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BY ITALIAN INDUSTRIAL DISTRICTS' FIRMS.
STRUCTURAL AND BEHAVIOURAL
DETERMINANTS**

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► **To cite this version:**

Sergio Mariotti, Marco Mutinelli, Lucia Piscitello. THE INTERNATIONALISATION OF PRODUCTION BY ITALIAN INDUSTRIAL DISTRICTS' FIRMS. STRUCTURAL AND BEHAVIOURAL DETERMINANTS. *Regional Studies*, 2008, 42 (05), pp.719-735. 10.1080/00343400701543264. hal-00514686

HAL Id: hal-00514686

<https://hal.science/hal-00514686v1>

Submitted on 3 Sep 2010

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THE INTERNATIONALISATION OF PRODUCTION BY ITALIAN INDUSTRIAL DISTRICTS' FIRMS. STRUCTURAL AND BEHAVIOURAL DETERMINANTS

| | |
|------------------|---|
| Journal: | <i>Regional Studies</i> |
| Manuscript ID: | CRES-2006-0117.R2 |
| Manuscript Type: | Main Section |
| JEL codes: | F23 - Multinational Firms International Business < F2 - International Factor Movements and International Business < F - International Economics, R11 - Regional Economic Activity: Growth, Development, and Changes < R1 - General Regional Economics < R - Urban, Rural, and Regional Economics, R15 - Econometric and Input-Output Models Other Models < R1 - General Regional Economics < R - Urban, Rural, and Regional Economics |
| Keywords: | industrial districts, internationalisation of production, spillovers, multinational corporations |
| | |

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The Internationalisation of Production by Italian Industrial Districts' Firms.**Structural and Behavioural Determinants**

Formatted: English U.S.

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ABSTRACT

The paper argues that structural and behavioural determinants combine to influence internationalisation of production through FDI by industrial districts' firms. As far as the former, *leadership effects*, represented by the presence of large firms within the district, and *Porterian effects*, denoted by the intensity of domestic rivalry, positively influence the likelihood that district firms will start internationalise through FDI. Moreover, spillovers induced by the presence of foreign-owned MNCs positively impact on the district's degree of internationalisation, provided it has already autonomously developed the ability to grow internationally. As far as behavioural features, previous export relationships increase the district firms' likelihood of undertaking FDI, while innovative capacity joins and strengthens internationalisation processes already started.

1
2 Key words: industrial districts, internationalisation of production, multinational
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4 corporations, spillovers

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6 JEL: R110, R150, F230
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1. INTRODUCTION

The extensive literature on the Italian industrial districts¹ has highlighted the esoteric array of interweaving factors that distinguished them as self-propelling and self-referential (that is, 'closed' in their set of production factors) systems: filière specialisation, network organisation, trust relations, collective learning, circulation of knowledge and technologies, diffuse entrepreneurship, spirit of emulation, quality, flexibility and mobility of human resources, education, strong domestic competition, and co-penetration between the economy and society in local cultures founded on centuries-long traditions (see PYKE et al. 1990, PYKE and SENGENBERGER 1992, COSSENTINO et al. 1996, BECATTINI et al. 2003, BECATTINI 2004). Over time, these factors have engendered Italian industrial districts' competitive advantages, and their strong propensity to export (BAGELLA et al., 1998; BECCHETTI and ROSSI, 2000; HELG, 2003).

However, such entirely local and self-contained entrepreneurial mechanisms have been recently threatened by the "international fragmentation of production" (FEENSTRA, 1998; ARNDT and KIERZKOWSKY, 2001; GEREFFI et al., 2005). Such a new industrial paradigm entails "global circuits of labour division" whereby firms' value chains are disarticulated, and the phases thus isolated are relocated internationally, emphasising cross-border linkages between firms in global production and distribution systems, rather than local linkages.

Cost advantages brought by these global value chains have highlighted several weaknesses in the district model: the fragility of the governance model and the organisational structure; lacks and deficiencies in innovation and advanced services, especially marketing, financial, and Internet-based activities; difficulties in absorbing and assimilating foreign technologies and in fulfilling the standards imposed – for both intermediate inputs and final goods – by the

1
2 large international supply and purchasing chains; and scant resources to be devoted to
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4 extraordinary financing operations.

5
6 The new paradigm might force districts to undertake major changes in line with what
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8 STORPER (1997) has called the 'location paradox'. According to the latter, the advantages of
9
10 local embeddedness, and the importance of local linkages, must be adjusted to new – and
11
12 therefore risky – openness to international markets. Namely: (i) 'local networks' must become
13
14 'trans-local' networks spread internationally; (ii) these networks must be embedded in global
15
16 supply and marketing circuits, where the market power of multinational companies generally
17
18 prevail; and (iii) district firms must gain a more forceful presence as 'insiders' on broad
19
20 international markets.

21
22 Although various forms, going from outsourcing to foreign direct investments (FDIs), and
23
24 requiring different level of commitment, might be adopted to grow internationally, industrial
25
26 districts do not adapt easily to the new paradigm. A first reason is the historically localised
27
28 nature of their competitive advantages. The dependence of individual firms on idiosyncratic
29
30 externalities constrains their locational choices. The integrated system of customers,
31
32 suppliers, services, knowledge, and untraded interdependencies that has hitherto sustained
33
34 districts is difficult to replicate abroad. The strong commercial culture (producing at home to
35
36 sell on foreign markets) of districts' firms make them often reluctant to devote relevant
37
38 resources to transferring their productive capacities to different and distant economic
39
40 contexts. Furthermore, relocating production abroad requires organisational innovations often
41
42 difficult for family small and medium enterprises (SMEs). Indeed, when suppliers are no
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44 longer geographically close, SMEs' resource constraints prevent their control over the whole
45
46 production filière.

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48 Within this context, the present paper aims to examine the determinants of the industrial
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50 firms' ability to internationalise their production. In particular, it suggests a conceptual

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2 framework linking such an ability to their structural and behavioural features. The focus is on
3
4 the internationalisation of production processes undertaken through FDI, which act as a
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6 promoter for other non equity forms of international involvement. The literature on these
7
8 processes is relatively meagre, mainly because of a shortage of data.
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10 The paper is organised as follows. Section 2 provides the theoretical framework and develops
11
12 the research hypotheses. Section 3 illustrates the methodology and the data employed to
13
14 empirically test the hypotheses. Section 4 reports and discusses the econometric findings,
15
16 while Section 5 concludes with summary remarks and suggestions for future research.
17

18 19 20 **2. THE DETERMINANTS OF THE INTERNATIONAL GROWTH OF INDUSTRIAL** 21 22 **DISTRICTS** 23

24
25 The literature on international growth by Italian industrial districts has mainly dealt with
26
27 international trade (BAGELLA et al., 1998; BECCHETTI and ROSSI, 2000; HELG, 2003;
28
29 MENGHINELLO, 2004; SHIN et al., 2006). Less attention has been paid to the
30
31 internationalisation of production through either FDI or outsourcing that, according to the
32
33 new paradigm previously mentioned, represent crucial drivers of their performance
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35 (MARIOTTI and MUTINELLI, 2004; CORÒ et al., 2005; FEDERICO, 2005).
36

37 In order to address such an issue, we elaborate a conceptual framework stemming from the
38
39 literature on the industrial districts' international competitiveness and their determinants,
40
41 which can be associated to structural and behavioural features of the districts themselves.
42
43 Specifically, according with recent empirical studies on firms' international growth (SOUSA
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45 et al., 2000; GREENAWAY et al., 2004), we argue that these determinants might impact both
46
47 on the firms' decision to undertake, and also on their decision about the extent of such an
48
49 international involvement.
50

2.1. Structural determinants

According to some scholars (LAZARSON and LORENZONI, 1999; LORENZONI and BADEN FULLER, 1995; BRIOSCHI et al., 2002; RUGMAN and VERBEKE, 2003), the district's likelihood of achieving international success depends on the presence of leader firms. Indeed, leader firms with high growth rates act as the engines of local industrial development as they generate innovation, enlarge and open new markets, and favour human capital spillovers. More importantly here, they also develop international production networks, and implement multinational market-seeking strategies. However, although the presence of leader firms may increase the likelihood that the district will undertake a virtuous internationalisation, their impact on the extent of such an international growth is less clear, especially *vis-à-vis* the other smaller firms dwelling the district. On the one hand, they may exert a *pull effect* by inducing the local firms linked with them to grow abroad (a sort of 'follow the customer' model); but on the other, they may act as a protective umbrella for those same firms, which may cut back their internationalisation efforts because the foreign initiatives already undertaken by the leaders provide the district with the needed international perspective. In this latter case, a *substitution effect* arises between the foreign investments made by leader firms and those by other firms in the district.

