Firms' Clustering and SEE Export Performance: Lessons from the Italian Experience*

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Abstract

Like all transition economies, South Eastern Europe (SEE) countries stand to gain most from an export-led growth. Unfortunately, though, productive structure in these countries is largely made up of small and medium enterprises (SMEs) that, due to their limited size, may face obstacles to gain access to international markets. A possible way out of the conundrum is for SMEs to cluster together and, by sharing the costs of internationalization, jointly tap foreign markets. This approach has been at the heart of the successful export performance of SMEs clustered within Italy's industrial districts.

In this paper we use historical data on Italian exports (in 1971 and 1961) to quantify the boosting effect due to firms' clustering. In particular, we use detailed data on export classified by sector and by destination country to estimate a panel gravity model on which we compute the firms' clustering effect.

Next, building on the Italian experience we design four scenarios for firms' clustering in three SEE economies (Bulgaria, Romania and Slovenia). By means of these scenarios and applying the estimated coefficient for firms' clustering in Italy, we simulate the firms' clustering effect for the three SEE economies and obtain the gain in export growth over the benchmark case. Results show that an additional export growth between 3% and 11% over a five-year period could be expected.

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1. Introduction

The importance for firms' of their size and their ability to cluster together has been recently recognized by both academics and policymakers. The existence of economies of scale does not necessarily imply that the firm size should be large. First, large firm size is not the only way to internalize scale economies as production externalities can be reaped also by small firms that are closely linked together both geographically and in terms of production stages. Second, the decreasing appeal of the "Fordist" labor organization makes large firms less attractive than in the past and the growing tendency towards domestic and international outsourcing favors small enterprises.

Empirically, the most recent example of successful firms' clustering is offered by the Silicon Valley experience in California, which shows that the small-enterprise model can be the keystone also in the high-tech sector (usually characterized by substantial economies of scale). Taking a longer-term, multi-sector perspective and starting as far back as the 1960's, however, the country offering perhaps the most significant example of firms' clustering success is Italy. During the 1960's the Italian economy experienced its, so called, "economic miracle" with a growth rate at or above 5% for a protracted number of years. The growth boom was largely export-led with increasing market shares in the newly created European Common Market. What is more important, both large firms and small and medium enterprises (SMEs) participated in the export boom. As it was later ascertained (e.g., Pyke et al., 1990) SMEs clustered in industrial districts were mostly responsible for the success story.

Can such experiences be important also for emerging and transition economies? We believe the answer is yes for one main reason. Small enterprises are production units that are most likely to develop in transition and emerging economies, as opposed to large firms, given lower organizational costs,[1] and offering better opportunities to young

[1] However, financial constraints may be more stringent. International organizations (like the World Bank and the EBRD) have recently tried to lessen those constraints with different types of intervention.

entrepreneurs.[2] However, the probability of success of small firms could be greatly enhanced by clustering so as to indirectly exploit economies of scale.

In this paper we take a macroeconomic perspective and try to assess empirically the boosting effect that firms' clustering may have on the export performances of South Eastern Europe. No data on the intensity of firms' clustering at the sectoral level exist for South Eastern European (SEE) economies; hence, we take Italy's case in 1971 so as to obtain plausible estimates of the boosting effect. As we argue below, the characteristics of the Italian economy in 1971 are comparable to the case that some SEE economies experience today, especially with regards to international trade. Next, we design different scenarios for some SEE countries (Bulgaria, Romania and Slovenia) and compute the additional effect that firms' clustering in some (or all) sectors may have on total export growth.

The rest of the paper is organized as follows. In the next Section we briefly review theoretical and empirical explanations of firms' clustering and the impact of international integration and we also argue that the Italian case in the 1960's and early 1970's could be taken as a benchmark to assess the case of SEE today. In Section 3 we estimate a gravity model augmented to include a sector-varying clustering factor for Italy in 1971. Section 4 illustrates a simulation exercise where we use the estimates obtained in Section 3 to discuss some scenarios for firms' clustering in three SEE economies. Finally, Section 5 concludes.

2. Clusters and internationalization. Theory and evidence

According to the "new economic geography", firms can enhance their competitiveness and regions and countries can improve their growth potential through agglomeration effects as clusters of firms exploit increasing returns generated by

[2] Two further benefits may be associated with an SME-based type of development. First, SMEs increase competition and more competitive market structure has been shown to increase efficiency and firm performance in transition economies (Angelucci et al. 2001; Carlin at al. 2001). Second, given their limited ability to collude among themselves and with the State bureaucracy, SMEs may be an antidote to corruption, often plaguing restructuring in transition economies (Kaufmann et al. 2000).

locational proximity. Such effects result from several factors, including the availability of a pool of skilled workers and concentration of demand - referred to as "pecuniary externalities" (Krugman 1991) - or innovation spillovers - named as "technological externalities" (Belleflamme, et al. 2000). Others (e.g. Bagella, et al. 1998) have stressed the role of interactions among firms participating in clusters. So it is not just proximity which allows firms to benefit from shared costs, but also, and more importantly, it is the exchange of information between firms that allows to exploit knowledge externalities.

