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TOPICS IN LOCAL ECONOMIC DEVELOPMENT

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TOPICS IN LOCAL ECONOMIC DEVELOPMENT

Social Capital
Quality of Government
Productivity Specialization

"Autostereotypes, or the stories people tell about themselves, can themselves become a part of the social reality, influencing action and expectations, and they can be stimulated or discouraged by leadership".
(Keating, 2001)

Table of Contents

Spatial interaction and nonlinearities in the levels of Quality of Government in Europe

Specialization and Land Productivity A Spatial Analysis on Italian Provinces

List of Tables

Administrative Continuity: Enhancer or Constraint for Regional Governments' Efficiency?

Spatial interaction and nonlinearities in the levels of Quality of Government in Europe

Specialization and Land Productivity A Spatial Analysis on Italian Provinces

List of Figures

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Introduction

Since the last decade *local economic development* has been a concept in vogue among regional scientists. Old traditional approaches to regional development relied on assumptions and hypotheses strictly concerned with the distance from markets, availability of labor and raw materials, and considered only traded interdependencies thanks to which complementary industries are able to reduce their costs by locating together, *i.e.* agglomeration.

The process of globalisation brought a change in local and regional development studies. As Pike, Pose and Tomaney (2006) argue, globalisation is characterized by complexity, uncertainty, risk, and it requires a much more integrated multi−level governance. In this context, new actors and institutions have emerged, often interacting through "partnership" relationships. Globalisation challenges all territories to directly face the global competition. It bears winners and losers. Differences in regional capabilities conduce to a marked polarisation of economic activities, which in turn exacerbates divergences among regions themselves. In order to face these new challenges, regions need new development strategies, able to re-dress the weaknesses, thus reducing the constraints to economic potential of individuals, firms, and territories.

Developmental and employment creation policies (*top-down* policies) have thus, until recently, been usually structured along two axes. The first axis concerned with investments in physical capital (Solow, 1956) and in infrastructural endowment (Aschauer, 1989). One of the most spectacular cases of failure of these top-down and supply-led approaches has been the Italian Mezzogiorno (south of Italy). Despite more than forty years of huge investments in infrastructure by the Italian governments, the income gap between the North and the South

of the country remains at the same level as before the intervention started in the early post-war years (Triglia, 1992).

The second axis was based on industrialisation. The introduction or attraction of large firms to areas presenting a weak industrial structure, in combination with other development policies, has been in few cases, as in the case of South East Asian countries, a key enacting the economic take-off of these areas (Storper, 1997), often in contexts of strong, state-led national development strategy support. However, these policies have not been particularly successful in the long term, and the failures outnumber the success stories. As a consequence, most of these large industrial complexes remained detached from their local environments ("cathedrals in the desert") whose principle suppliers and customers were located elsewhere rather than locally or in nearby areas (Lipietz, 1980). Around the end of '80s, endogenous growth theories underlined the importance of two factors largely neglected in the neoclassical approaches to economic growth: innovation (Romer, 1986) and education (Lucas Jr, 1988). Indeed, since the economic boom of the period after the Second World War, traditional economic development approaches had spurred "top−down" policies, mostly producing "one size fits all" developmental models.

Since these traditional local and regional development policies experienced a large failure (Pike, Pose and Tomaney, 2006) mainly due to weak local economic structures, poorly suiting the local social and institutional contexts, over the last decade an increasing attention has been paid to "bottom−up" approaches to economic development.

As Pike, Pose and Tomaney (2006) indicate, the "new" conception of local and regional development strategies is structured around a threefold scheme that covers development of the economic hardware (infrastructure and education), software (design and implementation of development strategies), and "orgware" (Barquero, 1999) that indicates institutional capacity. As Keating (2001) underlines, new academic thinking focuses on "places" as "a complex system of social relationships, norms, institutions and understandings", supporting the idea that

development is more than the merely assembling of production factors in physical space.

The place itself has become a factor of production; outcomes of investment will depend on attributes owned specifically by places. The new approach considers "untraded interdependencies" arising from proximity of innovators, manufacturers and suppliers within regions or localities and the dense pattern of informal exchanges encouraged by proximity. Trust, cooperation and competition give rise to a "regional worlds of production" (Storper, 1997), "associational economies" (Cooke and Morgan, 1999), "learning regions" (Morgan, 2007), where innovation is self-sustaining and today's success lays the ground for future success (*path-dependency*).

In response to these changes, regional development policies have become more decentralized, therefore closer to the regional and local level where there is a greater awareness of existing criticalities, and therefore a more effective capacity for horizontal integration (Begg and Mayes, 1993; Cappellin, 1995*a*; Cappellin, 1995*b*). In the European context, regional policies have followed the same path, since the time of the reform of the Structural Funds in 1989.

Several studies point to the evaluation of the impact by previous regional policy paradigm structured around a "top-down" approach, with very different outcomes. While some scholars evaluate as positive or mixed the effects by these policies on regional development (Mohl and Hagen, 2010; Cappelen et al., 2003), others find a limited or not influential impact (Bouvet, 2005; Boldrin and Canova, 2001; Dall'Erba and Le Gallo, 2008). More recently, a number of studies underline the importance of local contexts, that is a "place based" approach in the drawing of effective regional policies at European level (Barca, 2009; Leonardi, 1995). Consequently, the focus is more on local characteristics, such as the endowment of social capital and / or the quality of institutions.

This thesis is the result of a work started three years ago, aiming to better define the relation among development and socio-economic characteristics, focusing on the importance of places. It consists of three different papers, which

take into account three different issues related to local development, in a very "place-based" perspective.

The first research focuses on administrative continuity and its effect on the efficiency of Italian regional administrations in terms of both long term and short term policies. In particular, the focus is on the relation among administrative continuity and the quality of social capital. Since the seminal work of Putnam, Leonardi and Nanetti (1994), social capital is considered as crucial for local economic development. Putnam, Leonardi and Nanetti (1994) argue that differences in regional levels of social capital explain the development patterns observable in northern and southern regions of Italy. Criticism of this approach mostly concerns its vision too anchored in history, thus trapped in a dynamic of historical determinism (Viesti, 2009), with the outcome of assuming social capital as subject to a very slow change, not much influenced by policy interventions. More recently a new perspective in regional development highlights that interactions among *bridging* and *bonding* social capital is determinant in influencing the general effect that policies have on economic development (Storper, 2005; Trigilia, 2011). As already pointed out, development policies are widely accepted to be strongly influenced by social contexts and social relations that are in place within those contexts.

Literature on the relation among administrative performance and administrative continuity is characterized by two main standpoints in conflict, where some scholars argue administrative continuity may be detrimental to efficient behaviour, thus conducing to clientelism and the rising of interest coalitions (e.g. Olson and Olson, 2009; Olson, 1984). Others argue administrative continuity may benefit efficiency through a process of learning by doing, producing instead a higher policy effectiveness (Milio, 2008).

The first paper of this thesis, "Administrative Continuity: Enhancer or Constraint for Regional Governments' Efficiency?" analyses differences in the efficiency of regional governments in Italy assessing the interaction by administrative continuity with different typologies of social capital. Results show that

administrative continuity may be detrimental in terms of policies efficiency when it is coupled by *bonding* social capital, while it may be beneficial when it is coupled by *bridging* and *linking* social capital.

The second paper of this thesis focuses on the spatial interaction by different levels of quality of government (QoG), assessing the diffusion of best practices among European regional administrations. Indeed, institutions are considered a key factor for economic development and economic growth in literature (North, 1990; Rodrik, Subramanian and Trebbi, 2004).

Previous literature focus on the assessment of the relation existing between institutions and local economic development and on the mechanisms institutions directly affect development. Indeed, institutions influence transaction costs, as well as the existing level of inequality and trust in societies (Rodríguez-Pose and Storper, 2006), that in turn are crucial factors for a socially constructed market (Bagnasco, 1988).

Notwithstanding the influence by institutions is more visible at regional level than at the national one (Rodriguez-Pose, 1999), and more effective in mobilizing those forces which contribute to development, spatial diffusion of institutions has been widely studied at country level, while regional level has been highly neglected. Rodríguez-Pose (2013) states that an optimal regional development policy in Europe should acknowledge "*institutional factors, their variability and limitations and attempts to address the potential shortcomings of institutions in a place-specific manner*". In other words, as Barca (2009) underlines, the regional policies in Europe should be 'tailored-made' or context specific.

In the light of these arguments, it seems highly important to understand how regional institutions affect each other when building a strategy for regional development in Europe.

Our research underlines the heterogeneity of spatial interactions in levels of QoG within groups of regions defined as "leading regions" and "lagging regions", and analyses different mechanisms of spatial interaction (pure competitive mechanism and competitive learning/imitative mechanism). Finally, it shows non-

linearities in the effects wealth and demographic variables have on levels of QoG.

In the third paper another key issue in regional science and local development has been considered, that is the relation among the rising of clusters and the process of innovation. By definition, these two concepts are strictly related. If a cluster is defined as the "agglomeration of specialized actors that compete and cooperate" (Porter, 2000), the process of innovation as a "interactive, iterative, and cumulative" process (Bathelt, Malmberg and Maskell, 2004) has its origin in the formation of clusters.

Economic geography literature recognises the existence of two typologies of externalities originating from agglomeration and affecting directly innovation processes: Marshall (Marshall et al., 1920) and Jacobs (Jacobs et al., 1970) externalities. While the former is related to sectoral specialization, the latter is related to diversification and refers specifically to densely populated urban areas, where a diversified environment might allow the creation and exchange of ideas.

The strict social relations inside a cluster may be "positive to a certain extent" (Bathelt, Malmberg and Maskell, 2004) because the knowledge process is cumulative. On the other hand, too much specialization might lead to the "lock−in problem", that is the risk associated with the inability to change or to get back once the process of cumulative knowledge has started (Cohen and Levinthal, 1990).

Several studies analyse theoretically the characteristics of different kind of clusters and empirically assess the effects by Marshall and Jacobs typologies of externalities on economic development and growth. The focus of this literature has been within industrial and financial sectors and, more recently, within high technology clusters (Beaudry and Schiffauerova, 2009; Marrocu, Paci and Usai, 2013). On the contrary, no attention has been dedicated to the agricultural sector. Few researches analyse the mechanisms of creation, exchange and diffusion of innovation within agricultural clusters. In the same way, no much research

has been conducted on the effects of externalities by agglomeration with the agricultural sector. The research presented here is instead focused on the agricultural sector in Italian regions (NUTS 3), aiming to assess the existence of a direct causal relationship between the (increasing) specialization and sectoral productivity in agriculture.

In conclusion, this thesis wants to contribute to the current debate about two main topics in local economic development literature: quality of institutions and the importance of clusters in the process of innovation and productivity. The analysis makes use of quantitative methods, mainly adopting econometric methodologies and spatial econometrics methods. Each part of the work focuses on specific research questions and hypothesis, with the aim to provide policy recommendations both at European and Italian level.

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Administrative Continuity: Enhancer or Constraint for Regional Governments' Efficiency?

Abstract

This work shows that administrative continuity is an enhancer of regional governments' efficiency in Italian regions. Moreover, the analysis explores the different effect of administrative continuity on implemented policies when coupled with a certain quality of social capital, considering both cases of long and short term policies. The literature explains the positive and negative effects that administrative continuity has on regional governments' performance (e.g. Olson 1982; Milio 2008), but it does not specify the socio-cultural factors explaining why continuity itself might be an enhancer or a constraint of the performance by regional government. The research analyses these relationships, assessing whether administrative continuity may foster political patronage when *bonding* social capital is prevalent compared to *bridging* social capital, or when the predominant factor in the social capital is represented by the *linking* social capital. This may be due to an evaluation by politicians based on particular interests of particular groups, rather than on common interests (Nannicini et al. 2010). This standpoint is confirmed in the case of long term policies (health care mobility) while there is no evidence of this in case of short term policies (absorption of EU structural funds) analysis. While recently the focus has been on the analysis of the efficient institutions at Italian provincial level through cross-section analysis (Giordano and Tommasino 2011), this study takes into consideration Italian regions (NUTS 2) as unit of analysis through panel data covering a time frame of seventeen years (1995-2011).

1 Introduction

This research aims to analyse the role and the effects of administrative continuity (hereafter also AC) on regional administrative efficiency (hereafter also AE), given different levels and quality of social capital (hereafter also SC) (*bonding*, *bridging* and *linking*) in Italian regions (NUTS 2). This work focuses on the regional level of government, as it is considered the most suitable unit of analysis, in the Italian case, given the research purposes. The Italian regional governments have larger powers and resources than other local governments. Consequently, the analysis of the drivers of regional governments' efficiency has several political implications, since a large number of regional policies are exclusively or mainly managed by regional governments (e.g. health care). Since the landmark study by Putnam et al. (1993), Italy has been the object of various studies on the effect of SC on administrative efficiency and quality of government. This research considers three different components of SC: *bonding* SC represents the relationship within exclusive groups or communities, *bridging* SC indicates the relationship between different communities or groups of people and it is related to the degree of *civicness* (Storper, 2005), *linking* SC stands for the cooperative behavior within inclusive group or communities (Sabatini, 2009). Capturing the relational aspects of SC allows to assess social interactions among people, which influence their culture dynamically (Trigilia, 2011).

The literature on administrative continuity explains both the positive and negative effects by continuity on the performance of the regional governments, but it does not consider and specify the socio-cultural factors explaining the conditions in which continuity may be an enhancer or a constraint for the efficiency of the regional governments. This represents a important limitation which this work aims to overcome.

The literature on administrative continuity (see Section 2.2) includes two main lines of thought. On the one hand, several authors suggest that the turnover of political administrators tackles some constraints of governments' performances.

An high turnover suggests meritocracy and competition because it shows that incompetent administrators have to take responsibility and leave their office (Ferejohn, 1986). Olson (1982) suggests that a low turnover may lead to entrenchment of distributive coalitions, which ultimately interferes with the policy-making. Indeed, changes in cabinet members are considered to prevent the creation of little feudal areas within the government (Bueno de Mesquita, 2000). According to Feiok and Strema (1998) government turnover is beneficial because it brings in different skills and expertise, and represents a pressure on managers to work harder.

On the other hand, some studies provide evidences that AC improves some dimensions of the performances of regional governments (e.g. Pfiffner, 1987; Milio, 2008) since the high complex jobs need time to be mastered and only after some experience the effectiveness is maximized. When analysing the absorption of Structural Funds in a sample of Italian regions, Milio (2008) looks at the benefits of having a low turnover of regional administrators, which acquires a stronger specialization and a global understanding of the problems they are facing. This perspective also analyses the benefits of developing a coherent and consistent long term strategy, driven by AC.

Evaluating the literature on the linkages between SC and AE, it is reasonable to expect that continuity is enabled as a positive factor for AE when a high level of *civicness* SC is in place, in particular in the case of the implementation of common good oriented policies. On the contrary, the continuity of leadership in those regions showing a low level of *civicness* is expected to be negative for common needs satisfaction. In fact, in the latter case, there is less control on bad practices by politicians, which in turn leads to the consolidation of political patronage already in place due to a scarce level of *civicness*. In other words, continuity may trigger both a virtuous and vicious circle, depending on the level and quality of SC embedded in a region. Our analysis shows administrative continuity is an enhancer for regional administration's efficiency when it is coupled by *bridging* and *linking* SC, while it represents a constraint when coupled by

bonding SC.

This paper is structured as follows: after the introduction, the second section presents an overview of the literature on SC, AE and AC. The third section focuses on research questions and on the discussion of the variables selected for the analysis. Variables have been chosen carefully referring to previous works on SC, AE and AC. Methodology and the model are described in the fourth section. The fifth section is devoted to the description of results. This section provides evidences supporting the research hypothesis about the impact by AC on AE, and, more in deep, it describes the qualities of social relations able to trigger a positive or a negative effect by AC. Since the analysis makes use of several indicators and variables, both general answers to research questions and particular insights are faced out. An important differentiation is made between the effect of AC on long-term and short-term policies. Furthermore, a subsection is devoted to Southern regions, since the implications of the results are contradicting partially the current literature. Finally, the sixth section summarizes the results providing answers to the research questions and underlying the political implications of such outcomes.

2 Administrative Efficiency and Social Capital in Italy

2.1 Social Capital

Since the landmark study on SC in Italian regions, conducted by Putnam et al. (1993), in which particular attention is dedicated to the historical conditions of northern-southern dualism, a considerable amount of research has been published on SC in Italy, providing many definitions of this concept. The *collectivist* (Putnam 1993, 1996, 2000) approach defines SC as a factor existing only within an organized society. This approach draws on the work of the American sociologist Robert D. Putnam, identifying SC as "trust, norms that regulate it, the networks of civic associations, elements that improve the efficiency of the organization's efforts in promoting social mutual agreement" (Putnam, 1993: 196).

Other scholars define SC as the degree of trust in social relations: Fukuyama argues that SC is a resource coming from the prevalence of trust in society or in a part of it (Fukuyama, 1996: 40). The author also highlights that SC may be defined as trust and the expectation that arises within a community, predictable, fair and cooperative, standards based on commonly shared by its members. In line with this approach, Narayan and Pritchett (1999: 872) propose a definition of SC based on the "quantity and quality of life membership and rules related to it". Finally, the World Bank points out that SC refers to institutions, relationships, and norms shaping the quality and quantity of social interactions within society (World Bank, 2004).

A second approach considers the centrality of the individual. In this perspective, social relationships have value only as functional elements to achieve individual goals (Bourdieu, 1980, Coleman, 1990, Granovetter, 1985). Coleman defines SC as "the value of those aspects of social structure as resources that can be used by actors to achieve their interests" (Coleman, 1990: 305). Thus, SC is a factor that an individual can add to financial capital and to human capital for own benefits. From this standpoint, the benefits deriving from human relations not necessarily produce positive externalities. Instead, these relations may trigger disadvantages for those people who are excluded from them.

The choice made in this work is to use a *collectivist* approach to SC, taking broadly the theoretical assumptions of Putnam et al. (1993). This perspective is coherent with the literature on the relations between SC and AE: this approach has the strength of clarity and simplicity for explaining the SC-AE relationship, since civicness is considered a driver of AE (see Putnam et al. 1993, Nannicini et al. 2010, Giordano and Tommasino 2011). Moreover, this perspective allows to consider social relations among individuals embedded in a particular geographical location. It enables to measure social capital as related to a territory, and it fits the research purposes of this work. Finally, the *collectivistic* approach has the advantage to allow SC to be relatively simple to assess in a comparative study, given that the latter may be measured by *proxies* for a large group of

regions in the same country.

Several studies underline a close relation between SC and AE usually explained by single key factors: Putnam et al. (2000) consider the historical factor, Giordano and Tommasino (2011) focus on political participation, while Nannicini et al. (2010) on political accountability.

