THE INTERNATIONAL SPECIALIZATION PATTERN OF ITALY: AN ANALYSIS BASED ON PROVINCIAL DATA

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ABSTRACT

This paper investigates the evolution of specialization patterns for the Italian provinces over the period 1995-2005 by analysing the dynamics of the sectoral distribution in the Balassa index of revealed comparative advantages. The results show that underlying a relatively stable distribution of national comparative advantages over time, there are wide variations in local performance: only a few provinces demonstrate any stability in their specialization over the last decade, with the majority showing decreased specialization. We find a higher *average* degree of persistence for district provinces, but no systematic differences between provinces with or without industrial districts. District provinces show wide variation, with a few concentrating on their past comparative strengths, but many diversifying.

Keywords: Intra-regional differentiation, Italian provinces, Export specialization dynamics

JEL classifications**:** F10, F14, R10

1 INTRODUCTION[*]

Italy is losing ground in the global market. Italian exports accounted for over $US 417 billions in 2006, representing 3.4 % of world trade compared to 4.5 % in 1995 and 5 % in 1990;[1] accordingly, the country has gone down in the ranking of major world exporters, from the 6th position in the mid-1990s to the 8th position in 2006.[2] This reduction in the export share is even more significant because it has occurred during a period of continuous growth in world trade, showing that Italy is indeed experiencing some difficulties in terms of international competitiveness.

The literature has extensively investigated the reasons behind Italy's recent disappointing international performance and there is generally wide agreement that the Italian specialization pattern is mainly responsible for this slowdown. In contrast to most advanced countries, Italy has a specialization model that has been persistent over time and is based mainly on the production and export of highly labour-intensive goods, which are the type of goods that suffer most in contexts of increasing international competition from labour-abundant emerging economies. Moreover, a large share of Italian exports of labour intensive goods comes from industrial districts (IDs),[3] which is a peculiar model of industrial organization based on geographical concentration of small and medium scale firms specialized in one particular sector, that has been at the centre of the economic debate. Some scholars have insisted that IDs and their small manufacturing firms are responsible for the inability of the Italian manufacturing system to respond to the challenges of globalization (DE CECCO, 2004; GALLINO, 2003; NARDOZZI, 2004; ONIDA, 2004). Other scholars have argued that, notwithstanding the recent economic crisis, firms in IDs have shown better than average performance (BECATTINI and DEI OTTATI, 2006). In particular, there is evidence that provinces in which industrial districts are located have performed better than the national average in terms of

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export growth (SIGNORINI and OMICCIOLI, 2005). Moreover, the specialist literature on IDs has a growing number of contributions showing that several industrial districts are undertaking deep transformations to their sectoral and product specializations, with some of them abandoning earlier areas of specialism (ISTAT, 2002; RABELLOTTI *et al.*, 2008).

It is difficult to reconcile the empirical evidence available at the local level with studies that mainly rely on aggregated trade data at country level to explain the declining national competitiveness and unfavourable international specialization. In this paper, we address the gap between these two different strands of literature by analyzing the evolution of local patterns of specialization in the Italian provinces (NUTS3) over the period 1995 to 2005. The aim is to examine the dynamics of the sectoral distribution in the Balassa index of revealed comparative advantage (RCA) to investigate whether and to what extent local patterns of export specialization have been stable over time and whether district provinces show any peculiarities compared with non-district provinces.

Our results show that only a few provinces provide evidence of stability in their patterns of specialization over the decade studied, while the majority have become less specialized. This suggests that the evidence of persistence provided by many national level studies is obscuring significant and divergent trends at local level. Morevover, in district provinces we find a higher *average* degree of persistence but no systematic differences between provinces with or without industrial districts. In provinces with industrial districts specialized in leather and footwear, textiles and clothing, machinery and equipment and furniture and home accessories we find a variety of behaviours and only a minority of provinces where the district sectors are responsible for the persistence of the international specialization patterns.

The paper is organized as follows. Section 2 reviews the recent empirical literature on the relative persistence of the structure of Italian comparative advantage over time. Section 3 presents the empirical results: 3.1 describes the data and discusses some decriptive statistics; 3.2 examines the stability of local patterns of export specialization; 3.3 explores the contribution of different sectors to the persistence of patterns of international specialization in district provinces, and identifies a

variety of behaviours. Section 4 summarizes the main results and concludes with some implications for further research.

2 PERSISTENCE AND CHANGE IN ITALIAN SPECIALIZATIONS

The debate on the structure of Italian exports, its evolution, causes and implications over time, has generated a vast empirical literature which was recently reviewed by De Benedictis (2005). As Onida (1999) forcibly points out, there is general agreement that the trade stucture in Italy is atypical compared to the other high-income OECD countries, in terms of its persistent specialization in traditional low-skilled labour-intensive sectors such as textiles, apparel, leather products, footwear and furniture. This persistence has been identified in a number of empirical studies based on various datasets, which have analysed sectoral classification, level of aggregation over varying time spans and using different statistical methodologies (BUGAMELLI, 2001; CEC, 1999; CEPII, 1998; CHIARLONE, 2001; CHIARLONE and HELG, 2002; CIPOLLONE, 1999; DE BENEDICTIS, 2005).

Two major concerns about the anomaly of the Italian model of specialization have been expressed. The first is related to the risk that the Italian manufacturing industry is being overexposed to competition from low cost producers, especially those in emerging labour-abundant economies; the second is related to the risk that Italy is lagging in relation to other industrialized countries in terms of the production and export of more dynamic goods such as high tech and ICT products. As a result – so the argument goes – Italy has become locked into an unfavourable specialization model, which is leading to a decline in international performance.

To explain the persistence of the Italian pattern of specialization over time, we can refer to standard international trade theory which predicts that specialization patterns largely reflect factor endowments. De Benedictis (2005) makes the point that since the mid-1950s Italy has embarked on a process of capital accumulation and is no longer a labour-abundant country; therefore, according

to the Heckscher-Ohlin theorem, it should not be specializing in labour-intensive sectors. However, in terms of its human capital endowment, Italy differs with respect to the other high-income OECD countries. If we take the simplest measure of educational attainment –number of years of education of the working age population - Italy has lagged behind the other high-income OECD countries since at least the 1960s and this lag was increasing up to the 1990s. Moreover, the share of high-skilled labour over the total labour force is less than half that of France and Germany, and a meager third of that for the United States. Hence, Italy's export composition can be explained in terms of its poorer human capital endowment compared to the other major industrialized countries (FAINI and SAPIR, 2005).

Another strand of the literature explains the persistence of the Italian structure of comparative advantage in terms of dynamic economies of scale (KRUGMAN, 1987) and Marshallian externalities (DE BENEDICTIS and PADOAN, 1999; EPIFANI, 1999). According to this view, Italy has become more and more efficient in those sectors in which it specialized 50 years ago, and has remained locked-in to its initial comparative advantage. The reason for learning-by-doing being so effective and dynamic scale economies being strong enough to nullify the effect of a change in factor proportions, is due to the diffusion of clusters of small specialized firms able to exploit Marshallian externalities (BECATTINI, 1989; BRUSCO and PABA, 1997; RABELLOTTI, 1997; SIGNORINI, 2000).

