

## AN INPUT-OUTPUT ANALYSIS OF DEVELOPMENT AT LOCAL LEVEL

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### Abstract

The present paper finds models of development for the Local Economic Systems (LES) of the region of Tuscany, through the reconstruction of economic accounts at local level.

LES belonging to different models vary according to the role they play in trade (if they are a “base for export” towards internal and/or external direction, if they have a positive balance in goods or services trade or in the tourism sector) and according to their productive characteristics and to the level and kind of development they are able to guarantee.

An analysis of how effects of exogenous shocks in final demand spread over territories is carried out through a multi-regional (multi-LES) input-output model. The ways in which economic effects spread among LES enables to verify whether the various territories of Tuscany form a fully integrated economic system or not.

## **Introduction.**

The analysis of the development of Italian administrative regions<sup>1</sup>, in a medium to long term perspective, shows that the paths they followed are very different. The shape of regional growth curves over the last forty years has been interpreted as a consequence of the intersection of long waves of development and the different moments of the various regional take-offs [G. Bianchi, S. Casini Benvenuti, G. Maltinti 1989].

After the take-off period regions tend to grow according to similar patterns, even if at different speeds, following an S shaped (logistic function) curve. After a first period of growth at increasing speed, various elements (e.g. external diseconomies) tend to saturate the possibilities of increasing the level of development even more; thus the process of growth slows down, until regions reach a horizontal asymptote. It has been maintained [G. Bianchi, S. Casini Benvenuti, G. Maltinti 1987] that such a behaviour depends upon the existence of a sort of “roof” to the expansion of industrialisation levels; the height of the maximum level of reachable development is then determined by the take-off period with the property that, the earlier it takes place the higher the level of development reached in the long run.

This interpretation of the process of growth seems to fit quite well the recent economic history of Italian regions. Within this scheme of interpretation they can be grouped, according to the level of development reached and the path followed, into three major groups: areas that took-off by the end of last century and have already reached their period of saturation at a high level of development (the regions of the North-West), regions that are still lagging behind and do not seem to have clearly started their phase of take-off (the regions of the South of Italy), and the areas of the Centre-North-East (the second wave of regional development in Italy) that have experienced a take off shortly after World War II. Starting from levels of development far behind the ones reached by old industrialised regions, Centre-North-East areas are still growing during the 1980s and 1990s and tend to reach similar levels of per capita production.

Within this last group of regions, Tuscany, which is our main subject of research and our primary interest, shows a peculiar behaviour. While the other areas of the group continue to grow, although at lower rates, during the last two decades, Tuscany seems to reach its maturity at an earlier stage [Bianchi 1986].

Various hypothesis have been put forward: the first one, which is concerned with the starting point, maintains that both an initial level of development much below the one of the more developed regions and a take-off only in a second stage, has prevented our region from reaching the same levels of development as old industrialised areas. A second one explains that the slow down in growth occurred at a lower level of development because Tuscany growth rates have been lower than other region's rates, hence the moment of maturity has occurred at a lower stage of development. A third one stresses that, services to firms were not able to back those SME systems in the moment of shift from local to global competition due to a low qualitative level of tertiary activities.

Each of these interpretations probably contains a part of the truth but none of them seems completely satisfying to us. The most promising explanation for the mentioned phenomena regards the variety of the region's economic systems.

The territory of Tuscany consists of very different local systems. Industrial districts and other SME clusters are scattered among rural areas and tourist resorts; large industrial firm areas alternate along the coast with highly specialised tourist systems; small and medium urban centres, many of which are endowed with world-wide known treasures of arts and history, are placed in very different

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<sup>1</sup> Hereafter with the term region we will refer to the administrative regions of Italy (regioni amministrative). To avoid misunderstandings we will use the terms local system, or territory or areas to indicate functional regions.

surroundings varying from beautiful landscapes to areas of diffused urbanisation and industrial contexts.

The introduction of variety in the analysis of the local economic systems of the region offers new possibilities of explanation for the early economic maturity observed at aggregate level for Tuscany; it can be explained in terms of: a) a progressive decline of large industrial firms systems caused by the crises of fordist organisation of labour; b) the slowing of growth of the SME clusters that experienced their take-offs in the early seventies and are now on the upper part of the S curve of development; c) the lack of territorial diffusion of manufacturing systems, which are still located where the first industrialisation of the seventies took place; d) the emergence of different models of development in areas that specialise in tourism, leisure and residential functions, often mixed with activities of rural resources valorisation.

A rough explanation of the peculiar shape of the Tuscany curve of development, a sort of first impression diagnosis, is that the crises of large industrial plants, the decline in the rate of growth of industrial districts and their insufficient diffusion over time have not been outweighed by those areas that, although developing at a steady pace, experienced much smaller growth rates than those of emerging industrial districts in previous decades. Such an explanation, notwithstanding its hastily conclusions, seems to us more convincing than any other explanation given at an aggregated territorial level.

We think that for a full understanding of the regional process of growth we should draw and study the S curves of development for different areas and rebuild the regional one as a sum them. Since Tuscany presents a high territorial variety (much higher than the majority of the other regions of Italy), we expect to find growth paths that differ in terms of starting points, speed and shape of growth, kind and levels of development reached.

Complicating the analysis by considering many smaller areas will not shed any additional light on the mechanisms of development of a region if the latter is quite homogeneous within its boundaries. However, in those cases where differences between local systems are high and the poorer areas tend to remain at the end of the ranking over time, territorial disaggregation becomes necessary if we want to fully understand very different realities<sup>2</sup>.

Figure 1 illustrates the paths of development of Tuscany as whole and of some of its most representative local systems. It clearly shows the relevance of territorial disaggregation in the analysis of Tuscany.

From this point of view therefore, the problem of regional development (of large administrative regions), tend to become an empty box due to the high internal variety of local systems. The overall behaviour of regions reflects only the average performances of different local economic systems and any explanation that does not take in to account the internal variety of territories will result biased. The problem of regional development shifts therefore from the analysis of large administrative regions, which boundaries have little meaning in economic terms, to the study of the variety of those smaller areas, the local economic systems, that constitute them.

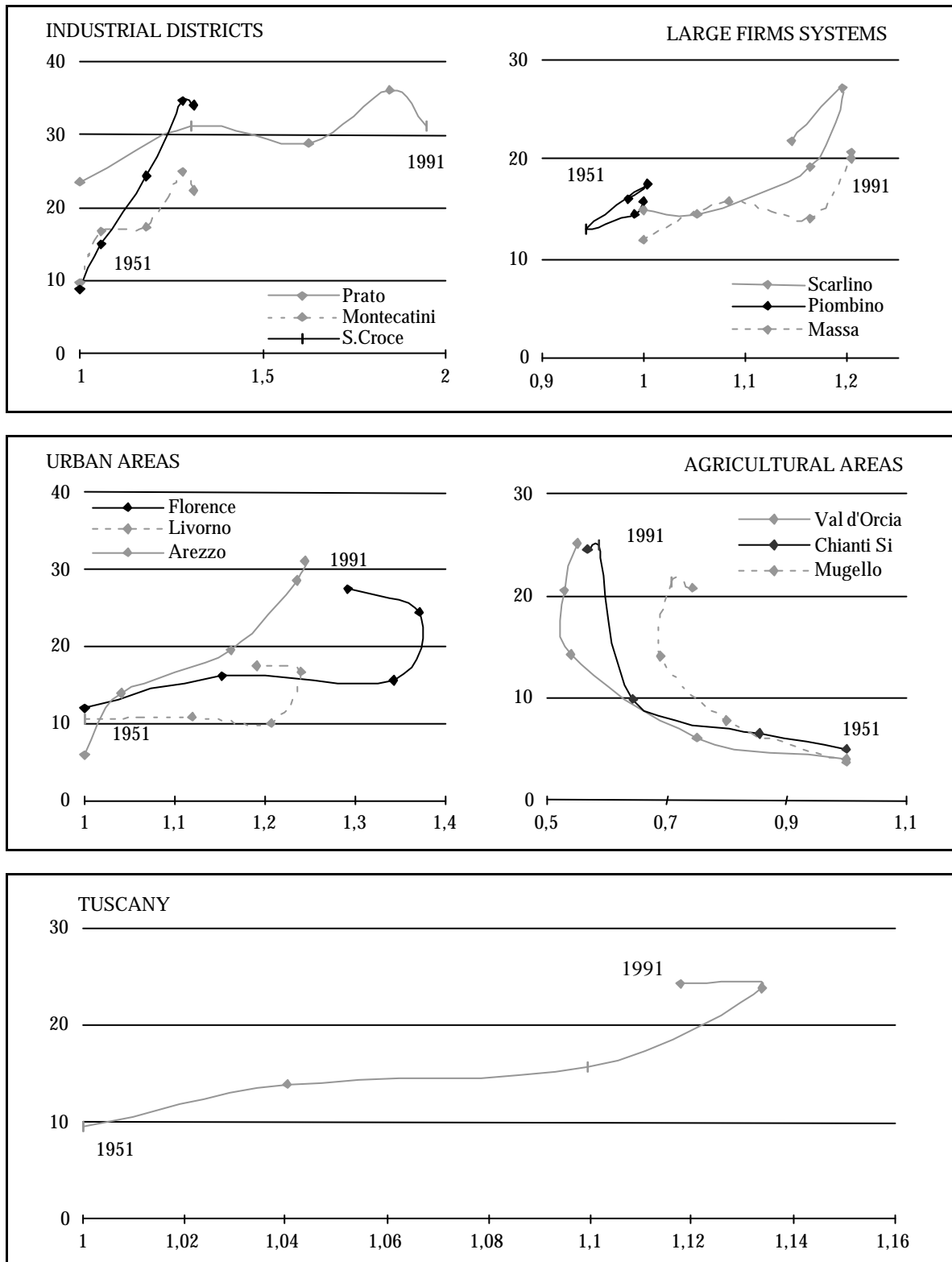
The aim of this study is threefold. First, single out models of development at local level for the region of Tuscany; second find out the economic relations taking place between them; third verify to what extent the various territories of the region form a fully integrated system.

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<sup>2</sup> An increasing part of economic literature considers local characteristics as some of the key elements for the understanding of the production process. From this point of view the analysis at a territorially disaggregated level (Local Labour Markets) is necessary independently of the variety of local systems. On this see for instance Piore M.J.; Sabel C.F. 1984.

**Figure 1: Local and regional development paths.**

On the horizontal axis resident population (1951=100); on the vertical axis labour force employed in industrial activities per 100 residents.