Actual cases of clusters, both in developed and developing economies, however, are diversified and not always amenable to simple classifications, and the causes of their developments are more complex than the stereotypes derived from abstract models.

In countries at intermediate stages of industrial developments, clusters can be the result of vertical integration, as large firms or conglomerates outsource some of their production to small firms that agglomerate around them. In cases ranging from Korea (Park and Markusen 1995) to Slovenia (Bateman 2001) the high capital intensity of the sector (e.g shipbuilding) has allowed for the exploitation of pecuniary externalities, while the initial stimulus for the formation of clusters comes from direct policy intervention (a model that can be hardly replicated in the current SEE environment). In other cases, local clusters of SMEs are the results of investment decisions of multinational companies investing in an emerging economy undergoing partial trade liberalization, as in Brazil (Altemburg, et al. 1999). This specific case reflects the pattern described theoretically by Basevi and Ottaviano (1999). Clusters in developing as well as in developed countries can also arise as a consequence of cultural factors that induce positive interactions within the local population. This horizontal cooperation in the initial stages of development, however, may be replaced by more efficient vertical integration when the competitive pressure increases as a consequence of further trade opening. Schmitz (2000) offers an analysis of such cases in Brazil and Pakistan; Tewari (1998) considers the case of India. Some evidence of clustering in SEE is also available (Bateman et al. 2000 and Bateman 2001, Mandova and Stanchev, 2001).

Trade liberalization can be an important source of agglomeration, and viceversa. If we take into consideration agglomeration effects, the impact of trade liberalization and trade integration on national specialization patterns may be different from what traditional trade theory suggests. Venables (1998) shows that when clustering is taken into consideration

the division of industries between countries is not unique. While some industries will locate in countries according to the principle of comparative advantage, others may locate in countries in which there is a comparative disadvantage, in contrast with standard trade theory. Furthermore, agglomeration may itself be a catalyst for foreign direct investment (Campos and Kinoshita 2001), potentially very important as it may embody technology transfer and reduce endemic financial constraints.

These results lead to important implications for countries entering into a new phase of international integration such as the SEE countries today. As mentioned, clustering effects may generate positive results in terms of growth and export performance by sustaining sectors where ex ante comparative advantage is not available but can eventually reach a sustainable competitive position in world markets. In other words, clustering can provide a boost to growth, in addition to that delivered by traditional trade liberalization, leading to deepened comparative advantage.

International integration can lead to cluster formation through different channels. This general point can be developed by adding foreign direct investment to the picture. As Basevi and Ottaviano (1999) show, in the process of international integration, after an initial stage of the product cycle, firms organized in clusters face the alternative to serve foreign markets through exports or through FDI. Growth of the home industry is based on knowledge accumulation which is enhanced by the technological externalities that the industrial district exploits. Outsourcing of production is possible and profitable as key R&D functions are concentrated in the headquarters and material production is carried out abroad. The size of barriers (and of relative wages) determines the choice: high (low) trade barriers encourage (discourage) FDI with respect to exports. If outsourcing increases in favor of low wage countries, some of the agglomeration effects that are present in the home countries can be transferred to the former; indeed, location in the low wage countries allows for the exploitation of pecuniary externalities, while location in the advanced country benefits mostly from technological externalities. In other words, in this framework the source of new clustering in the periphery is the original clustering in the center.

Both explanations of clustering (domestic clustering and integration-led clustering) are consistent with a stage-approach to clustering that emerges from formal analysis as well as from empirical evidence. The occurrence of stages in clustering can be

described as follows. Technological accumulation and the exploitation of knowledge externalities takes time to unfold and so does the exploitation of pecuniary externalities. In the initial phases, the source of growth is the exploitation of pecuniary externalities, while technological externalities begin to appear at a later stage. This implies that more complex internationalization strategies (i.e. the choice between exports and FDI) are available only once innovation becomes relevant as a source of growth.

Such a pattern in the evolution of clusters is consistent with different country experiences as well as with different stages of country experiences. The following table, adapted from Bateman and Vehovec (2000) offers an illustration.

Table 1. 1

	Stage One	**Stage Two**	**Stage Three**	**Stage Four**
Process	Formation of a critical mass of small manufacturing and industrial service enterprises	Gradual coalescing of key small-small (horizontal) and small-large, medium-large (vertical) linkages. Agglomeration economies begin to appear.	Clusters begin to grow and develop "collective efficiency" economies	Clusters are efficient, but need to develop process and product innovations in order to remain competitive. Global links need to develop in order to cut costs.
Country - period example	Italy, West Germany, Japan 1945-1960; Taiwan 1950s and 1960s; South Korea and China in the 1980s.	Italy, West Germany and Japan in the 1960s; Taiwan in 1980s; South Korea and China in the 1990s.	Italy, Japan and West Germany in 1970s and 1980s; Taiwan in 1990s	Italy, Japan and Germany today

adapted from Bateman and Vehovec (2000)