The Porterian school (PORTER, 1998, 2000; SAKAKIBARA and PORTER, 2001) takes a different approach by viewing vigorous 'local rivalry' as a crucial condition for international competitiveness. Competition on a local scale educates and trains firms in how they should compete internationally. It induces them to emulate successful strategies and models, and stimulates them to improve their performance by adopting more efficient production methods, also in their international dimension. Consequently, greater domestic competition boosts a district's international competitiveness and growth. According to this view, the polarisation of

1
2 districts around one or more firms is deleterious. A district's excessive horizontal and vertical
3
4 concentration dissolves domestic rivalry. It engenders inefficiencies and lock-ins due to a
5
6 'national champion syndrome', and it transforms non-core firms into passive sub-contractors,
7
8 rather than specialised producers able to operate on world markets.

9
10 We claim that identifying success with one or the other structure would be misleading, as
11
12 indeed neither conceptual nor empirical reasons recommend that one cluster structure is
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14 necessarily always more effective than the other one (the same perspective had been
15
16 suggested for example by SAXENIAN, 1994). Our hypothesis is that the 'leadership' effect
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18 and the 'Porterian' one, coexist and combine, just as in innovation processes, 'Schumpeterian'
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20 effects (monopoly rewards innovative effort because it assures the appropriability of its
21
22 outcomes) combine with 'Darwinian' ones (competition stimulates a search for differential
23
24 competitive advantages). Therefore, the optimal trade-off between leadership and
25
26 competitiveness in clusters is a matter to be decided in practice, not in theory.

27
28 A second important question risen within this debate concerns the role played by the affiliates
29
30 of foreign-owned multinational corporations (MNCs) (for excellent recent surveys, see
31
32 GÖRG and GREENAWAY, 2004; DRIFFIELD, 2006). Theoretical and empirical studies on
33
34 growth envisage a positive relationship between the presence of foreign MNCs in a country
35
36 and its endogenous development (BLOMSTRÖM et al., 2001; BALDWIN et al., 2005).
37
38 Therefore, the presence of MNCs might provide a bridge to foreign markets for district's
39
40 firms, as it injects a mix of skills, services and competitive *stimuli* into the district; it also
41
42 increases, via both horizontal (i.e. intra-industry) and vertical (in customer/supplier relations)
43
44 spillovers, the likelihood of systematic and fruitful external contacts by local firms. Moreover,
45
46 it induces a more general kind of spillovers (that we call "lateral") related to the creation of a
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48 cosmopolitan atmosphere in the area, thereby reducing the danger of lock-ins and
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50 encouraging firms to seek growth paths different from the one dominant in the district.

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Conversely, relying on the dilemma risen by HYMER in his seminal work (HYMER, 1970), MNCs can represent an extensions of market power, other than an international vehicle of efficiency. Specifically, when foreign MNCs are deeply embedded in the local system (RODRIGUEZ-CLARE, 1996), and the links with district firms are intense, systematic and robust, the former participate in the district's growth and local firms benefit from their presence. However, MNCs may also unilaterally appropriate local knowledge and expertise (YOUNG et al., 1994; ENRIGHT, 2000; PHELPS et al., 2003; WHITE, 2004) or generate a "crowding out" or "competition" effect, stealing market share from less efficient indigenous firms (AITKEN and HARRISON, 1999), thus causing the district to decline and disintegrate. If this were the case, the impact of foreign MNCs' presence on the industrial district's international growth would be intuitively negative.

2.2. *Behavioural determinants*

Internationalisation performances of industrial districts depend also on the strategic behaviours of local firms.

First, a circular relationship has been envisaged between innovation and internationalisation. Innovation gives rise to proprietary advantages which enable firms to grow abroad and establish themselves on the relevant markets, capitalising the exclusive rents that derive therefrom (COOKE and MORGAN, 1998). In the case of districts, the innovativeness of firms is crucially determined by the endowment of scientific and technological infrastructures, and of the qualified localised capabilities that foster collective learning processes (MASKELL and MALMBERG, 1999; MARIOTTI and PISCITELLO, 2001).

At the same time, being multinational enhances the firm's innovative performance. Indeed, the presence on foreign markets stimulates the introduction of new processes and products,

1
2 and it also becomes a means to absorb 'localised expertise' that may be embedded and further
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4 developed within the home technological base (FROST, 2001).

5
6 Second, activities on foreign markets may generate important cognitive externalities that
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8 largely benefit the other district's firms. They favour accumulation of experience, which
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10 reduces the information costs needed to overcome the 'liability of foreignness' (ZAHEER,
11
12 1995). Moreover, relying on long-standing conceptual approaches (JOHANSON and
13
14 VAHLNE, 1993), the market relationships established through exports and the relative
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16 commercial activities also help create the conditions – in terms of information, knowledge
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18 about foreign countries, global culture and managerial resources – to undertake major
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20 commitments and agreements with foreign companies (LIPSEY and WEISS, 1984;
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22 CANTWELL, 1994; MARKUSEN, 1995). As far as the latter, however, the relationship is
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24 complicated by the interaction of complementarity and substitution effects between exports
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26 and other forms of firms' internationalisation² (see BLONINGEN, 2001; MARKUSEN, 2002;
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28 HELPMAN et al., 2004; GREENAWAY and KNELLER, 2005, for a survey). Specifically, if
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30 FDI substitutes previous export relationships, then we should expect a positive relationship
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32 between them; otherwise, when the former complements exports, the effect can not be
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34 predicted a priori.

35
36 Therefore, while previous exports should reasonably increase the likelihood that industrial
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38 districts undertake internationalisation through FDI, the net effect on the latter's extent is far
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40 from being univocally determined.

41 42 43 **3. THE EMPIRICAL ANALYSIS**

44 45 46 47 *3.1. Methodology*

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2 The industrial district is not a collection of atomistic and autonomous producers, but a
3
4 complex network of social relationships within and between firms and between firms and
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6 local institutions (SAXENIAN, 1994). Accordingly, each firm takes strategic decisions
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8 strictly interacting with other firms, both through implicit local arm's length transactions, and
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10 through explicit coordination. Moreover, incentives for coordinating foreign investments are
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12 provided by industrial policies, which also promote the internationalisation of the district as a
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14 whole³ (for a survey on cluster policies around the world, see ANDERSSON et al., 2004).

15
16 Within this context, one should model the single firm's decision allowing for all the strategic
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18 interdependencies among firms (for an analysis of the influence of inter-firm relations on the
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20 strategies of the individual firm, see CANINA et al. 2005). Arguably, such a way is hardly
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22 feasible as it would require in depth analyses and detailed case studies. As a second best, we
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24 model the districts' firm international growth using the whole district as the unit of analysis in
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26 order to encompass the strategic interdependencies among district's firms. Additionally, we
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28 try to model part of the strategic interactions between district's firms, by disentangling the
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30 district's leader firms. That allows us to capture the impact of their international growth
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32 decision on the other companies' behaviour.

33
34 Internationalisation by industrial districts has been measured through FDI, which represents
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36 part of a more general strategy for internationalisation of production, often including
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38 outsourcing. Such a choice is justified first by the availability of data (see below), and
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40 secondly, by the fact that FDI has been acknowledged to be often complementary, rather than
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42 substitute, with the other forms of internationalisation. As far as the Italian case, such a
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44 complementarity has been tested by CUSUMANO et al. (2006) with reference to a sample of
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46 firms from Lombardy. Specifically, they show that being already abroad, especially through a
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48 subsidiary, increases the probability of developing linkages with local sub-contractors.
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50 However, MITRA and RANJAN (2005) show that complementarity stems from externalities

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2 generated by foreign MNCs on the host country; indeed, foreign MNCs stimulate local
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4 potential suppliers to improve their efficiency, thus increasing the former' resort to local
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6 outsourcing.
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10 3.2. Sources of data and descriptive statistics

11 In order to identify the Italian industrial districts, we relied on the statistics issued by ISTAT,
12 the Italian National Institute of Statistics, in 2002⁴. ISTAT's method consists, first, in
13 decomposing the national territory into *local labour systems* (LLS), which are identified on
14 the basis of commuters' patterns and correspond to geographic areas wherein the majority of
15 the resident population both live and work. Second, industrial districts are built by
16 aggregating LLS by means of specific indicators (degree of industrialisation, presence of
17 SMEs, production specialisation). The industrial districts thus identified amount to 199,
18 classified in 10 macro sectors.
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27 Our empirical analysis refers to these 199 districts, but their sectoral specialisation has been
28 further detailed in order to better capture their productive scope on the one hand, while
29 maintaining the diversification of district firms along *filiere*, on the other. Specifically, we
30 considered a two-digit – or more - ATECO sectoral disaggregation, which led us to consider
31 17 sectors⁵ (see Table 1).
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39 Table 1 about here

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43 Table 1 shows the distribution by sector and geographical area of the 199 industrial districts
44 considered. From the sectoral point of view, the so-called 'Made in Italy' sectors confirm
45 their preponderant weight, accounting for 65.8% of the total. If we consider also the scale
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2 intensive and medium-tech manufacturing sectors, which we call here Intermediate sectors,
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4 the proportion rises to 88.9%, while High-tech sectors account for a marginal 12.1%.

