.1   *FDI and multinational firms*

In this section we provide a brief sketch of the main paths followed by the literature on production internationalization. As the aim is to clarify the theoretical background of the hypotheses tested in the paper, the discussion will focus on the determinants of FDI.[7]

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[7]   For a review of the literature see Markusen (1995), Markusen and Maskus (2001) and Lipsey (2002).

The first contributions were made in the context of the international finance literature and considered FDI as a form of international capital flow. In this approach, investments are made to equalise the marginal productivity of capital among countries. This hypothesis raises several problems. One would expect capital to flow to emerging countries, where it is scarcer, but these receive only a marginal share of global FDI flows. Furthermore, the theory predicts that there are capital-exporter and capital-importer countries; however, there are often two-way flows, so that a large FDI recipient country is also a big investor (Lipsey, 2000).

Starting with Hymer (1960), the literature has therefore abandoned the macro approach and has looked at FDI from an industrial organization perspective. Why should a firm choose to expand abroad, and therefore why do multinational enterprises exist? The answers can be grouped in two broad classes. The first explanation is based on cross-country differences in factor prices or factor quality (vertical FDI). For example, a firm's production capacity could be localized in a low-wage country, while its headquarters are in the country of origin (Helpman, 1984; 1985).

Data suggest, however, that FDI mainly takes place between countries with similar factor endowments. Together with the observation that FDI tends to flow to rich and large countries, this has led to the idea that FDI is motivated by market-access strategies (horizontal FDI). A firm will serve a foreign market by FDI rather than export if there are strong barriers to the latter, such as shipping costs, tariffs, or if it is important to be located near the final customers, for example to provide distribution or after-sale services (Brainard, 1993; 1997, Markusen and Venables, 1998).

Since the early studies it has been observed that multinational firms have specific features. First, they all tend to be large firms. This is easily explained if one supposes that there are fixed costs of FDI, so that big firms find it easier to pay for them. In Helpman *et al.* (2003), for example, the assumption of fixed costs of exports and (higher) fixed costs of FDI, together with firm heterogeneity, implies that the smallest (least productive) firms serve only the domestic market, while exports are made by middle-sized firms and FDI by the largest (most productive) firms. Empirical studies confirm the importance of firm size for investing abroad, although Blomström and Lipsey (1991) say that it only matters for the probability of being a multinational firm. Once a firm is multinational, its size apparently does not affect the scale of foreign activities. Evidence for Italian firms is provided by Bugamelli *et al.* (2000); they find that firm size

accounts for 85 per cent of the explained variation in greenfield investments.

Before highlighting the other main features of multinational enterprises, it is useful to remember that firms can replace FDI with other forms of internationalization. As has been said, among the main reasons behind FDI there are either cost-reduction or market-access strategies. In both cases, firms could attain the same objectives, respectively by foreign outsourcing or by licensing to foreign companies. Local firms, furthermore, enjoy many advantages compared with the multinational firm, which faces language and cultural barriers and is less informed on the foreign country's law, institutions and business environment (Markusen, 1995).

The literature has therefore wondered why multinational firms exist at all, given that their operating costs are higher than those of local firms. The conventional answer is that there must be specific advantages gained by the multinational companies to offset their higher costs. Examples are special inputs, such as patents, technologies and management know-how, that can easily move between plants located in different countries. The hypothesis has usually been tested using firm-level data. It turns out that multinational companies spend more on R&D, marketing and advertising, and also show larger product innovation (Grubaugh, 1987; Caves, 1996).

The impact of sector specificities on firms' internationalization process has been the focus of recent work by Antràs (2003) and Antràs and Helpman (2003). They study the choice between FDI and foreign outsourcing in a context of limited information and argue that FDI is more likely the more capital-intensive or headquarters-services-intensive is the production process. Estimates by Antràs (2003) confirm that the share of US imports from foreign affiliates is positively related to the degree of capital intensity.

Finally, further evidence from a macro point of view comes from Lipsey (2000). He observes that countries invest more abroad in the sectors in which they enjoy comparative advantages and concludes that FDI is driven by the detention of specific advantages, such as technological or managerial ones.

3.2   *FDI and industrial districts*

The main purpose of this study is to shed some light on industrial districts' FDI. The first step is to set out a precise definition of what is

meant by industrial district. Although there is no complete agreement in the literature, we think that the following definition captures the most important features of a district: "a spatial agglomeration of small independent manufacturing enterprises, all specialized in a single industry (or line of industry), such as to enjoy idiosyncratic external economies, closely related to the local community (Signorini, 2000; the translation is mine).

