

WHICH ECONOMIC ANALYSIS IS REALLY ENABLED BY DISTRICT MAPS IN ITALY?

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1. INTRODUCTION

The debate over the Italian industrial development during the past forty years has largely focused on the role played by small and medium-sized enterprises, and in particular by those in traditional, low-tech sectors (Barca and Magnani, 1989; Fuà, 1981; Onida, 2004). One central aspect of this debate concerns the so-called “industrial districts”, that is, the geographical concentration of small firms specialised in the same industry or within the same production chain. Industrial districts are considered to be the source of external economies (external to the firms but internal to the district), the origins of which remain a much-debated question; however, generally scholars tend to agree that there are three features of such industrial districts that act as “propellants” of growth (see Signorini, 2000): the division of labour between small-sized firms; companies’ network of relations, both competitive and cooperative; and an environment characterised by the strong link between productive enterprise and those places in which family, political and social life evolves, which leads to such districts being compared to a community market (Dei Ottati, 1995).

Following this approach great many studies on local development describe industrial districts as the new agent at the meso-economic level (situated, that is, between the macroeconomics of the nation state, and the microeconomics of the individual, representative agent), the new unit of industrial-economic investigation as Giacomo Becattini has called it (Becattini, 1979; 1987; 2003). A new economic geography has also emerged, which reformulates growth theory from the “district-based” point of view. At the same time other scholars (Lipparini, 1995; Varaldo and Ferrucci, 1997) have criticised the excessive idealisation of socio-cultural homogeneity, and have pointed out the heterogeneity of evolutionary paths and of the types of inter-company relations characterising Italy’s industrial districts.

The formulation of maps identifying the positioning of these industrial districts within the Italian territory constitutes a classificatory paradigm whereby data may be organised on a geographical basis so as to submit theoretical hypotheses to

both measurement and econometric testing. From this point of view, the analysis of industrial districts presupposes the definition of the said districts in both conceptual and operational terms. To this end, while many observers lament the lack of suitable databases comprising vital aspects of social and institutional life, the problem remains of a working definition of the industrial district that is in keeping with the conceptual premises (premises which scholars do not appear to agree upon).

The considerable number of recent studies of industrial districts may be divided in two groups: on the one hand there are case studies analysing the reasons for the development of industrial districts, carried out using ad hoc surveys and methods, and often supported by local authorities and organisations; on the other hand, there are few studies aiming to provide an organic, overall picture of the industrial district system, obtained through a number of automatic procedures. The most important of these are those adopted by the Italian National Institute of Statistics (ISTAT, 1997; Sforzi, 1990), Cannari and Signorini (2000), and Iuzolino (2000 and 2004). ISTAT has provided an initial map of industrial districts in Italy for the year 1991. However, as far as we are aware, very few regional authorities have adopted the proposed map to legally acknowledge these districts as part of implementation of national Laws 317/91 and 140/99 (IPI, 2002). This undoubtedly represents a point of conflict if one agrees with the claim (Giovannini, 2005) that economic statistics ought to constitute information on which decisions may be made. Although we realise that it would not be possible, nor indeed right, to take account of all the local requests made regarding the informational bases on which political-economic decisions are to be made, nevertheless we consider necessary to check the classificatory hypothesis: and this is the reason which stimulates a deep investigation of the previous algorithms.

To this purpose we consider two completely different approaches to retrieve industrial clusters, which are the algorithms proposed by Istat-Sforzi and Iuzolino, and contrast them from different and original perspectives. In fact, while these algorithms have been compared in terms of theoretical properties and empirical classification of the Italian territory in district areas at fixed times (Iuzolino, 2000; 2004, Giovannetti *et al.*, 2005), no evidence is provided, at the best of our knowledge, on the different economic dynamics they describe.

Therefore, in the present paper, first the general descriptions of both the maps is provided to highlight the impact of hypotheses underlying the choice of map on the picture of the industrial district phenomenon. Then the differential contributes according to the different maps of structural composition and local economies to total change in employment over the inter-census 1991-2001 period are disentangled and examined. At the end the evolution of the most relevant economic aggregates are considered. Such reflections are focused on two Italian regions, Emilia-Romagna and Veneto.

It is worth noting that is beyond the scope of this study to offer a substantive analysis of economics of the district phenomenon. The interested reader may refer to Dei Ottati and Grassini (2008) for a deep investigation of employment changes in the Italian local labour systems in the 1990s.

2. THE ISTAT-SFORZI ALGORITHM

The method developed by Istat in conjunction with Fabio Sforzi, provides a classification of the geographical areas into district and non-district zones, which reminds to the Giacomo Beccatini's definition of industrial district as the result of the encounter between certain socio-cultural features of a community, the historical-naturalistic characteristics of a geographical area, the technical features of the productive process, and the result of a process of dynamic integration between the division of labour within the district, and the expansion of the market for that district's products.

The transition from the conceptual definition of industrial district to a working definition, inevitably involves a certain degree of arbitrariness, partly due to the nature of the census data which constitute the only available source of information for identification purposes. In fact, the working identification of the district areas introduces the following hypotheses: the basic territorial unit of analysis is the Local Labour System (hereinafter referred to as the LLS), that is, a set (aggregation) of local boroughs containing the daily commuter flow; the LLS is hereinafter identified as industrial districts when sector and dimensional criteria that are deemed to characterise such districts are satisfied. The criteria are: the prevalence of manufacturing employment, which has to be above the national average; the prevalence of employment in small and medium-sized enterprises (SME), that is, those enterprises with fewer than 250 employees; the identification of a highly-specialised manufacturing sector, and the further control that this specialisation is concentrated in SME. The analysis is carried out on sectors corresponding to sub-sections of the NACE classification, with some adjustments. More specifically, if $A_{manu,lls}$ represents the total added in the manufacturing sector of each LLS, the indices and the respective conditions to be satisfied are as follows:

$$\text{index of manufacturing prevalence:} = \frac{A_{manu,lls}}{A_{tot,lls}} \bigg/ \frac{A_{manu,It}}{A_{tot,It}} > 1;$$

$$\text{index of prevalence in SME:} = \frac{A_{manu,lls}^{SME}}{A_{manu,lls}} \bigg/ \frac{A_{manu,It}^{SME}}{A_{manu,It}} > 1;$$

$$\text{index of specialisation:} = \max \frac{A_{ind,lls}}{A_{manu,lls}} \bigg/ \frac{A_{ind,It}}{A_{manu,It}};$$

$$\text{prevalence of specialisation in SME:} = \frac{A_{ind,lls}^{SME}}{A_{ind,lls}} > \frac{1}{2}.$$

On the basis of the 1991 Industrial Census data 199 LLSs in Italy are identified according to ISTAT definition. The results presented by ISTAT represent a very important contribution to the quantitative analysis of local economic development. However, on closer inspection the algorithm adopted has certain limita-

tions, and the impact of such on the analysis of results has to be taken into consideration.