In contrast to this view of IDs as being one of the reasons for the persistence of the Italian pattern of international specialization, there are some recent studies that provide evidence of changes in sector and within sector specialization in IDs. De Arcangelis and Ferri (2005) show that there is a tendency for a shift from production of final goods to production of the machinery needed to produce them. Based on provincial level trade data for the period 1991-2001, De Arcangelis and Ferri show that provinces with high concentration of IDs and high degree of delocalization of production, have shifted their specialization from final goods to capital goods within the same production segment.

Changes in specialization are also taking place within sectors due to quality upgrading of products and functional upgrading of production processes. On quality upgrading, Schott (2004) suggests that there is growing empirical evidence of countries specializing in different quality ranges of the same products. Changing relative factor endowments imply changes in within product specialization, i.e. a reallocation of comparative advantage *within* the same industry. For industrialized countries producing traditional labour-intensive goods, exposure to increasing competition from labour-abundant countries results in increasing vertical differentiation of the domestic industry with a progressive shift from lower quality (low market) to higher quality (up market) varieties of the same products (BUGAMELLI, 2001; CHIARLONE, 2001).

Accordingly, De Nardis and Pensa (2004) show that traditional Italian exports have not been displaced by the same goods from less developed countries, because of a vertical shift within sectors toward more advanced segments of production characterized by better quality. They assess the intensity of competition from foreign competitors in traditional industries such as textiles, clothing, leather goods, ceramics and wooden furniture, evaluating the market power of Italian exporting firms in their major destination markets. Their conclusion is that during the 1980s and 1990s Italian exporters were not generally suffering from foreign competition, not even competition from low cost countries, because they were able to apply mark ups over marginal costs, for most of the products analysed and for most destination markets.[4]

In terms of the functional upgrading of production processes, several case studies have documented the delocalization (at home or abroad) of lower value added activities (mainly the non-skilled labour intensive stages of production) and the increasing outsourcing of non-core competencies by firms (TATTARA *et al.*, 2006). The delocalisation of labour-intensive activities abroad can progressively shift the export composition of sectors producing consumption goods from final products to intermediate products, sent to foreign subcontractors that undertake the final stages of production. Thus, apparent weakening specialization in final goods may be accompanied by increased specialization in intermediate goods, within the same sectors. Also, a by-product of certain final

stages being delocalized abroad, may be an increase in exports of the specialized machinery needed to produce those final goods.

By disaggregated analysis of RCA at province level in the period 1995-2005, we empirically investigate the dynamics in the Italian patterns of international specialization. To our knowledge, very few studies have analysed the dynamics of local international specialization in Italy (VIESTI, 1995; CONTI, 2005; CONTI and MENGHINELLO, 1996), with a notable exception of the recent study by GUERRIERI and IAMMARINO (2007), which adopts a similar methodology to the one in this paper, and focuses on the Italian Mezzogiorno.

In what follows we address three main research questions. First, we investigate the stability of local patterns of export specialization since the mid-1990s; second, we look at whether there are differences between district and non-district provinces (Sections 3.1 and 3.2). Third, over the same period and with a focus on selected district provinces we analyse whether district sectors have contributed more than non-district sectors to the degree of the persistence of trade specialization in each province, and identify some main trajectories in terms of specialization dynamics (Section 3.3).

3 STRUCTURAL CHANGES IN LOCAL SPECIALIZATION

3.1 Data and descriptive statistics

Based on 103 Italian provinces,[5] and data from the National Institute of Statistics (ISTAT), we analyse export flows for the period 1995-2005 by economic activity, at the 5-digit CPAteco (*Classificazione delle Attività Produttive*) classification level. Data on world exports are taken from the UN Comtrade database (United Nations Commodity Trade Statistics Database) at the 5 digit Standard International Trade Classification (SITC Rev. 3) level, which are then converted into the CPAteco classification.

Among provinces, we distinguish between provinces where there is at least one ID as identified by

ISTAT (henceforth referred to as *district* provinces)[6] and provinces that have no districts (referred to as *non-district* provinces).

As a measure of international specialization we use the Balassa index of Revealed Comparative Advantages (RCA) (BALASSA, 1965), widely applied in the trade literature (DE BENEDICTIS and TAMBERI, 2001):

$$RCAij=(Xij/Xi)/(Xwj/Xw) \quad (1)$$

Where the numerator is the percentage share of sector *j* in the exports of province *i*, and the denominator is the percentage share of sector *j* in world exports. RCA ranges from 0 to $+\infty$ and has a demarcation value of 1. Values below 1 indicate that province *i* has a comparative disadvantage (CD) in sector *j*; values above 1 indicate that province *i* has a comparative advantage (CA) in sector *j*. Sectors with a RCA above 1 are considered to be specialized sectors; those below 1 are despecialized sectors.

Two widely used descriptive statistics from the RCA index are the median of the RCA distribution and the Spearman's rank correlation coefficient. As suggested by De Benedictis and Tamberi (2003: 9), unlike the arithmetic mean[7] of the RCA distribution, 'the median of sectoral RCA has an immediate meaning: a low median means that a country has a large share of sectors with comparative disadvantages; a high median means that a country has a large share of sectors with comparative advantages'. And, therefore, 'the median of RCA measures the overall level of specialization of the country, that is, if a country has a concentrated structure of exports in comparative advantaged sectors' (De Benedictis and Tamberi, 2003: 10).[8] In addition, analysing the median allows both static and dynamic considerations: a median increasing over time means that a country has increased the share of its specialized sectors while a median decreasing over time means that a country has increased the share of its despecialized sectors.

At first glance, the distribution of comparative advantage among Italian provinces differs widely across regions (Table 1). In general, the median of the RCA distribution is lower in the South than in the Centre or North of the country, with this difference remaining similar across the period

considered.[9] Therefore, it seems that provinces in the South have much more concentrated export structures (i.e. a lower share of specialized sectors) than those in the Centre and the North, which makes their local economic systems more vulnerable to external demand conditions and the vagaries of international markets. The two island regions, Sicily and Sardinia, and also Calabria stand out as regions with extremely concentrated export structures.

It is interesting that, on average, district provinces have a higher median, i.e. a higher share of specialized sectors, than non-district provinces, suggesting that the former are characterized by a broader pattern of international trade specialization than provinces without districts. Nevertheless, among district provinces there is a persistent geographical difference because those in the South have a lower median than district provinces in the Centre and the North.