The empirical literature shows that districts enjoy significant advantages in terms of greater efficiency and productivity (Signorini,1994, Fabiani *et al.*, 2000). They also show a strong international openness. According to Bronzini (2000), their export propensity is higher than average, and Bugamelli and Infante (in this volume) find that district companies face lower fixed costs of export than non-district firms. The subject of production internationalization by the industrial districts has been less thoroughly investigated. Using Reprint data on Italy's provinces, Piscitello (1999) finds that the presence of districts favours the process of internationalization. Their measure of internationalization, however, takes into account only small and medium firms, not large ones.

A priori, it is not clear whether districts should have a special tendency to expand production abroad or not. A positive answer would find support in their high export propensity, which should increase their knowledge of international markets, and therefore lower the sunk costs of FDI. Since their strong specialization reflects competitive advantages, it should also foster FDI. Small firm size could instead be a barrier to moving production abroad because of fixed costs. Small firms, including those in a district, would then serve foreign markets by export, rather than FDI. Furthermore, industrial districts are mainly specialized in traditional, labour-intensive sectors, where foreign outsourcing might be preferable to FDI. Finally, one could suppose that, for a firm enjoying positive external economies within the district, moving out to produce abroad implies higher costs.

4. Methodology

4.1 *The model*

We estimate the following equation:

$$FDIPROPENSITY_{ij} = \alpha_1 + \alpha_2 LARGEFIRMS_{ij} + \alpha_3 GROUPS_{ij} + \alpha_4 DISTRICT_{ij} +$$

$$\alpha_5 CAPITAL_j + \alpha_6 INTANGIBLES_{ij} + \alpha_7 INFRASTRUCTURE_i + \alpha_8 VALUEADDED_i +$$

$$\sum_{k=1}^{8} \beta_k \; SECTOR_k + \sum_{l=1}^{3} \gamma_l \; AREA_l + \varepsilon_{ij}$$

The observation unit is the cell "province-sector" (*i* and *j* respectively), which corresponds to the finest detail available in our FDI data. There are nine sectors, covering almost all the manufacturing industry; they are reported in the Appendix. We work at the province-sector level rather than at more aggregate levels (region, region-sector) because our main focus is on industrial districts, which are usually defined as small areas. In the standard methodology, for example, they are identified at the level of 'Local labour systems' (LLS): narrow portions of territory, mainly within a given province. Searching for a 'district effect' is the harder, the more aggregate the point of observation. Moreover, there are often many economic differences with the same region (Viesti, 1995 on export).

4.2   *The dependent variable*

The dependent variable is a proxy of production internationalization. Its construction requires three choices. First, we cumulate the value of FDI flows between 1997 and 2001. Given the steep growth in FDI, this is an acceptable measure of the stock (which is not available). Moreover, we choose not to use annual data because they are more likely to be influenced by single operations, such as big M&As.

The second choice is between gross FDI and net FDI (i.e. gross FDI minus divestments). In the balance of payments, divestments are capital flows going back from the foreign affiliate towards the parent company. We take gross FDI because it is a more precise measure of actual investment expenditure, while divestments are a very heterogeneous category; they include not only the cases where the investment is sold off, but also those where affiliate's profits are not reinvested abroad or where the affiliate pays loans back to the parent company. Only in the first case would the foreign country be abandoned, while the second and the third events indicate the 'success' of the investment, which becomes able to produce returns to the investor. Other papers in the literature (Bronzini, in this volume) also use gross FDI.

Third, we divide the cumulative value of FDI by the employment in the province-sector. The source for the denominator is the 1996 census on industry and services. In this way we account for the size of the local economic structure and get a measure of FDI propensity. The choice of the scale variable is influenced by data availability. At our level of detail there are no data on turnover or added value. Employment data have already been used to get a measure of export propensity in Bronzini (2000). However, to assess the robustness of our results we alternatively employ the volume of sales for every province-sector obtained from Cerved, which is a very wide database on Italian firms.

4.3 *The industrial districts*

For an empirical paper on industrial districts, identifying and measuring them is a priority. The standard method is based on Sforzi (1991). The geographic unit is the LLS, which corresponds to an area that includes a large part of workers' daily mobility. If it respects some criteria (specialization in manufacturing, specialization in one sector, larger than average share of small and medium), the LLS is called a district. Applying this method to 1991 census data, there are 199 districts out of 784 LLSs.