Three aspects of local economic systems have been analysed in order to make out the different models of development at local level:

- productive characteristics (sector specialisation, organisation of production, residential and tourist vocation of the areas)
- levels and kind of development (GDP per capita, levels of employment, unemployment and formal education)
- quotas of overall production sustained by demand outside the local system (both from a sector point of view and from the destination of exports).

None of these points, except partly for the first one, could have been carried out using the official (i.e. of the Italian Central Statistical Office) local statistical data. The usual problem incurred by economic studies at local level arises: the available statistical information is very limited.

As far as Italy is concerned, the status of statistics at local level can be summarised into three adjectives: it is scarce, full of gaps and heterogeneous. It is scarce because there are no economic information at local level outside the years of productive and population census. It presents relevant gaps since there is no information at local level on some fundamental variables such as GDP, investment, household consumption, public spending, etc. It is heterogeneous because the most interesting information at local level comes from administrative data (that are difficult to compare and lack of coherence with the official data of the Central Statistical Office) or separate estimates of the same phenomena (performed with different techniques and therefore difficult to compare and/or to be used together with other estimates).

For these reasons IRPET committed to the construction of a system of economic accounts at local level; such a system is meant to offer a coherent and comparable set of statistical information for local-level analysis in Tuscany. For this purpose we used the input-output technique, which enables to build a framework within which the various information and estimates disposable at local level can be placed and made coherent with each other. In this proposal of an information system at local level the input-output technique does not represent the aim of the research but only an helpful instrument to obtain a coherent framework for estimates that otherwise could not be proposed.

The three above mentioned points of analysis of Tuscany's local systems, and in particular the last two, represent one of the first results of the economic account system estimated at local level.

### **Aims and structure of the study**

The aims of this study are mainly three:

- presenting the system of economic accounts estimated at local level and showing its information potential
- finding different models for the interpretation of the development of the local economic systems of Tuscany
- analysing, through a multiregional (multilocal) input-output model, what are the economic relations that take place between different areas, and verifying whether different territories constitute a system or live independently.

The paper is structured in four sections: in the first one we give a brief account of the procedure we used to build the system of local economic accounts; the only aim of this part is to illustrate and give a idea of the approach we followed without going into the details of the algorithms and

hypothesis we used [L. Bacci, S. Casini Benvenuti 1997; L. Bacci, S. Casini Benvenuti; A. Cavalieri 1998].

In the second section, on behalf of those who might not be familiar with the economic geography of Tuscany, we recall the results of previous studies showing the productive characteristics of the various territories. An analysis of the levels of development reached, from various points of view, by different local systems is also provided.

In the third section we illustrate the procedure used to identify the various models of economic development at local level. The basic idea of the approach we adopted comes from the theory of the regional economic base and from its application at urban level (urban economic base). After a brief account of the principal lines of the theory we discuss its major shortcomings and the ways they can be avoided using an input-output framework.

In the following part of the section we analyse the local systems of Tuscany from the viewpoint of their trade balance with the rest of the region, the rest of Italy and the rest of the world. From these trade relations and using other pieces of knowledge on the productive structure of territories, we identify seven typologies of models of development at local level.

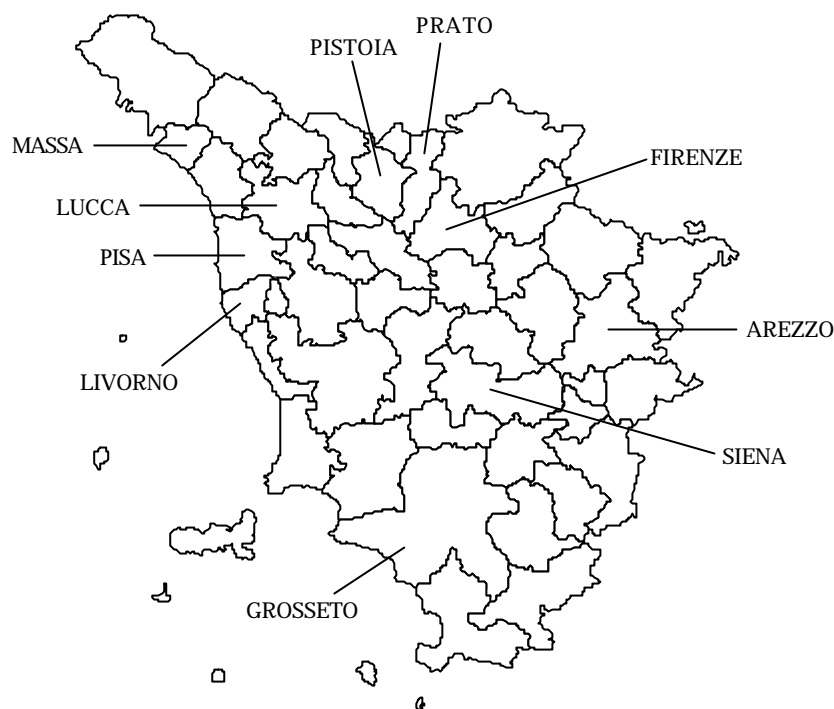
In the fourth section we present the estimated multilocal input-output model that was used to analyse how the effect of exogenous stimuli on demand spread within the Tuscan region. After the presentation of the structure and functioning of the model we analyse the ways in which local systems satisfy increasing demand. Questions addressed are: to what extent they satisfy it directly increasing their production? what part they transmit, through intersectoral or consumption relations, to other systems of the region? and what part of activation is lost through imports from the rest of the world? Thus we tried to ascertain whether the various local systems of Tuscany are simply a set of contiguous territories or whether they form a system of systems.

## **1. Subregional Input-Output Tables**

In order to define the frontiers of local systems territories, local systems being the basic unit of analysis for the construction of the statistical data base, reference has been made to the Local Economic System (Sistemi Economici Locali, LES hereafter).

**Figure 2**

**The Local Economic Systems of Tuscany**



The accounting framework for the LES has been built estimating 44 input-output tables, one for each LES, ensuring a sector breakdown into 44 productive branches. Such a level of disaggregation is particularly relevant given the small territorial dimensions of the basic units of analysis. Input-output tables built at LES level ensure a double order of consistency of estimation: the first one within each table thanks to the balance of use and resources, the second between tables since the 44 LES tables always sum up to the regional one, LES being an exact partition of Tuscany.

The tables have been built (only for the year 1991) following six steps:

**a) estimation of final demand and primary resources components for LES tables.**

In general such variables have been obtained by disaggregating data from official regional accounting or other sources at the provincial level, on the basis of labour units or population (top down procedure). A first set of variables has been obtained by simple disaggregation of the regional data on the bases of the labour force (added value, production transfers), assuming that productive techniques (in 44 branches) were constant and equal to the estimated regional one. A second set has been obtained assuming that the ratio between the variable in question and total demand at the LES level was constant and equal to the one computed at regional level (foreign imports, import taxes). A third set of variables (net indirect taxes) has been computed assuming constant fiscal burden at local level.

Concerning government spending , investments, FI.SIM. (Financial Intermediation Services Indirectly Measured) and most of all domestic personal consumption expenditure, disaggregation has necessitated a more complex procedure (bottom up estimates) in order to avoid too restrictive assumptions [Bacci-Casini Benvenuti, 1997].

**b) emergence of local phenomena**

Standard economic accounts instruments turned out insufficient to describe sub-regional<sup>3</sup> realities and it was therefore necessary to define new concepts to account for such new aspects, primarily

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<sup>3</sup> With the term sub-regional we refer to areas of smaller dimension with respect to Italian administrative regions .

affecting the personal consumption expenditure (hereafter consumption) and interregional trade variables.

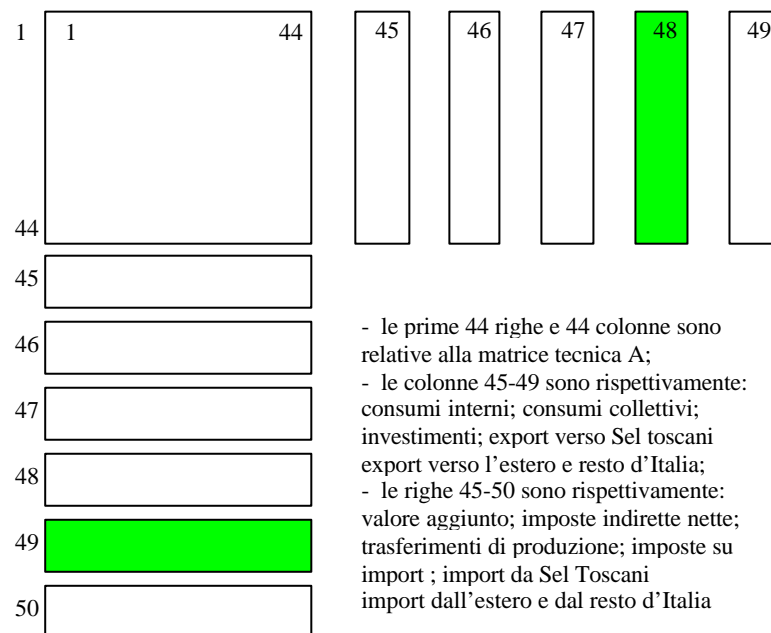
Regarding domestic (internal) consumption the shift to the local level raises the following problem: while consumption made in the *i*th LES by residents of the *j*th LES is registered at regional level as residents' domestic consumption, at the local level this is: consumption internal to the *i*th LES by residents of the *j*th LES. For this reason it has not been possible to simply disaggregate the regional data but it has been necessary to estimate bottom-up the following variables: 1) total consumption of resident population (national consumption); 2) external consumption by resident population (in exit: tourism, day touring, commuting); 3) domestic (internal) consumption by non resident population (in entry: tourism, day touring, commuting); by subtraction one obtains total domestic consumption (domestic consumption = 1+3-2).

### c) Elaboration of the tables and estimation of intermediate flows

Once the final demand and primary resources components of the tables (rows 45, 46, 47, 50 and 51 and columns 45, 46, 47, 48 and 49 in Figure 1) have been estimated, the regional techniques have been applied to added-value per LES to obtain interindustry flows (first 44 rows and columns). The estimation procedure produces 44 matrices, one for each LES, of dimension 51 by 51 (Figure 3).

**Figure 3**

**LES Input-output table**



The tables built for each LES result completed in each part, except for regional imports and exports internal to Tuscany (respectively row 48 and column 49) and those from and to Italy (resp. row 49 and column 50).