As regards the dynamics of the overall distribution, the gap between the Centre and the South of the country is smaller in 2005 compared to 1995, in the sense that on average the share of specialized sectors has increased in the South and decreased in the Centre, making the two areas slightly less diverse in terms of export concentration; or, in other words, we can say that the South has converged towards the national average and is less strikingly different from the rest of the country than in the mid-1990s. The opposite trend can be observed in the North of the country, where provinces in the East, which had a slightly higher median compared to the West in 1995, have moved further away.

< ***Table 1*** about here >

The other indicator in Table 1 is the Spearman rank correlation coefficient: a high ranked correlation indicates that the province's comparative advantages has changed very little over 1995-2005, while a low value indicates considerable change. Table 1 shows that sectoral specialization has been very stable in the Central and North regions: 95 % of the provinces in the North-East and 70 % of the provinces in the Centre and the North-West have a coefficient higher than 0.7, compared with only 19 % of the provinces in the South. Also, in each macro area district provinces on average show a higher value correlation than non-district provinces, meaning that on average the

RCA distribution in those provinces has lower sector mobility. However, analysis of the Spearman rank correlation does not provide information on the determinants of a higher or lower degree of persistence. In other words, it does not explain which sectors are contributing the most to that persistence, and in particular it does not explain whether district sectors actually contribute to the overall degree of persistence of the provinces in which they are located *more* than do other sectors. Hence, the presumption that because district provinces have more persistent trade patterns, industrial districts must therefore be responsible for the overall persistence of the Italian model of sectoral specialization, needs further investigation. In the following sections we analyse the dynamics of the overall specialization of Italian provinces using a methodology that allows us to test for degree of persistence of each province across sectors, as well as the contribution of each sector to the degree of persistence of a province as a whole.

3.2 The dynamics of overall specialization

In this section we explore the persistence of the patterns of specialization of Italian provinces and whether their overall degree of specialization has increased or decreased, by exploiting a methodology that has applied to international trade data in the past (AMENDOLA *et al.*, 1992; CANTWELL, 1991, 1993; CANTWELL and IAMMARINO, 2001; DE BENEDICTIS, 2005; GUERRIERI and IAMMARINO, 2007).

With an OLS regression model we test whether the specialization patterns of Italian provinces have remained fairly stable over time, using a simple transformation of the RCA, i.e. the symmetric RCA (RSCA), defined as follows:

$$RSCA_{ij}=(RCA_{ij}-1)/(RCA_{ij}+1). \quad (2)$$

The RSCA has a lower- and upper-bounded distribution ranging from –1 to +1 with a demarcation value of 0. Negative values indicate comparative disadvantages and positive values indicate comparative advantages.

Under the hypothesis of conjoint normality of the RSCA distribution in 1995 and 2005, we test the

following equation for each Italian province:

$$RSCAij_t = \alpha i + \beta i\ RSCAij_{t-k} + \varepsilon ij \quad (3)$$

with the error term εij independent of $RSCAij_{t-k}$ and where i= 1, ..., 103 are the Italian provinces, j= 1, ..., 92 are the 5-digits manufacturing sectors, t is the final year (2005) and t-k is the initial year (1995).[10]

The estimated βs from the regressions above provide information on the dynamics of the overall specialization of the Italian provinces between 1995 and 2005. The null hypothesis tests for the absence of linear path-dependence (β=0) against the alternative hypothesis of linear persistence of specialization patterns (β≠0) in the structure of sectoral specialization, i.e. whether on average (de)specialized sectors remain (de)specialized. Therefore, the following cases are possible:

- β =1 denotes stability in the initial specialization pattern;
- β>1 denotes a structure of specialization in which on average the initial pattern is strengthened (i.e. higher comparative advantages and disadvantages);
- 0<β<1 denotes a structure of specialization which on average is weakening, i.e. lower comparative advantages and disadvantages. Hence, the structure of specialization tends on average 'towards the mean' (HART, 1976);
- β <0 denotes an inversion of the initial pattern of specialization.

Analysing the estimated βs does not provide sufficient information to conclude that the degree of specialization has either increased or decreased.[11] The regression model in combination with the estimates of β, allows us to test for changes in the *degree of trade specialization* in each province: i.e. to calculate the variance in the RCA index by measuring the degree of dispersion of the distribution around the mean.

If the variance of the RCA index is:

$$\sigma_t^2 = \beta^2 \sigma_{t-k}^2 + \sigma_\varepsilon^2 \quad (4)$$

the square of the correlation coefficient ρ^2 can be written as:

$$\rho^2 = 1 - \frac{\sigma_\varepsilon^2}{\sigma_t^2}, \tag{5}$$

and from equations (4) and (5) above, we obtain that:

$$\frac{\sigma_t^2}{\sigma_{t-k}^2} = \frac{\beta^2}{\rho^2} \tag{6}$$

which is equal to:

$$\frac{\sigma_t}{\sigma_{t-k}} = \frac{|\beta|}{|\rho|} \tag{7}$$

Equation (7) suggests that a change in the degree of specialization depends on the comparison between the estimated β and the estimated correlation coefficient ρ.[12] More specifically, ρ is a measure of the mobility of sectors up or down the RCA distribution (LAURSEN, 2002). A high estimated ρ indicates that the overall structure of sectoral specialization is rather stable with the relative positions of sectors almost unchanged (low mobility). A low estimated ρ implies that the ranking of sectors has changed significantly (high mobility).

It follows that $\beta=\rho$ indicates that the degree of specialization is the same, and the dispersion of the distribution is unchanged; $\beta>\rho$ implies an increase in the variance of the RCA distribution, hence a higher degree of specialization and $\beta<\rho$ denotes a decrease in the degree of specialization.

Combining the results for the βs and the β/ρ, we can distinguish make three cases:

- If $\beta>1$ this necessarily implies that $\beta>\rho$, as ρ is never higher than 1. This means that provinces that strengthen their initial specialization patterns over time, also face an increase in the dispersion of their specialization patterns., i.e. specialized sectors and despecialized sectors are increasingly further apart;[13]
- If $0<\beta<1$ and $\beta>\rho$, this means a higher dispersion in the specialization structure. However, the increasing dispersion is not due to higher comparative advantages or disadvantages (on the contrary, it acts to weaken some of the initial comparative strengths as $0<\beta<1$), but rather to high mobility across sectors. Therefore, the net effect is an *increase* in the degree of

specialization;

- If $0<\beta<1$ and $\beta<\rho$ this implies a weakening of the specialization structure combined with low mobility across sectors, resulting in lower dispersion (i.e. a decrease in the overall degree of specialization).

Table 2 summarizes the results of the analysis of the dynamics of overall specialization in the Italian provinces.[14] First, we consider the signs of the β coefficients, which are all positive, therefore excluding the case of inversion of the initial specialization pattern. Second, there are no βs higher than 1, implying that no province has significantly strengthened its initial specialization in the period under consideration. Third, a small group of provinces (16%), almost all district provinces, has an estimated β not significantly different from 1, which is evidence of a stable specialization pattern. For the remaining provinces, the value of the estimated coefficient is $0<\beta<1$ denoting a weakening of their specialization structure over time. Also, within this very large group, 20% of provinces, mainly from the South, have a β coefficient that is not significantly different from 0.5, or significantly lower than 0.5.

