THE SPECIALIZATION OF THE DISTRICTS: FROM TYPICAL FINAL GOODS TO MACHINERY FOR MAKING THEM?

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1. Introduction

In recent decades many of Italy's industrial districts, evolving within their respective product chains, have progressively shifted from the production of typical Italian final goods to the production of machinery and equipment for making them. Perhaps the two best-known examples are the Biella textiles district, where the production of textiles has increasingly given way to that of machinery for the textile industry, and the Vigevano footwear district, once a shoemaking hub, now a centre for the manufacture of machinery for the footwear industry. Vigevano and Biella are not isolated cases but part of a pattern of evolution that has helped make Italy one of the world's leading suppliers of capital equipment for some sectors of manufacturing that one traditionally associates with Italy.[1]

This paper has two main objectives: (a) to frame the evolution of the districts' specialization from final goods to capital goods in the context of the debate on international trade, product specialization and growth; and (b) to quantify the phenomenon at industrial-district level.

Any analysis of the changes in the districts' product specialization needs to take account of the debate on the relationship between international trade, growth and technological innovation,[2] most recently extended to the new paradigm of the New economic geography.[3] These recent trends in economic analysis combine the effect on international trade of (internal and external) economies of scale and imperfectly competitive markets. The shift from the production of "made in Italy" final goods to the

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[*] Department of Economics, University of Bari. The authors thank Fabio Farabullini for his key contribution to the analysis of the data, and Luigi Cannari, Riccardo Faini and Vittorio Grilli for fruitful exchanges of ideas on the subject. The work incorporates helpful comments by Matteo Bugamelli, Carlo Gola, Giovanni Iuzzolino, Massimo Omiccioli and Luigi Federico Signorini. The usual disclaimer applies.

[1] See De Arcangelis *et al.* (2002), ACIMIT (2001), and Ferragina and Quintieri (2002).

[2] See, for example, Grossman and Helpman (1991).

[3] See Fujita *et al.*(1999).

production of capital goods for making them can be interpreted in the light of the evolution of the specialization of the Italian economy envisaged by these theoretical models. Accordingly, the first part of this paper defines a theoretical frame of reference.

Secondly, it is necessary to quantify the phenomenon, i.e. to evaluate how many districts have evolved within their respective product chains from makers of final goods to makers of machinery, and in what sectors Our study covers the decade 1991-2001 and uses Istat data on foreign trade, which provide both a sufficiently detailed breakdown into product groups and an adequate level of geographical classification (provincial level).

The quantification proceeds in three logical stages. It starts out by classifying the district areas according to their prevalent product specialization. As in Brozini (2000), to overcome the constraint imposed by the fact that export data are at provincial and not local-labour-system (LLS) level, we construct an "indicator of district intensity"[4] (which ranges from 0 to 1) of the *i-th* province and identify 32 district-intense provinces.

In the second stage, the product groups of capital goods of the kind used in making typical Italian final goods are identified and coupled with the product groups of typical Italian final goods. This taxonomy is crucial for the rest of the analysis and associates final goods with capital goods within the product chain.

The third stage consists in analyzing the foreign trade data at provincial/product level to verify whether between 1991 and 2001 the exports of the district-intense provinces evolved towards a mix in which the importance of capital goods rose and that of final goods fell within the same product chain. The analysis is performed on the basis of both descriptive and econometric evidence.

The results show a slight but perceptible respecialization of industrial districts from final goods to capital goods. They also show that the increase in machinery's share of total exports is more likely for the provinces that have fewer district sectors of specialization and/or resort more extensively to the delocalization of production. In other words, the

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[4] On the subject, see also Iuzzolino (2000).

admittedly preliminary empirical evidence now available appears to suggest a scenario in which Italy's industrial districts are slowly becoming more specialized in the production of capital goods and leaving the more labour-intensive phases of production to foreign partners in the emerging economies.

2. Evolution of specialization towards capital goods: some intuitions from theory

According to the traditional theories of international trade, better technologies and/or more abundant endowments of key factors of production are the elements that determine a country's model of specialization. The evolution of the Italian economy's model of specialization towards capital goods can thus be interpreted as a recent modification of comparative advantages.