Firstly, the LLS – the borders of which have been defined in terms of the daily movement of workers in all sectors (and not only in the specialised sector) from their homes to their places of work – is exogenous in relation to the industrial census, and even more so in relation to the chosen locations of manufacturing plants. There is interaction within the LLS between the exchange of goods and services, and the exchange of labour; in other words the LLSs represent the territorial limits within which income is distributed and utilised (Erba, 2003); however, little can be said about the relationship between the LLSs and the income production circuit, or about the causes of localisation of production. The decision to use the LLS as a reference unit has the advantage of enabling the ISTAT's LLS-based database to be employed, together with additional information not supplied by the census, such as estimates of employment and sector value added. On the other hand, the comparability of such data has not been preserved, since the LLS network are rebuilt at each population census. Moreover the use of the LLS as the local reference unit may imply the hypothesis that the LLS also contains the social environment (where such exists), for which no measurements exist however.

The sector classification adopted by ISTAT subdivides manufacturing sector into 15 specialised industries; whilst these industries may be sufficiently ample, they obviously do not reflect those productive chains perceived as modelling the division of labour within the industrial districts. Moreover, it is generally agreed that the classification in itself does not univocally follow the logic underlying the organisation of production, and manufacturing activities are sometimes grouped together according to the similarity of the productive processes, and at other times according to the degree of substitutability of the product from the demand side.

One limitation of the classificatory procedure concerns the formulation of relative criteria only, which together with the highly heterogeneous dimensions of the various LLSs, makes it difficult to compare results. In fact, a greater degree of variability is associated with indices of smaller LLS, with the consequence that smaller LLSs more frequently exceed unitary thresholds (corresponding to average values). In 1991, 34% of the 784 LSSs had fewer than 500 employees in the manufacturing sector, while 43% had fewer than 1,000 employees; in the case of these LLSs, although sector specialisation may be significant in relative terms, it may be non-significant in absolute terms. The opposite may be true for larger LLSs: thus a large quantity of specialised employees in absolute terms may not be enough to obtain the relative prevalence of the sector specialisation. With regard to this, there are also numerous cases of multiple specialisations within the same area. The weakness of industrial controls, as denoted by the decision to consider the most frequently present specialisation only, shows that the algorithm searches for manufacturing agglomerations regardless of specialisation. The question of whether an industrial district may be defined without taking specialisation into account remains debateable; however, the presence of a variety of specialisations may be what distinguishes industrial districts from urban industrial sub-systems (see Capestri, 1990), or the different developmental phases thereof.

3. THE IUZZOLINO ALGORITHM

The initial hypothesis put forward by the Bank of Italy's researcher, Giovanni Iuzzolino, moves away from Beccatini's ideas of social climate and capital, to explicitly focus on the presence of local economies. First of all, the algorithm differs from the previous one because it takes the local borough as its basic territorial unit, that is, the smallest area in relation to the available census data. Local boroughs that make a significant contribution to the geographical concentration of a given sector are identified as centres of agglomeration. The aggregation of those municipal areas situated around such centres of agglomeration is performed subject to the sequential control of the exceeding of a probabilistic threshold of specialisation, measured using the index of spatial concentration proposed by Ellison and Glaeser (1997). This procedure is based on a sector classification obtained by means of a cluster analysis, whereby macro-sectors are identified on the basis of the similarity of the sector composition of the Italian employment. Another significant difference from ISTAT's approach is that the analysis concerns all territorial units, and not only those in which small and medium-sized local units prevail. Table 1 indicates the characteristics of the Iuzzolino algorithm that distinguish it from those ISTAT algorithms used to identify industrial districts.

TABLE 1
Identification indices according to Istat-Sforzi and Iuzzolino algorithms

	Istat-Sforzi	Iuzzolino
Base unit	LLS	Local boroughs
Sectors	NACE Divisions	"Production chain" macro-sectors
Geographical concentration index	Localisation index	Ellison-Glaeser index
Unit size	< 250 employees	None
Index of district character	Dichotomous	Continuous
Reference year	1991 (General Census)	1996 (Interim Census)

The Ellison-Glaeser index is a suitable method, from the theoretical viewpoint, for measuring geographical concentration, since it is not affected either by the size scale of the sectors, or by the size of the geographic areas in question; in fact, it takes account of the size distribution of companies within certain sectors, and may also be broken down into shares of agglomeration attributable to each geographic area in question. Nevertheless, it appears overestimated when there are more territorial units than there are plants present in any one given sector, and this risk is greater the higher the level of territorial and sectoral disaggregation. To this aim, the proposed classification is based on the largest territorial analysis (that of the 8,100 Italian local boroughs), and productive sectors are aggregated into macro-sectors. On the other hand, calculation of the index – as indicated in past studies and confirmed also by Ellison and Glaeser's 1997 study – would entail the use of a high degree of sectoral disaggregation (3 or 4 digit).

With regard to the need to identify large industrial conglomerations, the network of local boroughs would in theory seem preferable due, among other things, both to the fact that the LLSs themselves fail to account for productive specialisation, and to the greater flexibility offered by disaggregation at local borough level, which

represents the minimum territorial basis. However, we need to bear in mind that numerous other items of information, needed for an analysis of local development, are not in fact available in such detail, and thus the examination of the development of industrial districts according to the provisions of this mapping is to an extent restricted to the frequency with which information is gathered by census. Furthermore, the sector classification, constituted by manufacturing sector “production chains” that have been reconstructed on the basis of the composition of employees working in the specialised sectors, may in theory represent a limit to the identification of industrial districts of an atypical nature; on the other hand, the choice of a specialisation index that may be additively decomposed into territorial parts, that takes account of a level of agglomeration due naturally to scale, and is compared with thresholds of statistical significance, would seem to be beneficial. The decision not to limit the field of observation to small and medium-sized local units was made after noticing that the relevant dimensional threshold within each sector depends on the optimal scale of the sector itself. Furthermore, an industrial district may coexist with, although not originate from, the presence of large-scale companies. Finally, the district index is continuous rather than discrete, and the maps built on it are based on the interim 1996 census data. Overall, there are certain aspects of Iuzzolino’s proposal that can certainly improve that put forward by ISTAT, such as the choice of an additively decomposable index; other aspects, on the other hand, are undoubtedly more controversial, and concern basic working hypotheses such as the construction of macro-sectors using multivariate statistical exploratory methods.