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6 Additionally, looking at the geographical dimension, a number of area specialisations do
7
8 emerge: the North-West reveals an above-average number of districts specialised in Textiles
9
10 and clothing, Machinery and equipment, Food and beverages, and Metal products; as far as
11
12 the North-East, Wood and furniture, Machinery and equipments, Precision instruments and
13
14 Non-metallic mineral products. Districts specialised in Leather and Footwear prevail in the
15
16 Centre and in the South, while districts specialised in Food and beverages dominate in the
17
18 South.

19
20 Data on the internationalisation of industrial districts via FDI, come from the Reprint
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22 database, which has been compiled by the Politecnico di Milano and sponsored by the Italian
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24 Institute for International Trade (ICE). The data set Reprint provides a census on both the
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26 foreign affiliates of Italian firms, and on Italian affiliates of foreign firms (in terms of number
27
28 of employees and sales) since 1986, and it is yearly updated (for details see MARIOTTI and
29
30 MUTINELLI, 2005).

31
32 As far as industrial district's degree of outward internationalisation, the Reprint data set
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34 allows to identify firms with foreign activities, whose headquarters is located in industrial
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36 districts. Table 2 illustrates the numbers and percentages of manufacturing firms with
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38 investments in foreign production activities and whose parent companies are located in
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40 industrial districts. The table shows both the total number and the majority-owned foreign
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42 affiliates. As at the beginning of 2003, 863 district firms owned 1,822 foreign
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44 (manufacturing) affiliates, for a total of 301,852 employees. The share on the outward
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46 internationalisation by the whole of Italian manufacturing industry is around one third of the
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48 total. As a benchmark for measurement of the phenomenon one could consider that the
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50 districts all together account for 44% of Italian manufacturing employment, and 46% of

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2 national manufacturing exports, which is comparable to their weight in terms of employment
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4 (ISTAT, 2002).

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6 *****

7
8 Table 2 about here

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12 Hence, internationalised firms are under-represented in Italian districts. In other words, the
13
14 gap in the internationalisation of production by industrial districts is as follows: the ratio
15
16 between total employment by districts in manufacturing activities abroad and their domestic
17
18 manufacturing employment is 0.148 (the ratio is 0.112 when only majority-owned affiliates
19
20 are considered), while the ratio at the national level is 0.210 (0.155).

21
22 However, these figures refer to all Italian-owned manufacturing firms in districts,
23
24 independently of their sector. If one considers only firms whose main activity falls within a
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26 district's sector of specialisation, their number diminishes significantly but their degree of
27
28 internationalisation is closer to the national average (20.5% and 17.9% for the total and for
29
30 the majority-owned case, respectively). Moreover, if the national average is calculated only
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32 considering the 17 district-level sectors of specialisation (therefore excluding sectors like
33
34 automobiles and petrol), the comparison is even more favourable, for in this case the national
35
36 average is 18.5% (for the total) and 16.1% (for majority-owned affiliates).

37
38 This latter evidence mitigates the negative judgement that might be drawn from the above
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40 information. However, the fact that districts are located in areas with a low presence of large
41
42 industrial groups or other economic agents operating in sectors with greater international
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44 scope (mainly high-tech sectors) seemingly explains their lower degree of
45
46 internationalisation. Yet districts comprise numerous national leaders in their respective
47
48 sectors of specialisation whose internationalisation strategies closely reflect the national
49
50 average.

1
2 The main finding of the descriptive analysis is the existence of inter-district differences. As
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4 reported in Table 3, numerous districts (102 of the 199 ISTAT districts considered) had not
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6 foreign majority-owned affiliates⁶, as at the beginning of 2003.
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8 *****

9
10 Table 3 about here

11 *****

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14 Moreover, their degree of internationalisation (defined as the ratio between employment in
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16 majority-owned foreign affiliates of district firms and domestic employment in Italian-owned
17
18 district firms) display a considerable heterogeneity (see Figure 1).
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21
22 Figure 1 about here

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28 **3.3. The model**

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30 Our conceptual framework deals with the impact of structural and behavioural determinants
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32 on the district firms' internationalisation, meant as both the likelihood of undertaking
33
34 international growth through FDI, and the extent of such a growth. The structure of such an
35
36 issue contains an inherent sample selection problem: we do not observe firms' international
37
38 involvement unless they have first started/attempted to internationalise. The standard
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40 statistical approach for treating this sort of problem is Heckman's (1979) two-stage
41
42 methodology. Therefore, we estimate a first-stage selection equation of the probability that
43
44 district firms start international growth, and then estimate a second-stage regression for the
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46 district firms' internationalisation degree, conditional on the results of the first-stage equation.
47

48 Formally:

49 *First stage: Selection equation of the probability/likelihood of internationalisation*
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$$p_{jk}^* = Z_{jk}\gamma + v_{jk}$$

$$p_{jk} = 1 \text{ if } p_{jk}^* > 0$$

$$p_{jk} = 0 \text{ if } p_{jk}^* = 0$$

Second stage: Regression of district firms' internationalisation degree

$$INT_{jk} = X_{jk}\beta + u_{jk}, \text{ observed only if } p_{jk} = 1$$

The sample selection methodology helps to control for the possibility that the estimated coefficients for our structural and behavioural determinants in the internationalisation degree equation may be biased because some of the variables are observed only when district firms have decided to engage in FDI activity. This bias will occur if unobservable or unmeasured factors affect both the likelihood that firms start to internationalise and the results of such an attempt. If such unobserved factors are present, the error terms in the two equations will be correlated. This two-stage approach mitigates the potential problem that the coefficient estimates for structural and behavioural determinants might otherwise be interpreted as proxies for the likelihood that firms have started to internationalise through FDI. Instead, we explicitly estimate the probability that district firms have undertaken FDI prior to the estimation of the extent of such internationalisation.

3.4. The dependent variables

Given the nature of the model employed, we built two different dependent variables. Specifically:

- (1) D_INT_{jk} is a dummy variable that equals 1 if at least one firm in district j , whose sector of specialisation is k , controls foreign manufacturing activities in sector k .
- (2) INT_{jk} is the degree of internationalisation of production for each district j , whose sector of specialisation is k . Specifically, it has been measured as follows:

$$INT_{jk} = EMPL_{forjk} / EMPL_{jk}, \text{ where: } j = 1, \dots, 199 \text{ and } k = 1, \dots, 15,$$

EMPLfor_{jk} = number of employees in the majority-owned⁷ foreign manufacturing affiliates of firms located in district j in sector k;

EMPL_{jk} = number of domestic employees in Italian-owned manufacturing firms located in district j in sector k (excluding the employees in foreign-owned firms).

In order to test our hypotheses on the leadership effect, the variable has been also calculated for the smaller district firms only i.e. those firms not belonging to the club of leaders (for the definition, see below). In this case, the variable becomes:

$$INT_{jk_SME} = (EMPL_{forjk} - EMPL_{for_Leaderjk}) / (EMPL_{jk} - EMPL_{Leaderjk})$$

3.5. The explanatory variables

The explanatory variables considered in the model refer to the conceptual framework illustrated in Section 2. Therefore, they have been classified as proxying structural and behavioural determinants of district firms' internationalisation. Descriptive statistics and correlation coefficients are illustrated in Table 4, while expected signs are reported in Table 5; further details (sources of data and years of reference) are given in the Appendix, in Table A1.