### d) Estimation of interregional trade and error correction

A first estimation of interregional trade, both the sum of the two columns 49 and 50 and the sum of the two rows 48 and 49, is obtained by subtraction. Subtracting, for each branch of the table, the resources to the uses, we have import from the rest of Italy and the rest of Tuscany if the result is



greater than zero, and export to the rest of Italy and the rest of Tuscany if the result is smaller than zero.

Knowing, from regional accounting, both imports and exports of Tuscany to the rest of Italy, it is possible to separate trade internal to Tuscany and trade with the rest of Italy, using a pooling approach, to obtain a first estimation of the two components.

At this stage, the table is fully completed. However, the figures of trade with the rest of Tuscany and with the rest of Italy contain both effective trade flows and possible measurement errors, given that they have been obtained by subtraction. Therefore, in order to eliminate such possible error, the three components of trade (Tuscany, Italy and Abroad) have been re-aggregated and then estimated (with econometric procedure) separately by import and by export. The estimated coefficients were then used to re-compute total imports and exports, which fill in the sum of the two rows and columns regarding trade within the region and trade with the rest of Italy. Lastly, error being eliminated in this way, it was possible to correctly compute demand for and production of each good in each LES.

At this point trade between LES, with the rest of Italy and, with the rest of the world is computed through a gravity model. Trade between areas is estimated as a function of each LES demand and production and, of Tuscany's import and exports to the rest of Italy and to the rest of the world. This procedure guarantees that the sum of LES imports and exports respectively to the rest of Italy and to foreign countries were coherent with the regional ones.

For each branch the trade between two areas is computed as follows:

$$\text{Trade}_{ij}^{\text{br}} = \text{Dist}_{ij}^{\text{br}} * f(\text{Dem}_j^{\text{br}}; \text{Prod}_i^{\text{br}}) \quad (\text{br}=1, 2, \dots, 44)$$

where:  $\text{Trade}_{ij}^{\text{br}}$  represents the goods of branch br sold by system i to system y and  $\text{Dem}_j^{\text{br}}$  and  $\text{Prod}_i^{\text{br}}$  are respectively LES j production and LES i demand.  $\text{Dist}_{ij}^{\text{br}}$  is instead an impedance function representative of distance between the two local systems that varies from branch to branch. Such distance of course has to be thought of not only in terms of physical space but also as productive characteristics, consumption structures and systems of relation differences between LES. Once exports are aggregated for LES of origin, and imports for LES of destination, we are able to fill the tables in all their parts.

#### **e) LES input-output tables balancing and consistency with regional accounting.**

In LES tables trade figures, firstly obtained as a difference, have been replaced with the estimates calculated through an econometric and gravity procedure. Therefore the equilibria between uses and resources are not satisfied any more. Moreover, except a few variables, LES accounts have not been constrained to the regional table, hence, their sum is not perfectly coherent with the latter.

To eliminate this double order of inconsistencies we submitted the 44 LES tables to a three-dimensional R.a.S.. The procedure allowed the reduction of the discrepancies within single tables and between their sum and the Tuscan accounts to negligible values.

Acting this way we obtained a set of estimates of economic accounts variables that guarantee a double order of coherence. On the one side estimates respect the use-resources equilibrium in each LES table, on the other the sum of LES accounts results coherent with the regional table.

Furthermore the construction procedure we followed has made possible not only the estimation of trade flows between each LES and the rest of Italy and foreign countries but also the evaluation of trade relations between each LES and the rest of Tuscany.

Thanks to the economic values computed at local level to estimate domestic private consumption it was as well possible to measure a balance of tourist consumption for each LES. This sort of

“tourist balance of payments” has allowed an evaluation of the relevance of this sector of activities in the economy of each territory.

Last but not least, since intersector intermediate good flows have been corrected by the R.a.S. procedure they end up to be representative of different productive techniques in each LES.

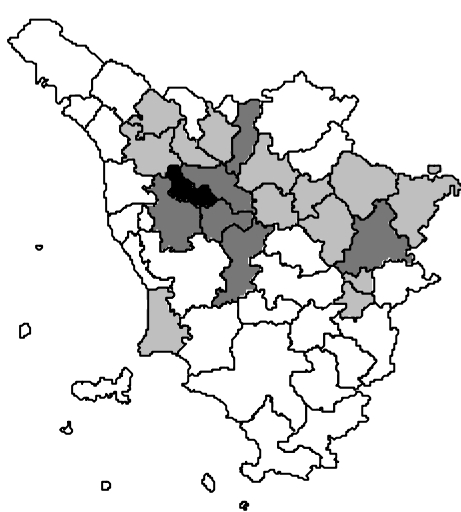
## 2. Introduction to Tuscany’s local economic geography

In what follows, the productive characteristics and development patterns of Tuscany’s LES are briefly presented<sup>4</sup> (rather than presenting numerous indicators we use maps for expositional clarity).

In order to make the descriptive framework better structured, the identification of the characteristics of the phenomena under study is based on an analysis of per capita indicators, rather than specialisation indices. The former indicators are preferred because they allow an identification of complementarities between LES, while the latter indicators just lead to an outline of the differences between LES.

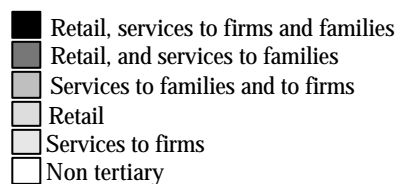
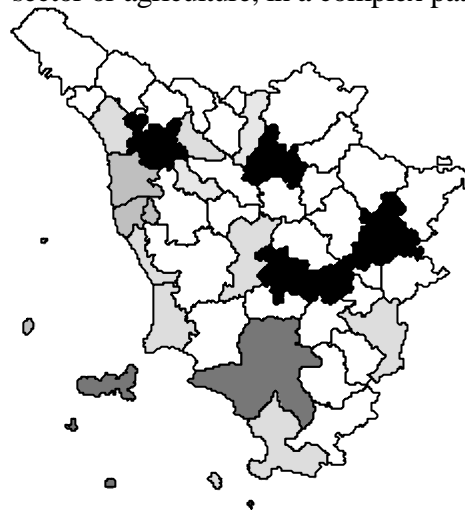
The first three maps below present the areas’ degree of specialisation in specific sectors. Such a representation is based on indicators defined as the ratio between the labour force in the sector and the residential population in the specific area, normalised according to the regional average. Areas showing indices values higher than the regional average are considered specialised in the sector. The fourth map shows the normalised (relative to the regional average) ratios between tourist presence and population.

The first striking feature coming out of the analysis of the Tuscan productive structure is the absence of any typology of territorially dominant LES; LES specialised in the manufacturing industry are located near LES specialised in the tertiary sector or agriculture, in a complex pattern.



**Figure 4: INDUSTRIAL LES - 1991**

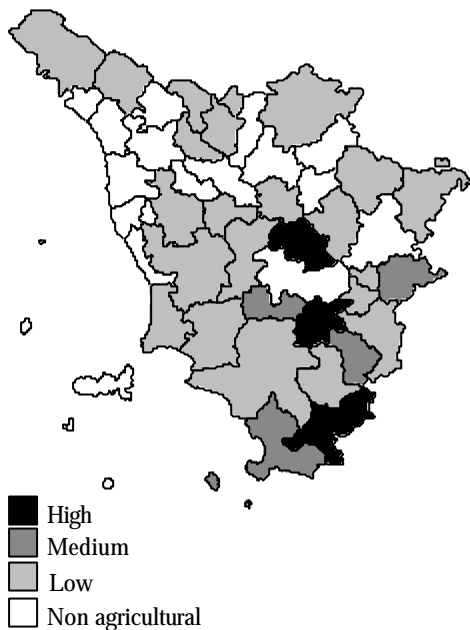
Employed in Manufacturing industry/resident population Ratio



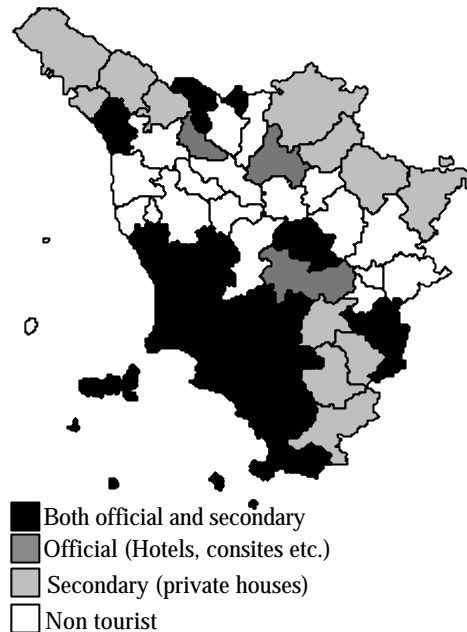
**Figure 5: TERTIARY LES - 1991**

Employed in Tertiary activities/resident population Ratio

<sup>4</sup> For more details see Bacci, 1995; IRPET, 1996 and 1998.



**Figure 6: AGRICULTURAL LES - 1991**  
Employed in Agriculture/resident population Ratio



**Figure 7: TOURIST LES - 1991**  
Number of tourists/resident population Ratio

In many cases the areas exhibit more than one specialisation. This confirms the complexity and specificity of the areas' productive features, which cannot be fitted into general categories. What is missing in Tuscany, unlike in other regions, is a dominant productive model (in terms of territorial coverage).

In terms of localisation, the tertiary sector clearly appears as concentrated in the main urban centres of the region. In contrast, the areas specialised in the agricultural sector are concentrated in the Central and Southern parts of Tuscany. The manufacturing industry is surprisingly little diffused in the region (Figure 4) relative to other industrial regions: in 1991, only 48% of the LES are characterised in industrial terms<sup>5</sup>.

Industrial areas are not uniformly distributed in the region but concentrated on the places where the first industrialisation<sup>6</sup> took place (along the Arno river and the linked minor valley of Chiana). One can notice the strengthening of industry in the area of the Eastern Appennino, while the only industrial areas that add to the existing ones are the ones located around the Florence-Arezzo axis. In contrast, all the coastal areas with large firms, except for a steel pole, are no longer characterised as industrial according to our definition. Overall the region does not show a higher territorial diffusion of industry in the 1990s than in the 1970s. Rather, industry shifted to the Eastern part of the region and almost disappeared from the coast.

Regarding the tertiary sector, the number of specialised areas appears to be limited to the main urban centres together with the Elba Island. However, a further division of the sector into service to firms, to families and to the person, retail services and other services, leads to a more structured outlook<sup>7</sup> (Figure 5). Using indicators of endowment (normalised to the regional average), one can identify:

<sup>5</sup> Using specialisation indices at the level of Local Labour Markets (Sforzi, 1996), the percentage of local industrial systems is 43% in Tuscany, against 58% in Emilia, 76% in Piemonte, 79% in Lombardia and 85% in Veneto.