For the purpose of the current analysis it can be noted that the Italian pattern of clustering of stage two (or even three) can describe the clustering stage of SEE countries at the beginning of the present decade or, more precisely, at the beginning of the process of SEE integration in a wider EU market. Stage two can be seen in two different ways according to the theoretical perspective. Clusters may be seen as the product of "pure" domestic factors, –i.e. the consequence of domestic investment initiatives, as the country begins to exploit the benefits of international integration (this is the case of Italy and West Germany in the 1960s when the benefits of currency convertibility and trade liberalization were beginning to pay off in the export-led growth pattern). Alternatively, clusters can be seen as the product of outsourcing from the center towards the periphery. So, today, advanced clusters in Italy outsource the more labor intensive stages of production toward low-wage areas (such as SEE) reproducing in the periphery cluster-

like structures similar to those that were active in the center two decades back. Evidence on Italian clusters confirms such a pattern (Guerrieri, et al., 2001; Forni and Paba, 2000; Bagella and Becchetti, 1999; Bronzini, 1999). In particular, Guerrieri, et al. (2001) offer a detailed description of the stages of clustering in mature economies facing a new wave of technological innovation.

This brief review of the literature suggests three elements that are useful for the present paper. First, conditions for the development of industrial clusters can be found both in developed and in developing countries. Second, phases of internationalization of production influence clustering and, in turn, clusters can lead to a distribution of comparative advantages that can be different from what predicted by traditional theory. In addition, different patterns of internationalization can lead to the transfer of clustering effects from the center to the periphery. Finally, clustering follows stages linked to technological evolution and product cycles as well as to patterns of internationalization (outsourcing).

The elements above lend support to the conjecture we adopt in the rest of the paper. Clustering phenomena in SEE at the initial stage of their integration process in a wider European economic space are a concrete possibility and could closely resemble the features and patterns of the evolution of clusters in the Italian economy in the early 1960s when Italy was beginning to exploit the benefits of integration in Europe and in the world markets.

3. Some Empirical Evidence on the Italian Experience

Empirical analysis is copious on the boosting effect of firms' clustering on both Italian growth,[3] as well as on export performance.[4]

[3] See, for instance, Forni and Paba (2000).

[4] See Bronzini (1999) and Bagella and Becchetti (1999) for the special relationships between export performance and finance, and between export performance, industrial districts and exchange-rate regime changes, and Guerrieri, et al. (2001) for clustering and internationalization strategies.

In this section we focus on the Italian experience so as to obtain a benchmark for the (potential) quantitative impact of firms' clustering for the SEE economies. The reason why we concentrate on industrial clusters[5] in Italy has been discussed conceptually in the previous Section; moreover, clustering in Italy has been investigated more intensively than elsewhere. However, other countries have been recently promoting research in this field. For instance, the study of the phenomenon of industrial clusters has gained momentum in the UK, where an Agency created on purpose by the British Government has recently published its first report on business clusters in the UK (Cluster Policy Steering Group, 2001).

It would not be appropriate for our purposes to estimate a "district effect" on current or recent Italian (or another country's) data as this would be of no use for inference on the SEE countries. As we discussed in the previous Section 2, SEE economies are at an early stage of firms' clustering formation that is not comparable with the current one in Italy or elsewhere in industrialized economies. Hence, we focus our attention on historical data of Italian exports for the year 1971 –and, alternatively, on the export performance of Italian sectors between 1961 and 1971. The choice of the reference year is due to two main reasons. First, 1971 is the first available year for which it is possible to identify "industrial districts" in Italy: data on firms' clustering are available only on the basis of the Italian Census (collected every ten years), however going back to 1961 would imply dealing with data that are less informative since the industrial-district phenomenon was still negligible.[6] Second, as we have mentioned already, although the economic and historical background is clearly different, in 1971 the stage of Italian economic development seems more comparable to the present economic situation of (some) SEE countries. At that time, in fact, Italy's "economic miracle" had only begun to take place. The economic boom for Italy crucially rested on the possibility to take full advantage of the low cost of labor and quickly expand its export share in the European Community. In

[5] We interchangeably use the terms "industrial clusters" and "industrial districts", even though the latter definition is more restrictive than the former (see Pyke, et al., 1990).

[6] Evidence on the existence of industrial districts goes back to the 1950s, but Brusco and Paba (2001) show that the largest increase in the formation of industrial districts occurred between 1961 and 1971.

these two respects (low labor costs and the beginning of an integration phase) the Italian case in 1971 could be said to resemble that in which the SEE countries will find themselves in a few years from now.

3.1 An Empirical Model

Let us now turn to the empirical part. We consider sectoral industry data. By applying the methodology described in Forni and Paba (2000), for each industrial sector[7] we obtain the share of workers employed in the industrial districts (over total employment in that sector) and we take this as a measure of firms' clustering. We then use this measure to assess the impact of firms' clustering on the export performance by using both a geographical and a sectoral dimension.