Bearing in mind the geographical reorientation of international trade in capital goods and the growing shares accounted for by the emerging countries (including the Mediterranean basin and the countries of Eastern Europe), Italy effectively does hold larger productivity advantages in capital goods than in final goods. Considering, further, that capital goods are more skilled-labour-intensive, especially compared with typical Italian final goods, the emergence of a model of specialization based on capital goods is also justified according to a Heckscher-Ohlin effect.

Beside the traditional approach based on constant returns to scale and perfect competition, the new theories of international trade are also a source of theoretical insight. For example, Grossman and Helpman (1991) provide a model in which endogenous growth and the evolution of the comparative advantages of a country interact reciprocally.

In particular, Grossman and Helpman posit a link between (a) the advantages of international trade in a context of imperfectly competitive markets and (b) the role of the accumulation of knowledge through product innovation (both in the presence and in the absence of technology spillovers). Trade openness (trade integration especially) tends to heighten the beneficial effects of the accumulation of technological capital principally through two channels. First, the availability of foreign goods eliminates duplication of varieties: trade openness makes available foreign goods that no longer have to be (re)invented. Second, if part of the

technological knowledge is not totally appropriable and technology spillovers are generated, trade integration fosters the diffusion of knowledge and augments the favourable effect of positive externalities.[5] If countries start out at different degrees of development, trade openness and integration imply that product specialization will change and that the accumulation of knowledge will be concentrated in only some countries.

The same conceptual schema can also be applied to the case of the production of "machinery for differentiated goods" (such as typical Italian final goods) versus the production of differentiated goods. Just as research and development (R&D) spending can generate new varieties, investment "in machinery for making typical Italian products" increases the capital stock and has a positive effect on the efficiency of production of final goods.

When integration ensues between different economies, the model predicts there will be specialization either in the differentiated final goods sector or in the capital goods sector (corresponding to the R&D sector in Grossman and Helpman's original model). The literature on R&D assigns a central role to the degree of development of the countries that interact (proxying the degree of development with the size of the R&D sector); in our case, countries with a higher (lower) degree of development are characterized by a larger (smaller) capital goods sector. We consider that interaction between economies with different degrees of development is precisely the case of the Italian economy, especially in its intense relations with the countries of Eastern Europe and the Mediterranean concerning the choice between exporting machinery for making typical Italian goods and exporting the final goods themselves.

The specialization effect posited by traditional theories, mentioned at the beginning of this section, is confirmed according to Grossman and Helpman's original model: R&D activity tends to concentrate where its production is more efficient for technological reasons (Ricardo effect) or else in the countries relatively better endowed with the resources necessary for innovation (Heckscher-Ohlin effect). The more developed country is probably the one that specializes in R&D and tends to transfer the production of final goods abroad.

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[5] See Basevi *et al.*, 2001, chapter 7, for a summary model.

In the context of our model, with the production of capital goods in place of R&D activity and referring to the Italian situation, the expected consequence of the first impulse (Ricardo effect) is that Italy's industrial districts will tend to retain the production of capital goods and transfer abroad the production of final goods (or at least the most labour-intensive phases of the production of differentiated goods).[6]

In addition, compared with the traditional theory of international trade, in our framework emphasis is placed on the possible scale effects that are connected with the machinery sector (necessarily absent in the approaches with constant returns to scale *à la* Ricardo or *à la* Heckscher-Ohlin) and that cannot be overlooked in the empirical analysis that follows.

3. Empirical findings

For the purpose of quantifying the phenomenon, i.e. measuring the extent to which the districts have evolved within their own product chain from makers of final goods to makers of machinery, our analysis covers the decade 1991-2001 and uses Istat data on foreign trade, which provide both a sufficient breakdown of product groups (Ateco91) and an adequate level of geographical aggregation (provincial level) of exports. The exercise proceeds in three logical stages.