4. INDUSTRIAL DISTRICTS IN EMILIA-ROMAGNA AND VENETO

4.1. *The Istat-Sforzi method*

An initial evaluation of the descriptive capacity of the two procedures in question may be carried out by verifying their representations of the industrial district phenomenon within the two regions. Hereinafter we always refer to the Istat district classification based on Census 1991 and the Iuzzolino based on Census 1996. In fact, whilst we are aware that part of the difference between the two maps can be put down to the difference timescale reference of the maps, we think that this part is nonetheless negligible with respect to the other relevant differences.

At the time of the 1991 census, Istat identified 24 industrial districts in Emilia-Romagna, comprising almost 6,800 local units and 85,000 employees within the specialised sector (Table 2); these industrial districts comprised 53% of all boroughs, 48% of the population and the geographical areas in question, and 57% of manufacturing employment. The variability in size of the LLSs, together with their definition in relative terms only, give rise to a substantial number of areas defined according to a low absolute threshold: nine districts have got fewer than 1,000 employees in the specialised sector, and overall represent a very small percentage both of specialised workers (4.7%) and of regional manufacturers (11.7%), but a large part of the territory (34.7%), thus highlighting conflicting aspects of the idea of geographical concentration.

TABLE 2
The industrial districts of Emilia Romagna as classified by Istat-Sforzi (Census data 1991-2001)

Local boroughs	No.	Specializations ⁽¹⁾				Manufacturing added		in specialised sector	
		91 1 st	91 No.	01 1 st	01 No.	No. 1991	% var. 91-01	No. 1991	% var. 91-01
Castel San Giovanni	8	01	5	10	6	2,889	3.3	725	-22.3
Fiorenzuola	2	10	6	01	5	5,248	1.7	523	-13.0
Busseto	5	01	3		6	1,885	5.3	501	6.0
Fomovo di Taro	10	01	5		3	3,092	2.8	899	-6.3
Langhirano	4	01	1		2	2,820	9.7	1,828	2.4
Parma	16	01	3		2	37,692	3.4	9,225	10.9
Castellarano	7	10	2		2	4,286	31.7	2,735	33.9
Correggio	3	02	5	11	3	7,582	24.5	1,257	-33.7
Guastalla	8	08	4		3	10,324	16.3	1,870	33.1
Reggio Emilia	18	10	5	07	4	41,481	4.3	3,534	-7.6
Carpi	3	02	2		2	21,760	-9.7	8,034	-28.4
Mirandola	9	02	6	08	6	16,459	4.6	2,698	-41.8
Modena	9	07	4		4	39,238	-7.7	16,756	3.4
Sassuolo	5	10	1		1	30,799	16.3	15,314	11.1
Vignola	11	10	4		5	13,812	6.4	2,305	19.9
Argenta	3	03	4		4	4,296	-1.4	698	-38.5
Cento	7	07	2	09*	1	15,236	-6.1	6,953	-11.1
Faenza	6	10	6		5	10,496	-11.7	1,352	6.6
Lugo	9	01	4		4	12,539	3.0	3,449	-2.9
Forlì	6	05	4		4	17,994	10.0	3,667	1.4
Mercato Saraceno	3	04	4		3	1,222	4.7	234	63.2
Marciano	13	14	7	05	6	2,321	16.4	95	-50.5
Rocca San Casciano	3	13	5		3	549	-2.7	99	-13.1
Santa Sofia	4	04	5	01*	2	1,220	40.1	193	-59.6
Districts	182					305,240	3.6	84,944	-0.1
% Emilia Romagna	53					57			
Emilia Romagna	341					531,928	1.3		

Key: 01- Food, 02 - Textiles, 03 - Clothing, 04- Leather products & footwear, 05 - Furniture and wooden products, 06 - Metal products, 07 - Non-electronic machinery and carpentry, 08 - Electronic machinery and precision tools, 09 - Vehicles, 10 - Non-metallic minerals, 11 - Chemicals, rubber and plastic, 12 - Paper and cardboard, 13 - Printing and publishing, 14 - Gold products, musical instruments and toys, 15 - Other products.

* No longer an industrial district in 2001.

Of those industrial districts identified on the basis of the 1991 census figures, in 2001 eight districts changed specialisation in a sector already of a district nature, but not belonging to the same production chain (for example, Fiorenzuola shifted from non-metallic minerals to foodstuffs). Of the latter, two LLSs are no longer industrial districts, as a result of its no longer conforming to the said requirement in the SME specialisation index. Thus one-third of the group have changed their status as industrial districts, due partly to certain changes in data of limited absolute importance. Those characteristics indicated in section two are also evident here; there are various different district specialisations within the same LLS, and certain district specialisations are present in adjacent geographical areas.

There were 34 industrial districts in the Veneto in 1991 (Table 3), which employed over 100,000 workers in the specialised sector, and these districts covered 72% of all local boroughs, involved 62% of the resident population and 60% of the territory, and accounted for 71% of all employment in the manufacturing sector. During the inter-census period, eight such districts changed their respective specialisations (and as in the case of Emilia-Romagna, these new specialisations were already present within the region), while two LLSs no longer satisfied the

manufacturing prevalence requirement (index 1), and a further three no longer satisfied the condition requiring the prevalence of SMEs (index 4). Overall, 12 out of the 34 districts in question have modified the 1991 preconditions for industrial district status. The phenomenon of multi-specialisation and of similar specialisations in adjacent areas is also to be seen in the Veneto region.

TABLE 3
The industrial districts of Veneto as classified by Istat- Sforzi (Census data 1991-2001)