Our analysis of Italian exports focuses on the role of firms' clustering sector by sector. In addition to the sectoral dimension, we use the geographical distribution of exports in order to control for other possible determinants of external trade. In particular, the geographical dimension enables us to adopt the reduced-form approach of the gravity model to control for other determinants of exports. Recent theoretical studies have shown that the gravity equation can be derived from both the traditional (Heckscher-Ohlin-type) and the new-trade-theory approach (see Deardorff, 1995, and Davies and Weinstein, 2000).

The equation to be estimated takes then the following form:

$$e_{j,k} = \beta_0 + \beta_j + \beta_1 y_{j,k} + \beta_2 d_{j,k} + \beta_3 fc_j + controls + \varepsilon_{j,k} \qquad (3.1)$$

[7] The definition of "sector" is close to a 3-digit SITC sector. More specifically, data on firms' clustering is available at the ATECO level, i.e. a segmentation of the economy in 101 sectors. Italian data on domestic exports are instead available for 236 sectors. A conversion between the 101 ATECO and the 236 export sectors is available from the Italian Statistical Office (ISTAT) and from the authors upon request, as well as a table relating the Italian classification to the 3-digit SITC.

where $e_{j,k}$ represents the exports of sector j to country k, $y_{j,k}$ is a measure of the economic mass of country k (for the export good/sector j), $d_{j,k}$ is the distance of country k from Italy, fc_j is the weight of clustered-firms employment in the sector j, β_j represents an individual (fixed or random) effect, β_0 is a common intercept term, *controls* stands for additional control variables and $\varepsilon_{j,k}$ is the well-behaved error term.

The estimation of this panel-data-type equation cannot be implemented with a simple least-square-dummy-variable (LSDV) approach since the sectoral firms' clustering measure does not change with the destination country. As a consequence, the individual fixed effect and the impact of firms' clustering cannot be both identified at the same time since they are collinear (i.e., they are both invariant by destination country). This problem is commonly encountered in panel data when estimation involves individual characteristics (such as sex, education, etc.) that do not change over time as the fixed effect. The way out is a two-stage estimation.[8] In the first stage, we construct deviations of each variable from the own sectoral mean; for instance, given $\bar{x}_j$ as the mean of sector j for variable x, then the deviation $\tilde{x}_j$ is equal to $x_{j,k} - \bar{x}_j$.[9] Then we perform a simple OLS estimation of the following equation:

$$\tilde{e}_j = \beta_1 \tilde{y}_j + \beta_2 \tilde{d}_j + \varepsilon_j \ , \qquad (3.2)$$

where the coefficients β_1 and β_2 are the same as in (3.1) and deviations from the sectoral mean of the individual effect and of the firms' clustering measure are zero since there is no intra-sector variation of these variables. From estimation of (3.2) we obtain the estimates of $\hat{\beta}_1$ and $\hat{\beta}_2$ that we use in the following stage.

Equation (3.1) holds also for the individual means and can be rewritten as follows:

$$\bar{e}_j - \beta_1 \bar{y}_j + \beta_2 \bar{d}_j = \beta_0 + \beta_3 fc_j + controls + (\beta_j + \bar{\varepsilon}_j) \qquad (3.3)$$

[8] See Hsiao (1988) p.50-2.

[9] This is analogous to compute deviations from each individual's time mean in a traditional panel data.

A consistent estimate of the left-hand side can be obtained by using the estimates $\hat{\beta}_1$ and $\hat{\beta}_2$ from the previous stage. Following Hsiao (1988), if we consider $(\beta_j + \bar{\varepsilon}_j)$ as the well-behaved error term, then we can obtain consistent estimates of β_0 and β_3 by a simple OLS regression of the left-hand side on a constant term and the measure of firms' clustering.

As we will show in the following sections, we considered not only the simple measure of firms' clustering, but also its interaction with other relevant variables when performing the second stage of our estimation in order to take into consideration the conjunct effect of firms' clustering with other relevant factors. But, before showing the results, let us present the data and their preliminary treatment before estimation.

3.2 The Data

Data on Italian exports are available for 236 sectors and for all destination countries. We have selected the thirty most important trade partners for Italy in 1971 and, for each sector, we have considered the first twenty destination countries (within the initially-selected group of thirty) in decreasing order of export quantity or value. As a result, the twenty countries considered are different by sector; hence, this introduces inter-sector variability for the independent variables (i.e., economic mass and distance). The economic mass of the partner countries can be measured through different variables: per capita income, population, gross domestic product. We have used the Penn World Tables (version 5.6) to obtain data on population and GDP per capita, from which we have also obtained real GDP.[10] Distance is measured in km and is referred to the capital-to-capital

[10] For GDP per capita we have used the series "Real GDP per capita in constant dollars adjusted for the terms of trade (1985 international prices for domestic absorption, current prices for exports and imports)".

segment. The firms' clustering variable is given by the fraction of total workers of the sector that are employed in the industrial districts in Italy specialized in that sector.[11]

We have used both quantity and values of exports and all variables are log-transformed except for the firms' clustering variable.