<***Table 2*** about here>

By comparing the regression coefficients (β) with the estimated correlation coefficients (ρ) we can divide the provinces in two groups. The first column in Table 2 includes 44% of the provinces, with weakening initial specialization and an overall *decrease* in degree of specialization. In other words, the loss of initial comparative strength in these provinces is not being accompanied by significant changes in RSCA distribution. The second column includes 56% of the provinces that are facing an overall *increas*e in degree of specialization; thus, although they are also losing their initial comparative advantage they are experiencing positive changes in the sector rankings within the RSCA distribution.

Overall, these findings, which are based on disaggregated provincial data, present a much more differentiated picture with respect to some of the existing country level empirical evidence (DE BENEDICTIS, 2005). Our analysis shows that the majority of Italian provinces are *not*

concentrating their structure of specialization but are experiencing a process of despecialization.[15] Also, there is large group of provinces whose sectoral composition of comparative advantage has changed, towards a process of diversification of specialization patterns. Moreover, despite there being no systematic difference between provinces with and without IDs, district provinces show slightly more persistence in terms of specialization. This result is in line with De Benedictis (2005), who through an aggregated estimation shows that the presence of IDs is positively related to the degree of persistence of RCA.

Nevertheless, although district *provinces* may have slightly more persistent specialization patterns than non-district provinces, this persistence is not necessarily related to the sectors of specialization of the districts. Indeed, as we showed in Section 3.1, district provinces have *consistently less* concentrated export structures than non-district provinces, i.e. they have a higher share of specialized sectors. Therefore, the evidence pointing to persistence in trade patterns being positively correlated to the presence of industrial districts does not necessarily imply that district sectors are more persistent than others. In the next section, which focuses on provinces with at least one ID, we test for the contribution of each sector to the degree of persistence in trade patterns.

3.3 How much do district sectors contribute to persistent specialisation?

Here, we focus on those provinces with, according to ISTAT,[16] at least one ID specialized in the one of the following sectors: textiles and clothing, leather and footwear, machinery and equipment and furniture and home accessories, which are considered as most representative of Italian specialization. Among these 56 district provinces we test the contribution of each (district and non-district) sector (see Table A1) to the overall degree of persistence of the trade patterns for the whole province. To do this, we introduce sectoral dummies into the model specification previously tested (2).

The results are presented in Table 3. Columns 5 to 9, present the coefficients of the dummies for the

district sectors. The coefficients are positive and statistically significant for 25% of the provinces considered, meaning that it is only in these provinces that district sectors contribute to the overall degree of persistence of the province in which they are located. It should be noted that in some provinces, such as Prato (PO), Biella (BI) and Vercelli (VC), in which well known textile and clothing districts are located, the coefficient of the district sector is quite high and the estimated beta decreases significantly from the first to the second model specification. From a geographical point of view, it is also worth noting that among the provinces in this group there are only two from the South (BA and LE), while in two regions that have a strong tradition of IDs, as Marche and Veneto, there are three provinces (PU, AN and AP) out of four, and in Veneto there are four provinces (TV, PD, VI, and PN) out of seven.

Also, within this group which is characterized by positive and statistically significant coefficients of the district sectors, in 10 out of 14 provinces the coefficients of the non-district sectors are also positive and statistically significant, meaning that in these provinces the degree of persistence is explained by the presence of different (both district and non-district) sectors. As can be seen from Table 2, all these provinces, except Vicenza (VI) and Ascoli Piceno (AP), register high mobility across sectors in the decade studied, and therefore have been diversifying their export patterns.

In another small groups of provinces (12%) the coefficients of the dummies for the district sectors are significant and negative, meaning that the overall degree of persistence is negatively affected by these sectors, particularly in five provinces with districts specialized in furniture/homeware related goods.

In the remaining majority of provinces (61%), none of the dummies for the sectoral districts is significant meaning that the persistence in trade patterns in these provinces is not explained by the presence of district sectors. Within this group, we can distinguish a few interesting patterns. There is a group of 6 provinces in which non-district sectors are positively and significantly contributing to the degree of persistence. In a larger group of provinces (37% of the total) the dummies for other non-district sectors are statistically significant but with a negative sign, meaning that they are

contributing to the weakening of the specialization structure. It should be noted that in this group six out of eleven provinces are located in the South of Italy. Finally, there is a group of seven provinces where none of the sectors significantly contributes to the overall degree of persistance.

<***Table 3*** about here>

Overall, our findings, based on disaggregated analysis, provide a rather different picture from the the highly persistent specialization model that is advocated in most of the literature. These differences are due in particular to the presence of IDs. Our analysis shows that only in a minority of provinces district sectors are significantly contributing to the persistence of international specialization patterns during the ten years from 1995 to 2005.

4. CONCLUSIONS

This paper analyses the dynamics of local specialization patterns in Italy over a period of ten years. The empirical analysis shows that underlying the relative persistence of international specialization at national level, there are significant and divergent local trends. The main results can be summarized as follows.

Only a few provinces have maintained stable specialization patterns in the decade examined; most show evidence of weakened specialization (despecialization). A large proportion of these provinces is also characterized by relative high mobility of sectors within the RCA distribution; thus, during the period under analysis they have undergone a process of diversification of their initial specialization patterns.

Specialization in what we define as district provinces, has o*n average* been slightly more persistent than in non-district provinces, and district provinces are also characterized by a broader pattern of international trade specialization than non-district provinces. However, there are no systematic differences between provinces with or without IDs. .

To investigate the contribution of district and non-district sectors to the degree of persistence of provinces, we restricted our analysis to those provinces with IDs specialized in the leather and

footwear, textile and clothing, machinery and equipment and furniture and homewear accessories industries. There were only a few provinces where we found a concentration of comparative strengths in the district sectors, which was often accompanied by high mobility across sectors. Moreover, in many district provinces, there is a relevant contribution of non-district sectors to the overall degree of persistence of their international specialization pattern.

This paper contributes to the understanding of Italian patterns of international specialization through the findings from a disaggregated analysis that takes account of local specificities. These findings show that the presence of IDs contributes to explaining degree of persistence in only a minority of provinces, and that other determinants, such as non-district sectors and geographical macro areas play a role.