Table 4 about here

Table 5 about here

Structural determinants

- *The presence of leader firms* in the district (variable 'Leader_{jk}') has been measured by the incidence of firms with more than 250 employees on the total number of firms in

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2 the district j and in the sector of specialisation k . Although the proxy may appear
3
4 rather crude as the prerogative of leaders is not deterministically associable with size,
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6 they are likely to have gained such a position because of their greater capacity to grow.
7
8 Accordingly, and also relying on certain anecdotal evidence on the Italian case (e.g.
9
10 FORTIS, 1998; CHIARVESIO et al., 2003), leader firms are unlikely to fall below a
11
12 reasonably high size threshold. As far as the latter, we refer to the EU Commission
13
14 Recommendation concerning the definition of dimensional classes for enterprises⁸.

15
16 According to our conceptual framework, we expect Leader to impact positively on the
17
18 probability that district firms start international growth, while we do not have any a
19
20 priori expectation as far as the impact on their internationalisation degree.

- 21
22 • The *role of the leader firms* in the district's internationalisation was measured by
23
24 introducing the variable Int_leader_{jk} , defined as follows:

$$25 \quad Int_Leader_{jk} = EMPL_{for_Leader_{jk}} / EMPL_Leader_{jk}$$

26
27 where:

28
29 $EMPL_{for_Leader_{jk}}$ = number of employees in foreign manufacturing affiliates of
30
31 leader firms in district j in sector k ;

32
33 $EMPL_Leader_{jk}$ = number of employees in the (Italy-based) leader firms located in
34
35 district j in sector k .

36
37 Such a variable aims at testing whether the internationalisation of leader firms exerts a
38
39 *pull* rather than *substitution* effect on the international growth of the other firms in the
40
41 district. Accordingly, we do not have any a priori expectation on its estimated sign.

- 42
43 • The *degree of domestic rivalry* within the district has been measured, as in previous
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45 empirical studies (for a critical survey see SAKAKIBARA and PORTER, 2001), by
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47 concentration measures, which are obviously inverse measures of that. In particular,
48
49 we used the Herfindahl index calculated in the district j 's sector of specialisation k :
50

$$\text{Herfindahl}_{jk} = \sum_{i=1}^{13} N_{ijk} \left(\frac{E_{jki} / N_{ijk}}{\sum_{i=1}^{13} E_{ijk}} \right)^2$$

where: $i = 1, \dots, 13$ are the ISTAT employee classes;

N_{ijk} is the number of firms belonging to class i , in district j and sector of specialisation k ;

E_i is the number of employees in class i , in district j and sector of specialisation k .

As we expect the degree of domestic rivalry to impact positively on the districts' firms internationalisation, Herfindhal should show a negative estimated sign.

- The *presence of foreign MNCs* has been captured by two variables intended to allow for two different aspects of inward FDI:
 - MNC_spec_{jk} measures the presence of foreign MNCs, in terms of employees, in the district's sector of specialisation k , with reference both to the manufacturing sector and to the commercial and service sectors connected with it⁹. As the district's sector of specialisation has been defined in order to capture the whole industrial *filière*, this variable accounts for both the potential horizontal and vertical spillover effects on the district's specific activities;
 - MNC_lat_{j-k} measures the presence of foreign MNCs in other sectors (with respect to the district's sector of specialisation, k) in terms of employees. This variable takes account of the lateral spillover effects generated by foreign MNCs that are external to the district's sector of specialisation.

According with our conceptual framework, spillovers might reveal both positive and negative effects on the local context. Therefore, we do not have any a priori expectation on the estimated coefficients neither for MNC_spec nor for MNC_lat .

Behavioural determinants

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- The district's *propensity to export* has been measured by the amount of exports – expressed in monetary terms and weighted on the number of employees – recorded by the district's sector of specialisation k ($Export_{tjk}$).

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According to our conceptual framework, we expect $Export_{tjk}$ to impact positively on the probability that district firms start international growth, while we do not have any a priori expectation as far as the impact on their internationalisation degree.

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- The *international experience* of Italian-owned firms in the district has been proxied by a variable expressing the longevity of their FDI. Namely, the variable *Experience* has been calculated in terms of the number of years elapsing from when the district reached 50% of the number of employees engaged in foreign activities, as recorded at the beginning of 2003. In line with a positive cumulative view, the expected sign for *Experience* is positive.

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- The *district's innovative capacity* has been proxied by an indicator ($Innovation_{jk}$) of innovative output: the number of patents in the district's sector of specialisation k , registered to the European Patent Office, weighted on the number of district firms. The variable *Innovation* has been constructed by aggregating at the district level the data available at the Local Labour System (LLS) level¹⁰.

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According with the idea of a circular relationship between innovation and internationalisation, the expected sign for *Innovation* is positive.

38 39 40 *Control variables*

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The analysis includes several controls for factors that may affect the district firms' international growth through FDI. First, in order to take into account the general economic conditions of the district areas, we added a proxy for the local economic, social and cultural development¹¹. We expect that districts localised in more advanced areas might benefit from additional externalities and services (due, for instance, to the proximity to important urban

centres) that increase their attitude towards international growth. Likewise, we considered also a dummy for districts localised in the Northern areas, in order to allow for advantages related both to the proximity to relevant host countries (namely, Western and Eastern Europe), and to the greater availability of network infrastructures that make it easier the access also to distant markets.

Finally, the list concludes with two sectoral dummies controlling for sectors more interested by internationalisation. Specifically, the first dummy (Advanced) refers to technologically advanced sectors, which are generally reported in the literature as being more involved in internationalisation processes (e.g. HATZICHRONOGLU, 1999); the second one (Made in Italy) refers instead to sectors where Italian firms enjoy a traditional comparative advantage¹² (as measured, for example, by revealed comparative advantage, see PIETROBELLI, 2002 and DE BENEDICTIS, 2005). The list of sectors considered refers to the classification reported in Table 1.

4. THE RESULTS

Table 6 reports the econometric estimates obtained for both the first stage, i.e the sample selection (columns a and c) and the second stage, i.e. the regressions of the district firms' internationalisation degree (columns b and d). Specifically, columns a and b concern the totality of district firms, while columns c and d refer to the models run in order to test the leadership effect (and, therefore, run only on the smaller district firms). Table A2 in the Appendix reports the baseline probit and truncated regressions without correction for sample selection. The results with and without correction are very similar¹³.

Table 6 about here

As far as structural determinants are concerned, the presence of large leader firms increases significantly the likelihood that district firms' start internationalisation through FDI (the variable Leader shows, indeed, a positive coefficient that is significantly different from zero, at $p < .01$ in the probit model, column a). Likewise, an internal robust domestic competition seems to be effective in training local companies and enabling them to grow internationally (the variable Herfindhal shows an estimated coefficient that is negative and significantly different from zero at $p < .01$). However, when leader firms are directly involved in international activities, they hinder the other (smaller) companies' international commitment (the variable Int_leader shows a negative estimated coefficient and strong statistical significance, at $p < .05$, in column d). The international perspective thus created seems to suffice the latter, which then reduce their efforts to invest abroad. In other words, a substitution effect between the foreign investments undertaken by the leaders and those by other firms in the district, does prevail on the pull effect.

Our hypothesis is then confirmed as these results suggest that 'leadership' and 'Porterian' effects interact virtuously to guarantee a sound international growth to the district. Relying only on the few leaders' international moves might eventually constrain the other district firms' international openness, as they might end to passively benefit from the formers' international growth, not developing any autonomous ability of growing abroad. Therefore, the co-existence of large customer firms and smaller supplier companies, which both cooperate and compete, seems to represent the most effective configuration to favour the district's answer to the mentioned paradigm of the international fragmentation of production.

Within this context, the presence of foreign MNCs shows a peculiar role. Indeed, MNCs do not exert any impact on the start of the international growth by industrial district's firms, while they boost the latter's internationalisation degree, once it started (with $p < .01$). In other

1
2 words, spillovers from MNCs advantage only districts firms that have developed their own
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4 absorptive capacity through autonomous ability to grow internationally. That seems to hold
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6 especially when foreign MNCs belong to the district's sector of specialisation, thus revealing
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8 positive intra-industry spillovers. Indeed, according with the existing literature (AITKEN and
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10 HARRISON, 1999), these spillovers generally exert a negative competition effect on local
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12 companies (possibly captured by the negative, although not significant, sign in colum a),
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14 which hardly manage to start international growth processes. Therefore, the benefits
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16 stemming from the presence of foreign MNCs take off only once the district has already
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18 started international initiative. The same holds when considering what we have called
19
20 "lateral" spillovers, i.e. those related to the creation of an international atmosphere in the
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22 district area. Indeed, they do not seem to be strong enough to trigger district firms'
23
24 international growth, while contributing to strengthen it once started. Such a positive role
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26 does emerge especially when modelling the smaller district firms companies, which seem to
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28 benefit more from MNCs' presence (the variable MNC_lat is positive and highly significantly
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30 different from zero, at $p < .01$, in column d). Indeed, district's firms reduce cognitive
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32 asymmetries with the foreign MNCs, and can therefore face them, through imitation, learning,
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34 and cooperative relationships (CANTWELL, 1989; KOKKO, 1994; CASTELLANI and
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36 ZANFEI, 2003).