	No.	Specializations ⁽¹⁾				Manufacturing added		in specialised sector	
		91	01	01	01	No.	% var.	No.	% var.
Local boroughs	1 st	No.	1 st	No.	1991	91-01	1991	91-01	
Bovolone	9	05	2		2	7,156	-1.5	3,824	-6.4
Castagnaro	2	05	4		4	1,429	10.2	381	-18.9
Cerea	4	05	2		1	5,313	-13.3	3,644	-14.6
San Bonifacio	13	03	5	07	5	9,669	7.8	1,495	-51.0
San Giovanni Ilarione	4	04	2		2	2,678	-12.8	1,645	-16.4
S. Ambrogio Valpol.	16	10	4		5	9,651	-3.1	2,830	13.1
Arzignano	12	04	3		2	24,298	21.9	7,437	40.9
Bassano del Grappa	20	14	7		5	27,182	6.6	2,217	40.3
Lonigo	27	03	6	12	7	16,701	12.8	3,416	-41.9
Marostica	9	10	4	03*	3	6,720	7.3	1,739	-25.8
Schio	7	02	3		3	16,184	5.4	3,478	-37.5
Thiene	24	12	5	12*	5	23,247	-3.4	1,183	-11.5
Vicenza	23	14	4		6	39,822	0.6	7,266	2.1
Pieve d'Alpago	5	05	3	08	3	1,003	105.3	277	-23.8
Pieve di Cadore	12	08	1		1	4,961	-10.5	3,490	-13.5
S. Stefano di Cadore	6	08	2	08*	2	1,119	-17.8	733	-26.9
Castelfranco Veneto	12	03	4		4	19,573	15.3	4,148	-11.1
Conegliano	12	05	5		3	20,630	18.4	4,573	13.0
Montebelluna	16	04	4		4	23,817	0.2	8,092	-23.9
Oderzo	13	05	2		3	12,176	46.0	5,293	45.3
Pieve di Soligo	14	05	3		3	13,389	4.8	4,559	11.1
Treviso	21	02	6	03	6	39,039	-0.4	5,641	-39.6
Vittorio Veneto	8	05	5		5	8,096	3.0	1,903	3.7
Cavarzere	5	03	2		2	3,748	-19.3	2,412	-36.8
Cittadella	17	03	5	12	4	23,493	3.4	5,110	-34.4
Este	13	02	4	03	4	5,845	-9.4	1,338	-50.1
Monselice	20	14	6	03	6	10,446	0.4	288	-54.5
Montagnana	7	05	3		3	4,280	4.6	2,022	12.8
Padua	36	04	7		6	64,373	-4.1	6,708	-21.8
Adria	4	03	2		4	3,190	-7.3	1,435	-32.5
Badia Polesine	10	04	6		5	5,514	-5.2	964	-36.9
Castelmassa	6	10	4	10*	4	2,371	8.8	298	35.9
Porto Tolle	5	03	2	03*	2	4,838	-20.6	2,702	-38.0
Trecenta	8	03	3		3	1,728	-19.0	624	-27.2
Districts	420					463,679	4.0	103,165	-8.8
% Veneto	72					71			
Veneto	581					649,282	2.5		

Key: 01- Food, 02 - Textiles, 03 - Clothing, 04- Leather products & footwear, 05 - Furniture and wooden products, 06 - Metal products, 07 - Non-electronic machinery and carpentry, 08 - Electronic machinery and precision tools, 09 - Vehicles, 10 - Non-metallic minerals, 11 - Chemicals, rubber and plastic, 12 - Paper and cardboard, 13 - Printing and publishing, 14 - Gold products, musical instruments and toys, 15 - Other products.

* No longer an industrial district in 2001.

A comparison between district and non-district areas shows that, as expected, in Emilia-Romagna (Table 4) the relative presence of manufacturing workers in district areas are higher than in non-district areas. In Veneto on average district areas involve smaller LLSs. The average manufacturing employment per LLS and overall per km² are still relatively higher in the industrial districts.

TABLE 4
Some characteristics of ISTAT's subdivisions

	LLS	km ²	Manufacturing workers per LLS	Manufacturing workers per km ²
Emilia-Romagna				
Districts	24	439	12,718	29
Non districts	24	483	9,445	20
Total	48	461	11,082	20
Veneto				
Districts	34	326	13,638	42
Non districts	14	523	13,257	25
Total	48	383	13,527	25

Source: elaboration of Census data 1991

4.2. The Iuzzolino method

The method proposed by Iuzzolino identifies 14 districts in the Emilia-Romagna region in 1996 (Table 5). His findings revealed almost twice as many local units and workers in the specialised sectors as had been shown by Istat's figures for 1991. The algorithm used grasps local multi-specialisation, and in general selects and maps industrial districts of a considerable size, none of which has fewer than 1,000 employees in the specialised sector. In one half of the cases in question, the local borough agglomerations identified as industrial districts are identified by indices that do not go beyond the Istat-Sforzi thresholds.

TABLE 5
Emilia-Romagna's industrial districts as classified by Iuzzolino

Principal borough	No.	Local units	Added in specialised sector	% employed in large plants	Sforzi Test	Principal products
Parma	17	670	8,588	11.5	No	Foodstuffs – meats, preserved food
Parma	5	62	3,398	85.6	No	Glassware
Castelnuovo	4	119	2,282	25.3	No	Foodstuffs – meats, preserved food
Carpi	5	259	1,748	0.0	Yes	Textiles
Carpi	19	1,715	8,627	0.0	Yes	Clothing
Carpi	40	1,771	11,558	0.0	Yes	Knitwear
Fiorano Modenese	25	585	26,598	28.7	No	Ceramics
Finale Emilia	2	14	1,026	32.2	No	Ceramics
Mirandola	20	819	9,810	17.3	Yes	Electronic goods
Modena	84	5,156	66,641	13.6	Yes	Iron and steel
San Mauro Pascoli	3	154	2,441	10.7	No	Leather goods and footwear
Forlì	7	493	4,269	14.2	No	Furniture
Fusignano	2	104	1,291	0.0	Yes	Leather goods and footwear
Correggio	8	173	2,238	0.0	Yes	Rubber and plastics
Total	157	12,094	150,515			

Source: G. Iuzzolino, *ibid.*, based on Census data 1996

In the case of Emilia-Romagna, the overlapping of maps is somewhat limited (Figure 1). There are 106 boroughs within areas where the maps are overlapping (Table 6): of these, 76 have been identified by Istat but not by Iuzzolino, compared with 53 identified by Iuzzolino but not by Istat; the remaining 113 do not come within district areas. In 1991, those boroughs within the industrial districts, according to Iuzzolino but not to Istat, featured only slightly larger local units,

thus pointing to the non-decisive role played by the dimensional threshold. The number of workers and local units per borough indicate the greater industrial vocation of Iuzzolino's classification, and the lesser industrial vocation of Istat's chosen map which aggregates local boroughs with a lower density of manufacturing industry.