There are some caveats to the interpretation of our results in terms of the stability of specialization, specialization trends and export performance, which are not related in any systematic way. Specialization is not *per se* conducive to positive export performance, in the same way that despecialization *per se* is not necessarily detrimental to competitiveness. In fact, these processes can be positive or negative in terms of economic development and growth, depending on competitiveness in the years considered. Moreover, if a province is more or less specialized over time, and has a more or less stable trade pattern, this does have clear-cut consequences in terms of competitiveness and growth. The economic consequences of specialization and despecialization are an empirical issue. Specialization can contribute positively to economic development only if it occurs in sectors that are dynamic in terms of export growth, i.e. sectors with relatively high income elasticities of demand. Specialization can be detrimental to economic development when a province tries to develop or strengthen its comparative advantages in sectors with low and/or declining demand. To make an analogy with the development literature, this situation could be defined as ‘immiserising specialization’. On the other hand, despecialization does not necessarily imply that a province is on the way to decline; instead, if a province loses part of its initial comparative advantage, despecialization can be positive for long-term economic development, provided that the

net impact on export growth is positive. Some very recent readings of Italian empirical evidence incline to interpret the diversification and despecialization of IDs as positive signals of long term economic performance and international competitiveness. Empirical analysis of the impact of specialization on export performance and economic growth would be an interesting issue for future research.

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Table 1 - Median of RCA and Spearman's rank correlation coefficient, 1995-2005

Sub-areas	Regions	Provinces[a]	RCA Median 05	RCA Median 95	Spearman's rank correlation coefficient
South	**Abruzzo**	AQ	0.054	0.043	0.74
		CH	**0.087**	**0.136**	**0.78**
		PE	0.211	0.244	0.67
		TE	**0.245**	**0.310**	**0.80**
	Basilicata	**MT**	**0.036**	**0.008**	**0.53**
		PZ	0.022	0.015	0.47
	Calabria	CS	0.080	0.104	0.46
		CZ	0.066	0.099	0.46
		KR	0.000	0.115	0.42
		RC	0.026	0.019	0.52
		VV	0.000	0.000	0.26
	Campania	**AV**	**0.063**	**0.074**	**0.72**
		BN	**0.020**	**0.079**	**0.62**
		CE	0.117	0.107	0.44
		NA	0.374	0.410	0.77
		SA	**0.184**	**0.242**	**0.72**
	Molise	CB	0.020	0.034	0.68
		IS	0.008	0.006	0.73
	Puglia	**BA**	**0.129**	**0.212**	**0.65**
		BR	**0.036**	**0.042**	**0.69**
		FG	0.019	0.056	0.44
		LE	**0.071**	**0.149**	**0.66**
		TA	0.009	0.021	0.52
	Sardegna	CA	0.011	0.005	0.35
		NU	0.002	0.002	0.40
		OR	0.001	0.000	0.43
		SS	0.039	0.032	0.58
	Sicilia	AG	0.036	0.006	0.49
		CL	0.014	0.003	0.52
		CT	0.138	0.042	0.66
		EN	0.006	0.009	0.41
		ME	**0.067**	**0.016**	**0.63**
		PA	0.060	0.090	0.59
		RG	0.018	0.029	0.65
		SR	0.003	0.000	0.69
		TP	**0.038**	**0.053**	**0.60**
Centre	**Lazio**	**FR**	**0.165**	**0.147**	**0.62**
		LT	0.132	0.057	0.80
		RI	0.057	0.009	0.64
		RM	0.384	0.364	0.71
		VT	**0.133**	**0.108**	**0.61**
	Marche	**AN**	**0.179**	**0.213**	**0.82**
		AP	**0.108**	**0.146**	**0.84**
		MC	**0.138**	**0.156**	**0.86**
		PU	**0.296**	**0.232**	**0.86**
	Toscana	**AR**	**0.105**	**0.143**	**0.82**
		FI	**0.437**	**0.478**	**0.82**
		GR	0.114	0.105	0.72
		LI	0.182	0.115	0.60
		LU	**0.158**	**0.123**	**0.87**
		MS	0.035	0.052	0.68
		PI	**0.096**	**0.127**	**0.82**
		PO	**0.049**	**0.039**	**0.65**
		PT	**0.146**	**0.241**	**0.89**
		SI	**0.160**	**0.086**	**0.79**
	Umbria	**PG**	**0.500**	**0.413**	**0.82**
		TR	0.057	0.088	0.75

Table 1 – *cont.*

Sub-areas	Regions	Provinces[a]	RCA Median 05	RCA Median 95	Spearman's rank correlation coefficient
North East	**Emilia Romagna**	BO	0.399	0.382	0.84
		FC	**0.502**	**0.401**	**0.83**
		FE	**0.159**	**0.092**	**0.77**
		MO	**0.219**	**0.267**	**0.87**
		PC	**0.297**	**0.263**	**0.72**
		PR	**0.313**	**0.407**	**0.84**
		RA	**0.188**	**0.288**	**0.81**
		RE	**0.327**	**0.438**	**0.87**
		RN	0.164	0.238	0.73
	Friuli Venezia Giulia	GO	0.391	0.279	0.73
		PN	**0.351**	**0.240**	**0.86**
		TS	0.531	0.268	0.66
		UD	**0.313**	**0.263**	**0.79**
	Trentino	BZ	0.497	0.463	0.80
		TN	**0.568**	**0.495**	**0.77**
	Veneto	**BL**	**0.086**	**0.106**	**0.80**
		PD	**0.652**	**0.693**	**0.89**
		RO	**0.276**	**0.263**	**0.80**
		TV	**0.537**	**0.520**	**0.90**
		VE	**0.488**	**0.621**	**0.84**
		VI	**0.390**	**0.590**	**0.89**
		VR	**0.420**	**0.549**	**0.83**
North West	**Liguria**	GE	0.429	0.357	0.66
		IM	0.150	0.155	0.67
		SP	0.240	0.259	0.59
		SV	0.126	0.108	0.56
	Lombardia	**BG**	**0.702**	**0.705**	**0.94**
		BS	**0.400**	**0.406**	**0.89**
		CO	**0.411**	**0.516**	**0.84**
		CR	**0.586**	**0.530**	**0.72**
		LC	**0.318**	**0.375**	**0.83**
		LO	0.407	0.215	0.50
		MI	**0.873**	**0.732**	**0.89**
		MN	**0.420**	**0.486**	**0.84**
		PV	**0.233**	**0.273**	**0.88**
		SO	**0.503**	**0.176**	**0.71**
		VA	**0.497**	**0.456**	**0.88**
	Piemonte	**AL**	**0.252**	**0.169**	**0.87**
		AT	**0.121**	**0.209**	**0.77**
		BI	**0.209**	**0.056**	**0.65**
		CN	**0.518**	**0.493**	**0.87**
		NO	**0.350**	**0.246**	**0.85**
		TO	**0.260**	**0.374**	**0.89**
		VB	**0.223**	**0.241**	**0.77**
		VC	**0.207**	**0.259**	**0.79**
	Valle d'Aosta	AO	0.052	0.062	0.63

[a] In bold provinces with at least one industrial district
Source: authors' elaborations on ISTAT