While districts are identified at the LLS level, our unit of observation is the province-sector. Using census data by municipality, and assuming that each municipality in a district LLS is a district as well (in its specialization sector), we build the following measure (*baseline* district):

$$DISTRICT_{ij} = \frac{ADD_{ij}^{DIS}}{ADD_{ij}}$$

where ADD_{ij}^{DIS} is employment in district municipalities for province i and sector j, ADD_{ij} is employment in all the municipalities for the same province and sector, and j is the specialization sector of the district. For example, taking a province where there is only one district specialized in textiles, the district measure will be positive for the cell 'province-textile', and will be zero for the (eight) cells 'province-other sectors'. Following this approach, there are 122 district province-sectors out of 927 (103 provinces times 9 sectors).

It has been argued that a province-based measure would not adequately describe the presence of districts. While our choice is dictated by the lack of a more detailed level for FDI (by LLS or municipality), we nonetheless believe that it is a satisfying approximation. First, using a

continuous variable rather than a dummy allows us to take into account how much the district matters for the province. Second, using a province-sector variable underlines the importance of specialization, which is one of the main features of districts and which should be a main source of external economies. Third, similar measures have been already employed in the literature (Bronzini, 2000 and in this volume).

Anyway, to verify the sensitivity of the results to this particular choice we calculate four other measures. The first two are discrete variables. The *employment* dummy is equal to 1 if at least 50 per cent of employment in the province-sector comes from district municipalities and 0 otherwise; the *municipality* dummy is equal to 1 if at least 50 per cent of the municipalities in the province-sector are district municipalities, and 0 otherwise. In this way we avoid taking provinces as district provinces, where districts are marginal or not very relevant. The district effect could be non-linear, so that it appears only when the district is very strong for a given province.

The third measure is given by the ratio of manufacturing employment in district municipalities for a province to manufacturing employment in all the municipalities of the same province (*province* variable). The difference with the baseline measure is that here it is calculated at the province level, while before it was at the province-sector level. This allows us to take into account the case of positive external economies, which are not restricted to companies specialized in one sector, but may accrue to all local firms, irrespective of their sectors. While it is hard to conceive how a textile district could favour local firms in the food or transport equipment sector, there could, however, be benefits due to mutual trust or to a set of values shared by the community. Furthermore, sometimes the specialization sector does not capture the whole set of activities carried out in a given line of industry by the district: going back to the example of the textile district, machinery for the textile industry is often manufactured within the district.

Finally, the fourth measure employs a novel algorithm devised by Iuzzolino (in this volume), whose methodology differs from Sforzi in several repects. For example, it is based on municipalities rather than LLS data. Using agglomeration measures *à la* Ellison and Glaeser (1997) it starts by identifying the centre of the district (i.e. the main municipality); it then extends the district to contiguous municipalities, provided that their measure of agglomeration is above a statistical threshold. Another important difference is that there are no selection criteria based on firm

size. Now, given that since the early literature industrial districts are closely related to small firms, it is probably safer to take the algorithm as a useful measure of industrial agglomeration, rather than an alternative measure of industrial districts. We will nonetheless use such a measure as a robustness check. Considering the relevance of the district centres, which account for about 70 per cent of the agglomeration economies, the indicator (Iuzzolino Algorithm, henceforth IA) is equal to the employment in the main municipality of the district for province and sector, divided by the employment in the entire province and sector.

As is shown in Table 3 the baseline district is highly correlated with the two dummies (0.90 for employment, 0.67 for municipality); the correlation with the other two measures is much lower (slightly over 0.30). This result is easily explained for the province variable, which assigns positive values to all observations that belong to a province where there happens to be a district. To interpret the low correlation with the IA district, instead, it is to be noted that the outcome of Iuzzolino's algorithm in terms of district municipalities is remarkably different from that of Sforzi. Sforzi's algorithm selects only 66 per cent of Iuzzolino's agglomerations, while Iuzzolino's algorithm, in turn, puts into agglomerations only 59 per cent of Sforzi's district municipalities (Iuzzolino, in this volume).

Table 3

Correlation table for five district measures

	Baseline	Employment dummy	Municipality dummy	Province	IA
Baseline	-				
Employment dummy	0.90	-			
Municipality dummy	0.67	0.68	-		
Province	0.31	0.27	0.21	-	
IA	0.33	0.31	0.14	0.09	-

Source: Author's calculations based on Istat, Sforzi (1991), Iuzzolino (in this volume).