The contribution of Putnam et al. (1993) provides two fundamental conclusions for the Italian case: the lower quality of regional institutions in southern Italy depends on the low level of *civicness*. In particular, a gap concerning the existence of a 'civic community' (civicness) is observable between southern and northern regions. This gap is considered to be one of the main factors causing the diversity in quality of regional governance and, ultimately, explaining the relatively low economic development in southern Italian regions. According to Putnam et al. (1993), the differences in the presence of SC is explained by diverse historical paths. The southern regions are characterized by a deficiency of *civicness*, since the Kingdom of Two Sicilies was characterised by large landed estates that limited the territorial autonomies. Conversely, the Northern regions have developed a very high sense of civic community because of the flourishing age of the municipalities (XI century) that contributed to the diffusion of a higher sense of responsibility by citizens being part of autonomous cities. Therefore, following this interpretation, the different historical paths by Italian regions determine different levels of institutional performance (*ibid.*).

However, this argument has been strongly criticized since it conduces to path dependency, not allowing to imagine a way out from the current situation. As Viesti (2009:67) states:

> "Although these studies have left an intimate and inescapable mark for every research considering the Italian case, after all these years it should not only refer to more recent data, but above all find a way out of the narrow determinism of which Putnam's theory is flawed" (Viesti 2009)

In order to overcome this limitation, Trigilia (2011) underlines the need to assess social relations as interactions able to influence the territorial culture dynamically. Quantitative research on SC is oriented on the use of particular *proxies* that are in some way *standardized* and well recognised, although studying human relations through quantitative variables may present some limitations (see Hadjimichalis 2006). Here it is safe to say that a *trade off* exists between a correct picture of local relations among people, related to a particular historical context, traditions and norms that are typical of each family, each region, and the possibility to use 'instruments that leave a trace in directories, files, records, sales volume etc..' (Cartocci, 2007: 59), which can be used in quantitative analysis. The standard variables have proven to be significant in several analyses in order to explain social relations in the case of the Italian regional contexts. SC variables have the role to control for social relations embedded in a territory, as detailed above.

The SC variables used in this analysis are the following:

- Blood donations standardized for regional population (as percentage);
- Adult children (Number of young adult individuals living with parents per 100 individuals aged 25-34);
- Presence of cooperative companies on the total number of companies in the regions (in percentage) ;

As indicator of *Civicness* and as *proxy* of *bridging* SC, the analysis considers the regional level of blood donations. *Bridging* Social Capital is a category that may be included in the concept of "generalized trust". This variable can explain the degree of openness in a region, that is the degree of interrelation among groups of people. This represents a favorable condition for the coordination of the economic dynamics and for the construction of a high level civil society (Putnam et al., 1993; Storper, 2005) .

The level of blood donations, as *proxy* of *bridging* SC, is considered by several scholars (Giordano and Tommasino, 2011; Crescenzi et al., 2011; Cartocci,

2007; Guiso et al.,2004) and in literature it is used to assess the effect of SC on economy, innovation and AE in Italian provinces. It is an expression of "disinterested altruism, which moves from a sense of moral obligation towards others" (Cartocci, 2007: 80). The donation of blood may be considered as a gift to unknown people, where there is not a social obligation to return the favor (Boccacin, 2000) nor to obtain a benefit. These two characteristics have been analysed by several authors such as Mauss (1924) and Polanyi (1978). Having knowledge of who is receiving blood, might cause problems because of ethnicity, religion and political motivations (Titmuss, 1970). This type of donation is free from any formal or informal obligations and it does not give possibility of constraints or gratitude and penitence. It is a one-sided exchange, and the donor has not the certainty of receiving back the gift in the future. Therefore, it is a proof of a great trust in others (Cartocci, 2007). As pointed out by Crescenzi et al. (2011), blood donations are free in Italy and there is no monetary compensation. Moreover, there is not a problem of unevenly distributed clinics, that could compromise the equal possibility for anyone in the country to be a donor. Data are extrapolated from the National Institute of Health (*Istituto Superiore di Sanita'-ISS*) with an availability between 1997 and 2008. Missing data are assessed through a linear interpolation method.

The variable on young adults living with their parents captures the degree of relations inside the familial groups (Crescenzi et al., 2011) and it is used as *proxy* of *bonding* SC. Studying social relations in Italy, Banfield (1958) underlines that strong familial relations blind the propensity to cooperate among people and that represents a transaction cost in an economic view. Alesina and Giuliano (2010) find out the relation between strong family ties and low degree of generalized trust. Duranton et al. (2009) consider the relation between typical family structures and economical outcomes with strong family ties fostering the closure towards the 'others'. As pointed out by Crescenzi et al. (2011), there is no relation between the variable 'young adults' and the local unemployment conditions, underlying the cultural factor behind this condition. Data on 'young

adults' are extracted from the Italian National Institute of Statistics (Istat).
The number of cooperative companies on the total number of companies represents the will to share common projects in order to grow economically. This variable is included in other studies (such as Putnam et al., 1993; Degli Antoni and Portale, 2009) among those variables capturing the level of associativity between people. It represents the degree of confidence in the workplace among individuals in the economic realm. The cooperative companies represent a challenge and a risk as the job of each participant is linked to the job of others. Therefore, this variable differs from blood donation, for which the contribution of the donor has not any assumption of refund. In the case of cooperatives the association has the goal of returning the gift. In this context, the cooperatives represent the degree of confidence in the collective and the degree of awareness that combining forces produces better results for those who are participating. This indicator is considered as *proxy* for *civicness* by Putnam (2000). Degli Antoni and Portale (2009) consider participation to social cooperative as a factor increasing social capital in its three components (relational networks, generalized trust and relational skills). The Italian national institute of statistics (Istat) takes into account the participation to social cooperatives as able to explain the component of social capital referred to social relation, together with participation to volunteer association. Sabatini (2009) underlines that membership in an association triggers an increased incidence of cooperative behavior, and it represents, as suggested by Putnam et al. (1993), a "school of democracy".
The *linking* social capital represents, in the words of Sabatini (2009), the "vertical relationships that connect individuals, or social networks they belong to, to persons or groups who are in positions of political or economical power". There are some drawbacks in considering participation to volunteer association as *proxies* of *linking* social capital. In fact, Sabatini (2009) argues that participation to these kind of association is mostly made within circles of people belonging to the same social class, and it is not simple to capture the degree of the involvement by participants, who may just participate in the sense of paying

an annual fee, rather than being really involved. Then, it is more convenient to consider the involvement of the relations and the intensity of the commitment required. Consequently, we consider the percentage of cooperatives on total firms in a region as a valid *proxy* for *linking* social capital.

2.2 Administrative Efficiency and Administrative Continuity: theory and empirical evidence

Administrative Efficiency is a concept used by Putnam et al. (1993) to study the relations between SC (as *civicness*) and quality of formal institutions. The authors label the concept of institutional performance as institutional effectiveness, conducting an evaluation of the policy processes, pronouncements and implementation. They create an index of institutional performance to measure the degree of innovativeness in legislation and in economic policy instruments. More recently, Cartocci (2007) and Milio (2008) have considered, respectively, health care mobility and the levels of expenditure of EU Structural Funds as appropriate indicators to evaluate regional formal institutions. This research builds on these contributions, using these indicators since they are considered as being strictly dependent on regional government policies, with the advantage to show, with limited drawbacks, the policy outcomes of regional governments in relation with AC and qualities of SC.

A number of recent studies focuses on the relations between efficiency of the public sector and aspects of social life in Italian provinces (NUTS 3). A relevant study in this field has been conducted by two researchers of Bank of Italy, Giordano and Tommasino (2012). The authors highlight the relation between the efficiency of the Italian public sector and both *political participation* and *generalized morality*. In their study, the authors identify indicators in the areas of public health, public education, civil justice, childcare and waste collection, using a method based on Data Envelopment Analysis (DEA), to measure public administration efficiency. *political participation* is measured as the number of

newspapers sold in provinces (building on previous work by Guiso, Sapienza and Zingales 2004), the elections turn-out in case of referendum in provinces and the results of surveys about personal interests in political affairs; the *generalized morality* is measured as the number of blood donations per capita in provinces and the results of a survey on the use of public services and on behavior (such as the behavior in case of accidents or when finding money belonging to other people). The results of this study finds a large causal relation between the public administration efficiency and the level of political participation, while there is no evidence of a causal relationship between generalized morality and the efficiency in supplying public sector services.

The research conducted by Cartocci (2007) finds evidence of the positive relationship between *bridging* SC and AE at provincial level. Cartocci uses health care mobility as an indicator of institutional performance. As the author highlights, "health care is the first budget item for regional governments and, secondly, the quality of health services is a source of legitimacy and trust of citizens towards the formal institutions" (Cartocci 2007: 103). In order to measure social capital, Cartocci considers four variables:

- diffusion of newspapers;
- level of election participation;
- diffusion of associations;
- diffusion of blood donation.

The first two variables capture the relationships between citizens and political community, with a differentiation between a form of visible participation (elections' turnout) and a non-visible form (newspapers' readers). The last two indicators (diffusion of association and blood donation) capture the diffusion of elective and formalized networks. These are an expression of the diffusion of an obligation towards other people, and the opportunities to accede to a social network, beyond basic links. The importance of these variables is the capacity

to include the donation dimension, or in other words, the availability to donate time, energy or blood. This dimension is considered a step forward from the simple obligation towards others (Cartocci 2007: 57).

Studying the causal relationship between SC and innovative performance of Italian provinces, Crescenzi at al. (2011) find out that not only the *quantity* of SC is important in exploiting the innovative strengths of a territory but also its *quality*. In particular, the *bridging* SC is the key for provincial innovative performance in the Italian case. The *bridging* SC is measured as blood donations (number of blood donations per 100 residents) and voluntary associations (number of voluntary associations per square Km), while the *bonding* SC is measured as weekly lunch (number of families having lunch at least once per week with relatives and close friends per 100 households) and, adult children (number of young adult individuals living with parents per 100 young adults).

Nannicini et al. (2010) show that, in Italian provinces featuring a high level of *bridging* SC (measured as intensity of blood donation), a community shares the rule of not confirming in office a politician who has made mistakes. As a consequence, where the level of *bridging* SC is high, politicians are discouraged from being corrupt. *Bridging* SC accounts in different ways the relationship between citizens and politicians, and the selection of the ruling class. According to the authors, if a politician develops his political experience in a province with a high level of *bridging* SC, he brings in his political career those rules of "good" behavior that he always takes as a reference. On the contrary, in an environment with a low level of *bridging* SC, it is simpler form political representatives reflecting this feature, and behaving more opportunistically. From the voters' perspective, if they do not share the idea of policy linked to the needs of the community but favor personal needs, then they will be more prone to vote regardless of the management of public goods by political representatives (Nannicini et al., 2010). This contribution, therefore, confirms that the lower *bridging* SC exists, the more political patronage is found.

As mentioned in the introduction, the turnover of political administrators is

widely analysed in the literature: on the one hand, there are scholars who think that it translates into stability and efficiency, on the other those scholars who believe that it may lead to political patronage and inefficiency. Ferejohn (1986) suggests that changes of Presidents are indicative of meritocracy and competition. However, the stability of regional Presidents during the entire mandate can ensure the continuity of the multi-annual programs compared to the situation in which the presidents are constantly changing. Every president has a different strategy compared to the previous one and changes often create incoherence and inconsistency in long-term development policies. A long term policy cycle requires a number of years to be implemented from design to implementation, while a president lasting a year or two can only follow short-term issues (Milio 2008). According to Bueno de Mesquita (2000), the longevity in office typically reflects institutional arrangements that reward political patronage and corruption. In hierarchical institutional arrangements, each member of the government is responsible for a specific field of administration and reports directly to the president. If a councilor thinks to remain in office for a short period, the commitment for long-term programs would be a negative priority, while opting for results in the short term would be more likely (Milio 2008). Piffner (1987) and Milio (2008) support the idea that a considerable amount of time is needed to efficiently manage the operations of high-level positions in complex organizations. Therefore, a public administrator can work with maximum efficiency only after acquiring some experience in office. Furthermore, a short term mandate encourages short term thinking in terms of political career avoiding the research of long term results. Acemoglu and Robinson (2002) defend the idea that fair competition between political parties is desirable to maintain an elected regional President under pressure to improve policy and government performance. However, stable political coalitions represent, for the regional presidency, a guarantee to perform its tasks without constant political dangers, without the fear to be replaced due to a lack of political support (Milio 2008).

3 Hypothesis and Data Description

The research hypothesis is built on the contrasting ideas about the effects of AC on government efficiency, highlighted by the literature analysed in the previous section. In this context, the evidence by Nannicini et al. (2010) is used to overcome the dichotomy on the (positive or negative) effects of AC.

Therefore, the main hypothesis considers AC as an enhancer for the AE when AC is coupled by the *bridging* and *linking* SC, while it considers AC as a constraint for AE when AC is coupled with *bonding* SC. As shown above, the literature on the relationship between quality of civil society and quality of politicians (Nannicini 2010) revealed that the quality of the regional civil society has an effect on the way in which the politicians are selected, and on how they are judged in case of election. Therefore, AC may foster a system of political patronage if the *bonding* SC is prevalent instead of the *bridging* and *linking* SC. In this case, the AC would reveal a negative effect on the regional government efficiency. As alternative hypothesis, regional government efficiency is not improved by AC when it is coupled by the *bridging* and *linking* SC. In this case, AC may be an enhancer or a constraint of the performance of the regional government, regardless the quality of SC prevailing in the region.

In other words, the analysed mechanisms are those concerning the differences of the impact of administrative continuity in different social contexts. Analysing in detail the case of Italy, the research question is whether administrative continuity has positive impacts both in Lombardia and in Calabria (respectively the most developed region of Italy and the least one). These two regions differ not only in terms of the economic contexts and wealth levels, but also in the quality of relations existing among people and the ways in which people tend to cooperate (Putnam et al. 1993; Cartocci 2007).

Hence, the research question focuses on the assessment of the consequences of AC in diversified contexts both in terms of cooperation (trust), and in terms of the concept of public goods (private needs vs common goods), leading to

different social regulations of the regional political scenario.

The annual turnover of regional Presidents (*presidenti delle giunte regionali*) and councillors (*assessori*) in regional governments is used in the analysis as an indicator of AC. This variable is considered as the main element for assessing the political and strategic scenario in a region, beyond the capabilities of single administrators. Data has been extracted from the 'register of directors' by the Italian Ministry of Interior (*anagrafe degli amministratori*[1]). The appendix reports the classification of regions depending on the average of the annual number of changes of regional councillors and presidents on the total number of the regional councillors and presidents in charge between 1989 and 2011 in Italian regions. The annual turnover is the main variable of the analysis, and it is used in different ways to evaluate AE. Two AE indicators able to measure long-run and short-run policies by Italian regional governments have been selected. The choice takes account of the following factors: firstly, the relevance of the policies for citizens; secondly, the reflection of competencies of regional governments (Article 117 of Italian Constitution); finally, the presence of these indicators in the previous literature. Subject to data availability, the indicators reflecting the AE and responding to the above-mentioned criteria, are the "inter-regional health care mobility" and the "absorption of European structural funds". While in the first case (long-term policy indicator) dummies are used to evaluate the level of continuity of the Italian regions between 1995 and 2011, in the second case (short-term policy indicator) it is used as an annual Index taking values from 0 to 10. This choice is justified by the assumption that the health care system is the result of a long-term policy, then its measure results in a average for a long period of time. On the contrary, the absorption of European Structural Funds represents a short-term policy, and its measure considers a yearly change.

Health care mobility among Italian regions is considered as a powerful *proxy* for AE at regional level. As pointed out by Cartocci (2007), the devolution

[1] www.amministratori.interno.it

process, started in Italy in the seventies, made the regional health care systems as the main budget items for regional governments. Consequently, the performances in this sector represent a priority for regional governments. Furthermore, health care has an extreme social importance, and citizens are very careful about the right to receive appropriate health care treatment (Eurobarometer 2010). Furthermore, local health care managers are chosen by regional governments through political decisions. Consequently, the decision making process in health care is a political process (Cartocci 2007). However, people have the possibility to choose whether being treated in their own region or in another one. Thus, the decision of people to not get treatment in their regions may be considered as an indicator of inefficiency of the regional institutions. People needing care assistance, would opt for a transfer (which may be difficult and expensive) if the local health care structures are insufficient or inefficient. For these reasons, health care mobility is considered as an appropriate *proxy* of efficiency of regional governments.

Every year, regional governments negotiate among each other the budget for health care services offered to patients moving from other regions, since each regional government compensates the costs for the treatments provided, by other regional health care systems, to its own citizens (Regione Puglia 2010). This work considers the monetary balance between revenues from other regional governments and costs to compensate to other regional governments for health care services, as *proxy* of long-term policy efficiency. Not only is the health care the largest item of regional public expenditure and it is the most important public service administrated by regional governments, but the Italian legislation gives a particular importance to the respect of financial plans in health care services, for both rewarding efficient and virtuous regions and sanctioning the less efficient ones. In case of inefficiencies, the regional government can be replaced by national authorities in the management of health care services (Ministero dell'Economia e delle Finanze 2009).

As said above, data on health care is related to the matrix of the amount for

which each region is creditor and the amount for which each region is debtor towards others. Data has been obtained from the Umbria region statistical office.

Structural Funds (ERDF and ESF[2]) co-finance national and regional policy interventions in the areas of infrastructure, innovation and entrepreneurship, with programming periods of seven years (EC 2007). The implementation of the funds is managed both at national and at regional level. Each regional government in Italy manages a regional operational programme where the main development goals in relation to the funds are stressed[3]. Two kinds of data have been used in order to create an indicator on the absorption of European Structural Funds: data on allocated ERDF and ESF funds that the European Commission has negotiated with the Italian Government and Italian regions (decided structural funds) and data on SF that regions have actually spent (paid or absorbed). Since each region has a yearly allocation which, if not entirely spent, can be transfered to the following year, it is possible that a region has a level of payments above the yearly allocation. Moreover, since funds can be paid after the end of a programming period, a region can manage at the same time funds belonging to different and overlapping programmes[4]. For these reasons the choice is to create an indicator considering the annual payments (from 1995 to 2011) divided by the total amount of decided European structural funds, considering the total allocation by region from 1995 to 2011 (through the programming periods 1994-1999, 2000-2006 and 2007-2013). Moreover, data of each region has been compared to the total amount of annual payments (on decided funds) of regional programmes of the entire country. In this way, the indicator has been constructed as the difference between the performance of one region (annual paid funds on the aggregate decided funds during the 1995-2011 period) compared to the others (total data of all Italian regions). National

[2] European Regional Development Fund; European Social Fund

[3] For an overview of the use of Structural Funds in Italy, see $http://ec.europa.eu/regional\_policy/atlas2007.htm$

[4] For an explanation of the payment system of EU Structural Funds, see Bubbico and De Michelis 2011

or multi-regional programmes, managed by national authorities, have not been included. Therefore, this indicator represents the ability of a region to use European Structural Funds compared to the average of Italian regions. Data has been obtained by the European Commission (Directorate-General Regional Policy)[5].