Table 2 - The dynamics of specialization for Italian provinces

		β<ρ	**β>ρ**
0<β<1	*Significantly <0.5*	*South: KR, CA*	-
	Not significantly different from 0.5	*Centre*: RI, LI *South:* CL, **ME**, **MT**, NU, OR, PE, PZ, SS *North West*: SV, LO	*South:* CE, CS, CZ, EN, FG, RC, RG, VV
	Significantly >0.5	*Centre*: **AP**, LT, MS, **PG**, **SI** *South:* AG, **BR**, CT, **SA**, SR, TA *North East:* **BL**, FC, **FE**, PC, **PD**, PR, RO, **VE**, **VI** *North West*: **AL**, AO, **AT**, **BG**, **BS**, **CR**, GE, **PV**, **SO**, SP, **VB**	*Centre*: **AN**, **FI**, **FR**, GR, LU, **PI**, RM, TR, **VT** *South:* AQ, **AV**, **BA, BN, CB**, NA, **TE**, *North East:* **BO, BZ**, GO, **MO, PN, RA**, **RE,** RN, **TN,** TS, **UD, VR** *North West*: **BI, CO**, IM, **LC**, **MI**, **NO**, **TO**, **VA**, **VC**
β = 1	*Not signignificantly different from 1*	-	*Centre*: **AR**, **MC**, **PO**, **PT**, **PU** *South:* **CH**, IS, **LE**, PA, **TP** *North East:* **TV** *North West*: **CN, MN**

[a]In bold provinces with at least one industrial district

Table 3 – Sector effects on district provinces

				District Sectors					Non District Sectors											
Area	**Prov**	**β no sect****	**B with sect****	**DB20**	**DB40**	**DC**	**DK**	**DN**	**DB20***	**DB40***	**DC**	**DD**	**DE**	**DG**	**DH**	**DI**	**DJ**	**DK**	**DL**	**DM**	**DN**
Centre	**PU**	0.993	**0.983**	**0.424****	0.058		0.081	0.063													
North East	**TV**	0.958	**0.896**	**0.346****	0.184	**0.295***		-0.044													
North West	**VC**	0.868	**0.755**	0.211	**0.382****																
South	**BA**	0.74	**0.686**	0.04	0.133	**0.527****		0.00													
Centre	**AP**	0.771	**0.662**	0.062	0.213	**0.741*****								0.263*							
North East	**PD**	0.891	**0.907**	**0.472*****	0.022			-0.092													
North East	**VI**	0.886	**0.817**	**0.383****	0.206	**0.278***	0.092	0.039				0.245*					0.330***				
Centre	**AN**	0.912	**0.908**	0.098	0.013	**0.291***	0.147					0.243*									
Centre	**AR**	0.935	**0.872**	0.019	**0.255***			0.058			0.479**										
Centre	**PO**	0.927	**0.406**	**1.063*****	**1.027*****						0.517***										
North East	**PN**	0.906	**0.812**				**0.343****	**0.231***				0.428***			0.346*		0.252**				
North West	**LC**	0.856	**0.795**				**0.265***											0.265*			
North West	**BI**	0.688	**0.333**	**1.287*****	**0.956*****						0.768***			0.404***	0.445*						
South	**LE**	0.89	**0.782**	**0.408****	**0.541*****													0.362**			
North East	**VR**	0.855	**0.795**			0.036	0.055	**-0.324***													
Centre	**SI**	0.777	**0.788**			-0.19		**-0.283***	0.434**												
Centre	**FI**	0.904	**0.947**	**-0.344***	-0.077	0.013										-0.328**					
North East	**VE**	0.83	**0.801**					**-0.329****								-0.352**		-0.280*	-0.285**		
North East	**TN**	0.824	**0.789**				0.037	**-0.438****				-0.394**		-0.316*			-0.307*		-0.266*	-0.474***	
North West	**PV**	0.889	**0.89**				-0.148	**-0.317****		-0.313**										-0.219*	
South	**TE**	0.857	**0.908**	-0.057	-0.117			**-0.311***				0.384**									
South	**ME**	0.491	**0.506**	-0.151	**-0.382****											-0.382**			-0.246*		
North East	**RO**	0.798	**0.809**	0.013	0.025								0.542***				0.274*	0.293*			
North West	**VB**	0.726	**0.67**				-0.027										0.385**				
Centre	**MC**	0.941	**0.89**	0.075	0.212	0.047		0.096												-0.261**	
North East	**FE**	0.813	**0.853**				-0.008										0.322**				
North East	**BL**	0.79	**0.794**				0.037										0.234*				
North East	**RA**	0.826	**0.781**					-0.107									0.376**				
North East	**RE**	0.893	**0.876**				0.063	-0.13	0.277*	0.217*											
North West	**NO**	0.863	**0.819**				-0.179								0.514**	-0.386***					
North West	**BG**	0.924	**0.924**	0.094	-0.126		-0.074						0.194*			-0.215**					-0.184*
North West	**CR**	0.671	**0.651**				-0.055						-0.416*						-0.325*		
North West	**AL**	0.856	**0.838**				0.041	-0.003								-0.423***				-0.249*	
North West	**AT**	0.797	**0.757**				-0.207				-0.401*					-0.384**			-0.286**		
North West	**CO**	0.865	**0.833**	0.227	0.091													-0.268*		-0.263**	
North West	**MN**	0.897	**0.885**	0.302	-0.012			-0.26								-0.272*			-0.290**		
North West	**VA**	0.894	**0.904**	-0.078	-0.007						-0.325*										-0.217*
North West	**CN**	0.916	**0.903**					-0.054						-0.337**		-0.275*					
Centre	**VT**	0.707	**0.646**					-0.236	-0.580**	-0.484**	-0.450*		-0.440*	-0.545***				-0.333*	-0.384**	-0.475**	
Centre	**PT**	0.964	**0.851**	-0.106	0.019									-0.307***		-0.472***	-0.419***	-0.502***	-0.354***	-0.409***	-0.320***
North East	**FC**	0.822	**0.806**				0.097	-0.148						-0.364**							
North East	**MO**	0.913	**0.891**	0.155	0.022		0.02						-0.244*								
North East	**UD**	0.886	**0.841**				0.071			-0.304**	-0.473**										
South	**AV**	0.818	**0.823**			-0.171	-0.185		-0.661**					-0.335*		-0.334*					-0.337*
South	**BN**	0.792	**0.678**	0.035	-0.108							-0.584**	-0.450*	-0.393*				-0.458**	-0.339*	-0.622***	
South	**CB**	0.807	**0.89**	0.177	-0.022									-0.566***							
South	**BR**	0.767	**0.742**	-0.173	-0.12									-0.247*							
South	**SS**	0.613	**0.572**					-0.025										-0.363*	-0.350**		
South	**TP**	0.956	**0.954**					-0.268								-0.336**					
Centre	**PG**	0.837	**0.835**	0.187	0.202		0.023	0.026													
North East	**PC**	0.724	**0.728**				0.136														
North West	**BS**	0.853	**0.808**	-0.069	-0.011		0.097														
Centre	**PI**	0.833	**0.844**			0.049															
North West	**MI**	0.908	**0.915**					-0.099													
North West	**TO**	0.9	**0.903**				-0.083														
South	**CH**	0.917	**0.93**	0.013	0.02	-0.251															

*DB20 refers to the Textile sector and DB40 to the Clothing sector. This decomposition is obtained with the ISTAT RPI (*Raggrupamenti Principali di Industria*) classification, based on the end-use of activities (intermediate, capital and final goods).

