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RESILIENCE OF AGRICULTURE IN A RURAL-BASED ECONOMIC DEVELOPMENT MODEL: THE LOCAL SYSTEMS OF THE MARCHES

JEL classification: R12, Size and Spatial Distributions of Regional Economic Activity; R52, Land Use and Other Regulations

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Abstract. *The paper aims at giving a description of the actual territorial diffusion in the Marche of the integration between the structures of the agricultural activities and the ones of other industries, interpreting the different capabilities of farming to interact and integrate with industries, giving sense to local industrial agglomeration and development. For this purpose, we have considered the 'geography' of the regional territory in 31 LLSs (Local Labor Systems of ISTAT) gathering socio-economic statistical data and elaborating them in order to model the*

territorial patterns of integration between farming and non-agricultural industries. Results show the capability of farming to interact with local labor markets, integrating industrial culture and labor calendars. Results give also sense to the social resilience of agriculture and light regional industrialization, offering some suggestions to eventually get better rural and agricultural policies, from a territorial viewpoint.

Keywords: *The Marche, agriculture, statistical analysis, territorial integration, urban-rural areas.*

1. Introduction: Research Focus and Question

The Marche are an Italian region where the consistency between economic development and quality of life has been very high, in terms of several possible features of civiness. Economic history scholars have largely shown that this consistency derives from the preceding rural society, which was capable of generating a 'light industrialization', fostering its own community cultural resources founded on reciprocity (Anselmi, 1990). This model of industrialization has been based on many Marshallian districts (Becattini, 1987; Becattini et al., 2009), namely on features very different from those of big companies industrialization. These features are: (i) the diffusion of a large population of small firms, extremely specialized and strictly networked by dense input-output relations; (ii) the productive development due to the proliferation of the number of firms and not to the increase of unit dimension; (iii) a high human activity level (high L/Y ratio); (iv) a quite fair revenue distribution, due to social contiguity between entrepreneurs and workers, and in any case corrected by an effective redistribution policy performed by local authorities (Becattini, 1987; Becattini et al., 2009).

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Moreover, in a territorial perspective, the main feature of the Marchigian districts is that of having originated within the old networks of small towns and even smaller urban centers, embedded in a densely populated countryside. In the related social environment, namely the 'urbanized countryside' *à la* Becattini (1975), the urban and rural components, as usually defined, are so intertwined to be hardly distinguishable. Following this feature, we can argue that in the Marches the relations between the present urban and the past rural societies are so dense that the region can be selected as a significant case-study by researches interested in focusing on the role of agriculture in the economic development processes. A high economic development coexists with a largely diffused rural memory (institutions and habits) which is the principal background of the current social culture (Anselmi, 1990), determining a quite original socioeconomic model, capable of merging material wealth with immaterial wellbeing (Fondazione Censis, 2002). Also a progressive concentration of residents and activities along the Adriatic Sea coast took place After World War II, stemming from the same social culture of people migrating from the inner areas (Corinto, 2014).

Anyway, in the Marches, agriculture has always and everywhere integrated its features with other productive sectors in a very peculiar and variable manner, originating different forms of co-existence within local markets of productive factors, specially the labor market (Calafati & Mazzoni, 2006; Corinto & Musotti, 2012). Moreover, the recent development of rural and farm tourism - the sole type of tourism capable of increasing sleeping accommodation - gave a clear and further drive to the integration between farming and non agricultural industries, both in the pretty rural areas and in the urbanized or industrialized ones and their neighborhoods (Corinto, 2014).

Our research aims at giving an interpretation of the actual territorial type of integration between agricultural activities and other industries, assuming the 'light industrialization' model (Becattini, 1999) as a general framework, and then asking if farming has different capabilities of interacting and integrating with other industries, thus giving a specific sense to the local industrial (and urban) agglomeration and development. More in general, our research can be considered within the geo-economic studies on the urban sprawl which triggered an increasing 'farming rarefaction' in several areas of the world where urbanization caused a large and complex consumption of land. This kind of studies, originated in the United States, have been approached since many years even by European scholars (European Environment Agency, 2006; United Nations-HABITAT, 2008; European Environment Agency, 2009) and in such an Italian region as the Marches, characterized by an old and dense 'inter-penetration' between a fabric of small-medium sized cities and the country, the topic seems to be a case of 'natural' scientific attention. In fact, it contains very different characteristics than the standard model of urban sprawl, and therefore is able to provide a valuable enrichment in the spectrum of analysis.