The first stage consists classifying the district areas according to prevalent product specialization. As in Bronzini (2000) and in the paper by F. Farabullini and G. Ferri in this volume, the constraint imposed by the fact that the export data are at provincial and not local-labour-system

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[6] In Grossman and Helpman's model, in the more developed country, which already possesses a very high level of knowledge capital, product innovation might be less profitable as a consequence of greater domestic competition due to the presence of a larger number of firms. In this case the model would predict a tendency to transfer innovation activity to the new markets, where a higher mark-up can be exploited. However, this effect seems less important for two reasons. One is empirical and concerns the degree of competition in the capital goods sector in Italy: it is not certain that competition in that sector is greater than in the typical final goods sectors. Second, the dynamics of integration between economies (as in the scenario of integration with the countries of the Mediterranean and Eastern Europe) could nevertheless leave unaltered the economic advantageousness of producing machinery in Italy and final goods in the countries with a lower degree of development. In other words, this second effect appears empirically less important and more ambiguous than the effect on comparative advantages. We thank a referee for suggesting this consideration.

(LLS) level is overcome by constructing an "indicator of district intensity" of province *i* for the whole manufacturing sector:

$$x_i = \frac{\text{number of manufacturing workers in district LLSs in province } i}{\text{total number of manufacturing workers in province } i}$$

with the degree of district intensity, x_i, evidently ranging from 0 to 1.

Using the classification into industrial districts of local labour systems in 1991 and referring to 1991 census data, Table 1 aggregates the workers of the individual LLS at provincial level and for each province shows the incidence of "district" workers.[7] Thirty-seven provinces have values above the mean, and these are selected as district-intense provinces (or simply "district provinces").[8] In addition, following the same procedure adopted in the paper by F. Farabullini and G. Ferri in this volume, for each of the 37 provinces we count from a minimum of one to a maximum of five groups of district sectors of specialization[9] (Table 2).

The second logical stage consists in identifying the product groups of capital goods used in making typical Italian final goods.[10] This operation is crucial for the rest of the analysis. In practice, we included the following eight Ateco91 segments in the sector of machinery for making typical Italian final goods: Machinery for the production and use of mechanical energy, excluding motors (code 291); Other general industrial machinery (292); Machinery for agriculture and forestry (293); Machine tools (294); Specialized industrial machinery (295); Home machinery n.e.c. (including electric appliances) (297); Office and IT equipment (300); Motors,

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7 It should be specified that when an LLS belongs to two provinces all of its workers are included in the district workers of both provinces. Since this criterion is somewhat arbitrary, we also measured provincial district intensity by assigning the workers of the district LLS to the "prevalent" province. The results do not change significantly.

8 In descending order, the provinces are: Prato, Ascoli Piceno, Lecco, Padua, Pistoia, Treviso, Reggio Emilia, Modena, Como, Cremona, Biella, Pesaro, Vicenza, Teramo, Brescia, Parma, Bergamo, Macerata, Lucca, Lodi, Varese, Udine, Mantua, Arezzo, Ravenna, Forlì, Ancona, Rovigo, Novara, Siena, Perugia, Verbania, Verona, Sondrio, Viterbo, Piacenza and Pisa.

9 The nine groups of district sectors of specialization considered are: food products; textiles and clothing; leather, leather products and footwear; furnishing; basic metals and metal products; mechanical machinery and equipment; petrochemicals; paper, paper products, printing and publishing; jewellery, musical instruments, etc.

10 Indications pointing in this direction are already to be found in Conti and Menghinello (1998).

generators and electrical transformers (311); Electrical equipment n.e.c. (316).