4 Methodology

4.1 Quantitative Analysis

The analysis is based on panel data over a time frame of seventeen years (1995-2011) for 21 Italian regions[6]. The Ordinary Least Squares (OLS) estimation using panel data with both regional fixed-effect and time fixed effects allows to control for: factors that vary across regions but do not change over time; factors that change over time but do not across regions. In this way the problem of omitted variable bias is reduced in the analysis. Here equation (1) is estimated using the indicators of regional health care mobility expenditure (divided by 1 million of euro) and of European Structural Funds' absorption by regional governments as *proxies* of AE. One critical issue addressed here is the possible bias resulting from endogeneity between AE and SC. This stems from the likelihood that AE be a function of SC. Therefore, time lags are used to reduce the possible problem of endogeneity.

In this theoretical framework, the degree of citizens' concerns for public affairs has an impact on efficiency (due to the pressure that vigilant citizens put on politicians). In the empirical analysis we capture this link estimating the following equation:

$$AE_{it} = \beta_0 + \beta_1 AC_{it} + \beta_2 SC_{i,t-\tau} + \beta_3 SC_{i,t-\tau} * AC_{i,t} + \beta_4 X_{it} + \delta_i + \epsilon_{it} \quad (1)$$

[5] Data on SF are shown in the Appendix.

[6] The analysis considers all the NUTS 2 regions but two NUTS 3 regions (Autonomous provinces of Bolzano and Trento) instead of Trentino Alto Adige region (NUTS 2).

where:

- AE is administrative efficiency as measured by health care mobility and absorption of European structural funds;
- AC is administrative continuity measured as dummy variables (low, medium-low, medium-high and high level of long-term continuity) when considering health care mobility as response variable (long-term policy) and as an Index from 0 to 10 constructed as follow:

$$AC_i stand = (\frac{AC_i - AC_{min}}{AC_{max} - AC_{min}}) * 10^7 \quad (2)$$

  when absorption of European structural funds is used as response variable (short-term policy);
- SC is social capital with a lag of 5 years when analysing Health Care Mobility and of 1 year when analysing EU structural funds;
- SC * AC is the interaction term between social capital and administrative continuity;
- X represents the matrix of control variables (economic and demographic) that are: log Gdp per capita, population density, regional population;
- δ represents a macro regional dummy and in particular the southern regions of Italy[8];
- ϵ is the error term;
- *i* represents each region, *t* the time and τ the time lag.

The indicator of AC has been created as the gap to one of the annual ratios between the number of changes in the councillors and the number of the councillors in office for each Italian region and year considered. While this variable is

[7] Method of standardization from Fischer and Schornberg (2007)

[8] The Southern regions are the following: Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna.

used directly when considering European SF absorption, when analysing health care mobility four dummies are constructed in order to represent different degrees of AC. The low level of continuity is considered as a baseline and dummies express medium-low, medium-high and high level of AC. Then, in order to create dummies, the distribution of the AC variable (as the average for data from 1989 to 2011) has been divided in quartiles. This choice is justified by the fact that health care system is a long-term policy, and its efficiency is incremental. Consequently, we hypothesize that it is not the change of one year in regional governments causing the efficiency in the health care services in Italian regions, but the overall trend of AC. Therefore, the average of the AC variable is considered between 1989 and 2011 because of the lag needed to AC to have some effect on a long term policy. Moreover, assuming that the positive or negative effect of AC is cumulative on health care services, the AC average between 1989 and 2011 may well explain the efficiency for each year, from 1995 to 2011.

Some precautions have been taken in order to avoid the possibility that the causal relation has an inverse relation from the response variable to SC, rather than the opposite: the analysis considers and controls for problems of endogeneity between AE and variables of SC using a temporal lag of five years in the case of health care mobility as response variable and one year in the case of analysis of EU structural funds absorption as *proxy* for AE. This choice is due to the difference between the long-term and the short-term policies. While the effect of the quality of social relations can be seen after long time in case of health care services, the control of the local society on the absorption of European structural funds is quite immediate.

5 Administrative Continuity and Administrative Efficiency

5.1 Analysis of Efficiency as Health Care Mobility

In Table 1 results for the first four models are summarized. The analyses aim to assess what is the effect of AC on AE (measured as health care mobility expenditure balance) when controlling for social relations as SC. In the first model we control for blood donations per capita as *proxy* of *bridging* SC, for people aged 25-34 living with their parents as *proxy* of *bonding* SC, and for economic and demographic variables. AC has a significant effect on AE. In particular, if a region is characterized by a medium-low level of AC, it receives 895 million of euro more compared to a region with a low level of AC. If its AC level is on a medium-high level, then money received for supplying health services is more than one billion compared to a region with a low level of AC. Finally, if a region is characterized by a high level of AC, than its gain is of roughly 3 billion more than the regions with a low level of AC.

In Model 2 we analyse the effect of AC on AE controlling for *bridging* and *linking* SC. The significant and positive role of AC is confirmed. Moreover, while the *bridging* SC has no significant effect, the *linking* SC has a significant and negative effect on the efficiency of regional administration.

In Model 3 we control for the effect of AC with *bonding* and *linking* SC: again the effect of AC on AE does not change, with a significant and positive effect. Moreover, while *bonding* SC has a significant and small positive effect, the *linking* SC has no significant effect.

Finally, in Model 4 we control for the effect of AC on AE with all the three components of SC. AC is significant and positively associated with AE. Within the components of SC only the *bonding* SC is positively associated with AE, while *linking* SC is significantly and negatively associated with AE.

In Model 5 the interaction between levels of AC and *bonding* and *bridging* SC is shown. The effect of *bridging* SC with increased continuity is more favorable than the effect of *bonding* SC (that is insignificant when coupled to

	Model 1	Model 2	Model 3	Model 4
log Gdp	217,7	106,4	-49,2	-40,5
	(256,6)	(276,6)	(239,7)	(243,0)
Density	-3,1**	-2,3*	-2,9**	-3,0**
	(1,4)	(1,4)	(1,4)	(1,4)
Population	61,2***	74,2***	76,9***	78,4***
	(6,2)	(7,74)	(7,2)	(7,5)
Continuity ML	894,9***	996,7***	822,7***	870***
	(328,1)	(355,8)	(298,1)	(313,7)
Continuity MH	1217,3**	1341,2**	1106,7**	1146**
	(479,6)	(515,6)	(463,4)	(472,4)
Continuity H	2932,8***	3398,7***	2942,9***	3041***
	(881,1)	(955,1)	(844,5)	(870,1)
Bridging_5	17,12	14,4		16,1
	(19,65)	(20,8)		(20,4)
Bonding_5	1,59***		1,94***	1,9***
	(0,45)		(0,5)	(0,5)
Linking_5		-109,6***	-110,2	-110,1***
		(20,01)	(20,4)	(20,5)
South	2718,7***	3536,8***	3018,6***	3104,7***
	(942,7)	(1013,2)	(913,2)	(934,5)
Intercept	-3344,2	-5011,2	-1509,4	-3250,7
	(3292,8)	(3818,2)	(3122,8)	(3381)
Observations	252	231	231	231
R-squared	0.61	0.66	0,7	0,7

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tab. 1: Determinants of regional efficiency as Health Mobility

	Model 5	Model 6	Model 7	Model 8
log Gdp	94,4	172,7	-108,1	-10,5
	(239,1)	(281,4)	(221,3)	(223,4)
Density	-2,21	-2,1	-1,4	-1,9
	(1,5)	(1,5)	(1,5)	(1,6)
Population	56,3***	64,9***	67,9***	66,8***
	(5,6)	(7,7)	(6,5)	(6,9)
Continuity ML	-316,8	1062,8**	57,84	363,1
	(366,1)	(523,2)	(546,9)	(523,9)
Continuity MH	96,7	635,2	310,9	284,4
	(500,2)	(649,1)	(617,0)	(609,9)
Continuity H	1493,9*	2599,8**	1694,3*	1654,5*
	(881,1)	(1054,8)	(943,4)	(981,5)
Bridging_5	-245,1***	-231,6***		- 195,3***
	(34,9)	(52,2)		(56,6)
Bonding_5	0,51		4,22***	2,4**
	(0,67)		(1,1)	(1,1)
Linking_5		-59,6	-250,1***	-125,5**
		(42,9)	(52,4)	(61,7)
Bridging_5 ML	242,2***	179,0***		155,4 ***
	(38,9)	(56,8)		(58,9)
Bridging_5 MH	309,6***	286,5***		262,0***
	(36,4)	(49,2)		(56,2)
Bridging_5 H	317,0***	280,9***		258,9***
	(36,3)	(48,6)		(56,2)
Bonding_5 ML	4,0**		0,23	1,7
	(1,6)		(1,8)	(1,7)
Bonding_5 MH	-1,66**		-5,07***	-3,9***
	(0,84)		(1,2)	(1,1)
Bonding_5 H	1,4		-1,8	0,2
	(0,9)		(1,3)	(1,2)
Linking_5 ML		-102,7*	98,4	-29,6
		(57,2)	(62,9)	(69,2)
Linking_5 MH		16,5	189,2***	61,3
		(49,3)	(56,2)	(65,0)
Linking_5 H		3,85	223,8***	120,3*
		(43,8)	(64,5)	(67,2)
South	2290,7**	3416,8***	2875,8***	2962,7***
	(880,2)	(1013,9)	(872,2)	(875,3)
Intercept	-3344,2	-5050,2	-1509,4	-2644,8
	(3292,8)	(3902,1)	(3122,8)	(3170,4)
Observations	252	231	231	231
R-squared	0.7	0.7	0,7	0,8

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tab. 2: Determinants of regional efficiency as Health Mobility 2

high continuity), controlling for wealth and demographic variables. In particular, when the *bridging* SC increases by 1 % and it is coupled by a medium-low level of continuity, the increase in the money a region perceives for the supplied health services is equal to 242,2 million of euro more compared to the situation in which the continuity level is low. If the level of AC is medium-high, coupled with an increase of 1% of blood donors (*bridging*), the increase in the amount of euro collected by a region, compared to the low level, equals to 309,6 million. Finally, in the case of the high level of continuity, the increase equals to 317 million. Also the increase in the *bonding* social capital appears positive when coupled with AC, but only with a medium-low level of AC. When coupled with the medium-high and high level of AC, the *bonding* SC is negative and not significant respectively. The effect on AC is confirmed to be highly positive for the AE.

In Model 6 we analyse the interaction effect among AC and *bridging* and *linking* SC. The effect of the interaction among AC and *bridging* is significant and positive. When AC changes from a low level to a high level, the increase of euro perceived by a region for health services is around 280 million. The interaction among AC and *linking* SC is, on the contrary, negative or not significant. In Model 7 the effect of AC on AE is controlled for *linking* and *bonding* SC. The interaction among *bonding* SC and AC is not significant or significant and negative, while the interaction of AC with the *linking* SC is positive when considering a medium-high an a high level of AC. The effect of a raise of AC on AE is very similar when it is coupled by the *bridging* and the *linking* SC, controlling for the interaction of AC with *bonding* SC. In Model 8 we consider the interaction of AC with all the three components of SC. AC coupled with *bridging* SC has a significant and positive effect. When it is coupled with *bonding* SC, the effect on AE is not significant or small and negative. When AC is coupled with *linking* SC, the effect on AE is significant only when the level of continuity is high.

In general, we find that AC has a significant and positive effect on AE, in the

case of a long-term policy as the health care service. Moreover, we find that the AC has a different effect on AE when coupled with the three components of SC. The AC is positively associated with AE when coupled with *bridging* SC, as we hypothesized. On the contrary, AC has a not significant or a negative effect when coupled with*bonding* SC. Finally, when coupled with *linking* SC, AC has a positive effect on AC. However, this positive effect is small compared to the effect by the *bridging* SC.

Furthermore, for all models, it is noticeable that Southern regions result more efficient compared to the others.

5.2 Analysis of Efficiency as EU Structural Funds

When measuring AE through the capability of using SF (Table 3), the results show that increased AC has a negative effect when it is considered without interactions with SC. Using the lagged continuity index (one year lag) and the lagged *proxies* of *bridging*, *bonding* and *linking* SC, there is evidence that, shifting from a degree to another in the index of continuity is associated with a decrease of the annual capacity of spending Structural Funds. In particular, the decrease equals to 2,4 million of euro, controlling for log GDP per capita, demographic variables and the level of *bridging* and *bonding* SC. The effect of an increase of the degree of *civicness* (blood donation) is negative for the absorption of structural funds, controlling for the level of continuity, *bonding* SC and for all the economic and demographic variables. The rise of a percentage point in blood donations (standardized for regional population) causes a decrease of 17000 euro of paid SF compared to the average of Italian regions. Moreover, the coefficient of geographical dummy shows that Southern regions have the capability to spend 16,2 million euro more than the other regions, controlling for the other variables. The response variable is built in a way that already controls for the higher SF allocations to Southern Regions.

The results do not change much when controlling for all the three component of SC. In general, AC and *bridging* SC are significant and negative associated

to AE. On the contrary, the effect of *bonding* and *linking* SC is not significant on the AE.

In Table 4 we show the interactions between SC components and continuity index. In Model 13, the interaction among continuity index and *bridging* SC is significant and positive, controlling for economic and demographic variables. This confirms that SF are better absorbed if there is an increase in the government continuity when also *bridging* SC is at a high level. This also shows that the contribution of *bridging* SC is very large relatively to the contribution of *bonding* SC, that instead is not significant. Particularly, when the continuity index increases by a point and the blood donations increase by a percentage point, the increase of paid SF is equal to 1,4 million of euro comparing to the Italian average (controlling for other variables). In this case the dummy for the Southern regions is again significant and positive.

In Model 14 we show the interaction effect of continuity index with *bridging* and *linking* SC. The findings do not change particularly. As in the case of Model 13, only the interaction among continuity and *bridging* SC is significant and positive. The level of *linking* SC do not affect the AE when coupled with AC. On the contrary, the effect of *Linking* SC is significant and negative when not considering the interaction. In Model 15 it is shown the same analysis considering *linking* and *bonding* SC interaction with AC, but both interactions have a significant association with the AE. Finally, in Model 16 the analysis is conducted on the interaction of continuity index with the three components of SC. It is confirmed that only the interaction among continuity and *bridging* SC has a significant and positive effect on the AE.

5.3 North-South dualism: evidence from the analysis

This research has not as a primary aim the analysis of the "Italian dualism", however, it is interesting to discuss the results of the current analysis in the light of this debate.

Indeed, differences in the quality of governments between Northern and South-

	Model 9	Model 10	Model 11	Model 12
log Gdp	107,6*	109,8	75,2	108,9*
	(63,1)	(62,8)	(62,9)	(63,1)
Density	0,2	0,07	0,2	0,1
	(0,3)	(0,3)	(0,2)	(0,3)
Population	0,4	1,6	3,2**	1,3
	(1,2)	(1,3)	(1,3)	(1,4)
Continuity_1	-24,1**	-24,2**	-24,4***	-23,9**
	(9,5)	(9,5)	(9,4)	(9,4)
Bridging_1	-0,2***	-0,2***		-0,2***
	(0,04)	(0,04)		(0,0)
Bonding_1	-0,12		-0,1	-0,1
	(0,1)		(0,1)	(0,1)
Linking_1		-6,61	-4,3	-6,2
		(4,4)	(4,9)	(4,5)
South	168,2**	207,3**	209,8**	205,2**
	(82,3)	(85,1)	(88,1)	(85,8)
Intercept	-1195,7*	-1236,6*	-976,5	-1216*
	(706,8)	(703,6)	(710,1)	(705,8)
Observations	334	334	334	334
R-squared	0,2	0,2	0,2,	0,2

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tab. 3: Determinants of regional efficiency as Structural Funds

ern regions represent a constant outcome by the analyses dealing with the Italian case[9]. When treating the problem from a sociological (Cassano 1996) or economical (Viesti 2009) standpoint, the lack of *civicness* seems to be the main issues for Southern Italian regions, in line with the findings of Putnam et al. (1993). Accountability and transparency are seen as main factors of change (Viesti 2009; Trigilia 2011; Barca 2009, 2012). However, the results of this analysis are not in line with previous research in the field (e.g. Giordano and Tommasino 2011). In particular, here it is shown that, when controlling for economic and demographic variables, the Southern regions are more efficient in the use of SF and in health care mobility expenditure.

Results by our analysis show better performances by Southern regions in terms

[9] Recent evidences on EU regions are reported in Quality of Government Institute 2010.

	Model 13	Model 14	Model 15	Model 16
log Gdp	103,5	106,9*	72,2	105,1
	(63,9)	(63,1)	(63,2)	(63,8)
Density	0,2	0,07	0,2	0,1
	(0,3)	(0,3)	(0,3)	(0,3)
Population	0,5	1,6	3,1**	1,3
	(1,2)	(1,3)	(1,3)	(1,4)
Continuity_1	-69,8**	-75,1**	-54,8*	-77,5**
	(29,1)	(32,6)	(33,1)	(33,3)
Bridging_1	-0,3***	-0,3***		-0,3***
	(0,07)	(0,07)		(0,1)
Bonding_1	-0,4		-0,4	-0,2
	(0,3)		(0,4)	(0,4)
Linking_1		-9,5*	-6,0	-8,7
		(5,7)	(7,6)	(6,65)
Continuity Bridging_1	14,8*	15,7*		15,4*
	(8,1)	(8,2)		(8,0)
Continuity Bonding_1	0.3		0,4	0,2
	(0,4)		(0,4)	(0,4)
Continuity Linking_1		3,6	2,8	3,2
		(6,3)	(7,8)	(7,0)
South	163,6**	202,2**	201,2**	198,9**
	(83,1)	(85,9)	(89,3)	(87,5)
Intercept	-1112,5	-1160,2	-912,8	-1129.3
	(718,2)	(708,6)	(714,8)	(717,0)
Observations	334	334	334	334
R-squared	0,2	0,2	0,2	0,2

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tab. 4: Determinants of regional efficiency as Structural Funds 2

of AE when considering both health care mobility and absorption of structural funds. Although data for these two *proxies* are more favorable for Northern regions, when the geographical location is controlled for, and demographic variables (density and population) and the log GDP per capita are taken into account, than Southern regions result more virtuous. The geographical dummy is not significant when considering only the log of GDP per capita. Considering health care mobility, the explanation of these results can be found in the fact that the health care system quality assessment is related to demographic variables (economies of scale).

Looking at the capability to absorb EU structural Funds, the results point again at the demographic factors for the explanation of the virtuosity of Southern regions.

In conclusion, the results suggest that Southern delays may be also explained by demography, and above all by total population, since the geographical dummy is more significant when analysing only population as control. The policy implication is that demographic variables need to be carefully accounted for when considering the management of public services and when assessing their supply efficiency. These findings raise some questions requiring further analysis.

6 Conclusions

The influence of administrative continuity on the efficiency by regional governments in different social contexts has been assessed in this work through the use of panel data related to Italian regions and covering a time frame of seventeen years. The analysis highlights that, when controlling for *bridging*, *bonding* and *linking* SC, administrative continuity has a positive effect for strengthening long term and short term policies. This finding confirms that AC plays a positive role in regional governments. In fact, it assures regional administrations to have time for taking decisions aiming at long term objectives, without the contingent strain for the satisfaction of just immediate needs.