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38 We are aware that more reliable evidence on the matter should allow for the effective
39
40 embeddedness of foreign MNCs in the local system, rather than only the mere presence.
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42 However, such a measurement, which constitutes a rather difficult task *per se* (PHELPS et al.,
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44 2003), goes well beyond the scope of this paper.

45
46 As far as behavioural determinants are concerned, the openness of the industrial district to
47
48 international trade appears to explain the likelihood of starting internationalisation of
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50 production through FDI. In particular, the district's firms attitude to export upon foreign
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1
2 markets appear to positively and significantly impact their ability to undertake FDI (the
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4 variable Export is positive and significant at $p < .05$ and $p < .10$ in columns a and c,
5
6 respectively), thus confirming our expectations. In fact, previous export relationships do not
7
8 show any correlation with the internationalisation degree, thus confirming an underlying
9
10 complex relationships. Only modelling the intertemporal relationships between exports and
11
12 outward FDI in the same destination country could reveal the complementary and/or
13
14 substitutive nature of such a relationship.

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16 Likewise, the innovative activity conducted within the districts, which should forge their
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18 companies' competitive advantages, does not seem to be able to trigger the industrial district's
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20 international growth (the variable Innovation is positive but never significantly different from
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22 zero in the first stages of the model, see columns a and c). In other words, product and process
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24 innovations reached within the district, although promoting district firms' international
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26 competitiveness (via exports, for example), do not engender those favourable advantages and
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28 conditions that, alone, might start their internationalisation processes through FDI. However,
29
30 innovation virtuously impacts on the international growth degree once it started. Indeed,
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32 existing foreign initiatives might foster innovative solutions which are better tailored on these
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34 markets' needs (SALOMON and SHAVER, 2005), which in turn positively influences the
35
36 degree of foreign involvement.

37
38 As far as the experience already acquired abroad by district's firms, it is not significantly
39
40 different from zero. In fact, although we expected that the relevant mechanisms of
41
42 information and knowledge accumulation affect district firms, by increasing their confidence
43
44 in foreign markets and fostering their greater involvement in foreign investment, the result
45
46 does not come out as too much surprising, given the poorness of the proxy employed
47
48 (Experience)¹³.

1
2 Finally, as far as control dummies are concerned, both the “Made in Italy” and the
3
4 Advantaged sectors are significantly important in increasing the probability that a district will
5
6 start international growth. Advantaged sectors show also a positive impact on the extent of
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8 such an international growth for smaller firms.
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10 The lack of statistical significance for geographical dummies shows that industrial districts’
11
12 firms do not stem any advantage (as far as their international growth is concerned) from their
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14 location.
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16 17 18 **5. CONCLUSIONS** 19

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21 The conceptual framework developed to explain internationalisation of production by
22
23 industrial districts’ firms relies on both structural and behavioural determinants. The
24
25 econometric model developed for this purpose yielded a number of statistically robust results.
26
27 As far as structural factors, ‘Leadership’ effects, represented by the presence of large firms,
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29 and ‘Porterian’ ones, described by the intensity of domestic rivalry, combine to increase the
30
31 likelihood that districts will internationalise. Moreover, the leadership of large firms exerts a
32
33 composite effect on the degree of internationalisation of other (non leader) district firms. It
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35 increases the range of foreign growth opportunities available to smaller firms, but it
36
37 eventually leads to a prevalent substitution effect: the internationalisation of large firms
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39 prompts an inertial behaviour by the other (smaller) firms, which do not develop any
40
41 independent ability to grow internationally. The presence of affiliates of foreign-owned
42
43 MNCs favours internationalisation by district’s firms, but only once they have already
44
45 matured an adequate absorptive capacity, thanks for example to competencies
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47 autonomously developed on foreign markets. Foreign MNCs are presumably more influential,
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1
2 the greater their embeddedness in the district system – but this is an aspect which requires
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4 further research.

5
6 As far as behavioural determinants, other district performances seem to be positively
7
8 correlated with the internationalisation of production. This applies to the innovativeness of
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10 districts, as measured by the intensity of patent registration by local firms, which positively
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12 influences their internationalisation degree. Likewise, the export performance of the district
13
14 triggers the start up of internationalisation processes, replicating the sequential causation
15
16 model (exports → commercial affiliates → productive affiliates). Previous export
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18 relationships do not show, instead, any impact on the district firms' degree of
19
20 internationalisation, thus confirming the difficulties of capturing complex inter temporal
21
22 linkages between export and FDI. In fact, these linkages would deserve further investigation
23
24 (for example on the distinction between horizontal and vertical investments, on the one hand,
25
26 and on the distinction between intra- and inter-firm trade, on the other) which goes beyond the
27
28 scope of the present paper.

29
30 We then conclude with two general considerations. The foregoing analysis suggests that it
31
32 would be advisable to discard – at the levels of both interpretation and policy-making – an
33
34 undifferentiated conception of 'district'. In fact, districts have been shown to be highly
35
36 heterogeneous, with marked structural and behavioural differences which significantly
37
38 influence their current performances and their potential for future growth. In industrial policy
39
40 terms, there is an undeniable necessity to act upon these determinants, which comprise
41
42 genetic components intrinsic to the histories of districts. Consequently, it becomes important
43
44 to move from a "national" to a "local" policy, and to adapt normative instruments and
45
46 services supporting internationalisation to the distinctive features of each area.

47
48 The second general consideration concerns the agenda for future research, which appears
49
50 quite rich. The specification of the model presented above should be improved by introducing

1
2 more adequate measures of certain phenomena, also by defining the mechanisms of intra-
3 district interaction more precisely. Firstly, the notion of leader firm should be given more
4 satisfactory operationalisation than that proposed here ('large district firm'). It does not seem,
5 at least to our knowledge, that the literature contains a specification of the concept which
6 enables, given well-known difficulties, its quantitative measurement. Secondly, further
7 inquiry should seek to give better definition to the presence of foreign MNCs in a district. We
8 refer in particular to the introduction of a proxy for the degree of embeddedness achieved
9 through linkages with local actors and participation in the local community. Finally, further
10 data are required to refine the analysis of the causality relations between foreign trade and
11 FDI. The findings of this paper seem to justify greater research efforts in the directions
12 indicated.
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NOTES

¹ Although in the recent literature the term cluster has increasingly gained favour, “the concept has now acquired such a variety of uses, connotations and meanings that it has, in many respects, become a chaotic concept” (for a critical review on the use of the concept of cluster, see MARTIN and SUNLEY, 2003, pp. 9-10). For this reason, we prefer the term industrial district, for which a much more largely shared Marshallian definition does exist (BECATTINI, 2004).

² Specifically, FDI undertaken for market-seeking purposes, and to replicate the parent company’s activities abroad, have export substitution effects. The linkage is more complex when FDI is mainly resource-seeking, as it often generates both intra- and inter-industry flows of exports and imports.

³ The rationale is that in SME dominated economies (like Italy), the size of firms prevents or reduces the possibility to count on firm-based international growth strategies. Therefore, a solution is to push forward the internationalisation of clusters: domestic firms could in that way pursue collective internationalisation processes, strengthening their internal relationships and implementing new international linkages.

⁴ Such a classification has unquestionable advantages, mainly related to the fact that its territorial exhaustiveness and identification of precisely circumscribed spaces enables analysis to be conducted on quantitative indicators (population, firms, employees, etc.) homogeneous across all districts. The other available classifications (see, for example, IPI, 2002) rely on disomogeneous, and often subjective, criteria. ⁵ Specifically, we found inappropriate keeping classifications that are too broad. In particular, in cases like Mechanicals, several specialisations might be easily disentangled (Processing of metals, Metal products, Machinery and equipments, Electronics and electrical apparatus). We acknowledge that such a method might miss some fringe segments along the filiere (for example when a district specialised in Textile has developed competencies also in Textile Machinery). However, the issue remains unsolved even in the (broader) ISTAT classification.