3.3 Estimation Results

In the first stage of the estimation, as described in section 3.1, we use the model in deviation form (3.2) in order to obtain consistent estimates of the coefficients referred to the variables that have both inter- and intra-sector variation (i.e., distance and economic mass). These estimates are then used in the second stage to compute a new dependent variable on which it is possible to compute the effect of firms' clustering.

Estimates of the coefficients for distance and (different measures of) economic mass are presented in Table 3.1.

The results show the expected good performance of the gravity model in its panel version: distance is always significant and negative; different measures of economic mass perform equally well, although there is a slightly better performance for GDP per capita together with population. All independent variables are significant at the 5% level and there is little difference between the versions with export values and export quantities. The goodness of fit is quite acceptable for a panel data estimation.

The next step is to consider the sectoral averages of exports, distance, GDP per capita, population and use the estimated coefficients of the panel estimation. As described above, this step is technically necessary to allow for the estimation of the firm-clustering effect; more precisely, we want to construct the left-hand side of (3.3). Intuitively this step cleans exports from its component that (on average) does depend on distance and economic mass, hence singling out the component that is affected by other characteristics, including the sectoral intensity of firms' clustering.

[11] See Forni and Paba (2000) and Brusco and Paba (2001) for the methodology and computation of this variable.

Table 3.1. Estimated Coefficients of the Gravity (Panel) Model in Deviation Form (3.2)

Dep. Variables	(1)		(2)		(3)	
	Exp. Values	*Exp. Quantities*	*Exp. Values*	*Exp. Quantities*	*Exp. Values*	*Exp. Quantities*
Distance	**-0.580**	**-0.769**	**-0.373**	**-0.581**	**-0.557**	**-0.749**
sd. err.	0.021	0.024	0.024	0.027	0.022	0.026
GDP	**0.579**	**0.528**	-	-	-	-
sd. err.	0.019	0.022	-	-	-	-
GDP p. cap.	-	-	**0.735**	**0.667**	**0.683**	**0.970**
sd. err.	-	-	0.044	0.049	0.039	0.045
Population	-	-	-	-	**0.540**	**0.494**
sd. err.	-	-	-	-	0.023	0.027
Adj. R2	0.767	0.781	0.692	0.737	0.768	0.781
F-statistics	66.12	71.44	45.43	56.46	65.83	70.90
P-value	0.00	0.00	0.00	0.00	0.00	0.00
n. obs.	1780	1780	1780	1780	1780	1780

Note: boldface means the variable is significant at the 5% level.

Before performing the estimation of (3.3), we have extended the number of variables to include in the cross-sector-mean estimation. In other words, we include plausible control variables and combine the firms' clustering effect with other economic determinants of exports.

First, we control for the stability of the Italian specialization by including a lagged variable. We have estimated the same gravity, panel model for the year 1961 and computed the portion of exports not affected by distance and income on average (i.e. the same left-hand side of 3.3, which we label *u_exp61*). We then use *u_exp61* as a control variable in the cross-sector estimation to take into account the historical distribution of exports and its influence on 1971 export performance.

Second, in addition to considering the firms' clustering effect *per se*, it may be interesting to see whether firms' clustering has a positive effect on export performances *in conjunction* with other characteristics. We have selected a measure of demand potential, i.e. GDP per capita and GDP, and a measure of own sector growth, i.e. the rate of growth of (sectoral) exports between 1961 and 1971. Hence, we construct new

variables defined as firms' clustering multiplied, respectively, by a measure of (sectoral) destination, country income and (sectoral) export growth. The first interaction takes into account a possible link between sectoral firms' clustering and demand facing that specific sector: were the coefficient of such multiplicative variable positive, it would imply that firms' clustering has a boosting effect on exports when the destination countries of those sectoral exports are high-income countries. We could expect this effect to materialize if the Italian industrial districts were most effective in boosting Italy's exports to the relatively high-income trade partners of the European Common Market that, as already mentioned, made for the major component of Italy's external demand. The interaction between firms' clustering and export growth takes into account the fact that firms' clustering acts as an additional growth effect. In such a case we expect that the coefficient of that variable would turn out to be positive.

Table 3.2 presents the estimates for the models that include the above-mentioned interactions and controls, which turn out to be highly significant.[12] The first regression shows that firms' clustering alone does not have a statistically significant effect (at the common 5-10% significance level), whereas its influence is clearly positive for export values when considered in conjunction with export growth. The significant effect on export values, rather than quantities, is probably due to the fact that quantities do not allow to take into account quality effects, whereas a price-embodied improvement in quality is clearly present in export values.[13] This positive effect is robust to the inclusion of other interacted variables, as shown in regressions (3) and (4). When considering export quantities, the interaction between firms' clustering and export growth is significantly positive only when the interaction with the destination-country GDP per capita is added (regression 4). However, in both regressions (3) and (4) we find a contrasting negative effect, which offsets the positive effect of the *fc* variable alone (together with its significant interaction with growth in regression 4).