This also confirms findings by Milio (2008). When considering short-term policies and controlling for *bridging*, *bonding*, and *linking* SC, administrative continuity has a negative effect on the administrative efficiency. In other words, when the effect of a policy is expected to be produced in the short term administrative dis-continuity in local governments has a positive outcome. This may be due to the need by the regional governments to provide the community with immediate results.

The research also assessed the role and the effect of administrative continuity on the regional government efficiency when interacting with different levels and

components of SC. Although the AC represents a positive element for regional governments, the analysis shows it has a diversified impact on regions with different levels of *bridging*, *bonding* and *linking* SC.

Indeed, when considering long-term policies, the interaction among administrative continuity and *bridging* SC produces a strong positive effect on the efficiency of regional administrations. We also find a positive effect on efficiency by the interaction among administrative continuity and *linking* SC has been also found. On the other hand, the interaction among administrative continuity and *bonding* SC produces a negative effect on the level of efficiency. In fact in this case, AC is likely to encourage inefficiency probably because it results in political patronage. These findings oppose Olson's standpoint (Olson, 1984), whereby administrative continuity is coupled with corruption in every situation and in all contexts. This work shows that the relationship between administrative continuity and administrative efficiency depends on the quality of the SC existing in a region.

In particular, *bridging* SC contributes to the positive effect by administrative continuity, both in case of short and long term policies. Instead, *bonding* SC appears to be negative if combined with administrative continuity in case of long term policies and irrelevant in short term policies. Finally, the presence of *linking* SC contributes positively, rendering AC to be positive on efficiency in the case of long term policies. It is, instead, irrelevant for short term policies. A possible explanation, confirmed by the literature (e.g. Milio 2008; Nannicini 2010), is that a positive relation between *bridging* SC and administrative efficiency occurs because the former component of SC promotes a broader "control" on the public administrations, and probably, this condition is the starting point for the creation of a virtuous circle of good practices.

In the lack of a certain level of *civicness* (Putnam 1993), triggering the "control" by the people on the management of public goods, administrative continuity easily leads to widespread patronage. As a consequence, regions with a scarce level and quality of social capital are affected negatively by an increase

in administrative continuity. Therefore, In this cases, more discontinuity would be recommended in local administrations in order to avoid clientelistic behavior. As shown in the analysis, this correlation is more evident when assessing the outcomes of long term policies, probably because of an higher difficulty by policy-makers to pursue long-term strategies that produce innovative policies in contexts where the level of *bonding* SC is higher than *bridging* and *linking* SC.

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7 Appendix

Regions	Category
Piemonte	Medium High
Valle d'Aosta	High
Lombardia	Medium High
Bolzano	High
Trento	High
Veneto	Medium High
Friuli-Venezia-Giulia	Medium High
Liguria Medium	High
Emilia-Romagna	High
Toscana	High
Umbria	Medium High
Marche	High
Lazio	Medium Low
Abruzzo	Medium Low
Molise	Medium Low
Campania	Medium Low
Puglia	Medium Low
Basilicata	Medium Low
Calabria	Low
Sicilia	Low
Sardegna	Low

Tab. 5: Regional Continuity Classification on average 1989-2011

Spatial interaction and nonlinearities in the levels of Quality of Government in Europe

Abstract

This research analyses the spatial interaction of Quality of Government (QoG) among European regions, with the aim to provide policy advices for the design of European regional policies tailored to diverse local institutional contexts. Using classical spatial econometrics, the research studies different mechanisms of spatial interaction and explains heterogeneous interaction effects on space. In particular, the analysis distinguishes two mechanisms of spatial interaction: competitive learning/imitation and pure competition/cooperation mechanisms. It verifies differences in the spatial interaction among groups of regions. When studying the competitive learning/imitation mechanism, findings suggest autonomous regions interact spatially more compared to not autonomous ones. Moreover, the effect of the spatial lag is greater among "lagging regions" (southern regions) compared to "leader regions" (northern regions). When analysing the pure competitive mechanism, there is no evidence of spatial interaction among autonomous regions, while the spatial lag is significantly positive among the not autonomous ones. "Leader regions" interact strongly within a pure competitive network, while there is not evidence of a significant spatial interaction among "lagging" ones. Finally, by using a semiparametric spatial lag model, the analysis verifies the hypothesis of a nonlinear effect by wealth and demographic variables on QoG levels. The evidence suggests a heterogeneous effect by Gdp and a mostly linear effect by demographic variables on levels of QoG, controlling for the spatial interaction among European regions.

1 Introduction

In recent years research on Quality of Government (hereafter QoG) has received an increasing attention by comparative political researchers such as La Porta et al. (1999), Kaufmann, Kraay and Mastruzzi (2011), Rothstein and Teorell (2008), Tabellini (2010), Charron, Dijkstra and Lapuente (2013), Fukuyama (2013). This research interest follows the previous large attention on the relation between democratization and people's well-being. Since the third wave of democratization, numbers of countries have transitioned to democracies, yet very few have experienced prosperity in the people's well-being, according to many of the standard measures used. Indeed, Holmberg, Rothstein and Nasiritousi (2009) report weak or even negative relation between the level of democracy and many standard measures of human well-being (Gdp per capita, poverty, equality, life expectancy, infant mortality, etc.) at country level. Carothers et al. (2007) argue that a quarter century of democracy promotion has brought "bad governance" resulting in an increased level of corruption by ruling elites, therefore favoring abuse and favoritism in the management of administrations. As argued by Rothstein and Teorell (2012), the focus on QoG is a reaction to lack of significant causality by democracy to explain well-being. Only when democracy is coupled by high levels of QoG, it is favorable to better quality of life. As Charron, Dijkstra and Lapuente (2013) underline, several scholars have proved QoG is a key factor explaining the level of well-being of individuals, since it is highly correlated to many of those characteristics determining better quality of life by people in a country. Rothstein (2013*b*) broadens the positive effects of QoG on society translating into benefits, such as absence of violence, trust, political legitimacy, democratic rights, and welfare gains. Recent researches, such those by Charron and Lapuente (2013), Charron (2013), Rothstein (2013*a*), are dedicated to explore differences in levels of QoG and in perceptions of corruption among European regions and countries, in an attempt to spot key factors determining those differences. On the contrary, several schol-

ars, such as Seldadyo, Elhorst and De Haan (2010) and Kelejian, Murrell and Shepotylo (2013*a*), examine diffusion of corruption and institutions at country level. Surprisingly, no effort have been made to analyse spatial interaction among European regions in levels of QoG. The work presented here wants to fill this gap, by analysing the key factors affecting levels of QoG at regional level in Europe, and assessing the mechanisms presiding its diffusion. The comprehension of mechanisms of regional QoG diffusion brings important implications in terms of policy. The European regional policies should be tailored-made or context specific and should take account of levels of quality of institutions in place, as suggested by Barca (2009) and Leonardi (1995). Therefore, it seems necessary to analyse how regional institutions affect each other when building a strategy for regional development in Europe. After defining the concept of QoG and summarizing the literature on policy diffusion in the first section, the research focuses on the theoretical basis underpinning the interaction of QoG. The third section explains the spatial interaction by QoG across European regions, using spatial econometric tools. The aim is to understand differences in "clubs" of regions when studying different interaction mechanisms. Therefore, the analysis focuses on assessing diversities among the leader regions and the lagging ones and among autonomous and not autonomous regions. Furthermore, nonlinearities are assessed in the causal relation of economic and demographic variables on levels of QoG. Finally, conclusions summarize analysis findings and supply policy implications.

2 The concept of Quality of Government

Defining QoG is by default a challenging issue. Although there is a broad consensus about the positive influence of QoG on the society well-being, there are diverse views about the conceptualization of this term. The World Bank provides a broad definition of governance, as stated by Kaufmann, Kraay and Zoido-Lobatón (2000): "the traditions and institutions by which authority in a

country is exercised". This definition includes the process through which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; the respect by the citizens and the state for the institutions that govern economic and social interactions among them. The 'standard' indicators used in literature for assessing levels of quality of government at country level are from datasets by the World Bank (The Worldwide Governance Indicators - WGI) and by the PRS group (International Country Risk Guide - ICRG), both inspired by the previous definition: Anthonsen et al. (2012) consider corruption, bureaucratic quality and law and order by ICRG; Charron (2009) and Charron and Lapuente (2011) consider the composite indices by ICRG and WGI; Seldadyo, Elhorst and De Haan (2010) and Kelejian, Murrell and Shepotylo (2013*a*) use the World Bank Indicators.
Nevertheless, some scholars, such as Rothstein and Teorell (2012) and Fukuyama (2013), agree on the lacking of practical conciseness by this definition. Keefer (2004) argues this definition includes almost all political science and political economy subjects, since as stated by Rothstein and Teorell (2012), it includes both the manners in which people participate to political life and the capacity of institutions to implement 'sound policies'. The need to narrow the concept is evident. Following Rothstein and Teorell (2012), a definition of QoG should be clear and avoid opinions on what 'sound policies' are. As suggested by Talbott (2005), the risk of not taking into account some ethical aspects but only the efficiency or effectiveness of governments, is the overshadowed of human rights. Then, a normative approach should be considered. At the same time, there is the necessity to assess the effectiveness of governments behave. Finally, the concept should be applied universally, for comparative purposes. That means that no institutional arrangement should be considered. To identify the government effectiveness, Rothstein and Teorell (2012) propose the 'impartiality' in the exercise of public power, being it independent by institutional arrangements. Impartiality has the characteristic to be normatively adequate in the context of quality of government. At the same time, it is not difficult to measure impartial-

ity in the supply of public services (through surveys) to proxy the effectiveness of government policies. On the output side (policies effect), impartiality implies that governments will be coherent with the principle of merit and qualifications when recruiting administrators, rather than following clientelistic, ideological or socio/ethnic logics. Therefore, through meritocracy in the selection of public servants, governments promote more professional skilled public servants that will increase the quality of the government services, i.e. the outputs.

Fukuyama (2013), on the other hand, defines governance as a "government's ability to make and enforce rules, and to deliver services, regardless of whether that government is democratic or not" (p.4) and suggests that concept of quality of governance should be combination or interaction of two dimensions: capacity and autonomy. Capacity in terms of resources and bureaucratic professionalism and autonomy in terms of the nature and mandates by the principal. Combination of those two dimensions, higher level of capacity and less rules or directions, provides the desirable "sweet spot", i.e. quality of governance. According to Fukuyama, QoG can and should be empirically measured. He suggests that by measuring taxation and tax collection one can approximate the resources (capacity dimension). Yet, he also raises many issues with the uncertainty and problems that come up with taxation as a measure. Although he argues that Rothstein recruitment based on "merit" is problematic to define (what is merit), yet the professionalism dimension of the capacity seems to be an approximation of the term "merit". Moreover, Fukuyama argues that "to say that a bureaucrat is selected on the basis of 'merit' does not define merit, nor does it explains whether the officials skills will be renewed in light of changing condition or technology." Yet, the same stands for bureaucratic professionalization. Professional and educated administrations (term related to merit) is not a prove itself of a maximized performance by such administration in the future. However, it is logical to assume that professionalization is a way to maximize productivity, i.e. maximizing every administrative aspect included the collection of resources. If we assume that someone is more professional and qualified for one position,

we expect that he/she will perform better than any other person with lower qualifications. Of course, hypothetical situation might be challenged by reality. Nevertheless, it does not mean that such hypothetical expectation is not reasonable assumption.

From this standpoint, there is no need to separate resources from professionalization, because if one assumes that there is maximization of the professionalization, then such bureaucracy will also maximize the capacity in term of resources (taxation). More skilled tax collectors are well suited for this position, therefore they are expected to collect taxes better than any other less qualified administrators. On the other hand, it is arguable how society can achieve such a professionalization, or even to which extent one can measure professionalism with certainty. Nevertheless, Rothstein's concept provides reasonable assumptions and less categorization.

In conclusion, the concepts that have been described are fairly close and built upon the same principles, that exclude any type of favoritism, clientelism, patronage and corruption in the management of public goods and services. The concept of QoG here adopted is the one by Rothstein and Teorell (2008), and has an explicit normative content. In fact, the *proxy* for QoG used in this research reveals perceptions by individuals on levels of corruption in public services, on unequal treatment of people using pubblic services, on quality of public services; all aspects affected by regional governments. A detailed list of the variables used to build the composite measure of QoG is provided in the appendix.

2.1 Interaction of QoG at regional level in Europe

Several studies have assessed the mechanisms of diffusion of policies and interaction of institutions by considering exclusively the country level. The importance of geographical proximity is underlined by several studies on regime transitions, such as Starr (2005), O'Loughlin et al. (1998), Gleditsch and Ward (2000), Starr and Lindborg (2003), Gleditsch and Ward (2006), Elkink (2011), and on diffusion of conflicts, such as Murdoch and Sandler (2004), Salehyan and Gled-

itsch (2006), Buhaug and Gleditsch (2008). Thereafter, geographical proximity is found as a key factor also in the studies on policy diffusion, such as Haider-Markel (2001), Mintrom and Norman (2009), Mooney and Lee (2000). Kelejian, Murrell and Shepotylo (2013*a*) underline the importance of geography in the diffusion of institutions, following the arguments by Crafts and Venables (2003) who consider the distance as a key factor in the explanation of trade and development performances: a close distance favors the spread of both formal and informal institutions. Since the diffusion of knowledge is easier among countries with similar culture and economic/social conditions, and since it is more likely that these factors are more similar in bordering countries, geographical distance represents a serious obstacle to the diffusion of those practices. Others scholars consider connections among states as related to trade flows, to participation to intergovernmental organizations and alliances. Some examples are found in Cao (2009), Greenhill, Mosley and Prakash (2009), Lazer (2011) and Strebel (2011). Qian and Roland (1998) assume an improvement of institutions as an effect by competition for foreign direct investments. Casella (1996) underlines the importance of the standard international coordination among private entities as source of institutional diffusion. Bikhchandani, Hirshleifer and Welch (1992) underline the importance of information in the decision to imitate institutions. Murrell, Dunn and Korsun (1996) refer to cultural and economical similarities causing the imitation especially between neighbours. Elkins and Simmons (2004) explain how there is a positive political pay-off in implementing successful policies of foreign countries. The mechanisms of policy and institutions diffusion are heterogeneous and complex: Mukand and Rodrik (2002) focus on the processes of experimentation and imitation of policies, where the former gives the possibility to build 'ideal' policies but the risk is to be wrong, while the latter eliminates that risk but is subject to the inappropriateness of the policy. They show how informational externalities by good practices, generated in some countries, benefit institutions of those neighbors that have a similar economic and social context, while damage institutions in those countries that have an 'intermediate' degree

of similarity. Shipan and Volden (2008) disentangle four mechanisms of policy diffusion among cities: economic competition, learning, imitation, and coercion. As underlined by Holmberg, Rothstein and Nasiritousi (2009), the World Bank and the United Nations emphasise the centrality of good governance especially in the developing countries because it encourages development. Understanding the mechanisms of diffusion of institutions has a great influence in the design of policies to foster the creation of better quality of government, especially in "low developed" countries. Kelejian, Murrell and Shepotylo (2013*a*) verify how the creation of institutions in one country has the characteristics of a public good, with the property of "undersupply when the focus is solely on one country's welfare" (pg. 311). Consequently, they suggest that, in order to foster development in countries resistant at the institutional change, the aid should be given also to neighbors. Similar results are found by Seldadyo, Elhorst and De Haan (2010) that identify spatial clusters of well/poorly governed countries. Despite important researches have been conducted on QoG at regional level in Europe (see Charron and Lapuente, 2013; Charron et al., 2013), spatial interaction/diffusion of QoG has not been considered at regional level. This work is meant to verify if the phenomena of spatial interaction is significant among European regions as it is among European countries, and, more importantly, which differences are observable among mechanisms acting at regional level when compared to those acting at country level. Levels of QoG within European regions show a large variance; nevertheless, the existence of spatial clusters is clear (see figure 1), where the higher level of QoG is present in the northern regions, while a medium-low level in the southern regions. In figure2 is represented the variogram of QoG. It is evident the spatial autocorrelation among QoG levels, with the maximum value around 2000 km.

Researches on the interaction/diffusion of governance or institutions consider several mechanisms, but no clear theoretical framework is shown. Conversely, this attempt has been made in the context of policy diffusion. Several

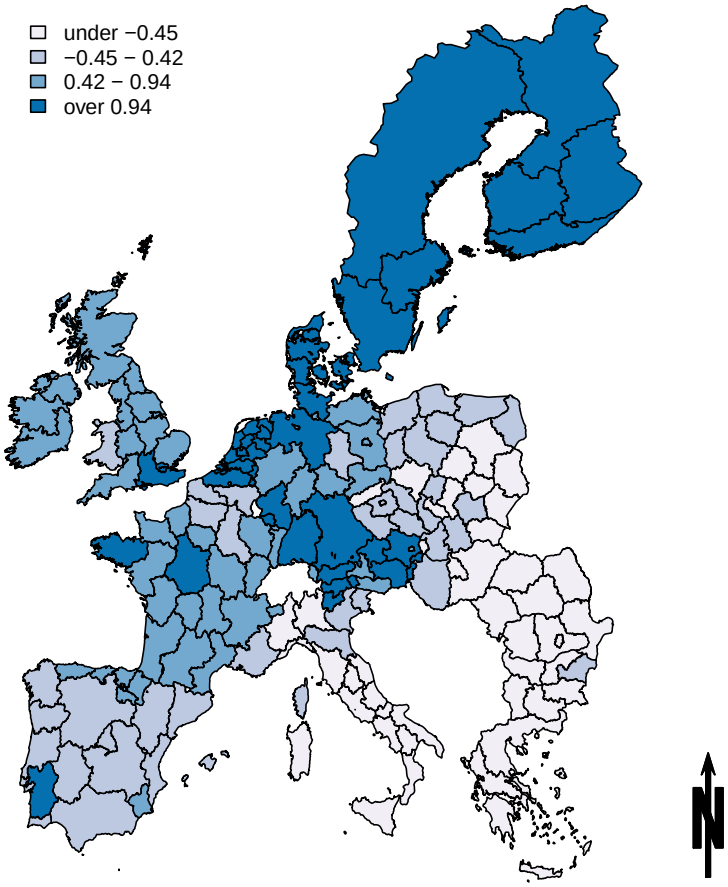

Fig. 1: Distribution of the Quality of Government Index (QoG) across Europe's subnational regions.

examples are by Braun and Gilardi (2006), Franzese and Hays (2008), Shipan and Volden (2008). As underlined by Franzese and Hays (2008), spatial interaction mechanisms may be differentiated by diffusion mechanism among European regions. Since we want to analyse the mechanisms which allows the QoG of a region i to directly affect and be affected by the QoG of another regions j in Europe, it becomes necessary to make a distinction between a direct effect by the neighbours' QoG in a regions, from the endogenous factors affecting the level of QoG in that region. Avoiding this distinction might cause the Galton's

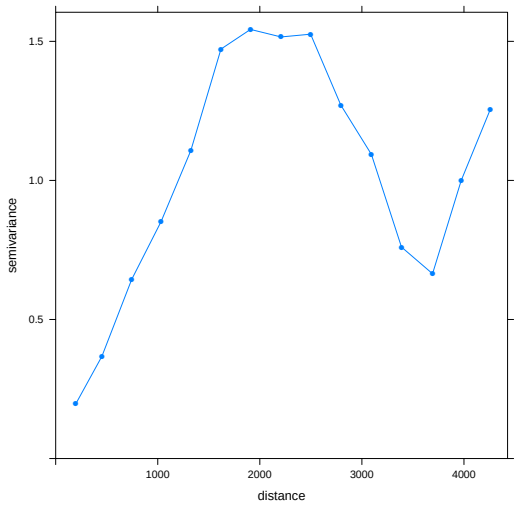

Fig. 2: The distribution of the Quality of Government Index (QoG) across Europe's subnational regions.

problem, i.e. analysing the independent factors when the aim is to focus on the interdependences between countries decisions. Braun and Gilardi (2006) make distinction between diffusion and "spurious diffusion", i.e. "the fact that a pattern may look like diffusion even though it is not driven by diffusion", but it is driven also by "internal determinants", as Berry and Berry (1990) suggest, or by "prerequisites", as Collier and Messick (1975) argue, or by "common contextual effects", as stated by Van den Bulte and Lilien (2001). The way to solve this kind of problem is the inclusion in the theoretical and empirical models of endogenous factors affecting levels of QoG.