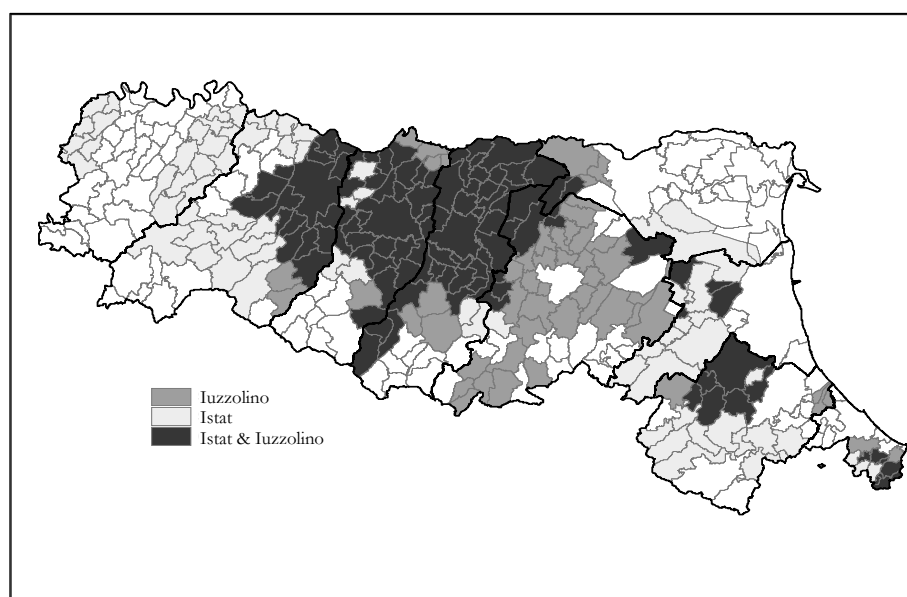


Figure 1 – Comparison of the Emilia-Romagna districts as classified by ISTAT (1991) and Iuzzolino (1996).

TABLE 6

Emilia Romagna: borough, workers and local units (LU) in 1991 according to the maps they are included in:

Included in the maps	Borough No.	Workers No.	Local unit No.	Workers (average per borough)	Local unit	Workers per Local Unit
Istat-Iuzzolino	106	262,350	28,726	2,475	271	9
Istat only	76	42,864	5,396	564	71	8
Iuzzolino only	53	94,923	8,851	1,791	167	11
Neither map	113	128,255	16,159	1,135	143	8
Emilia Romagna	348	528,612	59,160	1,519	170	9

Source: elaboration of Census data 1991

In the region Veneto, Iuzzolino's map identifies the presence of 24 industrial districts in 1996 (see Table 7). Local units and workers in the specialised sectors amounted to 16,148 and 184,260 respectively. In general, the industrial districts in the Veneto are of substantial size, and only two employ slightly fewer than 1,000 workers. The conditions for industrial district status according to the Istat-Sforzi indices were violated in one third of all districts. The geographical superimposition of the two networks is greater in the Veneto than it is in Emilia-Romagna

(Figure 2 and Table 8). 342 of the Veneto's 581 boroughs fall within these overlapping areas: 77 of them are identified by Istat but not by Iuzzolino, while 91 are identified by Iuzzolino but not by Istat, and the remaining 71 are non-districts. With respect to the case of Emilia-Romagna, the unusual feature is the greater presence of manufacturing industry in those boroughs belonging to Iuzzolino's districts only. On average, the said boroughs contain some 156 local manufacturing units employing a total of 1,669 workers. In those boroughs contained within the superimposed areas, however, the said local units and workers average 125 and 1,188 respectively, while those contained within Istat's network only are characterised by even lower numbers of both units and workers.

The number and size of the industrial districts in the Veneto and Emilia-Romagna thus vary according to the chosen method of identification. The description of the districts in the two Italian regions in 1991 given by the two maps, shows how the different features of the two methods produces just as many descriptions of the two regions in question. Iuzzolino's algorithm's greater vocation for identifying the industrial agglomeration is countered by the Istat method's tendency to include among the districts certain peripheral areas with an industrial presence which is of relative (if not absolute) importance for the local economy.

TABLE 7
Veneto's industrial districts as classified by Iuzzolino

Principal borough	No.	Local units	Added in specialised sector	% employed in large plants	Sforzi test	Principal products
Domegge di Cadore	18	611	5,313	6.6	Yes	Engineering
Longarone	11	197	8,308	64.3	No	Engineering
Campodarsego	64	2,162	28,788	15.2	Yes	Engineering
Contarina	1	87	699	0	Yes	Textiles
Villanova Ghebbo	3	81	790	0	Yes	Textiles
Montebelluna	19	586	9,749	29.1	No	Textiles
Oderzo	9	117	2,881	16.6	No	Petrochemicals
Fiesso d'Artico	16	744	8,906	0	Yes	Textiles
Cavarzere	11	2,958	34,535	9.1	No	Textiles
Venezia	18	631	5,242	0	No	Furniture and wooden goods
Vicenza	28	855	8,124	0	Yes	Furniture and wooden goods
Arzignano	27	806	13,491	0	Yes	Textiles
Trissino	2	105	1,126	0	Yes	Furniture and wooden goods
Nove	13	391	2,336	0	Yes	Furniture and wooden goods
Bassano del Grappa	8	151	2,208	0	Yes	Furniture and wooden goods
Chiampo	4	72	1,008	0	Yes	Furniture and wooden goods
Schio	11	172	6,379	52.4	No	Textiles
Thiene	31	642	9,472	11.3	No	Textiles
Noventa Vicentina	56	640	5,806	4.7	Yes	Textiles
Cerea	38	2,594	11,704	0	Yes	Furniture and wooden goods
Dolcè	12	446	5,124	0	Yes	Furniture and wooden goods
Bussolengo	11	380	3,484	0	Yes	Textiles
Castelnuovo Garda	8	222	1,947	0	Yes	Textiles
Verona	9	458	6,840	31.7	No	Paper
Total	433	16,108	184,260			

Source: G. Iuzzolino, *ibid.*, based on Census data 1996

TABLE 8

Veneto borough, workers and local units (LU) in 1991 according to the maps they are included in:

Included in the maps	Borough No.	Workers No.	Local unit No	Workers (average per borough)	Local unit	Workers per Local Unit
Istat-Iuzzolino	344	408,672	43,000	1,188	125	9
Istat only	76	54,872	6,460	722	85	8
Iuzzolino only	90	150,210	14,040	1,669	156	11
Neither map	71	35,358	4,331	498	61	8
Emilia Romagna	581	649,558	67,977	1,118	117	10