Table 1

District intensity of the Italian provinces

Province	District intensity	Province	District intensity	Province	District intensity
Prato	1.00	Piacenza	0.33	Trieste	0.00
Ascoli Piceno	1.00	Pisa	0.32	Grosseto	0.00
Lecco	1.00	Pavia	0.29	Livorno	0.00
Padua	0.99	Ferrara	0.29	Massa	0.00
Pistoia	0.99	Milan	0.28	Latina	0.00
Treviso	0.98	Trento	0.28	Rome	0.00
Reggio Emilia	0.98	Asti	0.27	Pescara	0.00
Modena	0.96	Belluno	0.26	Campobasso	0.00
Como	0.95	Florence	0.25	Isernia	0.00
Cremona	0.95	Avellino	0.20	Caserta	0.00
Biella	0.94	Pordenone	0.15	Naples	0.00
Pesaro	0.94	Bari	0.15	Salerno	0.00
Vicenza	0.93	Taranto	0.12	Brindisi	0.00
Teramo	0.93	Cuneo	0.11	Lecce	0.00
Brescia	0.87	Bologna	0.11	Matera	0.00
Parma	0.86	Rimini	0.11	Potenza	0.00
Bergamo	0.82	Frosinone	0.11	Catanzaro	0.00
Macerata	0.77	Vercelli	0.10	Reggio Cal.	0.00
Lucca	0.75	Alessandria	0.08	Crotone	0.00
Lodi	0.74	Chieti	0.08	Agrigento	0.00
Varese	0.73	Foggia	0.07	Caltanissetta	0.00
Udine	0.73	Vibo Valentia	0.07	Catania	0.00
Mantua	0.71	Venezia	0.06	Enna	0.00
Arezzo	0.70	Benevento	0.06	Messina	0.00
Ravenna	0.62	Turin	0.05	Palermo	0.00
Forlì	0.59	Bolzano	0.03	Ragusa	0.00
Ancona	0.59	Rieti	0.03	Siracusa	0.00
Rovigo	0.54	Terni	0.02	Trapani	0.00
Novara	0.53	Genoa	0.01	Cagliari	0.00
Siena	0.47	Savona	0.01	Nuoro	0.00
Perugia	0.41	L'Aquila	0.01	Sassari	0.00
Verbania	0.40	Aosta	0.00	Oristano	0.00
Verona	0.37	Imperia	0.00		
Sondrio	0.35	La Spezia	0.00	*mean*	*0.299*
Viterbo	0.34	Gorizia	0.00	*median*	*0.106*

Table 2

District sectors of specialization of the 37 district-intense provinces

	Sectors of specialization				
Province	**1**	**2**	**3**	**4**	**5**
Novara	mech. mach.	text. & cloth			
Biella (*)	text. & cloth				
Verbania (*)	mech. mach.				
Lecco (*)	mech. mach.	food products	text. & cloth		
Lodi (*)	mech. mach.	petrochem..			
Bergamo	petrochem..	mech. mach.	text. & cloth		
Brescia	text. & cloth	mech. mach.	basic metals.	petrochem..	
Como	text. & cloth	furnishings	mech. mach.	petrochem..	food products
Cremona	food products	mech. mach.	text. & cloth	furnishings	basic metals.
Mantua	text. & cloth	food products	furnishings	mech. mach.	
Sondrio	food products.	text. & cloth			
Varese	text. & cloth	petrochem..			
Padua	mech. mach..	text. & cloth	furnishings		
Rovigo	text. & cloth				
Treviso	leather, shoes	text. & cloth	furnishings	mech. mach.	
Verona	furnishings	text. & cloth	mech. mach.	leather, shoes	
Vicenza	text. & cloth	oref. ecc.	leather, shoes	furnishings	
Udine	furnishings	mech. mach..			
Forlì	furnishings	text. & cloth	paper, printing	leather, shoes	
Modena	mech. mach.	text. & cloth	furnishings		
Parma	food products				
Piacenza	mech. mach.	food products			
Ravenna	food products				
Reggio Emilia	mech. mach.	furnishings	text. & cloth		
Arezzo	text. & cloth	jewellery, etc..	furnishings	paper, printing	
Lucca	leather, shoes	paper, printing	furnishings		
Pisa	leather, shoes				
Pistoia	text. & cloth	leather, shoes	mech. mach.		
Siena	furnishings	food products	leather, shoes		
Prato (*)	text. & cloth				
Perugia	text. & cloth	paper, printing	furnishings		

(contd)

(Table 2 contd)

Ancona	leather, shoes	text. & cloth	jewellery, etc..	food products
Ascoli Piceno	text. & cloth	leather, shoes		
Macerata	text. & cloth	furnishings	leather, foot	jewellery, etc..
Pesaro	text. & cloth	furnishings		
Viterbo	furnishings			
Teramo	text. & cloth	furnishings		

(*) Province created in the 1990s; analysis cannot be performed with continuity from 1991 to 2001.

The third stage consists in analyzing the export data at provincial/product level to verify whether between 1991 and 2001 the exports of district provinces evolved towards a mix in which the importance of producer goods rose and that of final goods fell within the same product chain. The analyses are performed on the basis of descriptive and econometric evidence.

To begin with, we see that the ratio of the value of exports of machinery used in making typical Italian goods to that of exports of the particular goods typical of the individual district[11] rose appreciably between 1991 and 2001 (Figure 1).