<sup>6</sup> This concerned the development of light industries (industrial districts and clusters of SMEs).

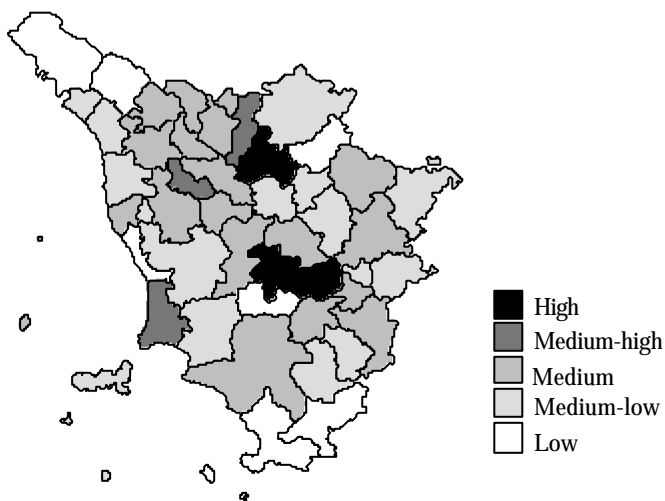
<sup>7</sup> See Bacci (1995) concerning the distribution of classes of activities in services to the firms, to the person and to family, retail service and other services.

- areas specialised in services to firms: main urban centres and industrial districts;
- areas specialised in services to the family: such services are much more important in Tuscany than in other regions; they are quite concentrated on the territory, although more numerous than the areas specialised in services to the firm. Services to the families are concentrated in the main urban centers and the Elba Island.
- the local systems characterised by an endowment in retail and other services above the regional average (and above the national average) are even less concentrated on the territory and show, over the last decade, a growing tendency to spread over the territory. Once again these are located in the main towns of the region, as well as the main tourist resorts.

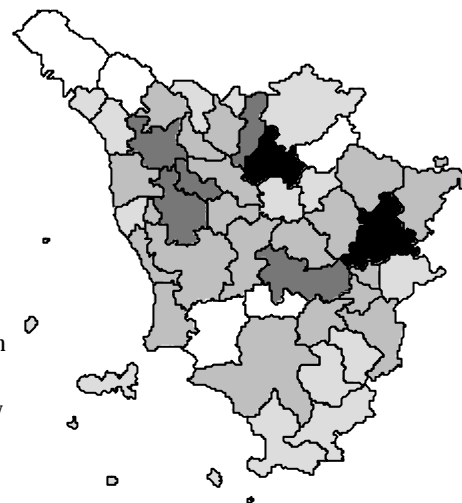
Overall, the number of areas showing specialisation in agriculture higher than the regional average (0.67 while the Italian average is 1) is quite high, although the same specialisation index is relatively low at the regional level (Figure 6). This is due to the diversity of the phenomenon at the local level: while in agricultural LES the values are three to four times higher than the national average, in urban or industrial LES values are often lower than a fifth. Local systems specialised in agriculture tend to localise primarily in the Southern part of Tuscany and on the hills in the centre of the region.

Figure 7 regards the tourist sector and shows how art cities such as Florence and Siena and the thermal systems of the region are highly specialised in “official” forms of tourist receptivity (hotels). Tourist receptivity in terms of second houses (secondary tourism) is most pronounced in areas of the Appennino and Amiata mountains. Areas specialised in both forms of tourism are either old seaside resorts either newer sites that base their tourist attraction on the minor art and environment resorts match (eg. Chianti-shire and other countryside areas of the south of the region)<sup>8</sup>.

To conclude on the economic geography some figures on the level of development reached by LES are in order. Our evaluation of development is not based solely on per capita GDP but on three additional factors (see Figures 8-9-10-11<sup>9</sup>).



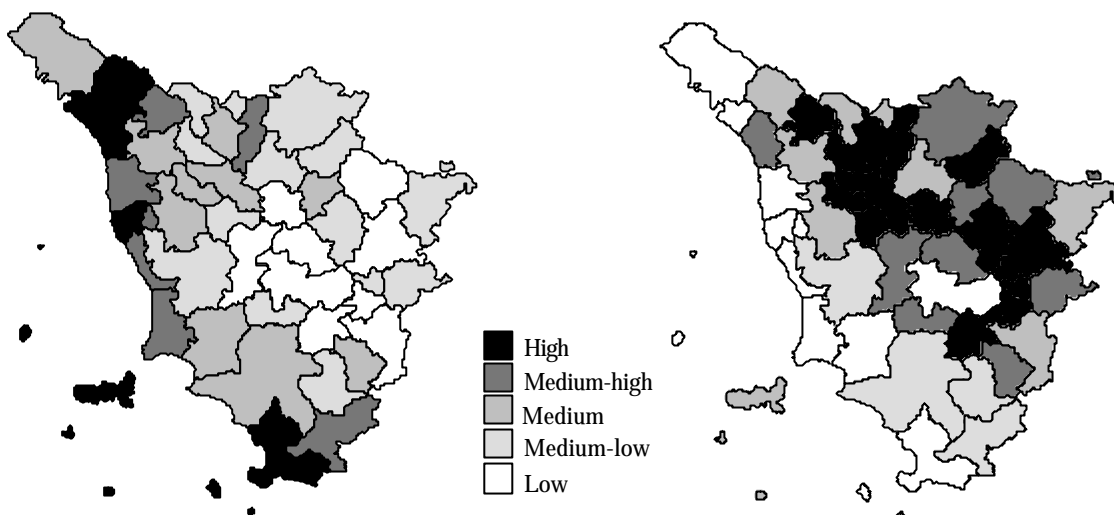
**Figure 8: GDP - 1991**  
Per Capita GDP



**Figure 9: EMPLOYEMENT - 1991**  
Employed persons/Population  
(Aged 15-69) Ratio

<sup>8</sup> As far as tourist flows are concerned we dispose of statistical data regarding the number of nights spent in each system in facilities such as hotels, campsites, farmtourism etc... Apart those recorded presences there are large tourist flows that find accommodation in bed and breakfasts or in rented houses that pass totally unrecorded. Therefore these data have been estimated with a complex econometric model (E. Becheri, R. Gambassi 1993). To distinguish between the two sources of tourist data we refer to the first ones as “official” and the second ones as “secondary” data.

<sup>9</sup> All the indices represented in the four mentioned maps are normalised on regional the average.



**Figure 10: UNEMPLOYMENT - 1991**  
*Unemployed persons/Population*  
 (Aged 15-69) Ratio  
 14-19

**Figure 11: “CONFLICT” BETWEEN  
 WORK AND EDUCATION - 1991**  
 % of employed and unemployed in pop. aged  
 14-19

First the capacity of the local productive structure to create jobs (number of employed on total population of working age). Second the capacity to meet the areas labour supply (number of unemployed on total population of working age). Third, the extent to which economic growth and employment are reached at higher levels of education or not (number of employed aged 14-19 on residential population aged 14-19).

Looking at per capita GDP data, clear differences emerge at the local level. Urban centres (especially Florence and Siena) and industrial areas are those with highest per capita GDP figures (higher than the regional average, which is also higher than the national one). Areas with lower per capita GDP are the ones specialised in agriculture and those which are not specialised in any economic activity. In 1991, therefore, the areas with highest per capita GDP are those specialised in industrial or tertiary activities, with growing importance of the latter specialisation. In addition the negative correlation between GDP per capita and numbers of employed in agriculture seems to become less significant.

Numbers of employed (among the population of working age) in Tuscany are also higher than the national average. The capacity of local areas to create jobs depends primarily on the level of industrialisation, the diffusion of tertiary sector, and, to a lower extent, on agricultural activities. Tertiary activities appear as a major contributor to job creation than in GDP growth. The areas with highest density of jobs are the urban centres, especially if characterised also in industrial activities, and the main industrial districts of the region. At the opposite the areas with lower capacities of creating jobs are those specialised in agriculture or non specialised in any specific sector.

Unemployment figures confirm these regional patterns. Unemployment is distinctly lower in Tuscany than in the rest of Italy. At the local level, the situation is not uniform across Tuscany. In relation to the data on GDP and number of employed we find that unemployment is lower in industrial districts and SME areas. Local systems based on large firms show unemployment figures closer to the national average. Some of the better established rural areas, especially those around Siena, do not experience high unemployment levels. Unemployment is instead highest in some urban centres (except Firenze, Siena and Arezzo), in the tourist areas and in the marginal agricultural ones.

Last, from the point of view of the “conflict” between the prosecution of education after compulsory school and the entrance into working activities, the data (being higher than the national average) provide evidence of a tendency to leave school after the end of the compulsory period (age 14). Such a tendency is more pronounced in the industrial urban belt of Florence and in industrial districts, that is to say, in the areas with more numerous job offers. In the latter areas both the high labour demand, especially for unskilled labour, and cultural aspects that encourage an entry in the labour market at a young age, explain the low prosecution of studies after 14. The areas where young people tend to pursue schooling for longest are the urban centres which are not characterised in any industrial sense, and the agricultural, tourist or marginal areas. This pattern is explained by both cultural factors and little job opportunities in the former areas, while in the latter three kind of territories it is probably due solely to the lack of job opportunities.

### **3 Identifying models of development at local level: the Tuscanies of Tuscany.**

#### **3.1 Methodological approach**

From LES characteristics description briefly sketched out in the previous pages emerges clearly that the various territories of Tuscany present very different levels of development: LES that could thoroughly belong to the most developed regions of the nation contrast with areas that are closer to the economically disadvantaged realities of the South of Italy.

These differences in the levels of development, that go together with an ample variety of productive and social characteristics, constitute one of the main features of Tuscany. Such a peculiarity had already been outlined in previous studies and especially in the 1975 Irpet study on Tuscan development. On that occasion the suggested scheme of interpretation considered the existence of four typologies of areas (“urbanized countryside”, urban areas, tourist-industrial areas, rural areas). Even if these archetypes of models of local development have represented a reference of great value for many studies of regional development in Tuscany, nowadays, after more than thirty years, they do not seem to be able to represent the variety of local systems of our region any more.

The approach we followed to update such a variety of interpretative models is based on a reconstruction of the economic relations that each LES bears with the rest of Tuscany and the rest of the world. Those relations regard both the production and exchange of goods and services (through backwards and forwards interindustry relations à la Hirshman [Hirshman 1958]) and tourist flows, where the space of relations is defined by consumer movement from the place of usual residence to the one of consumption.