2. The Marches and the Light Industrialization

Since the 1960s, the so called 'light industrialization'¹ has been the key-character of the Italian development, which was somehow different from that of other advanced economies. Over time, the region faced a formidable wave of industrialization based on the robust pro-

¹ In a 'light industry' the productive units are characterized by a low K/Y and L/Y ratio, with K , capital, L , labor and Y , production. Those issues are largely retrievable in the typical Italian sectors of the 'made in Italy' productive system, the so-called 'fashion industry' and in many parts of the mechanical industry. Frequently, a great fragmentation in well separated sub-processes of production is clear.

liferation of small and medium sized enterprises (SMEs), often clustered within Marshallian industrial districts (Becattini, 1999)². A long lasting series of specialized researches on the topic has strongly emphasized that the origins of Italian industrial districts descend from a number of factors, pertaining both to small (in many cases very small) urban and rural settlements (Fuà, 1988; Bellandi & Sforzi, 2001; Musotti, 2001). In various Italian regions, until World War II, urban and rural realities were actually connected, a real distinction being very hard at a glance. A dense network of micro-cities pervaded the countryside with a very intertwined tissue, so that rural areas always maintained close commercial, social and cultural ties with some small urban center.

With specific regard to the Marches a prominent scholar has written:

‘The territory is rich in small and medium-sized towns - urban centers with a long tradition of efficient and democratic local government and vigorously engaged in commerce, professions and handicrafts.

‘The countryside is governed by a good road network, is fairly endowed with infrastructures, and has reasonable access to services. The family run and small-scale enterprise (by the owner, share-cropper or tenant) is common in agriculture. The rural population has close links with the population of the towns.

‘In the whole population (rural and urban) there is a high proportion of self-employed workers. The economic role of the family is often not confined to consumption, but covers production too. [...] Relationships within the family and with the neighbors are supportive and there is a marked community participation and social integration [...] in this world of family businesses and self-employed workers, there is some management experience, some spirit of initiative, some sense of responsibility, and all these gifts, even in small doses, are widespread among population.’ (Fuà, 1988, pp. 262-263).

The Marches are the Italian region where the spread of industrial districts has been most penetrating and where - historically - there was the closest integration between the more urban and more rural settlements (Dunford & Greco, 2005; Musotti, 2001). Then, we argue that this greater integration between the two social environments has resulted in a large territorial spread of industrial districts and a corresponding geographical spread of inhabitants. The small average size of urban centers (only the municipality of Ancona has slightly more than 100,000 inhabitants) is the historical legacy of a society in which, for centuries, residents in urban areas based their way of life on contacts with the surrounding countryside (Conti, 1996).

These socio-economic and demographic special characteristics have been strengthened even by the other big driver of the regional development, i. e. the tourism activities concentrated along the coast of the Adriatic Sea (Corinto, 2014). The region has a coastline of 180 kilometers, along