Overall, the ratio increased from 41.0 al 42.7 per cent. The highest figures for 2001 are those for food products, mechanical machinery and textiles. Over the decade, the pace of respecialization towards machinery was fastest for leather, leather products and footwear, for paper, printing and publishing, and for “other sectors”, but the phenomenon occurred in every sector of district specialization except furnishings (where the proportion of machinery exports was stable) and petrochemicals (where it declined).

[11] To avoid artificially raising the value of the index, when a province is not specialized in mechanical machinery and equipment (which includes the segments of machinery for making typical Italian final goods) the value of exports of machinery for typical Italian final goods is added to the denominator. Note, further, that from now on the analysis will concentrate on the 32 district provinces for which their are continuous data between 1991 and 2001, so that the provinces of Biella, Lecco, Lodi, Prato and Verbania are excluded. The indicator shown in Figure 1 is given by the sum of exports of machinery for making typical Italian final goods over the sum of exports of the related final goods.

It is also necessary to bear in mind that the figures for the exports of typical Italian final products, the districts typical products, are probably inflated by outward processing trade, which implies double-counting of goods that are exported first for processing and then as final products. Since it is not possible to adjust for this distortion, given the limited availability of data on outward processing trade at disaggregated geographical level, we are forced to accept it. However, it is to be noted that the distortion leads to an underestimation of the phenomenon we are investigating. The indications we have found of a respecialization from final goods to machinery are corroborated by an examination of the simplest indicator of revealed comparative advantage, the performance of the normalized balances.[12] Between 1991 and 2001, while the normalized trade balance of the most characteristic Italian final goods sectors[13] fell from 44.1 al 36.3 per cent, that of the related segments of machinery rose from 40.9 to 45.1 per cent, showing an improvement in revealed comparative advantage greatly exceeding that recorded for the mechanical machinery and equipment segment as a whole (from 41.6 to 44.6 per cent; Figure 2).

Furthermore, a district province's ability to extend its specialization vertically from final goods to machinery could be greater if it has a single district sector of specialization, identifying a clear production focus. In fact, Figure 3, which groups district provinces into those with single-sector and multi-sector specialization, suggests that the increase in machinery's share in exports has been more intense for the former than for the latter. Referring back to the discussion in Section 2 on the theoretical model, the specialization of a district in a single sector could be interpreted as evidence of the presence of larger economies of scale than are to be found in districts whose economic activity is more "dispersed".

To carry out a more systematic initial exploration of the phenomenon, we ran two regressions with various specifications. Naturally, the smallness of the sample (32 provinces) limits the number of explanatory variables that it is reasonable to use to no more than 3 or 4.

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[12] Normalized trade balances measure the ratio of the trade balance (exports – imports) to total trade (exports + imports).

[13] The figures refer to the aggregate of textiles products, clothing and leather products on the one hand, and of machinery for the textile, clothing and leather industries on the other.

Figure 1

Share of exports of machinery for making typical Italian products in 1991 and 2001