4.4   *The other determinants of FDI propensity*

Together with a study of the districts' production internationalization, this paper aims to identify the main determinants of FDI, that is those features of the local industrial structure that are associated with higher FDI. Adding controls to the regression should, moreover, yield a more precise estimate of the district effect, which could otherwise mirror the impact of factors that are not specific to districts. The following variables appear on the right of the equation: presence of large firms, industrial groups, capital intensity and intangibles.

Table 4

Summary statistics

	Mean	Median	St. dev.	Min.	Max.
FDI propensity	0.002	0.000	0.009	0	0.128
Export propensity	0.068	0.023	0.743	0	22
Large firms	0.125	0	0.245	0	1
Groups	0.007	0.001	0.025	0	0.385
Capital intensity	51	39	54	0.721	746
Intangibles	0.069	0.042	0.091	0	0.893
Infrastructure	95	89	37	33	248
Per capita value added	14,949	15,523	3,874	7,817	23,816
Baseline district	0.047	0	0.163	0	1
Employment district	0.043	0	0.203	0	1
Municipality district	0.023	0	0.149	0	1
Province district	0.300	0	0.361	0	1
IA district	0.030	0	0.101	0	0.87

Source: Author's calculations. For the description of the variables, see the Appendix.

The first two variables are meant to control for the size of firms and they are expected to influence FDI positively. A positive sign is also expected for the two other variables; they should approximate the existence of specific competitive advantages that are associated with multinational firms. It is possible that these advantages are not perfectly proxied by the two regressors, and lack of data prevents the use of other potentially interesting variables, such as research and development, marketing expenditure and product innovation. This is why we also employ dummies for each sector.

The four regressors are built for every province-sector starting from firm-level data, which are taken from the Centrale dei Bilanci database. This procedure is necessary because of the lack of other sources of information containing details on provinces and sectors. Centrale dei Bilanci offers high quality data and is very representative of the main Italian firms. Details on the sample of firms used for the paper, together with the definition of the variables, are provided in the Appendix.

Finally, a precise measurement of the district effect requires that the district variable does not pick up the impact of local specificities that have nothing to do with the external economies of a district. Think, for example, of regional development policies or infrastructures (airport connections, business services) that may foster FDI. The solution is to add two more regressors: per capita value added, as a proxy of the degree of development, and a measure of provincial infrastructures.

The reference year for all variables except infrastructure is 1996, which avoids endogeneity with respect to the dependent variable. For infrastructure the reference year is 2001. Summary statistics are reported in Table 4.

4.5 *The estimation method*

The estimation is carried out on 786 out of the 927 province-sectors. The reason for drupping the rest is that data from Centrale dei Bilanci are not available for some observations. The incidence of the 141 observations that we are forced to drop is small in terms of employment, export and FDI (respectively 1.4, 0.6 and 0.1 per cent). Most of them are scarcely industrialized or have a limited range of specialization provinces and two thirds are located in the South.

There are 148 province-sectors with nil FDI; we clearly have to control for the censored nature of the dependent variable, which cannot take negative values. We therefore estimate a Tobit model by maximum likelihood. The dependent variable is the log of one plus FDI on employment; in this way, it will equal zero for observations with nil FDI (the lower bound).

5.   Results

5.1   *Descriptive analysis*

In this section we look at the role played by industrial districts in Italy's FDI with the tools of descriptive statistics. Table 5 reports the share of FDI, exports and employment for three areas: districts, non-district industrialized, non-district non-industrialized. The district areas are the 122 province-sectors mentioned above. The distinction between the other two areas was made on the basis of an index of industrialization. The districts' share equals 35.2 per cent in terms of employment; it is higher in terms of exports (41.5 per cent) but lower in terms of FDI (27.7 per cent). FDI are concentrated in non-district industrialized areas.

Table 5

FDI, export and employment by district and non-district areas

	Employment	Export	FDI
Non-district non-industrialized	18.3	12.2	8.5
Non-district industrialized	46.5	46.3	63.8
Districts	35.2	41.5	27.7
Italy	*100.0*	*100.0*	*100.0*

Source: Author's calculations based on UIC, Istat, Sforzi (1991). The table reports the distribution of Italy's cumulative industrial FDI outflows (1997-2001), manufacturing employment (1996) and exports (1996), by district and non-district areas. District areas are defined on the basis of the baseline measure (see Appendix). Non-district areas are grouped into industrialized and non-industrialized, depending on whether they are above or below the median by province of the ratio between manufacturing employment and total employment.