² Namely, an industrial district is defined as a local socio-economic system having the following characteristics: ‘a) a sufficiently small geographical entity [...]; b) a population of families living and “mainly” working in this area [...]; c) a population of manufacturing small or medium-small enterprises, one independent from each another [...] composed by clusters, each specialized in a particular phase of the industrial process characterizing the district; d) a network of international trade relations, acting both in purchasing raw and auxiliary materials, and - more importantly - in selling the district typical produce; e) a specific “culture” (value of labor and family, dating capacity, risk attitude, etc.) and its own “institutional network” (commercial behavior, socio-economic and political associationism, specialized schools, etc.) inherited from a historical process of reciprocal adaptation between the conditions of social reproduction and the external competitiveness of the district; f) [...] a unified image and typical characters perceived by members of the district and external interlocutors; g) [...] a strong sense of belonging and identification diffused in local actors’ (Becattini, 2001, pp. 95). After this ‘classical’ definition we should add some notations as follows. The individual manufacturing units are interlinked by a dense fabric of input-output relations, being each of them part of a cluster and specialized in a singular phase of the district productive chain (the so called ‘main industry’). That doesn’t mean they have no relations with external units, but the internal relations are quite prevalent. Within the district many other units (secondary industries) tend to replicate the main industry input-output model of relations

which the dissemination of tourism activities is seemingly equivalent to the light industrialization in the inner areas.

ISTAT has identified 31 Local Labour Systems (LLSs) in the Marches, with an average population of 47,844, while in Italy the LLSs are 686, with an average population of 83,084 (Orasi & Sforzi, 2005). Hence, we can concisely describe the Marches as a network of small and medium towns scattered in rural areas within which the communities do fertilize local economies and support the demographic strength quite differently than in many other Italian regions. Moreover, the socio-economic temper of rural areas fostered the regional development in reconciling the mere material wealth to a high quality of life, with a very high civic culture, in a way that has quite no correspondence in the rest of Italy.

3. Agriculture and Development

The above sketched origins of the development in the Marches underlie an ideal-type for the sociological research as well as the economic one, including agricultural economics. If the rural world had deeply contributed in shaping the regional development, by means of its own sociocultural features, we argue that it should be very interesting to ask how agriculture fits today within the overall economy of the region. We briefly outline two possible models as follows.

In a development model based on large cities and large companies, agriculture is territorially confined in a periphery, more or less remote from the main motors of growth and the socio-economic transformation. Thus, the labor markets of the 'major' centers and those of 'the green belts' result as being strongly separated.

On the contrary, in a model based on small and medium cities and systems of SMEs, with numerous and scattered urban centers, agriculture is not practiced in a 'more or less' remote periphery, but in places 'not so far' from the urban centers running specialized manufactures or tertiary industries. In this case, the labor market lays in local systems which are structured according to the actual geography of urban centers, and within which the agricultural activities tend to integrate with other sectors, both in terms of singular households, whose components have jobs in different sectors, and individuals (i. e. workers) capable of alternating farming and non-agricultural jobs.

In the first model, the territorial division and physical and cultural distances between agricultural and non-agricultural activities are very great. And, therefore, the farming activity is stronger (in terms of employment and wealth) whereas other activities are less developed (i. e. there is an agricultural persistence as a residual issue).

In the second model, the territorial integration between different jobs is possible, because jobs are both physically and culturally contiguous. Then, the 'size' of agriculture (always in terms of employment and wealth) depends more on its internal resources (especially the quality of entrepreneurial capacity and the institutional endowments) than on the concurrence of other industries for the same pool of resources (the so-called pull-effect).

In the Italian framework, the Marches are the region where, in particular, farming and non-agricultural works found the best conditions for their territorial integration. Therefore, the Marches should be a 'perfect' case-study of no-correlation between the size and activity of agriculture and industrial development (assuming the hypothesis of a weak-compatibility), or even a positive correlation (strong-compatibility).

4. Empirical Analysis

After considering the literature on the economic development of the Marches, we have made a quantitative analysis aiming at testing the eventual emerging interpretation. In particular, we tried to develop our discourse in two directions. On one hand, we tried to understand if the present geo-economic features are consistent with a transforming process strongly based on a rural economic model, and thus capable to reach high levels of development besides big urban concentrations. Namely, this model is based on local systems with a small demographic dimension (poor in external economies *à la* Jacobs (1971), but, being specialized in one specific industry, well endowed with external economies to the singular firm and internal to the local industry; on the other hand, we tried to verify if the emerging of urban external economies in certain places would have effects on the agricultural sector.