3 Theoretical Model

The analysis aims to explain the QoG interaction through two mechanisms: the competitive/cooperative network among regional governments and the learning/imitative mechanism of interaction. We assume that the level of QoG is due to regional decision makers (government and public services bureaucracies). Other two agents in our model are enterprises and the citizens/voters. They are both assumed to move freely across regions. As Wood and Bohte

(2004), we assume regional governments' actions, when designing public services through administrative agencies, aim to increase the possibility of being re-elected. Therefore, decision makers benefit by a certain level of QoG because of the utility deriving from the possibility of being re-elected. We assume this is function of two effects. A direct and an indirect effect. The direct effect regards the vote by citizens when the level of QoG increases. Citizens looking for a better quality of life (closely associated to a better QoG) will reward the government for an increase in QoG and will punish for a decrease of it; by assuming an equal level of taxation for every region, we consider voters' locational and electoral choices as a function of the level of QoG. The indirect effect regards the fact that voters repose their electoral decisions on quality of life and economic factors, that in turn depend by the presence of enterprises in the region. This is because an high QoG is related to an higher degree of cooperation among enterprises. As suggested by Rothstein and Teorell (2008), the capacity to supply public services impartially augments the degree of trust among enterprises. Trust among enterprises reduces transaction costs, through a process of competition/cooperation, as underlined by the broad literature on regional systems of innovation (e.g. Semlinger, 2008). Agglomeration of firms is determined by the reduction of transaction costs, as Krugman (1991) argues. Then, we assume the change of QoG influences the location choice of enterprises. In particular, enterprises move, inside a network of regions and based on their economic specialization, where QoG is greater. Consequently, we expect that if a region i increases its level of QoG, neighbours $j \neq i$ will react by raising their level of QoG too, thus avoiding the moving out of enterprises towards region i. Furthermore, we consider the costs of making a change in levels of QoG as political transaction costs, that are, as suggested by Wood and Bohte (2004), "those costs associated with monitoring and maintaining the principal-agent contract with the administering agency". Political transaction costs are generally non-monetary. They include the "difficulty of obtaining information about agency activities, the difficulty of intruding into agency pro-

cess, and the difficulty of generally altering agency policy". Political transaction costs "decrease the efficiency with which political actors can mold and shape the bureaucracy". Considering the QoG as the degree of impartiality in offering public services, the decision makers utility of having a certain degree of QoG is a function of the payoff derived by the re-election and the costs to obtain it:

$$U_i(Q_i) = F(\Omega(Q_i), K(Q_i, Q_j)) \tag{1}$$

Where:

Q_i represents the QoG of a region i;

$\Omega(Q_i)$ is the payoff derived from the possibility of being re-elected in a region i;

$K(Q_j)$ is the cost of a certain level of QoG in the region i, depending only by the level of QoG of that region.

The interaction among institutions may be explained through the general mechanism of strategic interdependences developed by Besley and Case (1995): "strategic interdependence arises whenever some unit(s)'s actions affect the marginal utilities of the alternative actions for some other(s)". Following Franzese and Hays (2008), we assume a strategic interdependence between marginal utilities of two regions i and j:

$$U_i \equiv U_i(Q_i, Q_j)$$

$$U_j \equiv U_j(Q_j, Q_i)$$

Strategic interdependence between regions i and j may be represented by best response functions:

$$R(Q_i) \equiv max(U_j(Q_j, Q_i)$$

$$R(Q_j) \equiv max(U_i(Q_i, Q_j)$$

The first derivative of the utility function with respect to Q_i is set as equal to zero and solved for Q_i^* as function of Q_j: $Q_i^* = R(Q_j)$

The slopes of these best-response functions depends on the ratios of second cross-partial derivatives:

$$\frac{\partial Q_i^*}{\partial Q_j} = -(U_i(Q_i, Q_j)/(U_i(Q_i, Q_i)$$

$$\frac{\partial Q_j^*}{\partial Q_i} = -(U_j(Q_j, Q_i)/(U_j(Q_j, Q_j)$$

If the governments are maximizing their utility, the second-order condition guarantees that the denominators in the above equation are negative.

Therefore, the slopes depend directly on the signs of the second cross-partial derivatives (i.e. the numerator). If $U_{i,j}(Q_iQ_j) > 0$, the slope of reaction functions is positive. If $U_{i,j}(Q_iQ_j) < 0$, the slope of reaction functions is negative. As Brueckner (2003) suggests, if the second cross-partial derivative is zero, there is not strategic interdependence with flat best response functions. As in Franzese and Hays (2008), the actions of governments, in the case reaction function is positive, is defined as "strategic complements", that is the case in which the actions by the two regions go to the same direction. In the opposite case, actions by regions are defined "strategic substitute".

4 Hypothesys

As mentioned, several mechanisms of policy diffusion have been proved to be in place at country level. Following several studies on policy and institutions interaction, such as Braun and Gilardi (2006), Elkins and Simmons (2005), Simmons, Dobbin and Garrett (2006), Franzese and Hays (2008), Shipan and Volden (2008), the most recognised mechanisms of diffusion are the following: learning, emulation, competition/cooperation. The aim of this paper is to verify not only the interaction among regions on their QoG, but also the existence of "asymmetric effects". Indeed, in literature a number of hypothesis have been

formulated on possible asymmetries in policy diffusion: Kelejian, Murrell and Shepotylo (2013*a*) explain that it might be easier to learn by emulating better examples rather than avoiding worse ones. Shipan and Volden (2008) sustain that bigger cities are less involved in economic competition and interact less with other regions compared to the others. Starting from these evidences, we formulate four hypothesis.

Hypothesis 1: Competitive Learning/Imitation

We hypothesize that spatial interaction among levels of QoG is in the form of "strategic complements": mechanisms of learning and imitative competition are in place among European regions. Elkins and Simmons (2005) argue the process of learning might be in place in different ways. Regions may learn from the "success" of neighbors: in this case a region learns from the best performing ones; learning can happen through "communication networks": we expect that regions with close relations in place with each other (both at level of government and privates) are the most successful in the acquisition of this knowledge. Imitation is instead the process of interaction through adopting policies, considered socially proper. The interaction of QoG through this process may fall, as in the case of learning, in that of "strategic complements". Braun and Gilardi (2006) consider the "taken for grantedness" process of interaction: "some practices may become accepted as the normal or even the obvious thing to do in given contexts". Braun and Gilardi (2006) consider, in the same way, the process of "Symbolic Imitation". Therefore, the analysis checks if the level of QoG is affected by neighbors, considering that the "obvious" level of QoG in region i is affected by the level of QoG of the neighbors j. Following Shipan and Volden (2008), the model assesses whether the process of interaction is different among groups of regions distinguishing among those with high levels of QoG (leader regions) and those with low levels of QoG (lagging regions).

Hypothesis 2: Pure Competition/Cooperation

The second hypothesis regards the mechanism of pure competition: spatial interaction in levels of QoG, based on pure competition, is expected to be high among leader regions, while it is expected to be low among lagging regions. Competition or cooperation are useful processes for the acquisition of scarce resources by regions. This typologies of interaction fall both in "strategic complements" and "strategic substitutes" concepts.

As Charron, Dijkstra and Lapuente (2013) suggest, the level of QoG is linked to many aspects of well-being: QoG is associated with economic performances, as stated by Knack and Keefer (1995), Mauro (1995), Mo (2001); it is associated to higher environmental sustainability, as argued by Morse (2006) and Welsch (2004); it causes lower income inequality and poverty, as shown by Gupta, Davoodi and Alonso-Terme (2002); it is associated to better education and health outcomes, as demonstrated by Mauro (1998); it determines also higher levels of subjective happiness, as underlined by Frey and Stutzer (2000), and causes lower probabilities of civil armed conflict as noticed by Öberg and Melander (2010).

Therefore, regions compete/collaborate each other in order to obtain better life conditions through better QoG. On the other hand, since QoG has positive spillovers, there may be a "free-rider" behaviour.

Spatial interaction based on competition of regional governments is influenced by the the presence of "leaders" and "laggers". We expect interaction among leader regions are stronger compared to those among lagging ones, since "good" governments (regions with a high QoG) are more ready to react to changes by their competitors, and citizens of successful regions are more ready to "punish" their government in front of an improvement of levels of QoG by their neighbor competitors. In the analysis we assume pure competition mechanism works among regions with a similar technological structure.

Hypothesis 3: Decentralization

The third hypothesis considers the differentiation among autonomous and not autonomous regions. In particular, we hypothesize that autonomous regions imitate and compete more. As Ward and John (2013), we assume the political cost of an improvement in the QoG is not linear according to the level shown by a region. More specifically, the cost for augmenting levels of QoG is higher as the level of QoG by regions increases. Tanzi (2001) stands higher decentralization leads to differences in QoG inside a country. Gerring and Thacker (2004) underline the difficulties by autonomous governments in managing the process of decision making, while Watts (1996) argues that higher decentralization influences positively the level of QoG. Finally, Charron, Dijkstra and Lapuente (2013) do not find these evidence in case of countries. We expect regions with more freedom in administration have an higher capacity to interact in term of QoG. In terms of costs, it means that autonomous regions should have less political costs in rising their level of QoG.

Hypothesis 4: Non Linear Effect of Gdp on QoG

This hypothesis considers the relation among wealth and levels of QoG. In particular, we hypothesize that the effect of a raise in wealth has a non linear influence on levels of QoG. We expect that the raise of Gdp per capita is more important in term of raise of levels of QoG when a region presents a low starting level of Gdp per capita. On the contrary, we expect to find that a rise in Gdp per capita in regions where wealth is already high, has a weak influence on the level of QoG. In other terms, we hypothesize a threshold does exist in terms of the wealth endowment, after which the level of QoG is less affected by a rise in Gdp level.

5 Quantitative Analysis

5.1 Competition Network

In the analysis two typologies of Competitive network have been used: one to describe the imitative/competitive network, and one considering the pure competitive network. As stated by Ward and John (2013), decision-makers may be able to learn how to increase the level of QoG from other regions. Learning reduces political transaction costs. For decision makers is more simple to learn by those regions with whom they have more relations. We assume that regional interrelations are due to economic transactions. Consequently, we use the same network for pure competition and for learning/imitating mechanisms.The first typology is highly constrained by geographical proximity within a certain distance[1] (figure 3). The second is not limited by proximity, but it is influenced by it. In fact, in order to build a pure competitive network matrix, an inverse distance matrix has been used, because all regions are considered as embedded in such a competition network, even if the closer regions are competing more intensely. The aim is to create an index able to explain the competitive pressure that generally enterprises are subjected to, when moving out from a region towards another. Literature regarding spatial interaction of institutions and efficiency in the supply of public services commonly identifies the weight matrices reflecting only the geographical factor, as in Kelejian, Murrell and Shepotylo (2013*b*) and Seldadyo, Elhorst and De Haan (2010). Conversely, Ward and John (2013), when analysing diffusion in the performances of larger English local authorities, consider the competitive pressure to which enterprises are subjected by taking into account the technological similarity. They assume that the more two localities are technologically similar, the more an interaction is plausible among them. There is an on-going debate in regional economics among two

[1] In this model the threshold has been set at 400 km. A common approach is adopted to compare log-likelihood function values in the spatial autoregressive model and to use the weights that exhibit the highest value in the model. In particular, it consists of the nearest neighbors matrix within 400 Km.

major ideas related to the externalities leading firms to agglomeration in specific areas (Beaudry and Schiffauerova, 2009). The first idea by Marshall (1890) states that enterprises have incentives to agglomerate in certain geographical areas because of positive externalities due to specialization: higher knowledge interaction, lower transport costs, and the availability of skilled workers. The second idea by Jacobs (1970) is related to the benefit enterprises receive from a greater technological diversification because a more diversified market is open to new ideas, then to innovation and growth. Boschma and Iammarino (2009) solved this discussion referring to the concept of *related variety*: the innovation process is fostered when diversity among firms ranges within a certain degree of technological proximity.

Our measure of competitive pressure takes advantage of this discussions, since we consider not only the technological similarities among regions, but also differences in efficiency among local economies. By doing so, the research takes into account the pressure which enterprises are subject to when moving towards places that are similar but show more efficiency, which in turn triggers stronger positive externalities. Briefly, the level of efficiency represents the degree of positive externalities offered by a region to firms, and the degree of innovativeness account for the technological regime of a certain region.

The index is built in a way that the higher the difference is in efficiency levels between region i and region j, the higher the probability is that firms from region i will move out towards region j. The more regions i and j differentiate in the level of innovativeness, the lower the probability is that firms move from the region i to region j. Moreover, the index also takes into account the geographical proximity between regions.

The competitive pressure network has been built as:

$$c_{ij} = \begin{cases} \frac{E_j - E_i}{(|I_j - I_i|)+1} & \text{if} \quad E_j > E_i \quad and \quad j \in \delta_i \\ 0 & \text{otherwise} \end{cases}$$

Where E_i and E_j are the levels of efficiency in regions i and j; I_i and I_j are the levels of innovation in regions i and j; and δ_i is the geographical network, defined through the geographical weights matrix.

The efficiency index makes use of structural variables related to regional economic systems, such as market size, education, and employment rate. The use of these variables (Table 1) is helpful in the building of the Competitive network in order to avoid problems related to endogeneity with the variable QoG, once this matrix will be used among the other explanatory variables in the model explaining regional QoG. Variables reflecting the structure of the economies have been used as a proxy for regional innovativeness. Indeed, the level of patent application is a proxy for the size of regional high knowledge intensive sectors; business sophistication accounts for the financial sector and FDI size, while the technological readiness by firms is given by considering the use of the Internet by those firms. Moreover, a temporal lag has been used, referring for the measures of efficiency and innovation to 2010. In Table 1 a list of the variables used for each proxy [2].

The weight matrix is row standardized after having multiplied the competitive pressure by the geographical matrix. A limit argued by Neumayer and Plümper (2012) is that, using a row standardized matrix, the different number of neighbors is not considered on the spatial stimulus. On the contrary, the theoretical framework underpinning this analysis does not consider each region as equally exposed to spatial stimulus and not equally responsive. Therefore, the obtained matrix accounts for different weights and numbers of neighbors thus generating a spatial lag which consists of a weighted average of neighbors level of QoG.

[2] We use data by "EU Regional Competitiveness Index for 2010". Data and description are available at the website: http://ec.europa.eu/regional_policy/information/focus/index_en.cfm

Fig. 3: Competitive - Imitative Network (competition index within 400 km)

Tab. 1: Competitive Pressure Index Variables

Sub-Index	Sub-Pillar	Variables
Efficiency	Higher Education and Lifelong Learning	Population 25-64 with higher education; Lifelong learning; Early school leavers; Accessibility to universities; Higher education expenditure.
	Labor Market Efficiency	Employment rate (excluding agriculture); Long-term unemployment; Unemployment; Labor productivity; Gender balance unemployment Gender balance employment; Female unemployment.
	Market Size	Gdp index; Compensation of employees; Disposable income; Potential Gdp in PPS; Potential POP.
Innovation	Technological Readiness	Households access to broadband; Individuals buying over Internet; Households access to Internet; Enterprises Internet access; Enterprises use of websites; Enterprises use of intranet; Enterprises use of internal networks; Employees extranet access; Employees Internet access.
	Business Sophistication	Employment in the "Financial intermediation, real estate, renting and business activities"; GVA in the "Financial intermediation, real estate, renting and business activities" sector; FDI intensity; Strength of regional clusters.
	Innovation	Innovation patent applications; Total patent applications; Core creative class employment; Knowledge workers; Scientific publications.

Source: Dijkstra, Annoni and Kozovska (2011)

5.2 Dataset

Data for measuring QoG are by Quality of Government Institute of University of Goteborg. This data come from a survey conducted in the spring of 2013, the QoG 2013 is drawn on over 84,000 respondents in 212 NUTS 1 and NUTS 2 regions in 24 countries (Charron (2013);Charron, Dijkstra and Lapuente (2013)). The index is composed by several variables proxying the degree of corruption, the level of quality of public services, the level of impartiality in the public services[3]. Table 2 summarizes the independent variables used in the analysis, while Table 3 shows the summary statistics. Precisely, the Composed Regional Index used in the analysis has been built following five steps (Charron, 2013):

- a regional indicator for each of the 16 survey questions was built;
- the variables were grouped in three Pillars through a factor analysis;
- the regional index was composed through the pillars;
- the index was weighted by the share of the national population, resulting in a mean score for each region;
- the weighted regional score was added to the national level by the World Bank (WGI data) resulting in a regional centered score (adjusted on the WGI data):

$$QoG_{regionXinCountryY} = WGI_{countryY} + (Rqog_{regionXincountryY} - CRqog_{countryY})$$

6 Spatial Interaction

6.1 Model Specification

The correct specification for the empirical model used in the analysis has been chosen accordingly to the theoretical model underpinning it. In order to evaluate if the model is sufficiently suited to available data, we found helpful to follow the flow chart proposed by Elhorst (2010):

[3] The dataset is available on the website: http://nicholascharron.wordpress.com/european-quality-of-government-index-eqi/

- Estimation of a benchmark model (OLS) and calculation of LM tests for spatial lag and spatial error model;

- Estimate the spatial lag, spatial error model or spatial lag and spatial error model.