Source: elaboration of Census data 1991

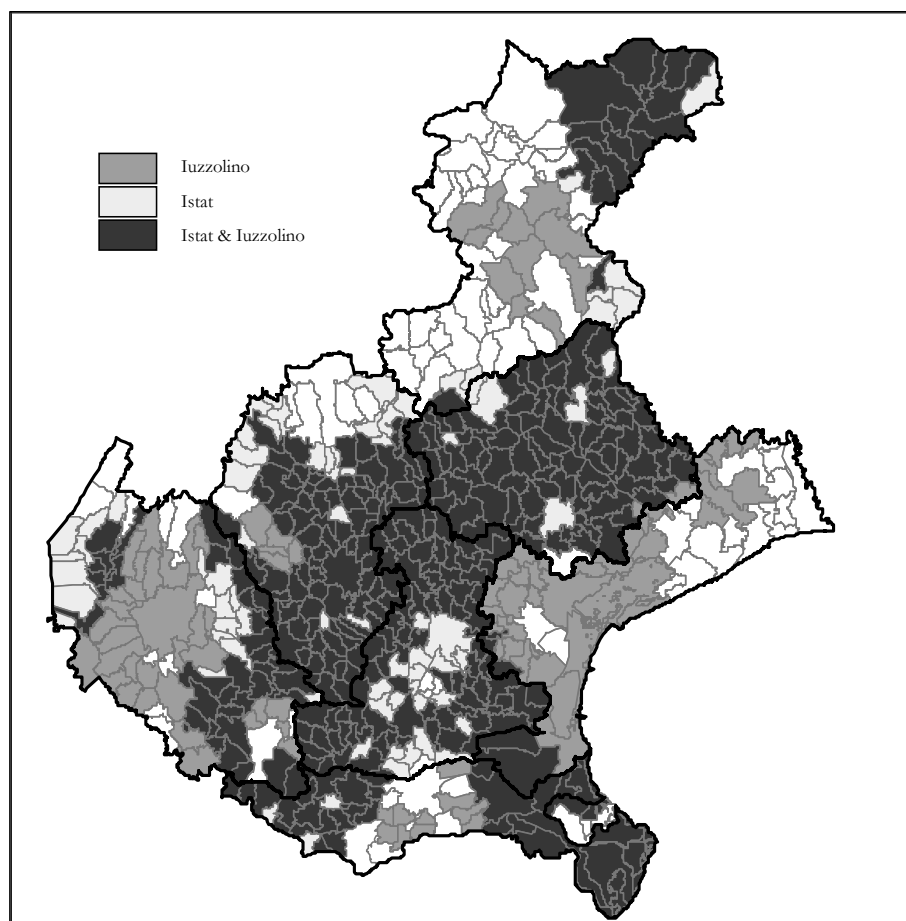


Figure 2 – Comparison of the Veneto districts as classified by ISTAT (1991) and Iuzzolino (1996).

5. THE MANUFACTURING SECTOR DURING THE PERIOD 1991-2001

The analysis of sensitivity continues with an evaluation of the results of the mapping from a comparative statics point of view, in order to find answers to the following questions: what changes took place in the manufacturing sectors of the two regions during the inter-census period 1991-2001 according to the two maps? Can the adoption of one of the two maps change the description provided of events? If so, in what way and to what degree?

During the course of the 1990s, the two regions' manufacturing sectors experienced a growth in the number of people employed, but a fall in the number of local units, with the consequence that the average size of a local unit increased. During the inter-census 1991-2001 period, employment in manufacturing industry at national level fell by 6.1%.

The alternative classifications for the inter-census period reveal that the Emilia-Romagna region saw a reduction in the total number of local units, and that this reduction was more accentuated in the case of non-district boroughs, which also experienced a fall in manufacturing workers numbers (which on the other hand rose in the industrial district boroughs – see Table 9). In Veneto, manufacturing workers numbers rose in the overlapping areas, both district and non-district, but fell in those boroughs that belonged to one map only; the number of local units fell in all areas, and to a greater degree according to ISTAT's figures.

TABLE 9

Changes in manufacturing employment (1991-2001) in the boroughs according to which maps are used

	Emilia-Romagna				Veneto			
	% var. LU	% var. workers	structural component	local component	% var. LUs	% var. workers	structural component	local component
Istat-Iuzzolino	-5.1	4.0	1.7	8.4	-0.2	5.4	-0.9	12.4
Istat only	-4.6	1.5	2.3	5.3	-5.3	-6.1	0.7	-0.7
Iuzzolino only	-4.3	4.5	5.2	5.4	-0.3	-2.2	-0.8	4.8
Neither	-9.7	-7.3	1.6	-2.8	-4.7	2.9	1.8	7.3
Total Istat	-5.0	3.6	1.8	8.0	-0.9	4.0	-0.7	10.9
Toatla Iuzzolino	-4.9	4.1	2.6	7.6	-0.3	3.3	-0.9	10.4
Total	-6.2	1.1	2.4	4.9	-1.0	2.5	-0.6	9.3

Source: elaboration on Census data 1991-2001

The decomposition of the percentage variations in the number of workers employed in local manufacturing units, achieved through a shift-share analysis (Barff and Knight, 1988), into one trend component shared by the national economy, one structural component imputable to the sector composition, and the residual one imputable to the presence of local economies/diseconomies, in the case of Emilia-Romagna reveals positive structural components for the analysed groups of boroughs. Local components were positive for the group of district boroughs as classified by both Istat and Iuzzolino. The graphs of local versus structural components for the two maps' districts (Figure 3) show that the aggregate values are very similar, in an improved positive local situation, with respect to both the national value (the origin of the diagram) and the regional average. Furthermore,

one can see that the cloud of Istat districts displays greater variability in terms of the local component (the standard deviation of which is 11.6 against Iuzzolino's 9.7), while the cloud of Iuzzolino districts displays greater variability in terms of the structural component (with a standard deviation of 4.3 against Istat's 2.9). In the case of Emilia-Romagna as a whole, there are clearly external economies associated with the district, whereas at the meso-economic level, which is the level of analysis required for designing local policies, results are more ambiguous.

TABLE 10

Emilia-Romagna: some variables per district, per non-district and per map

	Istat's map				Iuzzolino's map			
	1996		% var. 96-01		1996		% var. 96-01	
	Non-districts	Districts	Non-districts	Districts	Non-districts	Districts	Non-districts	Districts
	Workers – average per LLS							
Agriculture	2,082	2,426	-12.9	-9.9	2,109	2,476	-12.9	-9.1
Industry	11,458	15,598	1.0	6.2	6,731	23,902	5.5	3.4
Services	26,443	19,436	8.4	12.9	14,743	35,449	9.0	11.2
Overall	39,983	37,461	5.2	8.6	23,584	61,827	6.0	7.3
	Value added (in millions of euros 1999) – average per LLS							
Agriculture	58	67	14.8	19.0	56	73	16.6	17.6
Industry	470	623	22.4	28.6	254	993	26.0	25.9
Services	1,143	867	29.9	31.7	630	1,578	27.8	32.5
Overall	1,672	1,553	27.3	30.2	939	2,640	26.7	29.8
	Value added per worker (in thousands of euros 1999) – average per LLS							
Agriculture	27	28	31.8	32.0	26	29	33.9	29.3
Industry	36	37	21.2	21.1	35	39	19.5	21.8
Services	42	46	19.8	16.7	43	46	17.3	19.2
Overall	39	40	21.0	19.9	38	41	19.5	20.9

Source: elaboration on Istat's data

The sector composition of manufacturing employment in the industrial districts for the Veneto region (mainly in the textiles-clothing and furniture sectors) was not favourable, in general during the period in question. Nevertheless, the boroughs within the overlapping areas were characterised by certain highly positive local components. Those boroughs belonging to the Iuzzolino classification only witnessed similar, albeit weaker, trends. Finally, those boroughs that are only featured on the Istat map are characterised by components of the opposite sign to those of the two groups described, although they only concern a relatively limited share of manufacturing industry's workers. The clouds of points representing the districts in the diagram generated by structural and local components are overlapping to a fair degree; in this case, the standard deviations of the components of the two groups are very similar (2.2 for Iuzzolino's structural component, compared with 2.4 for Istat's structural component; 1.4 for Iuzzolino's local component, compared with 1.7 for Istat's local component).