Accordingly, we have based our analysis on the local development perspective, considering as a statistical unit each of the 31 Local Labor Systems (LLSs) (Bellandi & Sforzi, 2001; Orasi & Sforzi, 2005), as in the official 2001 Censuses³. A LLS is an actual functional region drawn by self-containment (about 75 percent) of the daily home-to-work commuting, or travel to work areas.

In each LLS, after having eliminated the redundant indicators, we have selected 10 analytical variables (table 1) capable of partially reflecting the above discussed, very complex, phenomena, even though we can accept it as sufficiently consistent and useful as a first recognition approach. These variables are:

- one variable for the degree of urban concentration (and, in the opposite sense, the rural persistence), in term of population density (POPD);
- four variables reflecting the global economic development, in terms of employment rate in for profit enterprises (EMPLD), total entrepreneurial density (BUSD), manufacturing entrepreneurial density (MANUFD) and tourist entrepreneurial density (TOURD);
- five agricultural variables, three of which pertaining to the agricultural structures *sensu stricto*, in terms of rate of utilized agricultural area (indicating a high quality of agriculture) on total farm area (USAF), average farm area net of grassland (SIZEF), rate of professional farms on total farms (FARMS); two other variables indicating the social weight of farming, in terms of work days density (LABD) and cultivated area density (CUAD).

³ The 2011 updating has not yet been made.

Tab. 1 - Analytical variables

Variable	Description
POPD	Inhabitants (2011)/Territorial Area (km ²) (2011)
BUSD	Enterprises for profit (net of agriculture) (2010)/Inhabitants (2011)
EMPLD	Employees of enterprises for profit (net of agriculture) (2010)/Inhabitants (2011)
MANUD	Manufacturing enterprises (2010)/Inhabitants (2011)
TOURD	Accommodations and Food Service Enterprises (2010)/Inhabitants (2011)
FARMS	Farms in ASIA (2010)/Farms in Census (2011)
SIZEF	Cultivated Area (net of permanent grassland) (2010)/Farms (2010)
USAF	Utilized Agricultural Area (2010)/Area of Farms (2010)
CUAD	Cultivated Area (net of permanent grassland) (2010)/Inhabitants (2010)
LABD	Farming Working Days (2010)/Inhabitants (2011)

Sources: ISTAT, Agricultural Census (2010), Demographic Census (2011), Industrial Census, ASIA (statistical archive of active firms)

The variables of this data set (31 observations on 10 variables), have been rescaled into values from 0 to 1, in order to eliminate the distortion caused by the different units of measure. Then, we have made two analyzes:

- a correlation analysis, by using the Pearson’s rank correlation index for any couple of variables, in order to identify the more evident association between the expressed phenomena;
- an ordinal multidimensional scaling analysis (ALSCAL method) in order to identify the fabric of relations among phenomena which characterize the Marchigian development model.

5. Correlation analysis: findings

The Pearson’s correlation matrix (table 2) allows us to state that the urban densification economies, measured by the population density (POPD), have significant positive correlations with the two indicators of whole development of for profit activities, i. e. the employment rate (EMPLD) and the entrepreneurial density (BUSD). Moreover, these economies are uncorrelated with the entrepreneurial density of the two leading sectors (MANUD and TOURD), and do concentrate where the land resources are better for farming (very high positive correlation with USAF) and describe a social rarefaction of agriculture (negative correlations with FARMS, SIZEF, CUAB and LABD).

The local systems which show major urban density may be alternatively specialized in the manufacturing or tourism industry. In general, their development depends on the density of tertiary activities (other than tourism), capable of supplying services to the residents, families and enterprises, and to other systems, especially the more advanced services for businesses.