Tuscany has been characterised, since its early stages of industrial development in the beginning of the seventies, as a region which: was highly specialised in the production consumption goods, was very oriented to foreign markets (with still a share of nearly 8% of national exports at 1997), and which growth depended greatly on the state of international trade and the level of North American and European demand. The partial shift of production from consumption to investment goods that occurred in the late seventies and the first years of the eighties, has not substantially modified this feature<sup>10</sup>. Even the slow down in economic growth experienced in the second half of the last decade has been attributed in large part to the negative dynamics of exports [Irpet 1999].

It has been a shared opinion in literature that especially at the moment of take-off the development of Tuscany should be interpreted as an export led process, and even in the last decade, there is strong evidence of a strict correlation between export growth and overall economic

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<sup>10</sup> Such a shift has often occurred within the sector of specialisation. Production has passed, for instance, from leather products to leather processing machinery, from textile to textile machinery.

performance. For these reasons, one of the major aspect to be taken into account in identifying local models of development was the LES' attitude to export.

The theoretical reference, especially for the many attempts made for an application at local levels, is, at least as a starting point, the theory of the economic base or export base. The idea of this theory, that dates back to the fifties<sup>11</sup>, is simple, perhaps too simple. The structure of the economy is considered to be composed of two main groups of productive activities: basic activities that produce goods and services for export outside the region; and service (or non-basic) activities which goods and services are consumed within the boundaries of the area by resident population. According to the theory, basic activities are the element that pull the expansion of the overall regional economy; an increase in the base sectors induces growth in service activities (non basic sectors) and hence in the regional economy as a whole.

Several criticisms can be made to this approach and their relevance is more and more evident when the dimension of the considered area shifts from a large region to a smaller urban or local labour market context.

The first point is how to distinguish between basic and non-basic activities. "Possible base sectors include manufacturing, mining, finance and banking services, distributive organisations catering for non local markets, and activities supported by outside income such as tourism, central government offices, laboratories and other establishments, certain kinds of medical and educational institutions. Non basic sectors include local government, shops supplying local demand, schools, lawyers, doctors and local service industries. But most categories cannot be sharply defined, and virtually all will produce for both outside and local markets<sup>12</sup>". The lack of detailed information about exports with territorial disaggregation has lead most studies at local level to use employment as a measure of the export base. The most common technique to define base sectors relies upon "location coefficients"; if these show values greater than unity (that is to say if the quota of employment in the considered sector is greater than the national average) the sector is considered to be a basic activity. Obviously such a threshold is quite arbitrary, and especially for large regions, a localisation index far below the unity might hide relevant activities strongly oriented towards external demand.

The second objection is that different sector mix may be representative of completely different vertically integrated sectors; their straightforward consideration, without the ways they participate to the production of final export goods taking into account, can lead to the exclusion from the base of phases of production that belong to the overall manufacturing process.

A third consideration arises from the fact that an expansion in the base sectors may be different in cases where goods and services are delivered to consumer from cases in which consumers come to the local system to purchase their goods and services (tourism, gravitation on larger urban centres for specialised goods and services). In these cases the purchase of basic activities (tourism included) may be accompanied by the consumption of goods and services (transport, restaurants and commerce in general) that are usually regarded as produced for local demand; therefore the usual distinction between basic and non basic activities becomes more difficult to trace.

As a fourth point, sectors which import goods and services from local output and those who do not should be distinguished. Non basic industries might supply important inputs for export products, becoming one of the key elements of the competitiveness of the local system, and should therefore be considered as part of the base sector. A location quotient below the unit may be representative of a sector whose production rules out a considerable quantity of imports. Regional income growth can

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<sup>11</sup> For a history of the concept of economic base see Richard B. Andrews, "Mechanisms of Urban Economic Base: Historical Development of the Base Concept," *Land Economics*, XXIX (May, 1953).

<sup>12</sup> H. W. Richardson, 1969.

be explained not only in terms of exports dynamics but also as a consequence of an increased activity in import-replacement industries<sup>13</sup>.

Last but not least, a major drawback of the base theory is that it is inappropriate for an analysis of a multiple region system. It reduces all economic relations to the ones that take place between the region under consideration and the rest of the world. This is too strict a simplification, especially if the propensity to import varies significantly from region to region; such a feature is quite common when small areas are taken in to consideration and present large differences in their relative dimensions.

The difficulties in separating basic from non basic sectors, the importance of local interindustry relations, the importance of considering not only exports but also imports, the need of a multiregional approach can find a solution using an input-output analytical framework.

The local economic account system we estimated and the multilocal input-output model we built have allowed to remove, or at least to minimise, the mentioned drawbacks. The estimate of exports and imports towards other LES, the rest of Italy and the rest of the world; the calculation of a net balance of tourist consumption; the reconstruction of interindustry flows of intermediate commodities at local level; the organisation of the input output tables into a multilocal model have made it possible to overcome the mentioned shortcomings.

When a local system is considered through input-output relations as an integrated unit of interdependent activities, the basic/non basic distinction tend of course to disappear. What remains of the economic base approach is the attention paid to the role of exports (and imports) in determining the level of total demand and hence the level of production.

The key to our reading of local economic development processes is based on a simple assumption generally made by theories of regional growth: the idea is that an area has to increase its ability to sell production outside (or alternatively to reduce its dependence from outside) in order to grow. However any single local system will achieve such a goal in different ways, according to: the kind of production it specialises in, the nature of external demand it satisfies, the origin and destination of its trade flows, the interindustry and consumption relations it develops with other local systems.

From the viewpoint of the larger region, the administrative region of Tuscany, our approach shifts the concept of economic base from the analysis of sectors into the one of territories.

### **3.2 The Tuscanies of Tuscany**

The estimate of resources and uses accounts at local level which distinguishes exports (imports) to (from) the other LES of Tuscany, the rest of Italy and the rest of the world, allowed, for each of the 44 branches, the reconstruction of deficit or excess of production with respect to local uses. A further distinction of these local trade balances in terms of trade within and outside the region has been made.

Moreover, the economic account system made it possible to measure tourists' private consumption in each LES, as well as private consumption made by LES residents outside its boundaries. A comparison between the two amounts allows the calculation of a sort of "tourist expenditure balance" that is positive when external expenditure of resident is smaller than the internal one of tourists and is considered as a net export, and, is negative and recorded as a net import when outgoing tourist expenses are larger than the ones incoming.

According to the suggestions of the economic base theory the identification of different typologies of LES concentrated on the features of their trade balance. LES have therefore been subdivided

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<sup>13</sup> Some of the above points are discussed in C. M. Tiebout: Exports and Regional Growth. and D. C. North: Exports and Regional Growth: A Reply. *Journal of Political Economy*, 64, 1956.



according to their capacity to be a local base for export relative to the rest of Tuscany (internal role) or towards the rest of Italy plus the rest of the world (external role).

In the map of “internal and external trade<sup>14</sup> balances” (Figure 12): the first group singles out LES where the overall positive balance (indicated by a “T”) is associated to a positive sign either on internal or on external trade. The LES presenting these characteristics are urban areas (Firenze, Siena e Lucca) and represent the models of development with maximum degree of opening; they project their production on external markets, but at the same time supply goods and services to the rest of Tuscany.

A second group of LES is the one we could define as “the windows on external markets” (markets outside the region) of Tuscan products, and to a lesser extent of Tuscan tourist resorts. Industrial districts, some large firm poles still present in our region, and some areas with a strong specialisation in the tourist activities belong to this group. In all these areas the active balance of external commerce is accompanied by a negative trade balance within the region. This brings about a total balance that is often largely positive for industrial areas, whereas tourist systems seldom reach an overall positive position (tourist activity generate an overall positive balance only in the most specialised areas). The term “window on external markets” is meant to suggest not only the direct export of goods and services locally produced, but also the function of inducing production of goods and services to other parts of Tuscany. In other words, the LES belonging to this group catch external demand (positive external balance) and transmit part of the activation, via interindustry linkages or via consumption, to the rest of Tuscany (negative internal balance).

Follows a third group of LES where the commercial balance is active only within the region. The territories of this group play a role of suppliers of crops, services and tourist facilities for internal demand.

The last group in this internal-external perspective is the one that scores negatively on both sides; the level of deficit in these areas depends on both the way they are affected by the tourist flows and the limited presence or absence of industrial activities. Such LES present with different intensities the typical features of marginal areas that where cut off from the various phases and kinds of regional development.

A second way of considering the nature of local systems of Tuscany can be derived from the joint consideration of the balances of trade originated by goods and services production and those related to the balances of tourist consumption. The map “commercial and tourist balances” (Figure n. 13) shows all their possible territorial combinations.

The four typologies of LES that emerge from this second point and the previous ones made out on the base of the direction of commercial balances overlap only in part.

The first group, where a local export base is found both on the commercial and tourist side, includes two urban areas (Firenze e Siena) but also two areas along the coast that belong to the old category of tourist-industrial areas (a mix between large firms plants and seaside tourism). The rest of the group comprises areas characterised by the presence of small and medium firms and the recent diffusion of various forms of tourist facilities.

The second typology, concerns areas with positive balances only on the commercial side, and singles out LES with a strong manufacturing specialisation. These are the areas that have represented the main part of the Tuscan export base since the take-off of light industrialisation (SME clusters development) in the early-'70s. This second group, consists of the principal industrial districts of the region and other clusters of SME of more recent development, as well as two urban areas (Livorno

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<sup>14</sup> In this case trade balance is comprehensive of both tourist expenditure balances and goods and services trade balances.

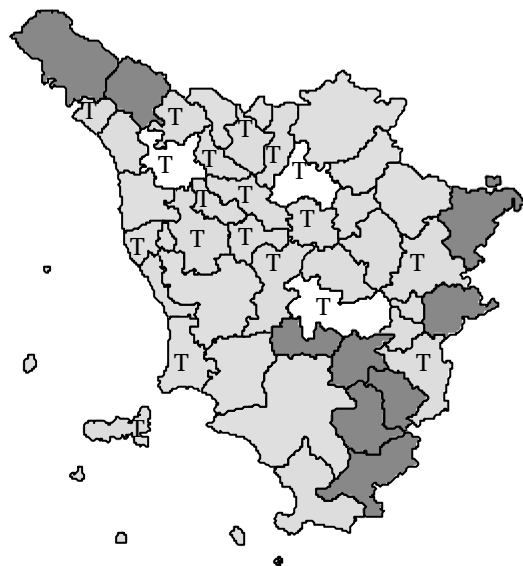
e Pisa) along the coast. The latter two systems are commercially open to the inside of the region and are specialised in the production of services to households and business related services to inland manufacturing systems.