**The number of observations for each province is 92. The first column of beta coefficients refers to regressions without sector dummies (Table A2 in the Appendix) . The second column of coefficients refers to regressions with sector dummies. All coefficients are significant at 1%. The complete outputs of regressions with sector dummies are available from the authors.

Source: authors' elaborations on ISTAT

[1] The data in this section are from the ISTAT Datawarehouse on international trade (http://www.coeweb.istat.it/), unless otherwise specified.

[2] After Germany, the United States, China, Japan, France, the Netherlands and the United Kingdom (WTO International Trade Statistics 2007 available at http://www.wto.org/).

[3] The 199 IDs identified by ISTAT in 1996 export 46% of total Italian manufacturing exports. In some sectors this share is much higher than the average: i.e. in the leather industry and agricultural machinery industry it is 85%, ceramic tiles 84%, musical instruments industry 82%, textile industry 74% (ISTAT, 2002).

[4] Along the same lines, Amighini and Chiarlone (2005) show that, over the 1990s, there was an increase in the trade overlap between Italian and Chinese exports (i.e. a higher percentage of OECD imports from Italy consists of the same goods that the OECD import from China). However, the majority of OECD imports from Italy are of higher quality than those from China, meaning that Italian and Chinese exports do not really compete with each other in OECD markets because they are positioned in different segments of the market; in other words, quality protects Italian exports from Chinese competition.

[5] In 1995, the total number of Italian provinces was 103. The 7 recently created provinces are not included in this study.

[6] To identify IDs the unit of analysis is the local labour system (LLS), defined on the basis on information about home-to-work commuting from the Population Census. The LLS are groups of contiguous municipalities characterized by a certain level of commuting to work. IDs are identified within LLS if they satisfy specific requirements about the percentage of manufacturing employees in the LLS compared to total non-agricultural employment, specialization in one particular manufacturing industry and prevalence of firms with less than 250 employees. According to the 2001 Industrial Census, the number of districts is 156 (ISTAT, 2005). The list is available at http://dwcis.istat.it/cis/index.htm.

[7] The arithmetic mean in this context is a 'poor synthetic indicator' given a skewed distribution of the RCA (De Benedictis and Tamberi, 2003).

[8] De Benedictis and Tamberi (2003) show that the median is positively correlated with the number of sectors with an RCA above 1 and negatively correlated with the Gini concentration coefficient.

[9] This is not surprising as the share of specialised sectors is supposed to increase with the industrial development of the province, which is notably higher in the North and Centre of the country than in the South.

[10] When testing for the normality of the residual distribution, the hypothesis is rejected for only 3 provinces. The tests performed are the Jarque-Bera and the Shapiro-Wilk (which is more appropriate for small samples). The rejected provinces are FI, PC and TN.

[11] *Specialization* in trade patterns means that a province increases its comparative advantages and simultaneously deepens its comparative disadvantages, with the effect that the structure of specialization becomes more dispersed (in terms of distance between sectors with the highest comparative advantage, and sectors with the strongest comparative disadvantage). Similarly, *despecialization* in trade patterns implies that there is a decreases in comparative advantage and a weakening of comparative disadvantages, in other words the structure of specialization in the province becomes less dispersed.

[12] This is the square root of the R-squared obtained from the regression.

[13] Using Cantwell's terminology, these provinces move towards a more 'narrow' specialization pattern.

[14] The values of β, ρ and β/ρ over the period 1995-2005 are reported in Table A-2 in the Appendix.

[15] Indeed we do not find any $\beta>1$.

[16] See footnote 6.

Appendix

Table A1 – Classifications - Cpateco

CPateco sectors	Groups[a]
DA - BEVERAGES AND FOOD PRODUCTS, TOBACCO	DA151, DA152, DA153, DA154, DA155, DA158, DA159, DA160 DA156, DA157
DB - TEXTILES AND TEXTILE PRODUCTS	DB174, DB175, DB177, DB181, DB182, DB183 DB171, DB172, DB176
DC - LEATHER AND LEATHER PRODUCTS	DC191, DC192, DC193
DD - WOOD AND PRODUCTS OF WOOD AND CORK (EXCEPT FURNITURE); ARTICLES OF STRAW AND PLAITING MATERIALS	DD201, DD202, DD203, DD204, DD205
DE - PULP, PAPER AND PAPER PRODUCTS; RECORDED MEDIA; PRINTING SERVICES	DE221, DE222 DE211, DE212
DG - CHEMICALS, CHEMICAL PRODUCTS AND MAN-MADE FIBRES	DG244, DG245 DG241, DG242, DG243, DG246, DG247
DH - RUBBER AND PLASTIC PRODUCTS	DH251, DH252
DI - OTHER NON METALLIC MINERAL PRODUCTS	DI261, DI262, DI263, DI264, DI265, DI266, DI267, DI268
DJ - BASIC METALS AND FABRICATED METAL PRODUCTS	DJ271, DJ272, DJ273, DJ274, DJ281, DJ282, DJ283, DJ286, DJ287
DK - MACHINERY AND EQUIPMENT N.E.C.	DK297 DK291, DK292, DK293, DK294, DK295, DK296
DL - ELECTRICAL AND OPTICAL EQUIPMENT	DL300, DL311, DL322, DL323, DL331, DL332; DL334, DL335 DL312, DL313, DL314, DL315, DL316, DL321
DM - TRANSPORT EQUIPMENT	DM354, DM355 DM341, DM342, DM343, DM351, DM352, DM353
DN - OTHER MANUFACTURED GOODS N.E.C.	DN361, DN362, DN363, DN364, DN365, DN366