The main findings from the correlation matrix are that the density of manufacturing firms (BUSD) is positively correlated with the two indicators of whole development of the for profit activities (EMPLD e BUSD); on the opposite, the density of tourism businesses (TOURD) has a negative correlation with the rate of total employment in for profit activities (EMPLD). That is to say that depending on the nature of the industrial districts, the number of the Marchigian manufacturing firms (usually small) is directly connected to the level of development. On the

Tab. 2 - Fixed parameter logit (FPL) and random parameter logit (RPL)

	BUSD	EMPLD	MANUD	TOURD	FARMS	SIZEF	USAF	CUAD	LABD
POPD	0,48 ***	0,34*	-0,00	-0,12	-0,22	-0,46***	0,54***	-0,78***	-0,47***
BUSD		0,13	0,38**	0,20	-0,08	-0,21	0,33*	-0,32*	-0,23
EMPLD			0,36**	-0,44***	-0,20	-0,07	0,36**	-0,40**	-0,07
MANUD				-0,32*	-0,27	-0,10	0,10	0,19	0,11
TOURD					0,34*	0,32*	-0,51***	0,15	0,01
FARMS						0,49***	-0,38**	0,35*	0,34*
SIZEF							-0,41**	0,52***	0,45**
USAF								-0,26**	-0,52***
CUAD									0,40**

Confidence: () 90%, (**) 95%, (***) 99%*

contrary, in the case of tourism, not the number of firms but, seemingly, the dimension of units matters. Even better, a high density of tourism businesses is generally a symptom of an over dimensioned supply, as likely shown by the negative correlation (99% significance) between TOURD and USAF indicators.

The indicators of farming vitality have no significant correlations with the diffusion of manufacturing activities and, hence, there apparently is a linkage of weak compatibility, if not a strong one, between the development of industrial districts and the agricultural resilience.

6. Multidimensional scaling: findings

By means of a multidimensional scaling analysis (MDS) with the ALSCAL procedure (Kruskal & Wish, 1978; Tomaselli, 1993) on a data matrix (31 LLSs per 10 variables) we reduced the 31x10 dimensions of data to a 2x2 dimensions representation. Therefore, we can describe the relationships of proximity existing among the 11 observed variables, and then the linkages among the phenomena represented by the selected variables.

You must read the graph 1 considering that the horizontal dimension 1 may identify the continuum between an intensive agriculture (right side) and an extensive one (left side) and the vertical dimension 2 the continuum between highly populated areas (top side) and lowly populated areas (down side) (table 3). Then, you must consider the distance that separates each variable-point (i. e. each point of the 10 variables on the graph) from any of the others. Independently from the quadrant where they are localized, the closer they are the more the linked phenomena tend to jointly emerge in the Marchigian local systems. That is an intuitive reading and we try to explain it in the following.

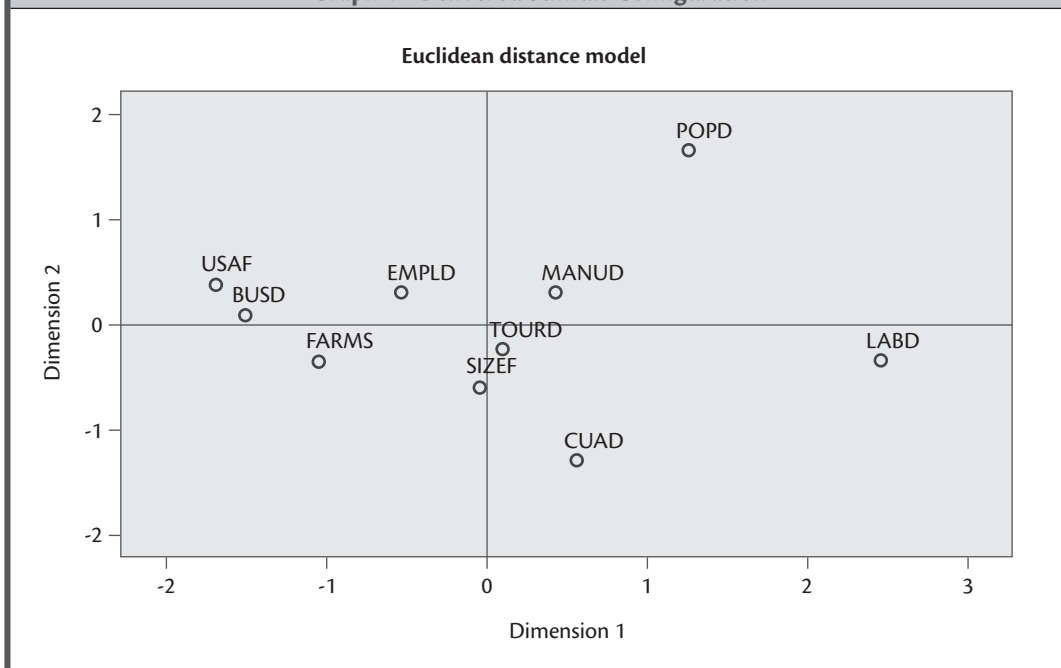
The demographic density indicator shows the greatest distances from all the 5 variables which describe agriculture. The economic development indicators are, in the average, and excluding the LABD, closer to (or less distant from) the variables describing agriculture rather than the population density. We can deductively state that even in the Marches the urban densification of population and economy produce an intrinsic and dis-aggregating trend effect on agriculture and the joined social environment.