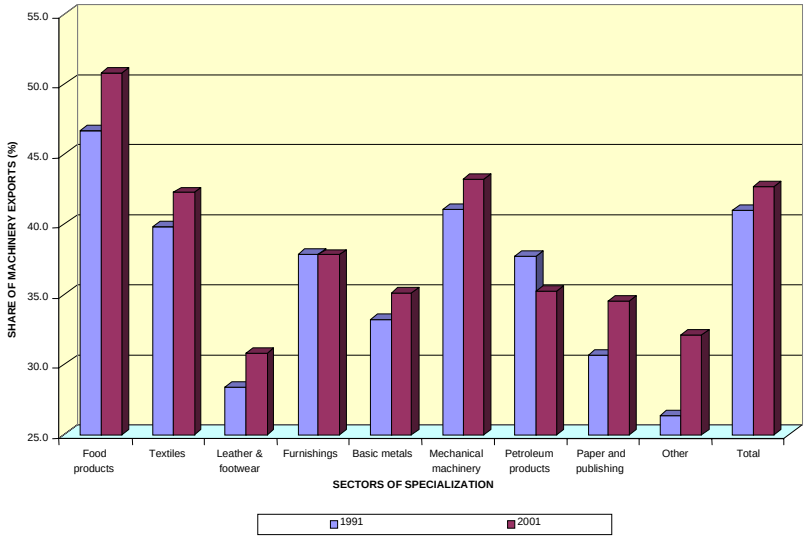


Figure 2

Normalized trade balances: machinery versus finished products

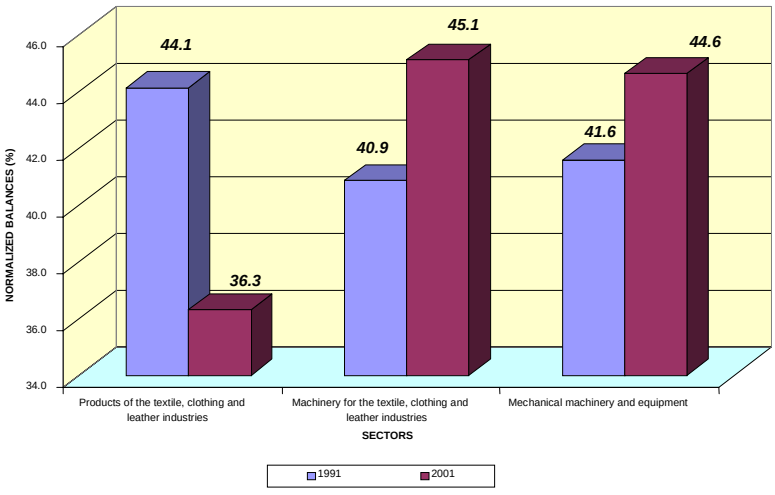
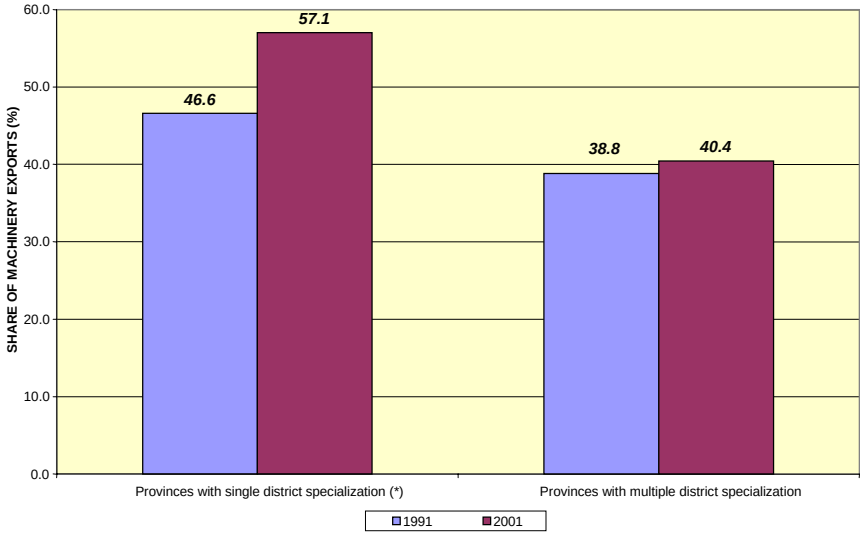


Figure 3

Exports of machinery for making typical Italian final products: provinces with a single sector of specialization versus provinces with multiple sectors of specialization



(*) We excluded Viterbo from among the single-sector provinces. Not only is it an outlier, but its sector of specialization, home furnishings, is one in which, as mentioned above, the verticalization of production did not advance in the period.

The first regression uses the ordinary least squares method to estimate an equation in which the dependent variable is the ratio of exports of machinery for making typical Italian final goods in the total exports relating to the individual province's district sectors of specialization in 2001 (QMAC01). The four dependent variables are:

- the value of the share of exports of machinery for Italian final goods in the total exports relating to the individual province's district sectors of specialization in the first year, 1991 (QMAC91), to capture persistence;
- a variable that measures the size of the province's productive structure (NEMP), to represent scale effects;

- a variable that evaluates the scale of the province's exports (LEXP01, the logarithm of total 2001 exports), to take account of scale effects that are more closely related to foreign trade;
- an of outward processing trade (OPTIND), which proxies for the intensity of production transfer and adjusts for the distortion that may be present in the export data.