Since the interest is focused on the Spatial Autoregressive model (SAR), this model is the only one included in the paper, and its significance is shown. The analysis considers a cross section data set: the dependent variable is referred to the year 2013, while explanatory variables have been temporarily lagged.
The empirical Spatial Autoregressive Model (SAR) used to estimate the QoG in European regions is described by the following equation:

$$QoG_i = \beta_0 + \rho \sum_j w_{ij} QoG_j + \beta_1 logGDP_i + \beta_2 logPOP_i + \\ + \beta_3 logArea_i + \beta_4 CapitalRegions + \varepsilon_i$$

where: QoG is the level of Quality of Government; log Gdp is the log of GDP per capita; log POP is the log of population; log AREA is the log of the geographical area; CapitalRegions is a dummy for regions that include the country capital. The analysis makes use of the Maximum Likelihood Estimation method to estimate the coefficients. In this case, we give an exogenous structure to the network of regions. In the equation above, matrix **W** reflects the Competition network, i.e. the degree of competitiveness among European regions. The coefficient ρ is an estimate of the effect by competition or by learning on levels of QoG. The intercept is an estimate of the change of QoG not due to competitiveness or to the exogenous independent variables, that is the estimate of the possibility to be re-elected with an increase of QoG. The analysis assesses the difference in the power of interaction among leader and lagging regions, and whether decentralized regions interact more intensely when compared to the others, as we expect because of their greater freedom in political choices. In order to verify these hypothesis a model considering different groups of neigh-

bors is helpful. Differences in the interaction among lagged and leading regions, and autonomous or not autonomous regions, are accounted by considering the following model (notation by Allers and Elhorst, 2005):

$$Y = \rho_{d=1}DWY + \rho_{d=0}(I_N - D)WY + \beta_{d=1} + \beta_{d=0} + X\beta' + \varepsilon$$

Where D is a diagonal matrix with no-zero elements equals to the dummy variable d (autonomous/not autonomous and leader/lagging); X represents the explanatory variables excluding the intercept.

The estimation strategy considered is by Allers and Elhorst (2005):

First Step: Obtain b0, the OLS-estimator of regressing Y on the X variables, including a different intercept for the two groups defined by the dummy variable D; Obtain b1 and b2, the OLS-estimators of MWY and $(I_N - M)WY$, respectively, on the X variables, including a different intercept for the two groups defined by the dummy variable D;

Second Step: Find ρ_1 and ρ_2 that maximize the concentrated log-likelihood function of the model, which is:

$$logL_C(\rho_1, \rho_2) = C - N/2ln[(e_0 - \rho_1 e_1 - \rho_2 e_2)'(e_0 - \rho_1 e_1 - \rho_2 e_2)] + ln|I_N - \rho_1 MW - \rho_2(I_N - M)W|$$

where C is a constant which may be neglected and e_0, e_1, and e_2 denote the the regression residuals of the three OLS-regressions. Note that it is not possible to compute the eigenvalues of the spatial weights matrix W in advance, as is usual in spatial models, and then to determine the determinant of the last right-hand side using these eigenvalues;

Third Step: Given ρ_1 and ρ_2, compute GLS estimator of the spatial lag model:

$$b = b0 - \rho_1 b_1 - \rho_2 b_2$$

$$\sigma^2 = 1/N(e_0 - \rho_1 e_1 - \rho_2 e_2)'(e_0 - \rho_1 e_1 - \rho_2 e_2)$$

Fourth Step:Determine the asymptotic variance matrix of the maximum likelihood estimator to obtain standard errors and T-values. This symmetric matrix, which we derived analytically along the lines in Anselin (1988, pp. 64), is (for the parameters β, ρ_1, ρ_2 and σ_2, respectively):

$$\begin{bmatrix} \frac{1}{\sigma^2}X'X & \frac{1}{\sigma^2}X'A_1b & \frac{1}{\sigma^2}X'A_2b & 0 \\ \cdot & \frac{1}{\sigma^2}b'X'A_1'A_1Xb + tr(A_1A_1 + A_1A_1') & \frac{1}{\sigma^2}b'X'A_1'A_2Xb + tr(A_1A_2 + A_1A_2') & \frac{1}{\sigma^2}tr(A_1) \\ \cdot & \cdot & \frac{1}{\sigma^2}b'X'A_2'A_2Xb + tr(A_2A_2 + A_2A_2') & \frac{1}{\sigma^2}tr(A_2) \\ \cdot & \cdot & \cdot & \frac{N}{2\sigma^4} \end{bmatrix}$$

where $A_1 = MWB^{-1}$, $A_2 = (I-M)WB^{-1}$, $B = I - \rho_1 MW - \rho_2(I-M)W$. The algorithm has been developed in R starting from Allers and Elhorst matlab code. Results of this estimation are described in Table 4.

Tab. 2: Exogenous Variables

Variable	Source	Description
Autonomy	Charron (2013)	Autonomous decision making units.
Decentralization	Hooghe (2010)	Index on the degree of regional power to study homogenous unit of analysis.
Ethnolinguistic	LaPorta (1999)	Impartiality in public services related to the degree of
Fractionalization	Charron (2009)	cultural and ethno fractionalization.
Economic growth	Eurostat	Key determinant of QoG in literature.
Regional Dimension	Eurostat	Related to the capacities and difficulties to mantain a certain level of QoG. Charron (2013); Charron (2009); Knack (2002))
Capital Region	Charron (2013)	Capital regions have generally a lower level of QoG.
HDI		Impact of HDI on QoG with fixed effects.
Social Trust	Charron (2013)	Strong positive relation among social trust and the level of QoG (Tabellini, 2010).
Inequality	Galbraith (2005)	It explains the level of QoG (Rothstein and Uslaner (2005)

Tab. 3: Summary Statistics

	N	Mean	Standard Deviation	Min	Max
QoG	187	0.1996	0.9667	-2.5980	2.7810
Area	188	22280	31487.23	13.4	309900.0
Autonomy	168	0.0892	0.2860	0.0	1.0
Capital Region	170	0.1	0.3008	0.0	1.0
Gdp pc	187	22920	8483.606	6500	54700
HDI	178	56.45	21.144	0.00	94.90
Inequality	129	0.00037	0.0029	-0.0035	0.02504
Population	188	2618000	2498838	28350	17840000

Tab. 4: Spatial regressions explaining quality of government in the Competitive learning/imitative Network

	1	2	3		4		5
			Autonomy		Region		
			high	low	north	south	
Intercept	1.81 **	-5.01 *	-6.27 **	-6.45 **			-5.02 **
	(0.51)	(1.61)	(1.63)	(1.62)			(1.85)
Ln Gdp		0.67 **	0.76 **		0.21 **		0.70 **
		(0.15)	(0.15)		(0.04)		(0.17)
Ln Area	0.04	0.09 **	0.09 **		0.06		0.14 **
	(0.04)	(0.04)	(0.04)		(0.04)		(0.04)
Ln Pop	-0.10 **	-0.13 **	-0.09 *		-0.13 **		-0.19 **
	(0.05)	(0.05)	(0.05)		(0.05)		(0.05)
Capital	-0.12	-0.39 **	-0.53 **		-0.29 **		-0.15
	(0.12)	(0.13)	(0.14)		(0.11)		(0.13)
Inequality							0.09
							(0.11)
ρ	0.39 **	0.27 **	0.45 **	0.26 **	0.09 **	0.51 **	0.25 **
	(0.07)	(0.07)	(0.16)	(0.05)	(0.04)	(0.06)	(0.06)
N	186	185	15	153	93	92	127

Note: All models include country fixed effects (with no intercepts in Model 4 due to perfect multicollinearity with the country fixed effects). * $\alpha = 0.10$; ** $\alpha = 0.05$; *standard errors in parentheses.*

As suggested by LeSage and Pace (2010), the effect of the independent variables in a region i has a "direct effect" and an "indirect effect" on regions j. In fact, the spatial dependence in the parameter ρ feeds back. The feedback of spatial dependence is because the Hessian elements are different from 0. Let's

rewrite the equation of a "classic" SAR as follow:

$$(\mathbf{I} - \rho\mathbf{W})y = \mathbf{X}\beta + \varepsilon$$

$$\frac{\partial y_i}{\partial x_{ir}} = ((\mathbf{I} - \rho\mathbf{W})^{-1}\mathbf{I}\beta_r)_{ij}$$

The average direct impacts are the sum of the diagonal elements of the matrix $((\mathbf{I} - \rho\mathbf{W})^{-1}\mathbf{I}\beta_r)$ divided by N for each variable. The average total impacts are the sum of all matrix elements divided by N for each variable. The average indirect impacts are the differences between the direct and total impacts. The direct and indirect effects obtained from the model 2 are reported in Table 6.

In Table 4 and Table 5 we show results relatively to models built to answer

Tab. 5: Direct and Indirect Impact

Model	Impact	*Ln* Gdp	*Ln* Pop	*Ln* Area	Capital	Inequality
1	Direct		-0.09	0.04	-0.12	
	Indirect		-0.06	0.03	0.07	
2	Direct	0.66	-0.13	0.09	-0.39	
	Indirect	0.25	-0.05	0.03	-0.14	
3	Direct	0.76	-0.09	0.09	-0.53	
	Auto. Ind	0.62	-0.07	0.07	0.70	
	No Auto. Ind	0.26	-0.03	0.03	0.66	
4	Direct	0.21	-0.13	0.06	-0.29	
	North Ind	0.02	-0.01	0.01	0.36	
	South Ind	0.22	-0.13	0.06	0.41	
5	Direct	0.69	-0.18	0.14	-0.14	0.08
	Indirect	0.23	-0.06	0.05	-0.05	0.03

to the first hypothesis in particular, and partially to the third one in the case of learning/imitating competition network. As hypothesized, the European regions, when considering the competitive learning/imitating, are "strategic complements".

Wealth (as log of Gdp) is commonly assumed to explain quality of institutions (Chong and Zanforlin, 2000; La Porta et al., 1999), but this relation is also thought to be reverse (Hall and Jones, 1999; Rodrik, Subramanian and Trebbi,

2004). In order to reduce the possible endogeneity, we temporally lag the log Gdp to 2010. Moreover, we run a model where log Gdp is absent (model 2). Spatial Interaction is stronger when we do not consider Gdp, but it is equally evident a positive and strong spatial interaction among levels of QoG as when controlling for Gdp. Then, we may conclude that Gdp does not influence our analysis. Moreover, as "control" variables, we use the regional demographic factors such as Area and Population. Knack (2002) shows how larger states in US states have higher-quality administration. Charron, Dijkstra and Lapuente (2013) do not find a robust relation between levels of QoG and dimension of regions in terms of population when they do not consider the country fixed effect. Instead, when controlling for country fixed effect, they find that more populous regions have lower QoG, while larger regions in terms of Area have a higher QoG. This results are confirmed by our analysis in all the models. Moreover, as Charron and Lapuente (2013), we verify that capital regions are negatively associated with level of QoG.

In model 3 and 4 we consider the differences in spatial interaction between autonomous and not autonomous regions, and among northern and southern regions. Our results indicate that autonomous regions interact more each other in their levels of QoG. This evidences that regions having freedom in managing their administration, have an higher capacity to interact in the levels of QoG. If we think in terms of costs, our results underline autonomous regions have less political costs in rising their level of QoG. Furthermore, northern regions (regions by the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Sweden, and the United Kingdom) are much lower interacting compared to the southern ones (regions by the following countries: Bulgaria, Czech Republic, Greece, Hungary, Italy, Poland, Portugal, Romania, Slovakia, and Spain). This may be explained by the fact that in a "vicious" environment the learning and the imitation is very high compared to the north, since the regional administrations have a structure that does not permit them to be "independent" by the surrounding environment.

Contrarily, the northern regions have a solid QoG that does not receive much stimulus by the external environment when considering the learning/imitative competition network. Model 5 confirms the results by models 1 and 2, when adding the variable 'Inequality'. It is considered as a check for the validity of our conclusions.

Following Ward and Gleditsch (2008), let's rewrite the equation of the "classic" SAR as follow:

$$(\mathbf{I} - \rho\mathbf{W})y = \mathbf{X}\beta + \varepsilon$$

In equilibrium, the expected value for y will be:

$$E(y) = (\mathbf{I} - \rho\mathbf{W})^{-1}\mathbf{X}\beta$$

We are going to show the short term impact of a change of QoG in region i to (then not a change in the systematic part of the model) the level of QoG of regions j being neigbors with i. The short term impact depends by $\hat{\rho}$ and by the particular structure of W. In our case, we are going to measure the impact of a change in QoG in region i on regions that are actually affected, through the competitive network, to region i. In figure 4 we show two examples of this impact, while the values of impacts are shown on Tables 6 and 7. Our first example is East England (UKH) with a QoG of 1.761. It affects 16 regions in UK, Netherlands, Belgium, France. It is evident how UKH does not affect UK3, even if it is a neighbor. This is due to the fact that UK3 is more efficient compared to UKH, then enterprises will not move from UK3 to UKH (but the contrary). Then, the UKH administration will not react to a raise in the Quality of Government of UKH. When considering the estimated spatial interaction only among northern region (Model 4, figure 4 on the left), the impact on neighbors is lower compared to the general impact (Model 1, figure 4 on the right). The second example considers the region with the lowest value of QoG of our sample: Yugozapaden-BG41 in Bulgaria, with a QoG of -2.598. If Yugozapaden had an

QoG of 2.781, regions having competitive pressure to go to Yugozapaden will be very low affected. Ten regions of three countries (Bulgaria, Greece and Romania) have competitive pressure towards Yugozapaden, and consequently are affected by a change of QoG in this region. Since W is row standardized, less is the number of neighbors towards whom a region has competitive pressure, bigger will be the impact by a change of the neighbors. With a change in BG41 of 5.379 in its level of QoG, the bigger impact is of 0.468 in GR1, that has a competitive pressure towards three regions. The lowest impact is on BG31 (0.062) that has a competitive impact towards 12 regions. Considering the spatial interaction estimated through the model 4, these impacts are evidently higher due to the higher estimated ρ. This is the picture of a mechanism of

Tab. 6: Short Term Impact East England (UKH) to QoG = 2.781

Region Code	Name	Country	Impact		QoG
UKG	West Midland England	England	0.133	0.054	0.655
NL23	Flevoland	Netherlands	0.093	0.038	1.277
UKD	Northwest England	England	0.093	0.038	0.853
UKE	Yorkshire-Humber	England	0.093	0.038	0.936
UKF	East Midland England	England	0.089	0.036	0.689
BE2	Vlaams Gewest	Belgium	0.085	0.034	1.318
UKL	Wales	England	0.085	0.035	0.389
UKK	South West England	England	0.081	0.033	0.522
NL12	Friesland (NL)	Netherlands	0.059	0.024	1.428
FR22	Picardie	France	0.057	0.023	0.403
UKC	Northeast England	England	0.045	0.018	0.705
NL34	Zeeland	Netherlands	0.043	0.017	1.257
FR23	Haute-Normandie	France	0.042	0.017	0.466
FR30	Nord - Pas-de-Calais	France	0.040	0.016	0.286
BE3	Wallonie	Belgium	0.039	0.016	0.161
FR25	Basse-Normandie	France	0.037	0.015	0.855

virtous and viciuos cycles. Then, a policy implication is to push for stronger relations among low QoG regions, making some macro regional policies able to give omogeneity to the entire economy developing cooperation and competition

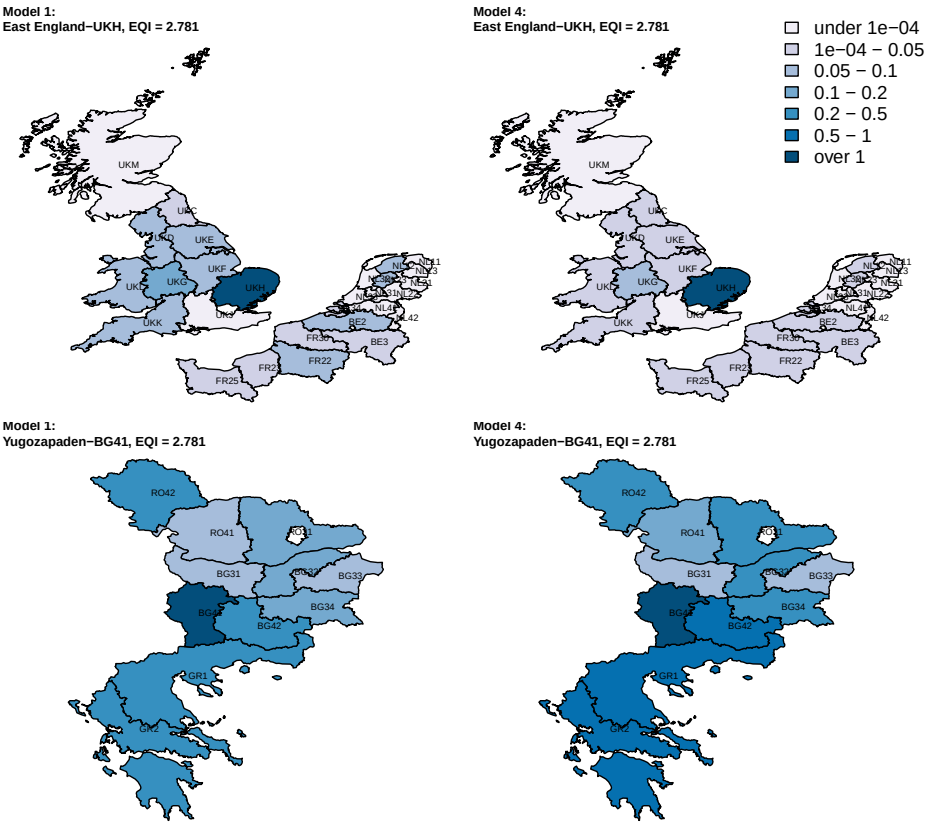

Fig. 4: Short term Equilibrium Impact of a change of QoG to the maximum value on neighbors

Tab. 7: Short Term Impact of Yugozapaden QoG = 2.781

Region Code	Name	Country	Impact		QoG
			Model 1	Model 4	
GR1	Voreia Ellada	Greece	0.468	0.584	-0.906
BG42	Yuzhen Tsentralen	Bulgaria	0.445	0.555	-0.940
GR2	Kentriki Ellada	Greece	0.423	0.527	-0.980
RO42	Vest	Romania	0.250	0.311	-1.591
BG34	Yugoiztochen	Bulgaria	0.176	0.220	-1.592
RO31	Sud-Muntenia	Romania	0.163	0.203	-1.478
BG32	Severen Tsentralen	Bulgaria	0.161	0.200	-1.391
RO41	Sud-Vest Oltenia	Romania	0.082	0.102	-1.659
BG33	Severoiztochen	Bulgaria	0.072	0.090	-0.111
BG31	Severozapaden	Bulgaria	0.062	0.078	-2.020

stimulating innovation in the policies and an higher level of QoG.