Tab. 3 - Stimulus coordinates (Multidimensional scaling: ALSICAL)

Variable	Dimension1	Dimension2
POPD	1,26	1,65
BUSD	-1,51	0,10
EMPLD	-0,53	0,31
MANUD	0,43	0,31
TOURD	0,10	-0,23
FARMS	-1,05	-0,34
SIZEF	-0,04	-0,57
USAF	-1,69	0,39
USAF		-0,52***
CUAD		0,40**

Kruskal's stress: 0,036 (good)
RSQ = 0,994

Graph 1 - Delivered Stimuls Configuration



7. Discussion and concluding remarks

The analysis we made on the LLSs of the Marches confirmed the initial hypothesis that the Marchigian development model did not leverage to much on any sort of urban densifications, dividing in an absolutely clear manner the urban and industrial areas (and societies) from the rural ones, i.e. the agricultural use of land from that of other industries. In this sense, we posed the question if the 'light industrialization' model *à la* Becattini is still consistent with the actual general socioeconomic features of the Marches, within which agriculture has apparently enough capabilities of interacting and integrating with other industries. Our analysis did confirm that Marchigians have been able over time to combine, or at least to make compatible, the proliferation of industrial activities with the persistence of a vital agriculture, in a model of both strong and at least weak agricultural resilience.

This persistence is clearly detectable even by the typical indicators of the agricultural structures we have selected: the rate of cultivated on total areas (forests included) which indicates the physical quality of land resources; the average farm land; the rate of professional farms which produce, even in a minimal quantity, for that market and not for the farming family consumption. The two other features we considered, the social weight of agriculture, the densities of work days and intensively cultivated area, did not picture the same framework of capacity to resist the competition of alternative activities. Where they reach the higher values they describe a situation of relatively scarce capacity of development.

Our research positively matches even to main hypotheses and findings of a large historic literature which pointed at interpreting the economic phenomena together with anthropological, cultural and sociological features. This result is interesting because in many other regions, in the well developed center and north of Italy, the model of 'light industrialization', organized in Marshallian districts, can be conveniently applied, giving sense to similar interpretations. As this model derived many of its characteristic from the pre-existent local rural communities, then, this issue is particularly stimulating for agricultural economists if we want to understand how resilience of agriculture and rural territories can be consistent with the overall development.

Eventually giving some suggestions to better govern the land use, it is important to stress the opportunity to stop land consumption in the coastal line and in the hilly zones, these latter actually endangered by further urbanization and industrial infrastructuring, where lots of industrial and commercial warehouses have been recently built, probably due to an excessive economic expectation for the contribution of the building industry to the whole regional economy. This has a major meaning when we consider that industrial districts are currently interested in processes of tertiarization, capable of following highly varied paths of evolution.

An interesting topic for the future is the research on the same topic but in a larger geographical scale, in order to compare the very typical features of the Marches with other Italian regions which showed different patterns of development.

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