[a] A detailed description of the groups is available at www.coeweb.istat.it

Table A2 – Regression output

Sub-areas	Regions	Province	β	R-squared	ρ	t-test: β =1	t-test: β =0.5
South	**Abruzzo**	AQ	0.827***	0.58	0.76	2.34**	4.44***
		CH	0.917***	0.77	0.88	1.59	7.95***
		PE	0.549***	0.32	0.57	5.37***	0.58
		TE	0.857***	0.69	0.83	2.33**	5.82***
	Basilicata	**MT**	0.534***	0.38	0.62	6.47***	0.46
		PZ	0.431***	0.39	0.62	10***	1.22
	Calabria	CS	0.534***	0.24	0.49	4.71***	0.34
		CZ	0.432***	0.16	0.40	5.50***	0.65
		KR	0.314***	0.11	0.33	7.09***	1.92*
		RC	0.683***	0.27	0.52	2.71**	1.56
		VV	0.389***	0.14	0.37	5.96***	1.08
	Campania	**AV**	0.818***	0.54	0.73	2.28**	3.98***
		BN	0.792***	0.46	0.68	2.31**	3.25***
		CE	0.552***	0.29	0.54	4.90***	0.56
		NA	0.789***	0.6	0.77	3.1***	4.26***
		SA	0.711***	0.52	0.72	4.02***	2.93***
	Molise	**CB**	0.807***	0.47	0.69	2.15**	3.42***
		IS	0.989***	0.7	0.84	0.17	7.08***
	Puglia	**BA**	0.740***	0.54	0.73	3.63***	3.35***
		BR	0.767***	0.65	0.81	3.96***	4.54***
		FG	0.625***	0.29	0.54	3.63***	1.20
		LE	0.890***	0.64	0.80	1.56	5.55***
		TA	0.613***	0.49	0.70	5.92***	1.72*
	Sardegna	CA	0.335***	0.34	0.58	13.6***	3.38***
		NU	0.531***	0.32	0.57	5.71***	0.38
		OR	0.497***	0.28	0.53	5.94***	0.00
		SS	0.613***	0.38	0.62	4.72***	1.38
	Sicilia	AG	0.637***	0.42	0.65	4.55***	1.72*
		CL	0.566***	0.43	0.66	6.35***	0.97
		CT	0.717***	0.54	0.73	4.04***	3.10***
		EN	0.641***	0.29	0.54	3.42***	1.34
		ME	0.491***	0.39	0.62	7.86***	0.14
		PA	0.956***	0.51	0.71	0.44	4.65***
		RG	0.498***	0.2	0.45	4.81***	0.00
		SR	0.591***	0.6	0.77	7.99***	1.78*
		TP	0.956***	0.61	0.78	0.54	5.62***
Centre	**Lazio**	**FR**	0.678***	0.45	0.67	4.08***	2.25**
		LT	0.730***	0.62	0.79	4.49***	3.83***
		RI	0.567***	0.54	0.73	7.78***	1.2
		RM	0.713***	0.5	0.71	3.80***	2.81**
		VT	0.707***	0.47	0.69	3.68***	2.60**
	Marche	**AN**	0.912***	0.82	0.91	1.92*	9.05***
		AP	0.771***	0.68	0.82	4.07***	4.83***
		MC	0.941***	0.83	0.91	1.31	9.77***
		PU	0.993***	0.8	0.89	0.14	9.47***
	Toscana	**AR**	0.935***	0.74	0.86	1.10	7.42***
		FI	0.904***	0.78	0.88	1.89*	7.94***
		GR	0.791***	0.55	0.74	2.76**	3.86***
		LI	0.502***	0.3	0.55	6.20***	0.00
		LU	0.900***	0.77	0.88	1.92*	7.73***
		MS	0.802***	0.65	0.81	3.18***	4.86***
		PI	0.833***	0.69	0.83	2.85***	5.68***
		PO	0.927***	0.65	0.81	1.02	6.00***
		PT	0.964***	0.83	0.91	0.77	10.0***
		SI	0.777***	0.72	0.85	4.41***	5.48***
	Umbria	**PG**	0.837***	0.71	0.84	2.86***	5.95***
		TR	0.855***	0.73	0.85	2.61**	6.39***

Table A2 – *Cont.*

Sub-areas	Regions	Province	β	R-squared	ρ	t-test: β =1	t-test: β =0.5
North East	**Emilia Romagna**	BO	0.872***	0.75	0.87	2.44**	7.10***
		FC	0.822***	0.68	0.82	2.96***	5.35***
		FE	0.813***	0.69	0.83	3.29***	5.49***
		MO	0.913***	0.81	0.90	1.88*	8.93***
		PC	0.724***	0.53	0.73	3.85***	3.13***
		PR	0.852***	0.74	0.86	2.80**	6.67***
		RA	0.826***	0.66	0.81	2.81**	5.27***
		RE	0.893***	0.78	0.88	2.15**	7.94***
		RN	0.763***	0.57	0.75	3.37***	3.74***
	Friuli Venezia Giulia	GO	0.768***	0.54	0.73	3.11***	3.59***
		PN	0.906***	0.77	0.88	1.80*	7.75***
		TS	0.742***	0.37	0.61	2.55**	2.39**
		UD	0.886***	0.69	0.83	1.83*	6.18***
	Trentino	BZ	0.841***	0.69	0.83	2.65**	5.66***
		TN	0.824***	0.64	0.80	2.71**	5.00***
	Veneto	**BL**	0.790***	0.72	0.85	4.03***	5.56***
		PD	0.891***	0.8	0.89	2.31**	8.30***
		RO	0.798***	0.66	0.81	3.34***	4.94***
		TV	0.958***	0.84	0.92	0.97	10.5***
		VE	0.830***	0.69	0.83	2.90***	5.62***
		VI	0.886***	0.81	0.90	2.51**	8.45***
		VR	0.855***	0.69	0.83	2.41**	5.90***
North West	**Liguria**	GE	0.674***	0.48	0.69	4.44***	2.37**
		IM	0.859***	0.57	0.75	1.79*	4.56***
		SP	0.674***	0.47	0.69	4.28***	2.28**
		SV	0.554***	0.34	0.58	5.51***	0.67
	Lombardia	**BG**	0.924***	0.88	0.94	2.15**	11.9***
		BS	0.853***	0.81	0.90	3.38***	8.15***
		CO	0.865***	0.73	0.85	2.40**	6.53***
		CR	0.671***	0.47	0.69	4.38***	2.28**
		LC	0.856***	0.73	0.85	2.62**	6.45***
		LO	0.429***	0.21	0.46	6.46***	0.80
		MI	0.908***	0.82	0.91	2.05*	9.19***
		MN	0.897***	0.69	0.83	1.63	6.28***
		PV	0.889***	0.8	0.89	2.38**	8.33***
		SO	0.769***	0.6	0.77	3.47***	4.04***
		VA	0.894***	0.75	0.87	1.97*	7.32***
	Piemonte	**AL**	0.856***	0.74	0.86	2.71**	6.71***
		AT	0.797***	0.64	0.80	3.18***	4.66***
		BI	0.688***	0.44	0.66	3.79***	2.29**
		CN	0.916***	0.73	0.85	1.42	7.00***
		NO	0.863***	0.67	0.82	2.11**	5.63***
		TO	0.900***	0.77	0.88	1.94*	7.77***
		VB	0.726***	0.58	0.76	4.17***	3.43***
		VC	0.868***	0.65	0.81	1.98*	5.52***
	Valle d'Aosta	AO	0.684***	0.48	0.69	4.17***	2.43**

Notes

*significant at 10%; ** significant at 5%; *** significant at 1%

[a] Provinces where there is at least one district are highlighted

[b] The number of observations for each province is 92 .

Source: authors' elaborations on ISTAT