⁶ It should be pointed that the phenomenon is evolving rapidly. Moreover, as in all diffusive processes, reference to the time period in which both sub-sets (internationalised and non-internationalised districts) are of ample size is important for study of the phenomenon’s determinants.

⁷ There were two reasons for referring only to majority-owned foreign affiliates: (i) the volatile nature of minority-owned ones; (ii) without adopting arbitrary procedures, it is not possible to apply a single measure to employees in majority shareholdings and the employees of foreign activities which may be of substantial size but in which there are minority shareholdings of very small proportions.

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⁸ Specifically, the EU Commission Recommendation of 6 May 2003 put forward the definition of micro, small and medium-sized enterprises (SMEs) as being made up of enterprises which employ fewer than 250 persons.

⁹ For example, if the district is specialised in textiles/clothing, consideration was made of both the foreign multinationals undertaking production in the above-mentioned manufacturing sector and the multinationals explicitly connected with it: affiliates with commercial activities concerning textiles and clothing, affiliates furnishing services connected with them (e.g. consultancy, logistics, dedicated computer and software).

¹⁰ These data were made available by the CRENoS-Centro Ricerche Economiche Nord Sud. We wish to thank Stefano Usai and Barbara Dettori, in particular, for their valuable assistance.

¹¹ It is worth observing that such an indicator is available at the NUTS 3 level (corresponding to the Italian provinces).

¹² It is worth observing that Machinery and equipments, which has been classified as Advanced, enjoys also comparative advantages.

¹³ If the correlation between the residuals in the first and second stage regressions in the sample selection model is not significantly different from zero, sample selection does not bias the coefficients in the regression of the internationalisation degree. Table 6 indicates that this correlation (i.e. the Inverse Mill's ratio) is not significant from zero for the full sample of firms, while it is not for the sub sample of the smaller firms dwelling the districts. However, we retain the sample selection approach for the remainder of the analysis also for the full sample, as a cautionary measure.

¹⁴ It might be not out of place here to observe that we tried alternative proxies for experience (e.g. the age of the first FDI). However, none of these revealed any significance.

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For Peer Review Only

Table 1 – The sectoral and geographical distribution of Italian manufacturing districts

| <u>Sector</u> | <u>North West</u> | | <u>North East</u> | | <u>Centre</u> | | <u>South</u> | | <u>Italy</u> | |
|---|-------------------|--------------|-------------------|--------------|---------------|--------------|--------------|--------------|--------------|--------------|
| | <u>No.</u> | <u>%</u> | <u>No.</u> | <u>%</u> | <u>No.</u> | <u>%</u> | <u>No.</u> | <u>%</u> | <u>No.</u> | <u>%</u> |
| <u>Made in Italy</u> | <u>29</u> | <u>49.2</u> | <u>38</u> | <u>58.5</u> | <u>51</u> | <u>85.0</u> | <u>13</u> | <u>86.7</u> | <u>131</u> | <u>65.8</u> |
| <u>Textile</u> | <u>13</u> | <u>22.0</u> | <u>6</u> | <u>9.2</u> | <u>4</u> | <u>6.7</u> | | | <u>23</u> | <u>11.6</u> |
| <u>Clothing</u> | <u>12</u> | <u>20.3</u> | <u>14</u> | <u>21.5</u> | <u>14</u> | <u>23.3</u> | <u>6</u> | <u>40.0</u> | <u>46</u> | <u>23.1</u> |
| <u>Leather</u> | | | <u>1</u> | <u>1.5</u> | <u>1</u> | <u>1.7</u> | <u>1</u> | <u>6.7</u> | <u>3</u> | <u>1.5</u> |
| <u>Footwear</u> | | | <u>3</u> | <u>4.6</u> | <u>18</u> | <u>30.0</u> | <u>4</u> | <u>26.7</u> | <u>25</u> | <u>12.6</u> |
| <u>Wood and furniture</u> | <u>4</u> | <u>6.8</u> | <u>13</u> | <u>20.0</u> | <u>11</u> | <u>18.3</u> | <u>2</u> | <u>13.3</u> | <u>30</u> | <u>15.1</u> |
| <u>Other industries</u> | | | <u>1</u> | <u>1.5</u> | <u>3</u> | <u>5.0</u> | | | <u>4</u> | <u>2.0</u> |
| <u>Advanced</u> | <u>11</u> | <u>18.6</u> | <u>13</u> | <u>20.0</u> | <u>0</u> | | <u>0</u> | | <u>24</u> | <u>12.1</u> |
| <u>Machinery and equipments</u> | <u>9</u> | <u>15.3</u> | <u>10</u> | <u>15.4</u> | | | | | <u>19</u> | <u>9.5</u> |
| <u>Electrical apparatus and electronics</u> | <u>2</u> | <u>3.4</u> | | | | | | | <u>2</u> | <u>1.0</u> |
| <u>Precision instruments</u> | | | <u>3</u> | <u>4.6</u> | | | | | <u>3</u> | <u>1.5</u> |
| <u>Intermediate</u> | <u>19</u> | <u>32.2</u> | <u>14</u> | <u>21.5</u> | <u>9</u> | <u>15.0</u> | <u>2</u> | <u>13.3</u> | <u>44</u> | <u>22.1</u> |
| <u>Food and beverages</u> | <u>7</u> | <u>11.9</u> | <u>7</u> | <u>10.8</u> | <u>2</u> | <u>3.3</u> | <u>2</u> | <u>13.3</u> | <u>18</u> | <u>9.0</u> |
| <u>Paper, publishing and printing</u> | <u>1</u> | <u>1.7</u> | <u>1</u> | <u>1.5</u> | <u>4</u> | <u>6.7</u> | | | <u>6</u> | <u>3.0</u> |
| <u>Chemicals and petrolchemicals</u> | <u>2</u> | <u>3.4</u> | | | | | | | <u>2</u> | <u>1.0</u> |
| <u>Rubber and plastic products</u> | <u>2</u> | <u>3.4</u> | | | | | | | <u>2</u> | <u>1.0</u> |
| <u>Non-metallic mineral products</u> | | | <u>5</u> | <u>7.7</u> | <u>2</u> | <u>3.3</u> | | | <u>7</u> | <u>3.5</u> |
| <u>Processing of metals</u> | <u>1</u> | <u>1.7</u> | <u>1</u> | <u>1.5</u> | | | | | <u>2</u> | <u>1.0</u> |
| <u>Metal products</u> | <u>6</u> | <u>10.2</u> | | | <u>1</u> | <u>1.7</u> | | | <u>7</u> | <u>3.5</u> |
| <u>Total</u> | | | | | | | | | | |
| <u>-No.</u> | <u>59</u> | <u>100.0</u> | <u>65</u> | <u>100.0</u> | <u>60</u> | <u>100.0</u> | <u>15</u> | <u>100.0</u> | <u>199</u> | <u>100.0</u> |
| <u>-%</u> | - | <u>29.6</u> | - | <u>32.7</u> | - | <u>30.2</u> | - | <u>7.5</u> | - | <u>100</u> |

Source: Our calculations on ISTAT data

Table 2 – The presence in Italian manufacturing districts of firms with foreign affiliates,**2003**

| <u>Indicators</u> | <u>Total manufacturing</u> | | <u>Specialisation sectors</u> | |
|--|----------------------------|-----------------|-------------------------------|-----------------|
| | <u>Total</u> | <u>Majority</u> | <u>Total</u> | <u>Majority</u> |
| <u>Investing firms (No.)</u> | <u>863</u> | <u>693</u> | <u>336</u> | <u>285</u> |
| <u>% of national total</u> | <u>31.2</u> | <u>31.7</u> | | |
| <u>Foreign affiliates (No.)</u> | <u>1,822</u> | <u>1,432</u> | <u>861</u> | <u>691</u> |
| <u>% of national total</u> | <u>36.1</u> | <u>35.5</u> | | |
| <u>Employees in foreign affiliates (No.)</u> | <u>301,852</u> | <u>227,524</u> | <u>162,636</u> | <u>141,927</u> |
| <u>% of national total</u> | <u>32.8</u> | <u>33.4</u> | | |
| <u>Degree of internationalisation (a)</u> | | | | |
| <u>- industrial districts</u> | <u>0.148</u> | <u>0.112</u> | <u>0.205</u> | <u>0.179</u> |
| <u>- Italy</u> | <u>0.210</u> | <u>0.155</u> | <u>0.185</u> | <u>0.161</u> |