A similar picture is obtained if one looks at the 15 province-sectors with the most FDI, where non-district areas prevail (Table 6). The strong incidence of two provinces (Milan and Turin), from which more than 60 per cent of FDI originates, is presumably associated with the headquarters of large industrial groups. The biggest groups would therefore seem to have a deep influence on Italy's FDI. Interestingly, this pattern also finds support in the Reprint data. In 2000 the five biggest groups included nearly half of total employment in Italian firms' foreign affiliates and more than 60 per cent in terms of turnover (Cominotti *et al.,* 2002).

Table 6

Province-sectors with higher FDI

Province	Sector	FDI	Employ-ment	Export	Baseline district
Milan	Electronic products	11.8	2.5	3.2	0
Turin	Transport equipment	8.1	2.4	3.1	0
Milan	Other manufacturing	7.2	1.1	1.1	0.37
Milan	Chemicals and plastic	6.8	2.7	2.9	0
Turin	Industrial machinery	5.6	0.8	1.6	0.02
Turin	Electronic products	5.4	0.7	1.1	0
Milan	Paper and printing	3.6	1.1	0.3	0
Milan	Food and beverages	3.2	0.9	0.4	0
Rome	Electronic products	3.1	0.5	0.5	0
Milan	Metal products	2.0	1.5	1.3	0
Milan	Textiles, clothing and leather	2.0	1.0	1.6	0.27
Parma	Food and beverages	1.9	0.4	0.3	0.94
Milan	Industrial machinery	1.7	1.5	3.2	0.07
Turin	Chemicals and plastic	1.4	0.5	0.5	0
Milan	Transport equipment	1.4	0.3	0.6	0

Source: Author's calculations based on UIC, Istat, Sforzi (1991). For the 15 province-sectors with more FDI, the table reports the percentage share of Italy's total cumulative industrial FDI outflows (1997-2001), manufacturing employment (1996) and exports (1996) and the baseline district measure (see the Appendix).

5.2 *Econometric analysis*

For a more systematic and rigorous assessment of the district effect an econometric analysis is carried out. Table 7 reports the results of a sequence of estimates, where regressors are added step by step, moving from a very simple specification (only large firms, groups, district and area controls) to more complex ones. FDI propensity is positively related to the

Table 7

Determinants of FDI propensity

	(1)	(2)	(3)	(4)	(5)
Large firms	0.76***	0.77***	0.66***	0.63***	0.60***
	(0.12)	(0.12)	(0.12)	(0.11)	(0.11)
Groups	8.85***	8.76***	8.91***	7.84 ***	6.09***
	(1.36)	(1.36)	(1.30)	(1.31)	(1.33)
Baseline district	0.07	0.08	0.30	0.33*	0.27
	(0.18)	(0.18)	(0.20)	(0.20)	(0.19)
Capital intensity	-	0.04	0.05	0.04	0.05
		(0.05)	(0.05)	(0.05)	(0.05)
Intangibles	-	0.07	-0.30	-0.46	-0.51
		(0.39)	(0.39)	(0.39)	(0.38)
Infrastructure	-	-	-	0.42***	0.39***
				(0.09)	(0.09)
Per capital value added	-	-	-	-	1.48***
					(0.29)
Area dummies	YES	YES	YES	YES	YES
Sector dummies	NO	NO	YES	YES	YES
Pseudo R-squared	0.14	0.14	0.17	0.18	0.19
Total obs.			786		
Censored obs.			148		

Source: Author's calculations. Regressions are estimated by Tobit maximum likelihood and include a constant, whose coefficient is not reported. Three stars (***) denote significance at the 1 per cent level, two stars at the 5 per cent level and one star at the 10 per cent level.

presence of large firms and industrial groups; both variables are always significant at the 1 per cent level. This is an important result, given the peculiar feature of Italian manufacturing industry, where small and medium firms prevail. Firm size is a key to understanding Italy's low propensity to invest abroad.

Table 8

Determinants of export propensity

	(1)	(2)	(3)	(4)	(5)
Large firms	0.64***	0.63***	0.28**	0.27*	0.23
	(0.15)	(0.15)	(0.14)	(0.14)	(0.14)
Groups	0.96	1.12	1.13	0.58	-1.13
	(1.04)	(1.08)	(1.27)	(1.22)	(1.13)
Baseline district	0.37***	0.35***	0.54***	0.56***	0.49***
	(0.13)	(0.13)	(0.14)	(0.14)	(0.14)
Capital intensity	-	-0.06	0.12*	0.12	0.13*
		(0.08)	(0.07)	(0.07)	(0.07)
Intangibles	-	-0.31	-0.25	-0.31	-0.34
		(0.55)	(0.44)	(0.44)	(0.43)
Infrastructure	-	-	-	0.22**	0.19*
				(0.11)	(0.11)
Per capita value added	-	-	-	-	1.45***
					(0.36)
Area dummies	YES	YES	YES	YES	YES
Sector dummies	NO	NO	YES	YES	YES
R-squared	0.22	0.22	0.46	0.46	0.48
Total obs.			*786*		