The equation is therefore as follows:

$$QMAC01_i = \alpha + \beta_1 QMAC91_i + \beta_2 LEXP01_i + \beta_3 OPTIND_i + \beta_4 NEMP_i + \varepsilon_i \quad (1)$$

The results show that machinery's share in exports in 2001 is very persistent with respect to the values of ten years earlier. Controlling for its initial value, the share is lower in the provinces with more workers (the larger provinces) and higher in the provinces whose total exports are greater (Table 3). The intensity of cross-border outsourcing does not appear to influence the process in question, nor does another explanatory variable that we included, the number of the province's district sectors of specialization (DSUM), which, when its value is low, identifies a province with a clear production focus. Lastly, the insertion of sectoral dummies (one at a time for each of the 8 segments of district specialization) turns out to be significant and has a negative sign only for furnishings.

The second regression is a logit estimation of the probability that machinery's share in exports increases between 1991 and 2001 (that is, ΔQMAC > 0). Our motive for performing this additional econometric exercise is that QMAC could be erroneously measured for a number of reasons. Foremost among these is that the values of exports of the districts' typical final products could be artificially inflated by outward processing trade flows, which are counted as exports even though there are corresponding inflows, thereby inflating the values of both exports and imports. Since Istat does not publish data on outward processing trade as detailed as those on exports, it is impossible to adjust the export data for this phenomenon. Consequently, it could be preferable to use a qualitative (0 – 1) instead of a continuous dependent variable. The equation tested is of the following type:

$$\Delta POSQM_i = \alpha + \beta_1 LEXP01_i + \beta_2 OPTIND_i + \beta_3 NEMP_i + \beta_4 DSUM_i + \varepsilon_i \quad (2)$$

where ΔPOSQM is equal to 1 if ΔQMAC > 0 and is 0 otherwise, while the independent variables are defined as above.

Table 3

THE OLS regression

An equation of the following form is estimated:

$$QMAC01 = \alpha + \beta_1 QMAC91 + \beta_2 LEXP01 + \beta_3 OPTIND + \beta_4 NEMP + \varepsilon$$

The dependent variable (QMAC01) is the value of QMAC (the ratio of exports of machinery for making Italian final goods to the total exports relating to the individual province's district sectors of specialization) in 2001 (Istat data). QMAC91 is the value of QMAC in 1991. LEXP01 is the value of the province's total exports in 2001 (Istat data). OPTIND is the indicator of the intensity of production transfer via outward processing trade (see the paper by Farabullini and Ferri in this volume). NEMP is the number of manufacturing workers in the province as shown by the 1991 census (Istat data). DARRE is a dummy whose value is 1 for the provinces with a district specialization in furnishings and 0 otherwise. DSUM is a variable that counts the province's number of district sectors of specialization (and thus ranges between a minimum of 1 and a maximum of 5). The t-statistics reported are obtained by OLS and are consistent with heteroskedasticity according to the Huber-White adjustment. The symbols ***, ** and * mean that the coefficient is different from zero respectively at the 1 per cent, 5 per cent and 10 per cent confidence level.

Dependent variable QMAC01	First specification		Other specifications			
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
QMAC91	1.0002	14.08***	0.9691	16.47***	0.9753	14.34***
LEXP01	0.1133	2.35**	0.1192	2.75**	0.1151	2.29**
OPTIND	0.0003	0.53	-	-	-	-
NEMP	-0.0002	-2.68**	-0.0002	-2.82***	-0.0002	-2.40**
DARRE	-	-	-0.0626	-1.97*	-	-
DSUM	-	-	-	-	-0.0895	-0.60
Constant	-1.6153	-2.31**	1.6427	-2.67**	-1.6045	-2.21**
No. obs.	32		32		32	
F	(4.27) 96.06***		(4.27) 79.37***		(4.27) 77.45***	
R^2	0.869		0.889		0.870	

The results of the estimations are reported in Table 4. They confirm the positive correlation of the increase in machinery's share in exports with the scale of a province's exports (LEXP01) and its negative correlation with the size of the province in terms of the number of manufacturing workers (NEMP), thereby excluding that the latter variable can validly capture only the scale effects. In addition, there is a (weak) negative effect of DSUM. This indicates that the probability of an increase in machinery's share in provincial exports diminishes when the province's

productive structure is less narrowly focused. Lastly, there is a positive (and not a negative) correlation with the index of intensity of the transfer of production. This suggests that cross-border outsourcing (to save on labour costs) and the respecialization of industrial districts from final goods to the related machinery are not alternative processes but, probably, are complementary. On reflection, this is not surprising: a district's decision to safeguard its competitiveness in final products by outsourcing production to countries with low labour costs (above all those of Eastern Europe) implies the necessity of equipping the production units abroad with the needed machinery and at the same time releases productive factors within the district that shift from final goods to the related machinery.