Tourism is the main pulling economic activity of the third group. Such activities, as mentioned above, are usually insufficient to make an overall productive surplus, with the only exception of highly specialised tourist resorts such as the Elba island and some thermal resorts. In addition to the coastal tourist systems this group is also made of the territories of the North-East mountains and part of the rural areas of the South of the region.

The last group is represented by those systems that present a deficit either in trade of goods and services or in tourist expenditure balance. Such LES correspond largely to the areas we previously defined as marginal.

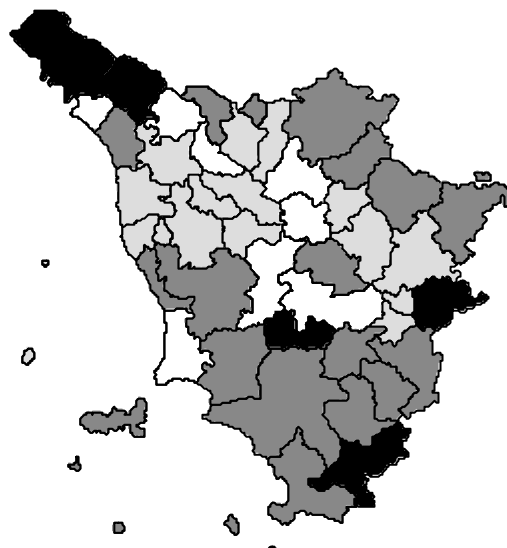
To complete the analysis of the various kinds of development models, besides considering the direction and nature of trade balances, a sector analysis of the latter is needed. The additional aspect we took into consideration was the sector specialisation of trade balances. From the traditional subdivision into three sector (agriculture, industry, and service activities) and all possible combinations, we obtained the seven groups that are illustrated in the map of “sector trade balances” (Figure 14).

Only two urban areas (Firenze and Arezzo) present positive balances both on goods and services. Three other medium sized towns<sup>15</sup> (Siena, Pisa e Livorno) are specialised in service production only, while Grosseto presents a unique mixture of agriculture and services.



- Negative internal and external balances
- Positive internal balances
- Positive external balances
- Positive internal and external balances
- T Positive overall balance

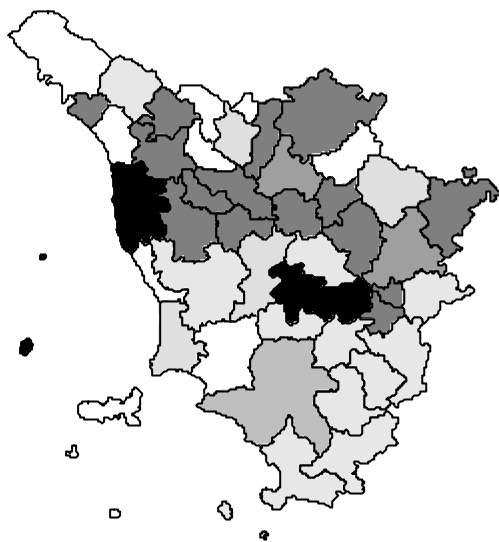
**Figure 12: INTERNAL AND EXTERNAL TRADE BALANCES**



- Positive trade and tourist expenditure balances
- Positive trade balance
- Positive tourist expenditure balances
- Negative trade and tourist expenditure balances

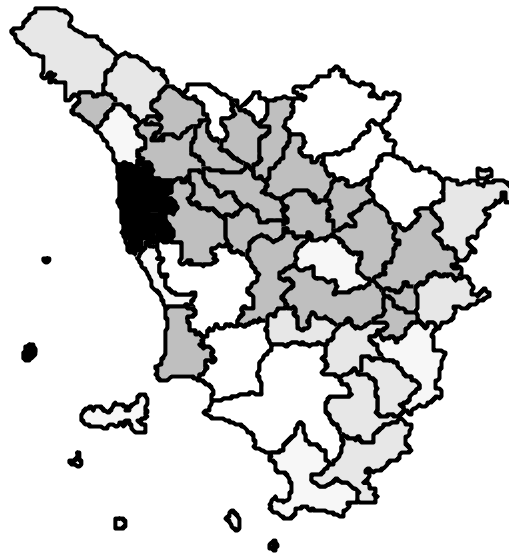
**Figure 13: TRADE AND TOURIST EXPENDITURE BALANCES**

<sup>15</sup> Their resident population ranges between roughly 60.000 and 160.000 inhabitants.



- Industry and services
- Services
- Industry
- Industry and Agriculture
- Agriculture
- Services and agriculture
- No positive balance

**Figure 14: SECTOR TRADE BALANCES TUSCANY**



- Marginal economic systems
- Internal tourist-rural systems
- Internal urban systems
- Tourist-industrial systems
- Open industrial systems
- External tourist systems
- Open urban systems

**Figure 15: THE TUSCANIES OF TUSCANY**

Industrial specialisation characterises the old and new industrial areas of the region: industrial districts, SME systems of more recent development and a few areas of large industries. Some of these areas present the peculiar feature of a still relevant agriculture export alongside an industrial base.

Agriculture represents the only form of a positive trade balance in many areas of the South of Tuscany. Developing tourist activities is often the only way to get out of economic marginality for these regions.

The last group contains areas with negative trade balances in all sectors. Three major reasons explain the situation in these areas:

- local production is not sufficient to meet the large (due to intense tourist flows) domestic (internal) demand.
- the residentiary role played by some areas induces consumption to be higher than production
- real economic marginality.

The various groups of LES we have obtained analysing trade balances from the three mentioned points of view (internal-external; commercial-tourist; sector distinction) result different in many aspects and are not comparable with the pictures of Tuscany obtained in terms of workforce specialisation.

In order to derive the most important aspects that should be taken in to account to single out different models of development at local level, we analysed both the existing relations between LES characteristics in terms of trade balances and sector specialisation, and the four dimensions of development. The following table shows the most relevant correlation we observed.

**Figure 16 Correlation between indicators of development and local trade balances**

|                   | Commercial trade balance (inside Tuscany) | Commercial trade balance (outside Tuscany) | Commercial trade balance (Total) | Tourist trade balance | Total trade balance Commercial + tourist |
|-------------------|---|--|----------------------------------|-----------------------|--|
| Unemployment      | -0,19101<br>(0,303)                       | -0,19597<br>(0,290)                        | -0,30978<br>(0,089)              | 0,35883<br>(0,047)    | -0,0831<br>(0,656)                       |
| Employment        | 0,17389<br>(0,349)                        | 0,52892<br>(0,002)                         | 0,6146<br>(0,000)                | -0,16851<br>(0,364)   | 0,79326<br>(0,000)                       |
| GNP               | 0,29244<br>(0,110)                        | 0,41255<br>(0,021)                         | 0,58105<br>(0,001)               | -0,05819<br>(0,755)   | 0,86689<br>(0,000)                       |
| Education VS work | -0,47924<br>(0,006)                       | 0,65426<br>(0,000)                         | 0,31006<br>(0,089)               | -0,15506<br>(0,404)   | 0,31922<br>(0,080)                       |

The table clearly shows a link between the two most important dimensions of development and the value of the export base at local level. The most significant among all possible correlations are the ones between the total trade balance (goods and services trade plus tourist consumption balance) and the levels of employment and per-capita GDP. In other words, the larger is the overall export base, the higher the levels production and employment that are locally produced.

Moreover, while areas open outside the region record the best results in terms of employment and production, those more oriented towards regional inner markets tend to score worse, especially on the labour market side.

Coherently with previous results, trade balances within the region appear to have a negative correlation with the conflict between education and work whereas those with trade flows outside the region show a relevant positive correlation with the latter index. This means that the areas open to other regions (in Italy and abroad), usually specialised in industrial productions, are able to guarantee high levels of employment at the expense of continuing education after compulsory school. In contrast, LES open to regional inner markets, usually specialised in the production of services, are associated with higher education, also because of the lower employment opportunities offered locally.

In addition, areas with a specific tourist export base show low levels of production and employment and present little probability of reducing unemployment, if there are no other relevant activities.

The significant relations between levels and kind of development and the values and characteristics of local export bases, and their coherence with the results obtained in terms of sector specialisation of trade and workforce, suggest to pay more attention to the analysis of direction and kind (commercial or tourist) of trade balance and to retrieve the sector information only in a second stage. Following this criteria we singled out the seven new typologies of models of local development illustrated in the “Tuscany of Tuscany” map (Figure 14).

The labels we used do define each category of this taxonomy (see the “Tuscany of Tuscany” map) tend to recall the characteristics of the development processes in terms of direction, nature and intensity of LES relations. While some LES belong, without any doubt, to only one of the mentioned typologies, other LES, which nature is less clearly identified are likely to belong to more than one of these theoretical models of development.

The first two graphs concern the local systems which present the most developed urban features of the region. They are distinguished according to the extent of trade openness, which is multi-directional in the first group and focused on the region in the second.

The first group, namely the group of “open urban systems”, consists of those urban realities that accomplish a connecting function both inside and outside the region. These systems represent the “stronger” points of the relation net and realise positive balances with respect to both the outer and the inner region demand. They have complex sector specialisations that vary from both services and industry (Florence), to productions more oriented to services (Siena), or predominant manufacturing activities (Lucca). Two of these systems realise this overall opening also through a relevant inflow of tourists that contribute to qualifying them as elements of attraction well visible even from outside the region.

The second group of urban systems, the “internal urban systems” is made of the confining towns of Pisa and Livorno. Their function is more clearly exclusively based on services; services that are supplied mainly to the other systems of the region; they play a specific internal role of way in and out for passengers, goods and services (through Livorno’s port and Pisa’s railway). Their tertiary function is reinforced by the presence of universities, research institutions, hospitals and other public health centres of national importance. However, this high quality segments of tertiary activities are not yet sufficiently developed in order to make the trade balances of these areas active on the external side.

The third typology finds its roots in the model of development of “light and territorially diffused industrialisation” (industrializzazione leggera e diffusa IRPET 1975), of industrial districts and clusters of SMEs.

This group, that we defined as “open industrial systems”, includes areas with high manufacturing specialisation that tend to export their production mainly out of the region and realise large positive trade balances on this side. Within the region they activate a considerable demand of goods and services, both of intermediate and final nature (also in terms of tourist consumption), and therefore realise negative balances respect the rest of the region. In other words these competitive systems catch a large share of external demand and transmit part of the consequent economic activation to other parts of the region. These are the LES that we previously called the “windows on external markets” of Tuscany’s production. They comprise: the principal industrial districts of the region, the more recently established SMEs, the urban-industrial areas of Arezzo (where manufacturing is associated to tertiary activities) and Pistoia (with still intensive agricultural activities).