Source: Author's calculations. Regressions are estimated with OLS and include a constant, whose coefficient is not reported. Robust standard errors are reported under the coefficients. Three stars (***) denote significance at the 1 per cent level, two stars at the 5 per cent level and one star at the 10 per cent level.

The district effect is small and generally not significant. Once we include sector dummies, its coefficient gets larger, while the standard error does not change much; its significance is, however, almost always below the conventional threshold of 10 per cent. Even taking into account differences across sectors in FDI propensity, there is still no robust evidence of a district effect.

<div align="right">**Table 9**</div>

Interaction between districts and firm size

	FDI (1)	FDI (2)	Export (3)	Export (4)
Large firms	0.74***	0.57***	0.64***	0.24*
	(0.12)	(0.11)	(0.15)	(0.14)
Groups	8.67***	6.00***	1.17	-1.08
	(1.36)	(1.33)	(1.05)	(1.14)
Baseline district	-0.54	-0.36	0.70**	0.78***
	(0.41)	(0.40)	(0.29)	(0.26)
Interaction district - firm size	0.04*	0.04*	-0.02	-0.02
	(0.02)	(0.02)	(0.01)	(0.01)
Capital intensity	0.04	0.04	-0.05	0.13*
	(0.05)	(0.05)	(0.08)	(0.07)
Intangibles	0.03	-0.53	-0.29	-0.33
	(0.39)	(0.38)	(0.55)	(0.43)
Infrastructure	-	0.40***	-	0.18*
		(0.09)		(0.11)
Per capita value added	-	1.48***	-	1.45***
		(0.29)		(0.36)
Area dummies	YES	YES	YES	YES
Sector dummies	NO	YES	NO	YES
Total obs.		786		786
Censored obs.		148		-

Source: Author's calculations. Regressions (1) and (2) are estimated by Tobit maximum likelihood; regressions (3) and (4) are estimated with OLS. All regressions include a constant, whose coefficient is not reported. Robust standard errors are reported under the coefficients. Three stars (***) denote significance at the 1 per cent level, two stars at the 5 per cent level and one star at the 10 per cent level.

Capital intensity is not significant, probably because there is little variability across provinces. The lack of significance of intangibles could instead be explained by the low propensity of Italian firms to invest in the high technology sector. There is also an issue related to our data. Intangibles are taken from firms' budgets and they include goodwill; this makes them a rather rough proxy for true intangibles. Finally, the

regressors that should capture the effect of local specificities (per capita value added and infrastructure) are both positive and significant.

In Table 8 regressions have been estimated replacing the FDI propensity with export propensity as the dependent variable.[8] The results show that there is a large difference between commercial and production internationalization. Now, there is a strongly significant district effect, in line with the previous literature. This is not, however, the only difference, because export is not influenced at all by industrial groups and only weakly by large firms. Another conclusion can be therefore drawn regarding districts. Industrial districts, which are mainly made up of small firms, face more barriers to FDI than to export for the very reason that firm size is relatively more important for FDI than for export.

5.3   *Understanding districts' low FDI propensity*

Small and medium firms may be deterred from investing abroad because of the high sunk costs implied by FDI. Some of these costs are information-related, however: the need to acquire information about the foreign country, its laws, its business regulations and markets. In theory this type of information could easily move from one firm to another, especially if those firms enjoy close relationships or if they share the same pool of labour. For example, district firms having regular contacts with larger firms that invest abroad could manage to increase their information on the foreign country and thus overcome the barriers to FDI.

This yields a simple way to verify whether high sunk costs hinder districts' FDI. We introduce an interaction term given by the product between districts and a measure of firm size (average firm sales). We expect that district firms located in province-sectors with higher average firm size, and therefore more available information on foreign countries, will be more likely to invest abroad. The evidence seems to support this idea: alone, districts are still not significant, but once interacted with a proxy of firm size they show a significant and positive FDI propensity. The interaction term is instead not significant in the export equation, while

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[8]   Export is positive for all province-sectors, so that the dependent variable (export propensity) is not censored. We therefore use a simple OLS model.

districts alone are still very significant (Table 9).[9] Sunk costs may then be one reason for districts' low FDI propensity.