Overall, the greatest differences were those seen in the case of Emilia-Romagna, where the presumed excellence of the districts is represented to a better degree by Iuzzolino's map, while the Istat map displays a greater degree of heterogeneity with regard to employment growth.

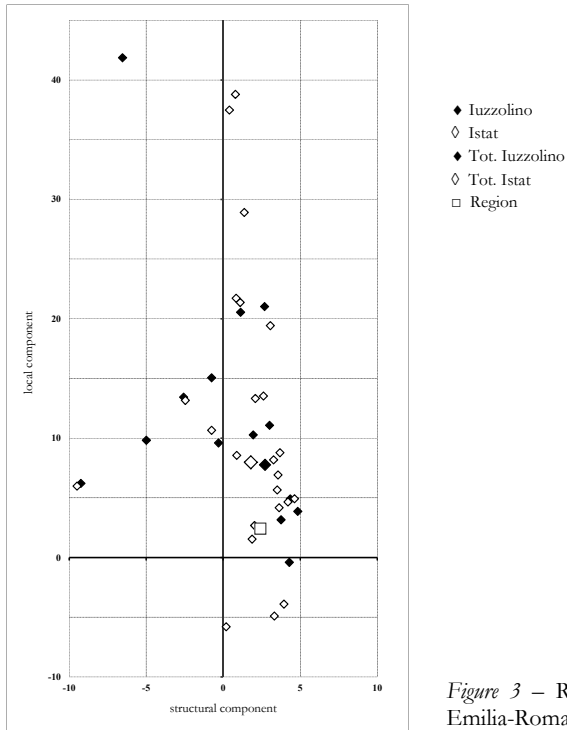


Figure 3 – Results of the shift-share analysis for Emilia-Romagna (Inter-census 1991-2001 period).

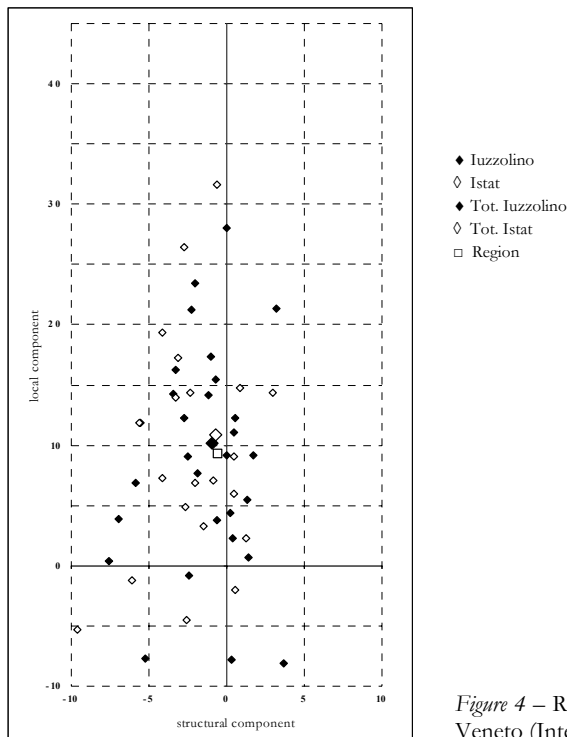


Figure 4 – Results of the shift-share analysis for Veneto (Inter-census 1991-2001 period).

6. LOCAL ECONOMIES

The analysis of the interpretative differences arising from the diverse maps may be extended to employment and value added per branch, thanks to the availability of Istat's estimates which are disaggregated at the LSS level. To this end we need to introduce certain approximations, since Iuzzolino's map, which was built by aggregating local boroughs, does not exactly concern the LLS neither, at borough level, data of this type are made available. The Iuzzolino's map has therefore been adjusted to fit the LLS network, by placing those LLSs for which the proportion of boroughs, and of manufacturing workers in district boroughs, exceeded 75% of the total according to Iuzzolino, into the category "Iuzzolino districts". Following this procedure, there are 32 such LLSs in the Veneto characterised by a strong presence of Iuzzolino's boroughs (34 original Istat, minus 6 Istat only, plus 4 Iuzzolino only), compared with only 19 in Emilia-Romagna (24 – 10 + 5).

In Emilia-Romagna, the average number of workers, the average value added, and the average value added per worker per LLS, are higher for each sector in the district areas than in the non-district areas, with the exception of the services sector which, according to Istat (but not to Iuzzolino), displays higher levels of employment and value added in the non-district areas than in the district areas (Table 10). The variations witnessed during the period 1996-2001 are very positive (with the exception of agricultural employment), and the differences in the performance of the two sub-groups (non-district/district) tend to favour the latter. The two maps, which reveal relatively important geographical differences, thus provide a consistent picture of the evolution of the principal variables in relation to the discriminatory "district" factor.

With regard to the Veneto, the two maps produce questionable evaluations (see Table 11). The Istat approach produces average levels for both workers and value added per sector within the district areas which are consistently higher than those in the non-district areas. According to Iuzzolino, this relationship between district and non-district areas is basically reversed. Value added and number of workers increase at a noticeable rate in the Veneto as well, in favour of the districts as classified by Istat, but not those classified by Iuzzolino (particularly in terms of value added). This also results in labour productivity growth rates for both maps that are not any better in the district areas, with the exception of industrial productivity which, according to Istat, grows faster in the district areas than in the non-district ones. Confirmation is provided of the shift-share analysis results, whereby Veneto witnesses significant growth which is shared by the districts, but is not led by them, at least as far as concerns the period prior to the last census. The greater heterogeneity of the economic picture produced by the maps is, on the other hand, more questionable.