[12] The sole inclusion of the firms' clustering effect is insignificant for both export values and quantities; results are available from the authors upon request.

[13] This is particularly important for the Italian exports in "*made in Italy*" sectors (mostly productions of high-quality consumption goods), whose comparative advantages are generally working through quality improvement.

In conclusion, the firms' clustering effect on export performance is positive, but only when considering export values and the interaction with export growth.

Table 3.2 Estimation of the firms' clustering effect (equation 3.3)

Dep. Variables	(1)		(2)		(3)		(4)	
	Val.	*Quant.*	*Val.*	*Quant.*	*Val.*	*Quant.*	*Val.*	*Quant.*
Constant	**-0.505**	**0.325**	**-0.751**	**0.315**	**0.294**	**0.322**	**-0.752**	**0.325**
sd. err.	0.323	0.013	0.312	0.012	-0.788	0.013	0.260	0.013
Fc	0.1667	-0.098	-	-	8.054	**8.760**	12.152	**11.287**
sd. err.	0.580	0.075	-	-	29.633	4.066	23.640	3.726
*Fc*GDP*	-	-	-	-	-0.782	**-0.464**	-	
sd. err.	-	-	-	-	1.518	0.209	-	
Fc(GDP p.cap.)*	-	-	-	-	-	-	-2.154	**-1.293**
sd. err.	-	-	-	-	-	-	2.627	0.417
fc(Dexp)*	-	-	**0.820**	-0.017	**4.357**	0.105	**4.466**	**0.235**
sd. err.	-	-	0.305	0.055	0.631	0.099	0.616	0.099
u_exp61	**0.908**	**0.995**	**0.923**	**0.996**	**0.957**	**0.996**	**0.953**	**0.995**
sd. err.	0.040	0.004	0.039	0.004	0.036	0.004	0.032	0.004
Adj. R2	0.860	0.998	0.871	0.998	0.912	0.999	0.913	0.999
F-statistics	261.50	28580	287.50	28037	222.40	15178	223.70	16008
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n. obs.	86	86	86	86	86	86	86	86

Note: *fc* is the firms' clustering variable; *Dexp* is the growth rate of exports between 1961 and 1971; *u_exp61* id the left-hand side of (3.3) obtained by applying the coefficients previously estimated with a panel data on 1961 data; boldface means significant at the 5% level.

3.4 Evidence on the dynamic effect of firms' clustering

In addition to the effect on the level of exports, it is interesting to investigate the possible effect of firms' clustering on export dynamics. Let us then consider a dynamic version of the gravity model with the addition of the firms' clustering effect. To simplify the analysis, we consider directly the sectoral averages and estimate the following model:

$$\bar{e}_{j,1971} - \bar{e}_{j,1961} = \beta_0 + \beta_1(\bar{y}_{j,1971} - \bar{y}_{j,1961}) + \beta_2(\bar{d}_{j,1971} - \bar{d}_{j,1961}) + \beta_3 fc_{j,1971} + \bar{\varepsilon}_j$$

or

$$\Delta\bar{e}_j = \beta_0 + \beta_1 \Delta\bar{y}_j + \beta_2 \Delta\bar{d}_j + \beta_3 fc_{j,1971} + \bar{\varepsilon}_j \qquad (3.4).$$

Since data on 1961 firms' clustering are not available and it may be assumed that in 1961 the formation of firms' clustering had just begun to develop, by omitting $fc_{j,1961}$ we assume that no firms' clustering was present in 1961.

Table 3.3 The effect of firms' clustering on the export dynamics.

Dep. Variables	(1)		(2)		(3)	
	Val.	*Quant.*	*Val.*	*Quant.*	*Val.*	*Quant.*
Constant	**1.963**	**1.641**	**2.351**	**2.050**	**2.460**	**2.150**
Sd. err.	0.178	0.193	0.196	0.213	0.207	0.225
D(GDP)	**-0.743**	**-0.723**	-	-	-	-
Sd. err.	0.210	0.227	-	-	-	-
D(GDP p. cap.)	-	-	**-1.734**	**-1.746**	**-1.808**	**-1.814**
Sd. err.	-	-	0.331	0.359	0.331	0.361
D(Population)	-	-	-	-	**1.466**	**1.501**
Sd. err.	-	-	-	-	0.370	0.403
Fc	***0.914***	0.618	0. 683	0. 403	***0.880***	***0.584***
Sd. err.	0.554	0.598	0.499	0.541	0.510	0.556
Adj. R2	0.115	0.088	0.204	0.203	0.248	0.210
F-statistics	6.51	5.10	14.05	11.84	10.35	8.54
P-value	0.00	0.01	0.00	0.01	0.00	0.00
n. obs.	86	86	86	86	86	86