In Table 8 the results of models for the pure competitive network. The specifi-

Tab. 8: Spatial regressions explaining quality of government in a Pure Competition Network

	6	7	8		9		10
			Autonomy		Region		
			high	low	north	south	
Intercept	2.61 **	-6.67 **	-7.50 **	-7.84 **			-7.06 **
	(0.61)	(1.84)	(1.70)	(1.68)			(2.17)
Log Gdp		0.86 **	0.91 **		0.27 **		0.90 **
		(0.17)			(0.05)		(0.19)
Log Area	0.03	0.09 **	0.10 **		0.06		0.16 **
	(0.04)	(0.04)	(0.04)		(0.05)		(0.05)
Log Pop	-0.19 **	-0.12 **	-0.09 *		-0.20 **		-0.22 **
	(0.05)	(0.05)	(0.05)		(0.05)		(0.05)
Capital	-0.40 **	-0.65 **	-0.65 **		-0.37 **		-0.24
	(0.14)	(0.15)	(0.15)		(0.14)		(0.16)
Inequality							0.14
							(0.13)
ρ	0.98 **	0.37	-0.66	0.23 **	0.70 **	0.26	0.58
	(0.06)	(0.18)	(0.27)	(0.08)	(0.18)	(0.19)	(0.19)
N	167	167	15	152	93	74	109

*Note: All models include country fixed effects (with no intercepts in Model 9 due to perfect multicollinearity with the country fixed effects). * $\alpha = 0.10$; ** $\alpha = 0.05$; standard errors in parentheses. N here is limited compared to Models in Table 4 since we eliminate those observations with no neighbors.*

cation of these models aims to answer to hypothesis 2 and partially to hypothesis 3. These models consider a pure competition network where each region competes with the others on the base of competitive network, as shown in sub section 5.1, and on the geographical distance, assuming that competition is higher with a geographical neighbor. In this case, the spatial autocorrelation is not independent by the wealth variable. When considering *log* Gdp per capita in model 7, the effect of spatial autocorrelation disappears. This effects, instead, is present in model 8 and 9 when taking separately autonomous and not autonomous and northern and southern regions. It means that the spatial autocorrelation is present also when controlling for Gdp per capita, but the effect is visible only in some regions. In particular, in the model 8 is shown the lack

of spatial effect among autonomous regions. They are indifferent, when considering a pure competition network, to the QoG of neighbors. The contrary happens for the no autonomous ones. In model 9 we observe a result completely different compared to the competitive learning/imitating network. In fact, in the case of pure competition Northern regions affect much each other, while the southern are independently behaving. This may say that, when the mechanism of pure competition is considered, the northern regions are ready to react to the spatial stimulus. On the other hand, southern regions do not compete much each other, but only within a restricted network (as shown previously in model 4).

6.2 Non linearities in the spatial trends of QoG diffusion

In order to verify nonlinearities in the exogenous variables used in the estimation of QoG (hypothesis 4), we adopt a Spatial Autoregressive Semiparametric Model by Basile and Gress (2004) and Basile, Capello and Caragliu (2012):

$$y_i = \mathbf{X}_i^* \beta^* + \rho \sum_j^n w_{ij} y_j + f_1(x_{1i}) + f_2(x_{2i}) + f_3(x_{3i}, x_{4,i}) + \\ + f_4(x_{1i}) l_i + \cdots + h(no_i; e_i) + \varepsilon_i$$

where $\varepsilon \sim iidN(0, \sigma_\varepsilon^2)$ and $\sum_j^n w_{ij} y_j$ and ε are correlated. Therefore, the analysis uses a "control function" approach by Basile (2009) and Blundell and Powell (2003), where the first equation is:

$$\sum_{j=1}^n w_{ij} y_i = \mathbf{X}*_i + f_1(x_{1i}) + f_2(x_{2i}) + f_3(x_{3i}, x_{4,i}) + f_4(x_{1i}) l_i + \\ + \cdots + h(no_i; e_i) + \sum_m g_m(Q_{mi}) + v_i$$

In this equation $\sum_m g_m(Q_{mi})$ are a set of instruments, that in line with Kelejian and Prucha (1998), is an intercept, all exogenous terms included in the model and spatial lags; v_i a set of random variables satisfying conditional mean

restrictions $E(v_i|Q_i) = 0$.

The second step consists of estimating an additive model of the form:

$$y_i = \mathbf{X}_i^* \mathbf{beta}^* + \rho \sum_j^n w_{ij} y_j + f_1(x_{1i}) + f_2(x_{2i}) + f_3(x_{3i}, x_{4,i}) + \\ + f_4(x_{1i}) l_i + \cdots + h(no_i; e_i) + c(\hat{v}_i) + \varepsilon_i$$

Finally, it is important to note that endogeneity problems due to omitted variables (i.e. missing permanent characteristics that drive both the response variable and the covariates) can be ruled out by directly controlling for the effect of "first nature" characteristics including the smooth interaction between latitude and longitude of the regional units of analysis. Similar algorithms for the semiparametric SAR model are defined. Specifically, the total effect of variable x_k is computed as:

$$\hat{f}_k^{e_k}(x_k) = \sum_q [\mathbf{I}_n - \hat{\rho}\mathbf{W}_n]_{ij}^{-1} b_{kq}(x_k) \hat{\beta}_{kq}$$

Finally, direct and indirect (or spillover) effects of smooth terms in semiparametric SAR is computed as follows:

$$\hat{f}_k^{de_k}(x_k) = \sum_q [\mathbf{I}_n - \hat{\rho}\mathbf{W}_n]_{ii}^{-1} b_{kq}(x_k) \hat{\beta}_{kq}$$

$$\hat{f}_k^{ie_k}(x_k) = \hat{f}_k^{te_k}(x_k) - \hat{f}_k^{de_k}(x_k)$$

On Table 9 are shown results by the geo−additive model. The edf shows that Gdp has a non linear effect on the QoG, as we hypothesized. In particular, looking at the figure 5, it is noticeable that the effect of the wealth variable on the levels of QoG is characterized by two humps. Gdp affects positively QoG at a low level of wealth, but the effect decreases and becomes negative around the first quartile. The effect is again strongly positive around the median and then again negative around the third quartile. Our hypothesis of a stronger

Tab. 9: Direct and Indirect Impact

	Nonparametric terms		
	F test	p-value	edf
f (*log* Gdp)	6.501	8.04e-05	3.866
f (*log* Area)	4.240	0.032217	1.155
f (*log* Population)	25.836	1.12e-06	1.000
f (*no;e*)	2.883	0.000985	10.337
f ($\hat{v}$)	36.018	1.39e-08	1.000
	Parametric terms		
	Coeff.	p-value	
$W\ \gamma_y$	0.9094	2.63e-07	
Capital Region	-0.2945	0.00925	
	Diagnostics and goodness of fit		
$R^2 - adj$	0.925		
Deviance	94.1%		
GCV score	0.092698		

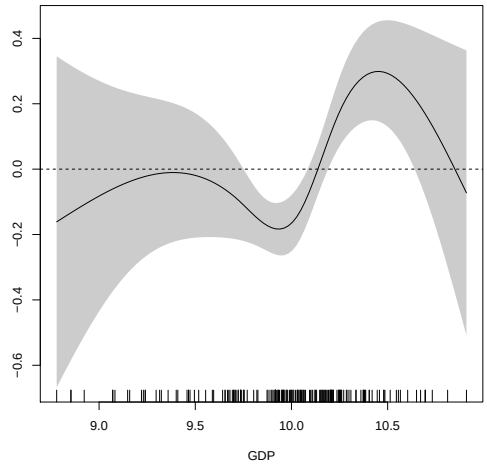

Fig. 5: Semiparametric spatial lag model: Estimated smooth functions as the effect of Gdp per capita

Note: Solid lines represent smooth functions of each term, alongside Bayesian confidence intervals (shaded grey areas) at the 95 percent level of significance. In each plot, the vertical axis displays the scale of the estimated smooth function, while the horizontal ones report the scale of each determinant. Rug plot along the horizontal axis represents observed data (Basile, Capello and Caragliu, 2012).

effect of Gdp at a low level of wealth is not confirmed. We find something more complex. In figure 6 and 7 are shown the effects of the demographic variables

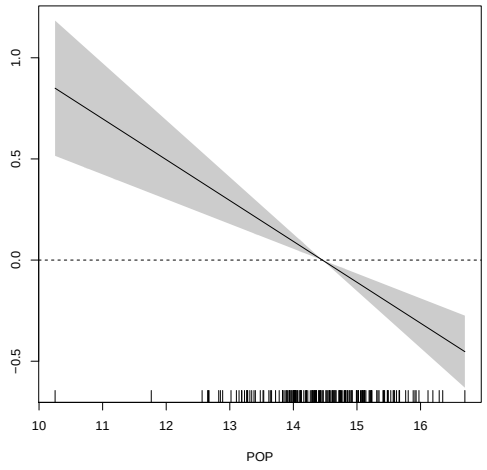

Fig. 6: Semiparametric spatial lag model: Estimated smooth functions as the effect of Population

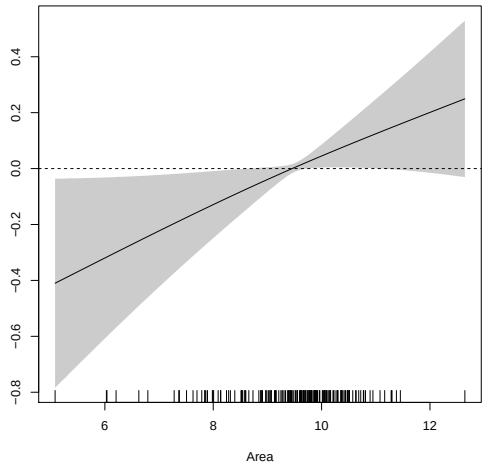

Fig. 7: Semiparametric spatial lag model: Estimated smooth functions as the effect of Area

(Population and Area) on the level of QoG. It is noticeable as the effects are pretty much linear: the raise of population affects negatively the level of QoG, while the geographical dimension of a region affect positively the level of QoG. Figure 8 displays the effect of the smooth interaction between latitude and longitude, $f(no, e)$. It can be observed that, *ceteris paribus*, some Eastern and

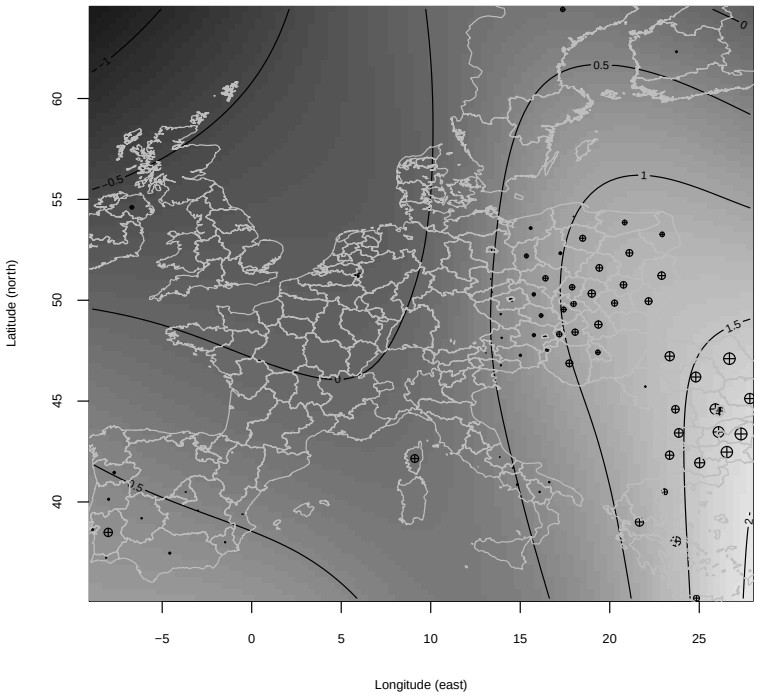

Fig. 8: Semiparametric spatial lag model: Estimated smooth interaction function of longitude and latitude

Note: Each circle in the plot, centered at the regional centroids, is proportional to the effect of the smooth interaction term $f(no; e)$ (Basile, Capello and Caragliu, 2012).

some South-Western regions have higher predicted QoG. This means that the model does not consider some factors (omitted variables /not observed heterogeneity) , that are instead got by the $f(no, e)$ factor.

7 Conclusions

Interest in Quality of Government is increasing in the fields of political science and economics. Several studies have been conducted in order to assess the quality of institutions, determining the key factors affecting those institutions and the diffusion at country level. A wide literature has focused on the determinants

of QoG at regional level in Europe, but no study has been conducted on the spatial diffusion of QoG. This paper studies the spatial diffusion of QoG at regional level in Europe. Data are collected by the Quality of Government Institute on 2013. Following the literature on policy diffusion, several hypothesis have been formulated on the mechanisms of interaction among regional governments for their level of QoG. The focus is on the competitive interaction distinguishing two kind of mechanisms: a competitive learning/imitating mechanism and a pure competitive one.

The two mechanisms are differentiated by two competitive networks distinguishable by the different geographical limitations considered. In fact, to study the competitive learning/imitating mechanism, the research makes use of a competitive network which considers only the closer geographical neighbors, assuming that imitation and learning is a process in place exclusively among geographical neighbors. On the contrary, when considering a pure competitive network, geographical proximity in terms of distance affects the scope of the influence exerted by the regional levels of QoG, since competition is assumed to be higher between closer neighbors, even if the mechanism is in place among all the European regions.

The research has found evidence of a strong spatial interaction in the competitive learning/imitating mechanism among levels of QoG in European regions, with a stronger autocorrelation in autonomous regions and southern regions. When considering the pure competitive mechanism, a large autocorrelation among northern regions and not autonomous ones has been found to exist. This results show that "leader" regions (those with an high QoG), corresponding to northern regions, do react to changes in QoG levels when they are competing economically, but they are not very sensitive to changes of restricted geographical neighbors, as in the case of learning/imitating mechanism. On the contrary, southern regions are very sensitive to the influence exerted by those competitors that are very close geographically. This indicates that these regions have an higher propensity to learn from their neighbors. Finally, it has been shown how

the influence by the wealth (Gdp) on QoG is not linear. Such effect is indeed characterized by two humps: with a huge influence at very low/high levels of Gdp per capita. In conclusion, this research shows how the spatial interaction among regions in their level of QoG is a very complex process, where several mechanisms in place have heterogeneous effects on space. Therefore, when studying the spatial diffusion of QoG it is important to make a distinction both among groups of regions and among mechanisms of diffusion.

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APPENDIX A

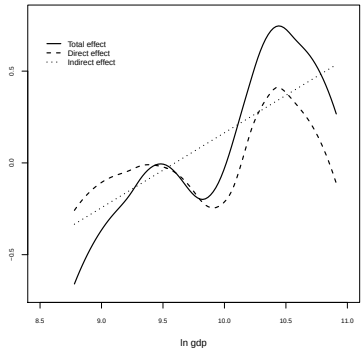

Fig. 9: Direct, Indirect and Total Smooth Effects of Gdp per capita

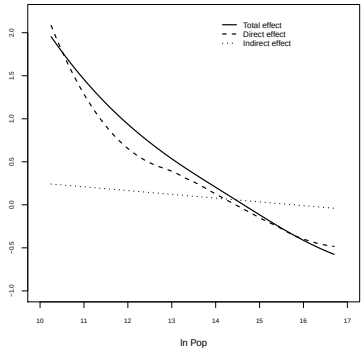

Fig. 10: Direct, Indirect and Total Smooth Effects of Population

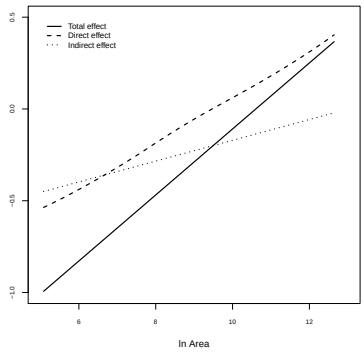

Fig. 11: Direct, Indirect and Total Smooth Effects of Population of Area

Appendix A: Quality of Government Institute Dataset **Corruption**

– EdCor:region's aggregated score from survey question on the extent to which corruption persists in the education system in the region/area

– HelCor: region's aggregated score from survey question on the extent to which corruption persists in the health care system in the region/area

– LawCor: region's aggregated score from survey question on the extent to which corruption persists in the law enforcement in the region/area

– OthersCorr : region's aggregated score from survey question on the extent to which respondents felt other citizens in the region/area use bribery to obtain public services

– HelBribe: region's aggregated score from survey question asking whether the respondents were forced to pay a bribe in the last 12 months to obtain any health care in the region/area

– Corrupt: The aggregated regional score for EdCorr, HelCorr, LawCorr, OthersCorr and Helbribe

Inequally treatment in public services

– EdImpart1: region's aggregated score from survey question on the extent to which certain people receive special advantages in public education

– HelImpart1: region's aggregated score from survey question on the extent to which certain people receive special advantages in public health care

– LawImpart1: region's aggregated score from survey question on the extent to which certain people receive special advantages from law enforcement

– EdImpart2: region's aggregated score from survey question on the extent to which all citizens are treated equally in public education

- HelImpart2 region's aggregated score from survey question on the extent to which all citizens are treated equally in public health services
- LawImpart2 region's aggregated score from survey question on the extent to which all citizens are treated equally by law enforcement
- Impart: The aggregated regional score for EdImpart1, EdImpart2, HeIImpart1, HelImpart2, LawIMpart1 and LawIMpart2 (equal weighting)

Quality of Public Services

- EdQual: region's aggregated score from survey question on quality of public education in region/area
- HelEq: region's aggregated score from survey question on quality of public health care in region/area
- LawEq: region's aggregated score from survey question on quality of law enforcement in region/area
- Election: region's aggregated score from survey question on the extent to which corruption persists in regional elections
- Media: region's aggregated score from survey question on likelihood of media reporting corruption in public sector or by politicians in the region/area
- Quality: The aggregated regional score of Edqual, HelQual, Lawqual, Media and Election (equal weighting)

Aggregate Indices

- RegQoG: The combined score from Quality, Impart and Corruption (equal weighting)
- Margin: The margin of error constructed around the regional QoG estimate
- NatregQoG: The national average for each country in the regional survey (weighted by each region's population)
- QoG: The full, combined composite QoG index score for each country and region

Specialization and Land Productivity A Spatial Analysis of Italian Provinces

Abstract

This paper aims to analyse the effect of specialization on land productivity in Italian agriculture. Using a relative measure of specialization (Location Quotient or Balassa Index), the analysis first assesses changes occurred in the specialization of sown crops during a period of ten years, using data by agricultural censuses on 2000 and 2010 by the National Institute of Statistics (ISTAT). The general evidence is the tendency to increase specialization mostly in all groups of crops. Classical methods for an Exploratory Spatial Data Analysis, such as global Moran's I and local Moran's I statistics, spatial correlograms and Moran's I scatterplot, are used to analyse spatial autocorrelation among provinces in their specialization in main crop groups, the presence of influential provinces and clusters and hotspots. Through a spatial model for panel data, the research demonstrates the impacts of specialization on productivity is heterogeneous among groups of crops. Specialization is an enhancer for land productivity in olives, grapes and industrial crops. On the contrary, specialization affects negatively land productivity in cereals, citrus fruit and fruits. Diversification in sown crops results significant and positive for land productivity when cultivating grapes, while the effect is negative on the productivity for cereals.