The persisting presence of manufacturing along with tourist activities makes out a group of “tourist-industrial systems” that are either a result of past development paths or a novelty of the eighties and nineties. This group in fact includes some of the so-called tourist-industrial areas<sup>16</sup> and some areas new to this tourist-industrial mixture. These new realities have experienced the development of a peculiar coexistence between small and medium sized firm clusters and new forms of tourism, which have brought significant flows of visitors in areas that were not considered as tourist resorts. This new kind of tourism (often called sanfter-tourismus<sup>17</sup>) is particularly sensitive to the natural qualities of the environment and tend to prefer minor art towns to the more famous but more crowded urban centres of the region.

The fifth group, that we call “external tourist systems”, is the one where the shift to a model of development based exclusively on tourism has already been achieved. These areas are characterised by both different levels of specialisation in the sector, hence different levels of development, and tourism as the main economic activity. In this case the base for export is essentially made of the positive tourist consumption balances of non regional visitors. These areas experience the highest

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<sup>16</sup> These areas were identified in the 1975 Irpet interpretation of local development (the areas along the coast where seaside tourism lived together with large firms plants).

<sup>17</sup> On the importance of this form of tourism in Tuscany see R. Krüger; M. Loda (1993).

tourist concentrations of the region in relative terms. Some of them, especially those along the coast, have developed a true “leisure industry” (mass tourism), others (mainly the countryside systems around Siena) have relied on their environmental and historic-artistic resources developing a higher quality segment of this sector.

The areas belonging to the sixth typology, the “internal tourist-rural systems”, are less specialised in terms of “tourism industry” and more oriented towards an economic valorisation of the environmental and natural resources. These areas seem to be following a path of development based on various forms of tourism and on a residentiary function, both aimed at satisfying demand within the region. The areas belonging to this group vary from realities that are close to the characteristics of the preceding group (Grosseto and the skiing resorts of the north of the region mountains) to areas near to the most important urban areas (Florence in particular) where relevant flows of daily and weekend commuting contribute to stress their residentiary function.

We define the last group of LES as “marginal economic systems”. These areas have four main features in common: they show the lowest development levels in the region; they did not experience the light and diffused industrialisation of the sixties and seventies; they are distant from the main urban areas; and they have not yet been valorised by relevant tourist flows. These areas present overall negative balances in trade of goods and services both within and outside the region. Tourist consumption balances, that in some cases show encouraging values, are the solely positive, but still insufficient, assets of these areas.

#### **4 An analysis of economic relations among LES through a multiregional model.**

As already mentioned, diversity is one of the features of the Tuscan economic system. Such a characteristic is nonetheless not a trivial one (all systems are to some extent different) since it involves not only its local productive features but the level of per-capita GDP, of employment and unemployment as well.

Considered from this point of view diversity represents not only the variety of local productive systems but also assumes a negative meaning in the sense of reduced economic opportunities in some areas. For these reasons, the regional government might operate to reduce such diversities, as far as the levels of development are concerned, by strengthening the weaker areas.

Anyhow this objective can not be correctly pursued if the above-mentioned linkages between the various parts of the region are not taken in due account in a quantitative manner.

In order to measure the economic relations that take place between different LES we have implemented a multiregional (regions are in our case the Tuscany LES) input-output model using a pool approach of the kind used by Leontief and Strout [W. Leontief, A. Strout 1963].

Starting from the resource and uses accounting equation of each LES:

$$x+m_1+m_2=t+c+g+i+e_1+e_2$$

where:

- x = production
- m<sub>1</sub> = import from the rest of Italy and the rest of the world
- m<sub>2</sub> = import from the rest of Tuscany
- t = intermediate demand
- c = house hold consumption
- g = collective consumption
- i = gross investment
- e<sub>1</sub> = export to the rest of Italy and the rest of the world

$e_2$  = export to the rest of Tuscany

it is possible to build a multiregional model by introducing some behavioural hypotheses. In particular, besides the classical assumption over productive techniques and trade (à la Leontief-Strout), we consider a partial endogenisation of private consumption. The latter depends on both the levels of production in the area of residence and exogenous variables:

$$c = k + Hx.$$

The main exogenous components of consumption are represented by the consumption of those who do not produce within the local system either because they produce elsewhere or because they live on public transfers: tourism and consumption of retired are the principal values that define  $k$ .

The multiregional pool model has therefore the following structure:

$$\begin{aligned} x + m_1 + m_2 &= A \cdot x + c + g + i + e_1 + e_2 \\ m_1 &= M_1(A \cdot x + c + g + i) \\ m_2 &= M_2(I - M_1)(A \cdot x + c + g + i) \\ c &= k + H \cdot x \\ m &= B \cdot m_2 \\ e_2 &= Q \cdot m \end{aligned}$$

where:

|       |   |  |
|-------|---|--|
| $I$   | = | identity matrix  |
| $M_1$ | = | matrix of import coefficients from outside of Tuscany  |
| $M_2$ | = | matrix of import coefficients from the rest of Tuscany |
| $A$   | = | matrix of technical coefficients                       |
| $H$   | = | matrix of consumption coefficients                     |

where  $B$  is simply an aggregation matrix of imports meant for obtaining the total import flows (the pool) for each branch.  $Q$  on the contrary is a matrix used to allocate imports (exports from this point of view) to the various LES (pool distribution).

From such structural form the following reduced form is obtained:

$$x = \{I - T(I - M_1)(A + H)\}^{-1} \{T(I - M_1)(k + i + g) + e_1\}$$

where  $T = I - (I - Q \cdot B)M_2$  represents the territorial allocation matrix of final and intermediate demand (hereafter we will omit the subscript 1). Naturally from the estimates of production we can obtain the more interesting ones of value added and employment (units of labour)<sup>18</sup>.

Some further consideration about the consumption coefficient matrix  $H$  is needed. In Matrix  $H$ , the blocks on the diagonal contain the consumption made by resident inside the LES of residence while the blocks placed off the diagonal contain the consumption made by resident in other LES of the region. That is,

$$H = ({}_{rs}h_{ij}) \quad \text{con } r, s = 1, 2, \dots, 31 \text{ (n. of LES)} \quad i, j = 1, 2, \dots, 17 \text{ (n. of branches)}$$

<sup>18</sup> Since the dimension of matrices and vectors depends on the number of branches and LES, for reasons of calculus we had to reduce the number of branches from 44 to 17 and the amount of Areas from 44 to 31 (LES without further subdivision).

Each element  ${}_{rs}h_{ij}$  -examined with respect to the subscripts r and s- represents the consumption that any participant to the production process of region r makes in the s region<sup>19</sup>.

Given that there exists a system of relevant trade relations between the local systems of the region, the strengthening the economy of a single LES can occur in two ways<sup>20</sup>:

- (a) increasing the sales of the LES firms outside the region (or decreasing imports from outside the region)
- (b) increasing exports to the other LES of the region (or decreasing imports from the rest of the region).

The latter case (b) can take place following three different mechanisms:

- (b1) some other LES experience an increase in exports outside the region and transmit (through interindustry or via consumption linkages) part of the economic activation to the considered LES;
- (b2) an increase in the trade flows of intermediate goods within the region takes place (regional firms use more LES intermediate inputs than before);
- (b3) an increase of household consumption and tourist activities within the region occurs (regional households shift their final consumption and tourist activities from outer region goods and services to the ones supplied by the considered LES).

The last two cases imply a change in the model parameters: in case (b2) matrices T and M become T\* and M\*; in the (b3) case H becomes H\*.

If we consider the reduced form of the model the previous hypotheses can be translated as follows:

$$\begin{aligned} \text{HP a and b1: } & x = (I - T (I - M)(A + H))^{-1} \Delta e_1 \\ \text{HP b2: } & x = (I - T^* (I - M^*)(A + H))^{-1} df \quad (\text{where } df = \text{final demand}) \\ \text{HP b3: } & x = (I - T (I - M)(A + H^*))^{-1} df \end{aligned}$$

It goes without saying that is not easy to introduce convincing scenarios for the (b2) and (b3) cases since additional hypotheses should be made on the direction and intensity of parameters change. For these reasons we restricted our simulations, at least for the moment, only to the (a) and (b1) hypotheses.

In order to analyse the economic relations that take place between the various LES of Tuscany and to see whether and in what way they relate, we carried out two different simulations.

In the first one, related to Hp(a), we increased exports outside the region by the same amount for each LES in turn (the elements of  $\Delta e_1$  are all zeros except for the exports of the LES considered in that turn). In this way we could ascertain to what extent each LES keeps economic activation inside its boundaries, transmit it to other LES of Tuscany, or loose it by importing from outside the region. The simulation has been implemented first by considering intersector linkages only (consumption is kept exogenous), and second, by adding the additional transmission linkage induced by consumption.

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<sup>19</sup>  ${}_{rs}h_{ij}$  represents the consumption of good i made in the s<sup>th</sup> region by a person working in the j<sup>th</sup> sector in region r.

<sup>20</sup> In the following scheme we do not consider substitutions between internal and external trade flows. In any case the overall outcome of an increase in exports outside (inside) the region that should occur together with a decrease in exports inside the region will depend only on the dimension of the two variations.



In the second simulation, related to Hp(b1), we kept exports outside of the region constant for the LES under control and increased by the same relative amount exports of all other LES (in this case the elements of  $\Delta e_1$  are all different from zero except for exports of the LES to other regions considered in that turn). In this way we studied the effects of a rise in other LES exports on each LES.

To summarise, we observe in the first simulation the share of activation that each LES distributes to the others; in the second we look at the share of activation that each LES receives from other LES.

As far as the first exercise is concerned, the first result to be noted is that (both with exogenous and endogenous consumption) the major part of the share of economic activation that remains within the region (Tuscany) (more than 75%) is due to the open industrial systems (about 40%), to the system of Florence (about 20%)<sup>21</sup>, and to the tourist-industrial areas (about 15%). The result is not surprising since these are the areas which show the maximum degree of openness out of the region and which account for the major part of the regional export base.

If we consider the way in which economic activation generated by exports outside the region transform into production within the LES, within the region, or is lost outside the latter we obtain more interesting results.