Note: the letter D stands for the Greek letter delta used in equation (3.4), i.e. variation over the 1971-1961 period; boldface means the variable is significant at the 5% level; boldface-italics means the variable significant at the 10% level,

Estimation results are summarized in Table 3.3 where we consider different measures of economic mass, as already presented for the gravity-model estimates in Table 3.1. Once again, for the case of export values the firms' clustering effect is always positive and significant (at the 10% level) in regressions (1) and (3), hence confirming the previous results. When we turn to the case in which both GDP per capita and population are included (i.e. the best regression in terms of goodness of fit), firms' clustering is significant (at the 10% level) also for export quantities. These results on the effect of firms' clustering are particularly important for the SEE economies where the process of

transition may trigger important dynamic effects. As already mentioned, SEE countries – whether EU candidate countries or included in other forms of trade integration with the EU– are expected to obtain favorable export performance vis-à-vis the EU in the years to come. SEE economies are, in fact, expected to enjoy relatively cheap labor and, in some cases, labor productivity may also benefit from relatively large human capital endowment.

4. What effect of firms' clustering on SEE exports?

After estimating the effect of firms' clustering on both the level and the dynamics of Italian exports, we use these results to infer the impact of the formation of sectoral clusters on SEE exports. In the previous section we were able to compute both an impact effect and a dynamic effect of clustering on export growth. In this section we focus on the dynamic effect and offer an assessment of the additional export growth induced by the formation of firms' clusters.

The econometric exercise of the previous section (3.4) has provided a measure of the marginal effect of the sectoral firms' clustering variable on Italian export growth. However, in order to use our results for the SEE economies we face an additional problem. While the coefficients estimated for the Italian experience represent a useful measure of the marginal impact, we still lack data on sectoral firms' clusters in the SEE economies. As mentioned, with the exception of Italy and recently the UK and France, for no other country such detailed statistics have been computed and are directly available.[14]

To, partially, overcome this difficulty we consider four different scenarios for firms' clustering formation in SEE by extracting as much information as possible from the Italian clusters in 1971. The first scenario is the most obvious one: we assume that the formation of clusters in SEE occurs with the same sectoral pattern and intensity observed

[14] Qualitative and descriptive analysis is however available, even for some SEE countries. For instance, for Bulgaria see the survey report in Mandova and Stanchev, 2000. See also the references quoted in Section 2.

in Italy in 1971. We can consider this scenario as a benchmark case with respect to the other three scenarios.

The second scenario considers a more stringent criterion: we assume that clusters in SEE take place only in a few sectors and, more precisely, only in sectors where firms' clustering was particularly intense in Italy in 1971.[15]

The next two scenarios are based on the estimated distribution of Italian firms' clustering in 1971. As a first step, we fitted the (ordered) distribution of the firms' clustering variable (*fc*) with a potential function and obtained both the fitted values ($\hat{fc}$) and the standard error of the estimates.[16] By constructing a confidence interval around the fitted values equal to twice the standard deviation (both up and down) some small values of $\hat{fc}$ turned out not to be significantly different from zero (at the 5% level). Hence, in the third scenario we set to zero all the non-significant $\hat{fc}$ values and let the others be equal to the original Italian values; this case is similar to the previous one, but the cut-off point is determined by statistical inference.

Finally, in the fourth scenario we substitute the fitted values $\hat{fc}$ for the original ones. In other words, we assume that the distribution of the (original) 1971 Italian fc is the result of a general pattern, which corresponds to the fitted pattern and we apply it to the SEE economies.

In our simulation we consider three of the major SEE countries: Bulgaria, Romania and Slovenia. The choice of the countries has been limited by data availability. In order to project exports for a long time span (i.e. a five-year-ahead period) we need at least five years back of full data. At the sectoral and geographical level, trade data are available

[15] The firms' clustering variable, described in section 3, takes values between 0.004 and 0.514; in this second scenario 0.2 is our cut-off point: we set to zero the value of the firms' clustering variable for all the sectors with original value under 0.2.

[16] We chose among three different functional forms for the estimation: exponential, potential and polynomial. We decided for the potential form as it provided the best fit. The estimated equation is: $fc = 0.0017x^{1.105}$ (where x is the increasing rank) with R^2=0.951.

only up to 1998, which means that we need to go back to 1994.[17] Reliable data from 1994 onwards are available only for the three selected countries.

Our benchmark projection of the five-year-ahead total exports for each SEE country is obtained by applying the 1994-1998 sectoral growth rate to all export sectors and then summing up all sectors' quantities.[18] Next, at the sectoral level we compute the boosting effect of potential firms' clustering. From Table 3.3 (considering the best regression 3 and only export values) the value of the marginal impact of firms' clustering has been computed as 0.880 for a ten-year period. Hence, we apply this marginal effect to the four scenarios of firms' clustering described above and obtain an additional sector-specific growth factor. We then apply the new sectoral growth rates (benchmark plus firms' clustering factor) to the 1998 exports and obtain the projected (potential) future sectoral exports; by adding up all sectors' exports we finally compute the potential *total* exports that include the firms' clustering factor.