Table 10

Probability of positive FDI

	(1)	(2)	(3)	(4)	(5)
Large firms	0.93***	0.96***	1.00***	0.95***	0.99***
	(0.31)	(0.32)	(0.34)	(0.33)	(0.33)
Groups	20.27	18.64	25.91	21.80	17.98
	(22.59)	(22.10)	(22.98)	(20.44)	(19.25)
Baseline district	1.50**	1.52**	1.75***	1.75**	1.65**
	(0.61)	(0.61)	(0.66)	(0.69)	(0.67)
Capital intensity	-	0.05	0.01	0.02	0.03
		(0.08)	(0.09)	(0.09)	(0.09)
Intangibles	-	-0.28	-0.63	-0.83	-0.88
		(0.62)	(0.63)	(0.61)	(0.62)
Infrastructure	-	-	-	1.27***	1.26***
				(0.29)	(0.31)
Per capita value added	-	-	-	-	1.62***
					(0.57)
Area dummies	YES	YES	YES	YES	YES
Sector dummies	NO	NO	YES	YES	YES
Pseudo R-squared	0.26	0.26	0.34	0.37	0.38
Total obs.			786		
Censored obs.			148		

Source: Author's calculations. Regressions are estimated by a probit model and include a constant, whose coefficient is not reported. Robust standard errors are reported under the coefficients. Three stars (***) denote significance at the 1 per cent level, two stars at the 5 per cent level and one star at the 10 per cent level.

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[9] This result, pointing to a leadership behaviour of large firms in the process of internationalization, recalls the findings of Mariotti (2001), whose analysis of 21 districts, all specialized in the mechanical industry, shows a positive association between the district's production internationalization and its degree of concentration.

A second key comes from taking a different estimation approach. If we look at the probability of positive FDI rather than at the levels, the role of districts turns out to be more important than before. For example, only 7 per cent of the district province-sectors does not invest abroad, while the share of province-sectors with nil FDI is much larger among non-district observations (slightly less than 30 per cent).

More formally, we estimate a probit model, where the dependent variable is a dummy equal to one when FDI is larger than zero, and zero otherwise. The results, reported in Table 10, differ from the level estimations in two respects. First, groups, which were very important before, are not significant in terms of probability of positive FDI. Second, and more importantly, there is now evidence of a positive and significant district effect. Together with our previous findings this seems to suggest that, if district firms invest abroad, the amount of their investments is probably small, especially when compared with that of the largest firms.

5.4 *Sensitivity analysis*

We test the robustness of our results in different ways. In the first group of additional regressions, we replace the baseline measure of districts with the four other measures outlined above. The results are reported in Table 11. None of the four district measures are significant. Interestingly, almost all of them are significant when the dependent variable is export propensity rather than FDI propensity.

We have also run further checks (we do not report them to save space). Firstly, we change the dependent variable to the ratio of FDI to sales (the latter being taken from the Cerved archive). Secondly, we widen the sample in such a way as to include the remaining 141 province-sectors for which no information is available in Centrale dei Bilanci. We build a new proxy of large firms using census data, while we are forced to drop some regressors (groups, capital intensity and intangibles) for which there are no alternative sources. In both cases, districts are never significant at the 5 per cent level.

Finally, we run regressions by sector and by destination area. The results should be taken with some caution: as the detail grows, so does the number of observations with no FDI in a given sector or towards a given geographical area. In the first set of regressions, the only sector with a statistically significant district effect is food and beverages. The coefficient is negative, although not significant, in the textiles and clothing sector. The

second set of estimates shows that there is no district effect in any of the six geographical areas.

Table 11

Alternative measures of districts

District measure	FDI propensity			
	Employment dummy	Municipality dummy	Province	IA
Large firms	0.60***	0.60***	0.62***	0.59***
	(0.11)	(0.11)	(0.11)	(0.11)
Groups	6.09***	6.13***	6.26***	5.66***
	(1.33)	(1.33)	(1.33)	(1.40)
District	0.20	0.29	0.14	0.37
	(0.15)	(0.20)	(0.10)	(0.31)
Capital intensity	0.05	0.05	0.05	0.05
	(0.05)	(0.05)	(0.05)	(0.05)
Intangibles	-0.50	-0.51	-0.52	-0.50
	(0.38)	(0.38)	(0.38)	(0.38)
Infrastructure	0.39***	0.39***	0.40***	0.39***
	(0.09)	(0.09)	(0.09)	(0.09)
Per capita value added	1.50***	1.50***	1.41***	1.51***
	(0.29)	(0.29)	(0.30)	(0.29)
Area dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
Pseudo R-squared	0.19	0.19	0.19	0.19
Total obs.		786		
Censored obs.		148		

Source: Author's calculations. Regressions are estimated by Tobit maximum likelihood and include a constant, whose coefficient is not reported. Robust standard errors are reported under the coefficients. Three stars (***) denote significance at the 1 per cent level, two stars at the 5 per cent level and one star at the 10 per cent level.