Note:(a) Ratio between employment abroad on domestic employment in Italian-owned firmsSource: Our calculations, REPRINT database, Politecnico di Milano – ICE

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Table 3 – The internationalisation degree of Italian manufacturing districts

| <u>Sector</u> | <u>No. of districts</u> | <u>No. of districts internationalised</u> | <u>Internationalisation degree (a)</u> |
|---|-------------------------|---|--|
| <u>Made in Italy</u> | <u>131</u> | <u>66</u> | <u>0.0685</u> |
| <u>Textile</u> | <u>23</u> | <u>19</u> | <u>0.0618</u> |
| <u>Clothing</u> | <u>46</u> | <u>13</u> | <u>0.0777</u> |
| <u>Leather</u> | <u>3</u> | <u>2</u> | <u>0.0149</u> |
| <u>Footwear</u> | <u>25</u> | <u>15</u> | <u>0.1166</u> |
| <u>Wood and furniture</u> | <u>30</u> | <u>15</u> | <u>0.0683</u> |
| <u>Other industries</u> | <u>4</u> | <u>2</u> | <u>0.0148</u> |
| <u>Advanced</u> | <u>24</u> | <u>19</u> | <u>0.1533</u> |
| <u>Machinery and equipments</u> | <u>19</u> | <u>16</u> | <u>0.1531</u> |
| <u>Electrical apparatus and electronics</u> | <u>2</u> | <u>1</u> | <u>0.0169</u> |
| <u>Precision instruments</u> | <u>3</u> | <u>2</u> | <u>0.2582</u> |
| <u>Intermediate</u> | <u>44</u> | <u>12</u> | <u>0.7279</u> |
| <u>Food and beverages</u> | <u>18</u> | <u>5</u> | <u>0.0080 (b)</u> |
| <u>Paper, publishing and printing</u> | <u>6</u> | <u>0</u> | <u>0.0000</u> |
| <u>Chemicals and petrolchemicals</u> | <u>2</u> | <u>0</u> | <u>0.0000</u> |
| <u>Rubber and plastic products</u> | <u>2</u> | <u>1</u> | <u>0.0551</u> |
| <u>Non-metallic mineral products</u> | <u>7</u> | <u>4</u> | <u>0.1467</u> |
| <u>Processing of metals</u> | <u>2</u> | <u>1</u> | <u>0.0595</u> |
| <u>Metal products</u> | <u>7</u> | <u>1</u> | <u>0.0043</u> |
| <u>Total</u> | <u>199</u> | <u>97</u> | <u>0.1788</u> |

Note:

(a) Ratio between employment in majority-owned foreign affiliates of district firms and domestic employment in Italian-owned district firms

(b) Such a value excludes the district of Parma where two large Italian-owned MNCs (Parmalat and Barilla) are located. Employment abroad by these two companies is more than two and half times the domestic one

Table 4 – Statistical properties of the variables and correlation matrix

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
|---------------|------|--------|--------|--------|--------|--------|--------|--------|--------|----------|--------|-------|--------|--------|
| Mean | 0.09 | 0.047 | 0.056 | 0.133 | 2.638 | 0.071 | 0.34 | 0.041 | 0.016 | 62514.44 | 0.09 | 0.121 | 0.658 | 0.623 |
| Max | 5.54 | 2.241 | 0.263 | 8.647 | 27 | 0.867 | 8.593 | 0.879 | 0.212 | 267396 | 5.54 | 1 | 1 | 1 |
| Min | 0 | 0 | 0 | 0 | 0 | 0.001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Std. Dev. | 0.44 | 0.199 | 0.066 | 0.746 | 3.84 | 0.116 | 0.888 | 0.115 | 0.027 | 55684 | 0.44 | 0.326 | 0.475 | 0.486 |
| INT | (1) | | | | | | | | | | | | | |
| INT_SME | (2) | 0.441 | | | | | | | | | | | | |
| Leader | (3) | 0.231 | -0.041 | | | | | | | | | | | |
| Int_leader | (4) | 0.755 | -0.015 | 0.349 | | | | | | | | | | |
| Experience | (5) | 0.199 | 0.238 | 0.237 | 0.181 | | | | | | | | | |
| Herfindhal | (6) | -0.028 | -0.083 | -0.177 | -0.033 | -0.231 | | | | | | | | |
| Innovation | (7) | 0.346 | 0.093 | 0.254 | 0.318 | 0.186 | -0.068 | | | | | | | |
| MNC_spec | (8) | 0.553 | 0.406 | 0.237 | 0.382 | 0.075 | -0.010 | 0.224 | | | | | | |
| MNC_lat | (9) | 0.241 | 0.486 | 0.206 | 0.048 | 0.219 | -0.157 | -0.011 | 0.264 | | | | | |
| Export | (10) | -0.013 | -0.028 | 0.206 | 0.043 | 0.140 | -0.148 | 0.116 | 0.151 | -0.003 | | | | |
| Development | (11) | 0.039 | -0.001 | 0.235 | 0.08 | 0.035 | -0.002 | 0.101 | -0.005 | 0.114 | 0.073 | | | |
| Advanced | (12) | 0.069 | 0.124 | 0.256 | 0.108 | 0.031 | -0.094 | 0.073 | 0.205 | 0.165 | 0.028 | 0.031 | | |
| Made in Italy | (13) | -0.102 | 0.003 | -0.226 | -0.134 | 0.106 | -0.087 | -0.019 | -0.035 | -0.017 | -0.010 | 0.003 | -0.514 | |
| North | (14) | 0.104 | 0.071 | 0.284 | 0.098 | 0.148 | -0.075 | 0.156 | 0.257 | 0.157 | 0.053 | 0.230 | 0.267 | -0.319 |

Table 5 – Expected signs for explanatory variables

| | <u>Selection equation</u> (probability of internationalization) | <u>Regression of district's firms</u> internationalization degree |
|--|--|--|
| <u>Structural</u> | | |
| <u>Leader</u> | ± | ? |
| <u>Internat leader (a)</u> | ? | ? |
| <u>Herfindhal</u> | - | - |
| <u>MNC_spec</u> | ? | ? |
| <u>MNC_lat</u> | ? | ? |
| <u>Behavioural</u> | | |
| <u>Experience</u> | | ± |
| <u>Innovation</u> | ± | ± |
| <u>Export</u> | ± | ? |
| <u>Control</u> | | |
| <u>Development</u> | ± | ± |
| <u>North</u> | ± | ± |
| <u>Advanced</u> | ± | ± |
| <u>Made in Italy</u> | ± | ± |
| <u>Note</u> | | |
| (a): Included only in the model for INT_SMEs | | |

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Table 6 – Results of the econometric estimations, Heckman two-stage models

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| | INT | | INT_SME | |
|-------------------|-----------------------|----------------------|-----------------------|----------------------|
| | Probit (a) | Truncated (b) | Probit (c) | Truncated (d) |
| Constant | -2.942 (-1.37) | -0.890 (-0.65) | -3.423 (-1.62) | -1.963 * (-1.76) |
| Leader | 6.259 *** (3.19) | 0.372 (0.31) | 3.219 * (1.83) | 0.310 (0.43) |
| Int_leader | | | | -0.064 ** (-2.56) |
| Herfindhal | -5.808 *** (-3.03) | 1.734 (1.13) | -7.098 *** (-3.30) | -3.046 * (-1.74) |
| MNC_spec | -0.139 (-0.13) | 3.414 *** (8.58) | 0.869 (0.85) | 1.594 *** (5.00) |
| MNC_lat | 4.975 (1.10) | -0.569 (-0.36) | 1.327 (0.33) | 3.287 *** (3.90) |
| Experience | | -0.003 (-0.30) | | 0.002 (0.36) |
| Innovation | 0.157 (0.92) | 0.088 ** (2.06) | 0.187 (1.13) | 0.059 ** (2.07) |
| Export | 1.48E-05 ** (2.57) | -1.63E-06 (-0.89) | 1.08E-05 * (1.96) | 2.26E-06 (1.65) |
| Development | 0.003 (0.70) | -0.001 (-0.65) | 0.005 (1.14) | 0.002 (1.43) |
| North | 0.229 (0.94) | 0.011 (0.09) | 0.179 (0.74) | 0.110 (1.48) |
| Advanced | 1.126 *** (2.77) | -0.382 (-1.62) | 0.403 (1.11) | 0.167 (1.61) |
| Made in Italy | 0.758 ** (2.49) | -0.054 (-0.26) | 0.503 * (1.68) | 0.274 ** (2.25) |
| Inv mills | | -1.147 (0.65) | | 0.628 ** (2.00) |
| Sigma | | 0.391 *** (13.93) | | -0.193 * (-1.76) |
| No. obs. | 199 | 97 | 199 | 85 |
| No. Dependent = 1 | 97 | | 85 | |
| Log likelihood | -98.033 | -46.672 | -107.393 | 19.219 |
| LR chi2 | 79.68 | | 56.85 | |
| Pseudo R-squared | 0.289 | | 0.209 | |
| Wald chi2 | | 142.51 *** | | 110.69 *** |