Figure 4.1 reports the result of our simulations describing for each country and for each scenario the additional five-year growth rate of the potential exports over the benchmark projection, based on the previous five-year growth rate. The figure shows that the gain from firms' clustering on total export growth ranges between 2-3% and 9-11% over a five-year period, but with a different impact on the three economies.

The highest gain occurs for Romania, which also presents the highest benchmark growth (equal to 292.4% on a five-year period, not reported in the graph) given it had the best performance in 1993-1998. The fact that Romania shows the largest impact implies that the sectors with the highest potential of firms' clustering formation are also the

[17] Data on the sectoral exports of the SEE economies have been obtained via the OECD *International Trade by Commodities Statistics* (Rev.3). In particular, since the SEE economies are not part of the OECD, we selected six major economies (France, Germany, Italy, Spain, UK, USA) and added up their imports from each of the three SEE economies. Since trade with these six industrialized economies makes up to 90% of total trade of the SEE countries, we deemed this as a reliable method to obtain SEE sectoral exports.

[18] Data for SEE sectoral exports have been obtained as described in the previous footnote. The sectoral detail follows the 2-digit SITC. However, data on firms' clustering follows the Italian ATECO classification. We have obtained a "translation" code to convert 2-digit SITC into Italian ATECO.

sectors that already present a good export performance in the country. Whereas the gap in the gains remains constant between Romania and Slovenia in the different scenarios, the gap increases in the comparison between Romania and Bulgaria when moving from the scenarios with a narrow *fc* value to the estimated scenario 4. This result suggests that Romania may gain most from a firms' clustering formation similar to the Italian pattern in 1971 and is not in contrast with what one might have expected, given that Romania, over the 1990's, has hosted an increasing number of industrial localizations originated from Italian firms and Italian firms' clusters.

Slovenia and Bulgaria show very similar impacts of firms' clustering in the first three scenarios, with Bulgaria slightly prevailing for the more restrictive cases 2 and 3. However, when considering the estimated scenario 4, Slovenia performs better. This evidence highlights that the Slovenian export performance is more equally distributed among the sectors and gains more from a generalized formation of clusters in all sectors. On the other hand, in Bulgaria the concentration of firms' clusters in sectors with the highest potential of firms' clustering formation (as especially in scenario 2) provides an advantage over Slovenia. However, all three countries benefit from a more even diffusion of firms' clustering.

5. Conclusions and future work

We started out considering that SEE countries stand to gain most from an export-led growth in view of their increasing integration with the EU. We observed, however, that the export ability of SEE countries could be jeopardized by their productive structure largely based on SMEs that, due to their limited size, may face obstacles to gain access to international markets. Next, we remarked that the export potential of SMEs could be boosted through their clustering.

Accordingly, the aim of this paper was threefold. First, we reviewed the extant literature on the advantages of firm clustering, particularly with an eye to the potential benefits of clustering for export performance. Second, we obtained an estimate of the boosting effect that sectoral firms' clustering may have had on sectoral and total exports in the case of Italy in the 1960's and early 1970's, the phase of Italy's export-led growth

most reminiscing the current perspective for closer integration between SEE and the EU. Third, we proposed a plausible way to apply such estimated effects to the SEE economies and quantify the gain in terms of export performance these economies could reap through sectoral firms' clustering.

We used Italian data for 1971 exports (with both sectoral and geographical detail) and we obtained the additional effect of firms' clustering on an 'agnostic' gravity equation. Firms' clustering seems to have had both a static and a dynamic effect on exports. On the static side, firms' clustering can significantly boost exports, but only in conjunction with other factors: we found that firms' clustering strengthens the domestic model of specialization by affecting more intensely those sectors that already experience higher export growth. On the dynamic side, we showed that firms' clustering has a relevant marginal impact on export growth, equal approximately to 0.009 % (per year) for each percentage point of sectoral workers employed in sectoral firms' clusters.

As data were not available for the SEE economies, we designed different scenarios taking the Italian experience as a benchmark and obtained the estimated additional impact of firms' clustering on the (projected) benchmark export growth. The simulation results showed that the gain in terms of export growth ranges between 2-3% and 9-11% over a five-year period.

In our view, this evidence indicates that SEE countries stand to reap substantial benefits by favoring SME clustering. To be sure, as noticed, such an evolution is already in progress, as SME industrial clusters from the EU (and particularly form Italy) are outsourcing their high-labor-intensive stages of production to relatively low-cost-of-labor SEE. Our results suggest that SEE countries will substantially gain if they will be able to accelerate this process. Indeed, it appears in the interest of SEE countries to introduce specific incentives to effectively boost the dissemination of SME clusters in order to take full advantage of their trade integration with the EU.

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Fig. 4.1. Simulated Firms' Clustering Additional Effect on Export over Benchmark Growth for Bulgaria, Romania and Slovenia

(per cent for 5 years)