Table 4

The logit regression

An equation of the following form is estimated:

$$\Delta POSQM = \alpha + \beta_1 LEXP01 + \beta_2 OPTIND + \beta_3 NEMP + \beta_4 DSUM + \varepsilon$$

The dependent variable (ΔPOSQM) is 1 if the change in QMAC (the ratio of exports of machinery for making Italian final goods to the total exports relating to the individual province's district sectors of specialization) between 1991 and 2001 (Istat data) is positive. LEXP01 is the value of the province's total exports in 2001 (Istat data). OPTIND is the indicator of the intensity of production transfer via outward processing trade (see the paper by Farabullini and Ferri in this volume). NEMP is the number of manufacturing workers in the province as shown by the 1991 census (Istat data). DSUM is a variable that counts the province's number of district sectors of specialization (and thus ranges between a minimum of 1 and a maximum of 5). The symbols ***, ** and * mean that the coefficient is different from zero respectively at the 1 per cent, 5 per cent and 10 per cent confidence level.

Dependent variable ΔPOSQM	First specification		Other specification	
	Coefficient	z-stat	Coefficient	z-stat
LEXP01	7.6681	2.59**	4.7339	2.40**
OPTIND	0.2224	2.49**	0.1336	2.25**
NEMP	0.0001	-2.60***	-0.0001	-2.33**
DSUM	-1.4815	-1.85*	-	-
Constant	-108.5768	-2.57**	-68.3090	-2.40**
No. observ.	32		32	
Chi^2	(4) 21.05***		(3) 16.05***	
Pseudo-R^2	0.530		0.404	

REFERENCES

ACIMIT (Associazione costruttori italiani di macchinario per l'industria tessile) (2001), *A Good Recovery for Textile Machine Exports in 2000 (+30%)*, press release.

Basevi, G., Calzolari, G. and Ottaviano, G. (2001), *Economia politica degli scambi internazionali*, Rome, Carocci editore.

Bronzini, R. (2000), "Sistemi produttivi locali e commercio estero: un'analisi territoriale delle esportazioni italiane", in L.F. Signorini (ed.), *Lo sviluppo locale. Un'indagine della Banca d'Italia sui distretti industriali*, Rome, Donzelli.

Conti, G. and Menghinello, S. (1998), "Ruolo e peculiarità delle produzioni meccaniche per le esportazioni nazionali di manufatti (1985-1997)", in ICE, *Rapporto sul Commercio Estero 1997*, Rome.

De Arcangelis, G., Ferri, G., Galeotti, M. and Giovanetti, G. (2002), "Quote di mercato e competitività delle imprese italiane nel bacino del Mediterraneo e nei Balcani", in G.P. Galli and L. Paganetto (eds.), *Rapporto sulla competitività dell'Italia: le imprese*, Milan, Edizione Il Sole-24 Ore.

Ferragina, A.M. and Quintieri, B. (2002), "I processi di frammentazione produttiva dell'Italia verso l'area Mediterranea e l'Est Europeo", in G.P. Galli and L. Paganetto (eds.), *Rapporto sulla competitività dell'Italia: le imprese*, Milan, Edizione Il Sole-24 Ore.

Fujita, M., Krugman, P. and Venables, A. (1999), *The Spatial Economy*, Cambridge MA, MIT Press.

Grossman, G. and Helpman, E. (1991), *Innovation and Growth in the Global Economy*, Cambridge MA, MIT Press.

Iuzzolino, G. (2000), "I distretti industriali nel censimento intermedio del 1996", in L. F. Signorini (ed.), *Lo sviluppo locale. Un'indagine della Banca d'Italia sui distretti industriali*, Rome, Donzelli.