Legenda: the asterisks denote the significance of the coefficients estimates: ***: p<.01; **: p<.05; *: p<.10

Table A1 – Sources of data for dependent and explanatory variables

| | Source | Year |
|--------------------|-------------------------------|------------------|
| | <u>Dependent variable</u> | |
| <u>Int</u> | <u>REPRINT data base</u> | <u>2003</u> |
| | <u>ISTAT – Census Data</u> | <u>2001</u> |
| | <u>Explanatory variables</u> | |
| <u>Structural</u> | | |
| <u>Leader</u> | <u>ISTAT – Census Data</u> | <u>2001</u> |
| <u>Int_leader</u> | <u>REPRINT data base</u> | <u>2001</u> |
| <u>Herfindhal</u> | <u>ISTAT – Census Data</u> | <u>2001</u> |
| <u>MNC_spec</u> | <u>REPRINT data base</u> | <u>2001</u> |
| <u>MNC_lat</u> | <u>REPRINT data_base</u> | <u>2001</u> |
| | <u>Behavioural</u> | |
| <u>Experience</u> | <u>REPRINT data base</u> | <u>-</u> |
| <u>Innovation</u> | <u>European Patent Office</u> | <u>1995-1997</u> |
| <u>Export</u> | <u>ISTAT</u> | <u>1996</u> |
| | <u>Control</u> | |
| <u>Development</u> | <u>Il Sole 24Ore</u> | <u>2001</u> |

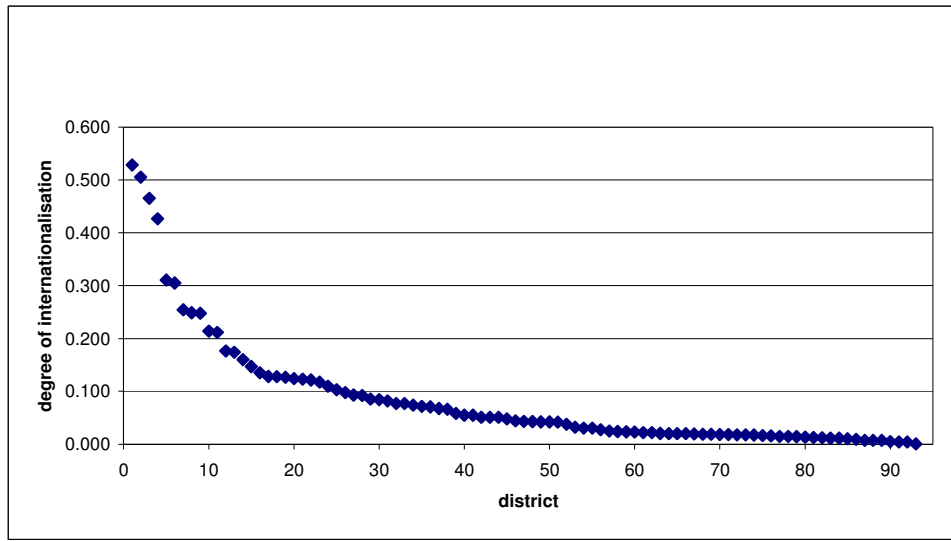
Table A2 – Results of the econometric estimations, probit and truncated models

| | INT | | INT SME | |
|--------------------------|--------------------|-------------------|-------------------|-------------------|
| | Probit (a) | Truncated (b) | Probit (c) | Truncated (d) |
| <u>Constant</u> | <u>-2.942</u> | <u>0.530</u> | <u>-3.423</u> | <u>-0.009</u> |
| | <u>(-1.37)</u> | <u>(0.50)</u> | <u>(-1.62)</u> | <u>(-0.02)</u> |
| <u>Leader</u> | <u>6.259 ***</u> | <u>0.805</u> | <u>3.219 *</u> | <u>-0.907 **</u> |
| | <u>(3.19)</u> | <u>(1.22)</u> | <u>(1.83)</u> | <u>(-2.34)</u> |
| <u>Int_leader</u> | | | | <u>-0.063 **</u> |
| | | | | <u>(-2.48)</u> |
| <u>Herfindhal</u> | <u>-5.808 ***</u> | <u>1.234</u> | <u>-7.098 ***</u> | <u>0.218</u> |
| | <u>(-3.03)</u> | <u>(1.27)</u> | <u>(-3.30)</u> | <u>(0.33)</u> |
| <u>MNC_spec</u> | <u>-0.139</u> | <u>3.435 ***</u> | <u>0.869</u> | <u>1.160 ***</u> |
| | <u>(-0.13)</u> | <u>(8.69)</u> | <u>(0.85)</u> | <u>(4.85)</u> |
| <u>MNC_lat</u> | <u>4.975</u> | <u>-0.294</u> | <u>1.327</u> | <u>3.105 ***</u> |
| | <u>(1.10)</u> | <u>(-0.20)</u> | <u>(0.33)</u> | <u>(3.62)</u> |
| <u>Experience</u> | | <u>-0.003</u> | | <u>0.003</u> |
| | | <u>(-0.31)</u> | | <u>(0.49)</u> |
| <u>Innovation</u> | <u>0.157</u> | <u>0.095 **</u> | <u>0.187</u> | <u>0.018</u> |
| | <u>(0.92)</u> | <u>(2.46)</u> | <u>(1.13)</u> | <u>(0.88)</u> |
| <u>Export</u> | <u>1.48E-05 **</u> | <u>-1.01E-06</u> | <u>1.08E-05 *</u> | <u>-2.52E-07</u> |
| | <u>(2.57)</u> | <u>(-0.91)</u> | <u>(1.96)</u> | <u>(-0.44)</u> |
| <u>Development</u> | <u>0.003</u> | <u>-0.001</u> | <u>0.005</u> | <u>-0.000</u> |
| | <u>(0.70)</u> | <u>(-0.54)</u> | <u>(1.14)</u> | <u>(-0.04)</u> |
| <u>North</u> | <u>0.229</u> | <u>0.037</u> | <u>0.179</u> | <u>0.023</u> |
| | <u>(0.94)</u> | <u>(0.32)</u> | <u>(0.74)</u> | <u>(0.38)</u> |
| <u>Advanced</u> | <u>1.126 ***</u> | <u>-0.306 **</u> | <u>0.403</u> | <u>0.036</u> |
| | <u>(2.77)</u> | <u>(-2.01)</u> | <u>(1.11)</u> | <u>(0.44)</u> |
| <u>Made in Italy</u> | <u>0.758 **</u> | <u>0.009</u> | <u>0.503 *</u> | <u>0.082</u> |
| | <u>(2.49)</u> | <u>(0.06)</u> | <u>(1.68)</u> | <u>(1.06)</u> |
| <u>Sigma</u> | | <u>0.392 ***</u> | | <u>0.197 ***</u> |
| | | <u>(13.93)</u> | | <u>(13.04)</u> |
| <u>No. obs.</u> | <u>199</u> | <u>97</u> | <u>199</u> | <u>85</u> |
| <u>No. Dependent = 1</u> | <u>97</u> | | <u>85</u> | |
| <u>Log likelihood</u> | <u>-98.033</u> | <u>-46.761</u> | <u>-107.393</u> | <u>17.262</u> |
| <u>LR statistic</u> | <u>79.68</u> | | <u>56.85</u> | |
| <u>Pseudo R-squared</u> | <u>0.289</u> | | | |
| <u>Wald chi2</u> | | <u>142.07 ***</u> | | <u>101.89 ***</u> |

Legenda: the asterisks denote the significance of the coefficients estimates: ***: p<.01; **: p<.05; *p<.10

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Figure. 1 - Dispersion of the degree of internationalisation of industrial districts



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