If the shares of each of the three components are calculated using interindustry transmission only, no particular regularity in LES behaviour is observed. There are two extremes: LES that keep a large share of activation (50% for Florence and the industrial district of Prato) and LES which loose a large part of activation (more than 70% for a large industry system on the coast. Between these two extremes, the remaining LES present average values sorted without a clear criteria. In the latter LES, the only feature that can be observed, although not clearly, is that the main part of open industrial and tourist-industrial systems tend to loose, via inter-sector linkages, a medium high share of activation out of the region (from 33 to 45%).

If the same percentage compositions are calculated using also endogenous consumption the results change in favour of those LES where the production of consumption goods and services is highest. More complex realities as those of Florence, the industrial districts of Prato and, to a lesser extent, of Empoli, tend to keep a larger share of the activation within their boundaries. In contrast, LES with more specialised productive structures (the district of S.Croce which shows less developed urban characteristics and the external tourist systems) tend to loose the main part of the effect added by induced consumption.

Turning to the second simulation, the analysis of the share of total production that is activated in each LES by exports outside the region of all the other LES leads to the following results: the share is minimal for the external urban systems and open industrial systems (ranging from 14 to 17%); more relevant for the external tourist systems and to a lesser extent for some tourist-industrial systems (20-21%).

The share of economic activation due to exports of the rest of the region does not appear too relevant for urban and industrial areas; on the contrary such a share is much more relevant for the weaker areas of the region (tourist and marginal systems) which production seems to depend largely

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<sup>21</sup> As we said before for reasons of calculus we had to reduce the number of areas and therefore it is not possible to follow exactly the seven Tuscanies partition of the region. In particular the LES of Florence, comprises in the zoning used in the model five sub-areas previously treated separately; this tend to emphasise the role of this system simply because of dimensional reasons. The figures reported in the paragraph are the average of the effects (in any case quite similar) measured with and without endogenous consumption.

on an activation induced by the rest of the region. Even this result is in part obvious since regional exports tend to concentrate especially in the former LES.

**Figure 17 Economic activation computed with endogenous consumption**

| Name of LES    | Typology of LES    | LES exports | Total activation | Activation transmitted outside Tuscany | Activation kept inside Tuscany | Activation transmitted to other LES | Activation received from other LES | Received - transmitted balance | Balance / GDP ratio |
|----------------|--------------------|-------------|------------------|--|--------------------------------|-------------------------------------|------------------------------------|--------------------------------|---------------------|
| Lunigiana      | Marginal           | 243,3       | 395,8            | 184,7                                  | 113,6                          | 97,5                                | 162,7                              | 65,2                           | 7,4                 |
| Massa          | Tourist-Industrial | 1400,1      | 1255,2           | 5,7                                    | 675,6                          | 573,9                               | 531,7                              | -42,2                          | -1,4                |
| Garfagnana     | Marginal           | 184,4       | 243,9            | 87,6                                   | 80,7                           | 75,6                                | 99,3                               | 23,7                           | 4,5                 |
| Versilia       | External-Tourist   | 1288,8      | 1570,0           | 426,6                                  | 604,7                          | 538,7                               | 640,3                              | 101,6                          | 3,0                 |
| Val di Serchio | Tourist-Industrial | 691,6       | 483,8            | -31,2                                  | 240,8                          | 274,2                               | 168,6                              | -105,6                         | -12,9               |
| Lucca          | Open-Industrial    | 2463,3      | 3457,1           | 1844,0                                 | 875,5                          | 737,6                               | 711,3                              | -26,3                          | -0,7                |
| Montecatini    | Tourist-Industrial | 1154,2      | 1312,6           | 353,4                                  | 495,4                          | 463,8                               | 487,8                              | 24                             | 0,9                 |
| Pistoia        | Open-Industrial    | 2273,2      | 2073,5           | 233,9                                  | 1026,5                         | 813,1                               | 690,4                              | -122,7                         | -3,1                |
| Prato          | Open-Industrial    | 4498,2      | 3409,9           | -145,3                                 | 2259,7                         | 1295,5                              | 977,9                              | -317,6                         | -4,9                |
| Firenze        | Open-Urban         | 10530,2     | 12296,8          | 3900,2                                 | 5964,4                         | 2432,2                              | 3005,2                             | 573                            | 2,4                 |
| Empoli         | Open-Industrial    | 2756,7      | 2112,4           | -127,6                                 | 1232,8                         | 1007,2                              | 745,1                              | -262,1                         | -6,1                |
| S.Croce        | Open-Industrial    | 1411,1      | 1029,4           | -115,4                                 | 570,2                          | 574,6                               | 304,9                              | -269,7                         | -15,1               |
| Val d'Era      | Open-Industrial    | 1836,8      | 1428,6           | -38,0                                  | 766,1                          | 700,5                               | 428,5                              | -272                           | -10,4               |
| Pisa           | Internal-Urban     | 1148,5      | 1866,0           | 899,1                                  | 540,1                          | 426,8                               | 695,4                              | 268,6                          | 6,7                 |
| Livorno        | Internal-Urban     | 1286,5      | 3160,6           | 2223,3                                 | 503,4                          | 433,9                               | 777,5                              | 343,6                          | 8,4                 |
| Val di Cecina  | External-Tourist   | 859,9       | 1053,9           | 344,9                                  | 374                            | 335                                 | 412,8                              | 77,8                           | 3,8                 |
| Piombino       | Tourist-Industrial | 1699,9      | 1143,0           | -133,7                                 | 501,9                          | 774,8                               | 370,5                              | -404,3                         | -22,2               |
| Elba Island    | External-Tourist   | 117         | 268,6            | 162,2                                  | 56,4                           | 50                                  | 136                                | 86                             | 12,9                |
| Scarolino      | Marginal           | 409,4       | 507,6            | 177,9                                  | 157,7                          | 172                                 | 188,6                              | 16,6                           | 1,8                 |
| Val d'Elsa     | Tourist-Industrial | 1051,1      | 838,5            | -4,3                                   | 435,1                          | 407,7                               | 311,8                              | -95,9                          | -5,8                |
| Siena          | Open-Urban         | 1463,5      | 1884,7           | 766,5                                  | 636,8                          | 481,4                               | 629,4                              | 148                            | 4,1                 |
| Valdarno ar.   | Open-Industrial    | 1309,5      | 1092,6           | 68,7                                   | 527,3                          | 496,6                               | 357,3                              | -139,3                         | -7,1                |
| Casentino      | Tourist-Industrial | 573,6       | 424,6            | -43,2                                  | 256,9                          | 210,9                               | 183,7                              | -27,2                          | -2,9                |
| Val Tiberina   | Marginal           | 436,6       | 426,2            | 98,2                                   | 167                            | 161                                 | 135,1                              | -25,9                          | -3,6                |
| Arezzo         | Open-Industrial    | 1644,1      | 1869,1           | 619,5                                  | 674,9                          | 574,7                               | 514,4                              | -60,3                          | -2,0                |
| Cortona        | Marginal           | 480,1       | 537,0            | 155,7                                  | 199,3                          | 182                                 | 184,4                              | 2,4                            | 0,2                 |
| Chianciano     | External-Tourist   | 545,3       | 658,2            | 202,0                                  | 251,5                          | 204,7                               | 278,7                              | 74                             | 5,1                 |
| Amiata Si      | Marginal           | 143,3       | 171,1            | 51,5                                   | 60,4                           | 59,2                                | 59,6                               | 0,4                            | 0,1                 |
| Amiata Gr      | Marginal           | 85,4        | 167,7            | 96,9                                   | 37,4                           | 33,4                                | 67,3                               | 33,9                           | 10,1                |
| Grosseto       | Internal Tourist   | 519,9       | 1005,8           | 552,1                                  | 253                            | 200,7                               | 439                                | 238,3                          | 10,3                |
| Albegna-Fiora  | External-Tourist   | 278,5       | 437,0            | 185,6                                  | 131,8                          | 119,6                               | 213,5                              | 93,9                           | 9,1                 |

At this point we can combine the results of the two simulations and calculate a balance between the economic activation that each LES transmit to other LES and the activation it receives from the rest of the region.

In terms of absolute values, urban areas present the highest positive balances. Marginal and tourist systems show modest balances but still of positive sign, while the open industrial areas, especially the principal districts and the two most important large firms systems, are those which present the most negative balances.

In the end, if the mentioned balances are divided by LES total value added, it becomes evident that, while this role of service suppliers accounts for a few percentage points of total urban areas value added, the advantage obtained by the areas that are more specialised in the tourist sector is much more important in relative terms.

The overall picture we sketched out in this analysis can be interpreted as follows:<sup>22</sup>. The open industrial systems play the role of not only catching external demand but also of transmitting part of

<sup>22</sup> This interpretation will be more rigorously tested in future research.

the activation to urban areas and part of their surplus to the tourist areas. They demand business related services and services for households (through both inter-sector and by consumption linkages) to urban areas and they distribute part of their surplus to the tourist and less developed areas mainly through tourist consumption.

In this game of trade balances within the region the manufacturing systems (open industrial areas) seem to play the role of lender of last resort; they represent the territories that, within the limits of the values we have shown, economically support the lagging areas of the region, the areas that produce tourist services and services to households, and to a lesser extent the urban areas specialised in business related services.

## **Concluding remarks**

Spatial organisation of production and territorial differences in development, after having been ignored for a long time by the economic mainstream, have recently experienced a period of increasing attention by economists.

Economic theory has deeply innovated the approach to the analysis of the world of production and has succeeded in getting into the peculiarities of the places where the manufacturing process is carried out. The importance of cultural and social characteristics of territories have eventually been widely accepted as relevant aspects in economic studies.

The study of local systems, the comparison between different milieux, the analysis of the ways they enter into relation with the global context, have lead to a better understanding of the functioning of the mechanism that regulates production.

Nevertheless, the territorial dimensions in which the analyses are performed are usually those of local and/or global context. In our opinion this way of considering economic phenomena bears the risk of neglecting important relations that take place in territorial environments that are larger than local systems but far beyond the endless limits of global space.

It goes without saying that the Tuscan regional administrative territory has scarce economic meaning and should not be considered as the optimal intermediate territorial level of analysis. The distinction we made between trade inside and outside the region might therefore seem artificial and to a certain extent distorting.

However, the choice of the administrative region boundaries has been suggested, besides obvious considerations of data availability, by two main considerations:

- 1) the objective of the implemented model is not only to deepen the knowledge of local economic development but also to represent an operational tool for economic programming at regional level;
- 2) the region of Tuscany seems to represent a plausible territorial level within which some economic relations such as tourist consumption and supply and demand of services to households could be usefully analysed.

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