TABLE 11
Veneto: some variables per district, per non-district and per map

	Istat's map				Iuzzolino's map			
	1996 Non-districts	1996 Districts	% var. 96-01		1996 Non-districts	1996 Districts	% var. 96-01	
			Non-districts	Districts			Non-districts	Districts
Workers – average per LLS								
Agriculture	2,146	1,750	-17.0	-3.0	1,544	2,026	-10.5	-6.6
Industry	16,771	16,374	1.2	3.2	12,820	18,325	3.5	2.2
Services	33,450	18,132	8.6	14.2	21,946	22,926	9.7	12.7
Overall	52,366	36,256	5.2	8.4	36,309	43,277	6.6	7.4
Value added (in millions of euros 1999) – average per LLS								
Agriculture	70	54	-0.2	5.5	46	64	5.4	2.8
Industry	677	595	16.0	21.0	470	694	26.5	17.0
Services	1,468	795	34.2	38.2	923	1,025	37.0	36.2
Overall	2,214	1,940	27.6	30.2	1,438	1,779	32.6	27.8
Value added per worker (in thousands of euros 1999) – average per LLS								
Agriculture	31	31	20.3	8.8	29	32	17.8	10.1
Industry	36	34	14.7	17.3	35	34	22.3	14.4
Services	42	44	23.5	21.0	42	44	24.9	20.8
Overall	39	38	21.3	20.2	39	38	24.4	19.0

Source: elaboration on Istat's data

7. CONCLUDING REMARKS

For a considerable number of years now, Italian economic development has been favoured by the increasing presence of industrial districts – local manufacturing systems boasting significant self-organisational capacities – whereby the growth of the country's productive systems is the result of the territorial integration of firms, which may be closely interwoven with the growth of the surrounding community and social capital. Within this framework, the object of economic analysis is now the geographical area known as the “industrial district” which, as Giacomo Becattini has pointed out, represents the new meso-economic agent, and for which measurements and validations are called for.

Industrial districts literature has served as a key to interpret the Italian economic development which, despite its structural peculiarities, has for a long time managed to produce satisfactory results in terms of both growth and competitiveness. Recently, the question being asked is whether, and to what degree, the slowdown in economic growth in the last few years has affected the industrial district model.

There is a growing need for quantitative analyses of the industrial districts, and the present notes are designed to provide an account of the important repercussions that the definition of the term “industrial district”, together with the practical procedures for the identification of such districts, may have on our reading and interpretation of economic trends. To this end, we have conducted a sensitivity analysis by comparing the quantitative results produced by different maps of the industrial districts situated in two specific Italian regions, Emilia-Romagna and Veneto, both of which are characterised by the significant, albeit differing,

presence of industrial districts. This comparative analysis, focusing on those areas identified as being district or non-district areas, has examined the territorial presence and distribution of such districts, their importance in terms of local employment changes during the inter-census period, and the dynamics of the main economic indicators.

The Istat-Sforzi approach, based on Beccatini's definition of the industrial district as a place of socio-economic exchange, adopts the "daily urban system" as empirical territorial approximation, and this system is represented by the local labour system (LLS). The approach consists in the computation of a series of relative indices of prevalence, of size and of a sectorial nature. One limit to this approach is that the LLS, as the area of self-containment of social capital, is adopted a priori, without any attempt being made to gauge its actual existence, and thus without taking any account of the fact that in Beccatini's approach, there are "non places" or areas that do not constitute a system. One further limitation of this approach lies in its choice of relative indices, as a result of which the degree of variability is affected by the joint entities of the sectoral and territorial classifications. The latter limitation could easily be overcome, however.

Giovanni Iuzzolino's approach, on the other hand, does not posit any a priori hypotheses about social capital, and it measures local industrial agglomerations using an absolute agglomeration index. One appreciable feature of this method, in fact, is the adoption of an agglomeration index to be compared at different thresholds of statistical significance. While the choice of the local borough as the territorial base, although appreciable due to its being free from unverified hypotheses, risks remaining a dead letter in terms of the production of data for the validation and measurement of the phenomenon in question. In fact, the production of a database for the interpretation of economic events at such a level of territorial disaggregation is unthinkable in the near future.

The analysis of the sensitivity of the district maps obtained following the aforesaid two approaches reveals many notes of disagreement. According to both maps, there are more smaller-sized industrial districts in the Veneto than in Emilia-Romagna, whereas there are differences with regard to the measurement of the extent of industrial cluster phenomenon within each region and, in particular with regard to Emilia-Romagna, of its localisation.

The use of the shift-share method to break down the dynamics of manufacturing employment, gives substantially similar results for both maps as a whole, whereas the results for individual industrial districts – that is, at the most useful meso-economic level from the local policy-making viewpoint – tend to differ to a certain degree. In terms of manufacturing employment, competitive advantages linked to the district system are evident during the 1991-2001 period in the case of Emilia-Romagna, whereas in the Veneto, such advantages do not emerge, and positive local economies are distributed throughout the region.

In the case of Emilia-Romagna, moreover, there were significantly positive variations in employment and in value added per sector during the 1996-2001 period, and differentials were generally in the industrial districts' favour. In the case of the Veneto, the results produced by the two classifications tend to diverge to a

greater degree, in terms of both the measurement of the sectoral component and the rates of growth; value added and workers numbers grew at a substantial rate in the Veneto as well, and this growth favoured the districts according to the Istat map, but not according to Iuzzolino.

Thus we can say that the analyses are strongly influenced by the methods employed to identify industrial districts, and as a result it is a good idea to clearly delineate the conceptual and working definitions underlying the different maps.

The method adopted by Istat represents a fundamentally important contribution to local economic analysis; nonetheless, it would be useful if Istat were to revise the ways in which the indices and their respective thresholds are established, with regard to which existing studies fail to completely agree.

From a more general point of view, if we are to gain a better understanding of growth, then we need to extend the information centred on the observational unit - the district - to include the principal economic, social, institutional and relational aspects thereof, in order to characterise local areas and identify the approaches and the factors that encourage local development; we also need to extend our analysis of industrial districts to take in the broader category of productive agglomerations, inclusive of the agricultural and service sectors, together with the phenomenon of industrial multi-specialisation.

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SUMMARY

Which economic analysis is really enabled by district maps in Italy?

Industrial clusters have played a central role for economies of many countries during the past decades. While there is an abundance of qualitative analysis on these, for a long time many observers lament the lack of a statistical operational definition of industrial agglomerations, which may constitute a classificatory paradigm whereby data may be organised on a geographical basis so as to submit theoretical hypotheses to both measurement and econometric testing. The present paper aims at disentangling which economic analysis is really enabled by the available district maps for the Italian territory. To this purpose the two most relevant maps, one of whom is by the National Office of Statistics (ISTAT), are compared to highlight the different descriptions of the industrial districts geography and its transformations. The two approaches reveal many notes of disagreement. As a whole, the method adopted by ISTAT represents a fundamentally important contribution to local economic analysis; nonetheless, some useful suggestions might be received by means of this comparison.