6. Concluding remarks

This paper makes two main contributions. The first one relates to the literature on industrial districts. While our results provide further support for their strong contribution to national exports, they suggest a much smaller contribution to Italy's FDI. Why then are districts very good at selling abroad and less good at investing abroad? There are three potential explanations. First, sunk costs of FDI may be too high for small district firms, while sunk costs of exports are probably much lower. Second, the incentive to move production abroad may be less for district firms that enjoy positive external economies in the local environment. Third, FDI data do not include non-equity forms, such as foreign outsourcing. There are signals that these forms might be especially relevant for district firms, although more work is needed on this topic.

Our paper also helps to explain why the process of production internationalization has been quantitatively smaller in Italy than in other European countries. FDI is driven by large firms, which are scarcer in our country, and is not supported by districts. There seems to be a big difference between commercial and production internationalization; factors that promote the former are not necessarily the same as those that favour the latter. An economic system based on small firms and districts may perform well on exports, but may make a smaller contribution once more complex strategies of internationalization are considered.

APPENDIX

A.1   Definition of the variables

Note: starred variables are available at the province level; other variables are available at the province-sector level.

FDI propensity: log of ratio between cumulative FDI flows and employment. Year: 1997-2001 for the numerator, 1996 for the denominator. Source: UIC, Istat Intermediate Census.

Export propensity: log of ratio between exports and employment. Year: 1996. Source: Istat data on external trade, Istat Intermediate Census.

Presence of large firms: ratio between sales of firms with at least 250 employees and sales of all firms. Year: 1996. Source: Centrale dei Bilanci.

Industrial groups: ratio between sales of firms belonging to groups and Italy's sales of firms belonging to groups in a sector. Year: 1996. Source: Centrale dei Bilanci.

Capital intensity: log of ratio between tangible assets and employment. Year: 1996. Source: Centrale dei Bilanci.

Intangibles: ratio between intangible assets and total (tangible + intangible) assets. Year: 1996. Source: Centrale dei Bilanci.

Infrastructure:* global index of infrastructure, net of harbours. Year: 2001. Source: Istituto Tagliacarne.

Per capita value added:* ratio between total value added and population. Year: 1996. Source: Istat.

Baseline district: ratio between employment in district municipalities and employment in all municipalities. District methodology: Sforzi. Year: 1996. Source: Istat Intermediate Census.

Employment district: dummy equal to 1 if at least 50 per cent of employment is in district municipalities, and 0 otherwise. District methodology: Sforzi. Year: 1996. Source: Istat Intermediate Census.

Municipality district: dummy equal to 1 if at least 50 per cent of municipalities are district and 0 otherwise. District methodology: Sforzi. Year: 1996. Source: Istat Intermediate Census.

Province district*: ratio between employment in district municipalities and employment in all municipalities. District methodology: Sforzi. Year: 1996. Source: Istat Intermediate Census.

IA district: ratio between employment in main district municipalities and employment in all municipalities. District methodology: Iuzzolino. Year: 1996. Source: Istat Intermediate Census.

A.2   Details of Centrale dei Bilanci data

For the variables taken from Centrale dei Bilanci (large firms, groups, capital intensity and intangibles), the procedure was as follows. Starting from 21,554 manufacturing firms in 1996, we first dropped 978 firms, whose sector (Ateco DF) was not included in the study. Then, firms with zero or missing sales or employment were dropped, leaving 17,028 firms. Data were aggregated to the province-sector level on the basis, respectively, of the firm's headquarters and its main sector of activity.

A.3   List of sectors

Sector	Ateco	UIC code
Food and beverages	DA	61
Textiles, clothing and leather	DB, DC	62
Paper and printing	DE	63
Chemicals, plastic and rubber	DG, DH	55, 64
Metal products	DJ	56
Industrial machinery	DK	57
Electronic products	DL	58, 59
Transport equipment	DM	60
Other manufacturing (including wood, furniture and non-metallic products)	DD, DI, DN	54, 80

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