1 Introduction

Sectoral specialization by economies is a key issue in the debate around economic growth and productivity within regional science. Since the seminal study by Krugman (1991), several researches have been conducted on sectoral specialization of regional economies in Europe. Economic geography theory has explained the mechanism of industrial agglomeration highlighting the benefits that it produces in terms of reduced costs and improved demand linkages (Fujita, 1988; Krugman, 1990; Venables, 1996) assuming increasing returns to scale by technology and imperfect competition. Positive externalities by agglomeration might derive from the knowledge spillovers and the process of cumulative innovation (Marshall et al., 1920; Malerba and Orsenigo, 1993). Two different typologies of externalities have been identified in literature: MAR (Marshall, Arrows, and Romer) externalities, and Jacobs' externalities (Rosenthal and Strange, 2004; Beaudry and Schiffauerova, 2009). They have been empirically associated with specialization and diversification economies respectively.
The Marshall-Arrow-Romer (MAR) model (Glaeser et al., 1991) is based on the idea that the concentration of a specific industry or sector in a region enhances knowledge spillovers between firms, therefore facilitating innovation in that industry within that region. Specialization encourages knowledge, ideas and information diffusion in such area (Saxenian, 1996). Furthermore, specialisation in certain productions provides countries with a set of capabilities that constrains technological diversification to related products (Hidalgo et al., 2007). Indeed, an indispensable requirement for the MAR model externalities to occur is that firms have to belong to the same or related sector. This is why this typology of externalities is referred to as the *specialization externalities*.
On the other hand, Jacobs' externalities are usually associated to (highly diversified) urban contexts, and are referred as *diversification externalities*. Starting from this classification, we focus on the relation among externalities and productivity. Several empirical researches have been conducted aiming to analyse

the relation between innovation and productivity with specialization and diversification taking into account industrial sectors or the entire economy of a place. As underlined by Iammarino and McCann (2006), it is important to observe the cluster under analysis having a precise idea of the kind of relations there are within the cluster, since the evolutionary process of different clusters may be different. The agriculture production has particular characteristics compared to other sectors due to the protectionism agricultural policies (concept of 'food regimes' by Friedmann, 1993 and McMichael, 2005). The agri-food sector is interesting because, as Ward and Almås (1997) highlight, despite the "transformation and industrialization of capitalist agriculture, the rising power of multinational food and agribusiness corporations and the global integration of the agri-food system", it is defined by 'heterogeneity at the local level'. The Italian industrial districts in the agri-food sector are characterized by 'quality' and 'typicality' due to strong regional gastronomic traditions, that limit imitation (Brasili and Fanfani, 2010). Nevertheless, these features do not prevent from external competition: only those districts that do not have a standardized production, instead presenting a more dynamic organization and links with high quality and specific territories, are well facing the global market (Foresti and Micelli, 2007). Currently, an empirical study focusing on externalities by agglomeration and their effect on productivity is missing within the primary sector. This research aims to fill the gap: after providing some insights on the importance of clusters in agriculture in section two, section three presents an index of specialization (as a Location Quotient) and an index of diversification (as Herfindahl Index) of the 110 Italian provinces for 8 main crop groups. Moreover, the classical indexes for an Explanatory Spatial Data Analysis (ESDA) are shown. Underlying the differences in the spatial autocorrelation among 2000 and 2010, using census data by the Italian National Institute of Statistics (ISTAT), section three focuses on a descriptive analysis of changes occurred in the Italian agriculture of the new millennium. Finally, section four is devoted to the analysis of the effects of specialization and diversification on productivity within

each main crop group.

2 Spatial Characteristics of Specialization

Following Marrocu, Paci and Usai (2013), this analysis uses a location quotient (the quota of UAA employed in a province relative to the Italian share) for measuring the relative specialization in the main crop groups in Italian provinces. The Location Quotient or Balassa Index captures both the relative importance and the intensity of a particular production. For province i (out of 110 provinces) and crop j (within a set of 8 crop groups), the specialization index based on UAA is defined as:

$$SPE_{ij} = \frac{L_{ij} / \sum_j L_{ij}}{\sum_i L_{ij} / \sum_i \sum_j L_{ij}} \tag{1}$$

This index is useful in order to avoid the problem of the measurement-induced spatial heterogeneity (Haining, 2003) because it controls for the territorial dimension of each province.

From Tukey (1977):

$$x(s) = m(s) + \varepsilon$$

where $x(s)$ is the crop sown; $m(s)$ is the large scale variation (smooth); ε is the small scale variation (rough).

The spatial data $x(s)$ can be partitioned in two components: $m(s)$ and ε. The former describes the variation of the spatial data in relation to a larger spatial context (it can be provincial, regional, national etc.), and it is the predictable part of the data, whilst the latter is the unpredictable part (Haining, 2003). It describes the variation of spatial data in the small context of our precise observation. In order to analyse the spatial trends and to point out spatial homogeneity, it is quite important to disentangle the variation of a large scale from the variation in a small context.

By assessing $m(s)$, it may be possible to point out the natural vocation of the land that should apply across the province, and which in turn is linked to

the crop sown in provinces. In order to estimate the smooth part, the analysis makes use of the queen-contiguity matrix, with a first order of contiguity as spatial weighted matrix for considering the natural vocation of a province land that is similar to the neighbors provinces. In the case of agriculture, in which climate is the key factor to decide what kind of cultivation to invest on, we consider necessary to focus on the contiguity weights matrix. In this context, the "islands" problem (unconnected observations) is not encountered (Anselin, 2003).

Fig. 1: Queen Contiguity Network

In order to verify the presence and the location of clusters of specialization in the sown crops, an exploratory spatial data analysis is conducted here using the Moran's I (global) and LISA (Local Indicators of Spatial Association - local

Moran's I) indices. The Moran's I is a global indicator used to test the presence of global spatial autocorrelation:

$$I = \left(\frac{N}{\sum_i \sum_j w_{ij}} \right) \left(\frac{\sum_j \sum_i w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2} \right)$$

where x_i is the ith observation, $\bar{x}$ is the mean of the variable of interest, and w_{ij} is the spatial weight of the link between i and j (Bivand, Pebesma and Gómez-Rubio, 2008). The null Hypothesis supports the absence of spatial autocorrelation Haining (2003). If the index value is higher than the expected one (equal to $-1/(N-1)$) , there is positive autocorrelation. If the value is below the expected one, this means that there is a negative autocorrelation. The significance of the global statistic of spatial autocorrelation (Moran's I) is assessed asymptotically or by approximation (Anselin, 1995). As common, Moran's I is considered normally distributed (approximation). The spatial autocorrelation can be assessed by the Moran's I scatterplot, where we can observe a positive spatial dependence (high-high and low-low) in the first and in the third quadrant, and a negative autocorrelation in the second and in the fourth quadrant (high-low and low-high). The Moran's scatterplot represents the standardized variable (variable menus mean and divided by the standard deviation) on the axis X, while the lagged variable is on the Y axis. The coefficient gives the measure of the linear association between a province and the contiguous neighbors. The same result of the Moran's I is obtained by an OLS regression, taking as independent variable the variable of interest and as lagged one as dependent. Then, it is possible to detect observations with an unusual strong influence on the slope, and assess if particular local relationships influence more than proportionally the slope (Bivand, Pebesma and Gómez-Rubio, 2008). The Moran's I calculated for each crop group gives the presence of spatial autocorrelation.

As underlined by Bivand, Pebesma and Gómez-Rubio (2008), the global tests for spatial autocorrelation may be divided in their local components, obtaining local tests for spatial autocorrelation. This is because the global tests

are constructed assessing the local relationships between an observation and its neighbors. The Local Moran I (Anselin, 1995) provides information regarding where clusters (observations with very similar neighbors) and hotspots (observations with very different neighbors) are, and their significance. It decomposes Moran's I coefficients in local values. The local form of Moran's I is a product of the zone value and the average in the surrounding zones (Anselin, 1995):

$$I_i(d) = \frac{(x_i - \bar{x}) \sum_j w_{ij}(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2 / N}$$

where we assume the global mean $\bar{x}$ is an adequate representation of the variable of interest y. $E(I_i) = -w_i/(N-1)$, $w_i = \sum_j w_{ij}$, with $j \neq i$; $Var(I_i) = w_i^2 V$, with V the variance of I under randomization. The sum of local Moran is proportional to the global Moran's I. The local Moran is equal to the product of the variable in our province and neighboring provinces variable divided by the variance of the variable on our province. The LISA null hypothesis supports the absence of spatial clustering in the province under analysis. In order to evaluate the significance of the local Moran for each province, the local statistics are tested for divergence by expected values using Saddlepoint approximation. As underlined by Bivand, Pebesma and Gómez-Rubio (2008), this method is important when the number of neighbors for wach observation is small, and the adoption of normality assumption is problematic. Following Waller and Gotway (2004), since the probability values are not adjusted for multiple comparisons, the probability values are interpreted as indications. Values that are close to zero indicate clusters characterized by positive local autocorrelation, while values close to unity indicate negative local autocorrelation.

The Moran's I and LISA are calculated on the Specialization Index of Italian provinces considering 8 main crop groups (cereals, citrus fruit, fresh fruit, grapes, olives, industrial crops, vegetables in open fields, greenhouse vegetables). We are going to show changes in Italian agriculture specialization in relation to the eighth most important crop groups. Moreover, we show Moran's I and local

Moran's I statistics for the main crop groups. Between 2000 and 2010, the dynamic in the use of land in agriculture is characterized by a reduction of UAA in crop production of 7.78 % in Italy. Looking at the sectors, the UAA reduced of 10.62 % in production of Cereals, of 7.39 % in Grapes, of 2.74 % in Citrus Fruit, of 14.8 % in Fruits, and finally of 32.91 % in industrial crops. On the contrary, the increase of UAA is for the production of olives (5.33 %), open field vegetables (12.63 %) and in the greenhouse vegetables production (46.6 %).
This raise has not been equal in all the territory and it is evident a particular difference among the different geographical areas of the Country. The province with the higher increase in UAA for production of crops is Belluno-ITD33 with an increase of 12.7 % of UAA (from 3168.87 to 3571.71 hectares), while the province with the biggest decrease is Verbano-Cusio-Ossola (ITC14) with a decrease of 52.04 % of UAA (from 530.93 hectares in 2000 to 254.65 hectare in 2010). In general, the dimension of enterprises in Italy raised of 54.6 % between 2000 and 2010: from 1.88 hectares per enterprise to 2.91 hectares per enterprise. The bigger increase has been done in Belluno - ITD33 with an increase of 5.7 times between 2000 and 2010 (from 0.42 hectares per enterprise in 2000 to 2.39 in 2010). The biggest reduction happened in Verbano-Cusio-Ossola - ITC14 with a reduction of 1.4 times in the dimension of enterprises (from 1.17 to 0.84 hectares per enterprise between 2000 and 2010). Beyond Verbano-Cusio-Ossola, only other three provinces reduced the dimension of enterprises (Lecco, Como and Varese). The province with the lowest dimension of enterprises in Aosta - ITC20 both in 2000 than in 2010, with 0.20 hectares per enterprise in 2000 and 0.34 in 2010. The province with the highest dimension in 2000 and 2010 is Vercelli - ITC12, with 22.41 hectares per enterprise in 2000 and 30.04 in 2010.

2.1 Cereals

In figure 2 the location quotient statistic is shown for Cereals in 2000 and 2010. The hectares dedicated to cereals are 4049741 in 2000 and 3619477 in 2010. The UAA used for Cereals is increased 27.65 times in Imperia-ITC31 (IM)

between the 2000 and 2010 (from 3.98 hectares to 110.07 hectares), and the maximum reduction in Massa Carrara - ITE11 (MS) of 2.85 times (from 486.74 to 170.78 hectares). The province with the largest amount of UAA used for Cereals is Foggia - ITF41 (FG) with 291935.6 hectares in 2000 and 254693.7 hectares in 2010. Within the production of cereals, the dimension of enterprises at Italian level increases of 1.4 times: it was of 5.32 hectares per enterprise in 2000 and 7.65 in 2010. The province with the largest UAA dedicated to cereals (Foggia - ITF41) both in 2000 and 2010 shows an enterprise dimension of 9.9 hectares in average in 2000 (29492 enterprises for 291935.6 hectares), while in 2010 the average dimension is of 10.7 hectares per enterprise (23775 enterprises for 254693.7 hectares). Foggia has a location quotient equal to 1.3 in 2000 and 1.2 in 2010, meaning that it is 1.2 times more specialized in cereals in 2000 and 1.3 times in 2010. Within cereals specialization the province with bigger enterprises is Vercelli - ITC12 (VC) with 34.17 hectares per enterprise in 2000 (2479 enterprises for 84700.42 hectares) and 47.53 hectares in 2010 (1841 enterprises for 87509.57 hectares). Vercelli is the most specialized province in cereals, with a location quotient for 2000 equal to 1.7 and 1.8 in 2010, that means that it is mostly 2 times more specialized in cereals than the whole country. The province with the lowest dimension is Genova-ITC33 (GE) with 0.13 hectare per enterprise in 2000 (440 enterprises for 57.78 hectares) and 0.26 in 2010 (195 enterprises for 50.73 hectares). Then, the province with the biggest growth in the dimension within cereals is Imperia with an increase of 35.26 times: from 0.26 hectare per enterprise in 2000 (15 enterprises for 3.98 hectares) to 9.17 hectares per enterprise in 2010 (12 enterprises for 110.07 hectares).

In the upper part of figure 3 we observe the spatial autocorrelation for higher orders of neighbors in 2000 and 2010 for cereals. It shows the Moran's I statistic when considering different orders of neighbors, from the first order the the sixth one. It is noticeable that the Moran's I statistic is very high (0.3) compared to other neighbour contiguity order. Then we may conclude that there is positive

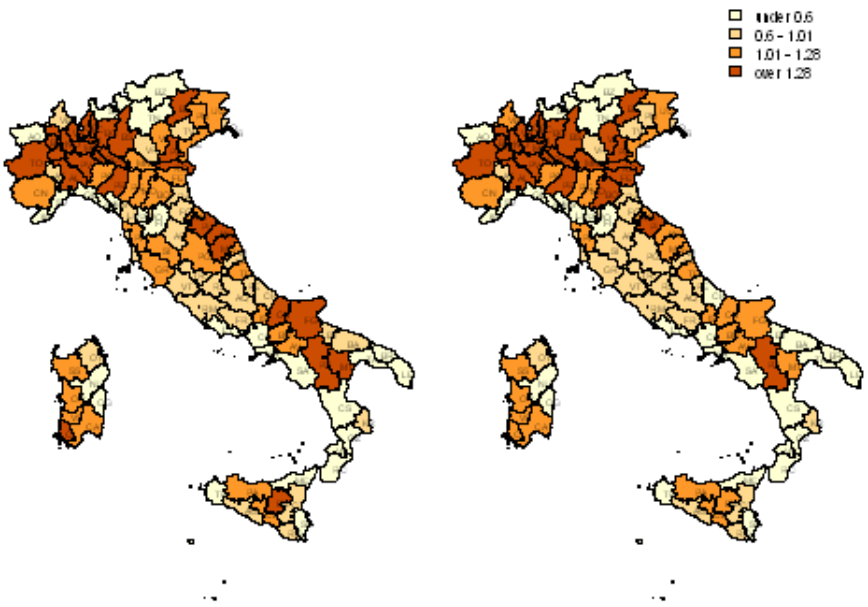

Fig. 2: Cereals Specialization: 2000 on the left; 2010 on the right

spatial autocorrelation in cereals only among the first order contiguity provinces. In other words, the spatial influence for the specialization in cereals is only observable among contiguous provinces. In the lower part of the graph, we show the significance of the Moran I statistic considering the distance among neighbors. Moran's I statistic is significant only when considering neighbors within a distance band of 0-10, 30-40 and 40-50 km. Coherently, only the Moran's I statistic referred to the first contiguity matrix is significant.

In figure 4 we may observe the Moran scatter-plot on the left and a map with the influential provinces on the right, in the case of the location quotient referred to cereals. On the upper part of the figure we show those statistics for the year 2000, while in the lower part for 2010. Looking at the scatter-plot,

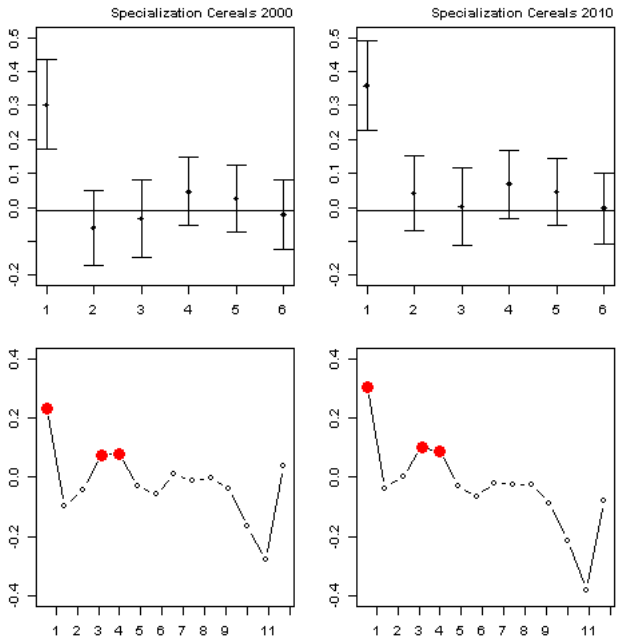

Fig. 3: Cereals Spatial Correlograms and Moran I

we see the most influential provinces named. In particular, these observations are those that influence more than proportionally the slope of the Moran statistic. In fact, since "global Moran's I is a linear relationship, we can also apply standard techniques for detecting observations with unusually strong influence on the slope. Specifically, we show the slope coefficient of the linear model of $(wx \sim x)$, where wx is the spatially lagged value of x. This means that we can see whether particular local relationships are able to influence the slope more than proportionally. The map in the right panel shows tracts with significant influence (using standard criteria) coded by their quadrant in the Moran scatterplot" (Bivand, Pebesma and Gómez-Rubio, 2008). In particular, we see that a high specialization with a high spatial autocorrelation is observable for Vercelli (VC), then this province is characterized by a High - high relation with his contiguous neighbours. On the contrary, Aosta (AO) and Verbano-Cusio-Ossola (VB) are characterized by a low specialization but they have neighbours with high specialization. That means they have a high-low relation with their contiguous neighbours. Napoli (NA), Genova (GE), Bolzano (BZ), Imperia (IM),

Vibo Valentia (VV), Trieste (TS) are characterized by a low-low relation with their neighbours: have a low specilization as their neighbours. Finally, Crotone (KR) has a high-low relation with its neighbours, since the neighbours specialization is very small compared to the one in Crotone. The global Moran's I in 2000 is equal to 0.29.

In 2010 the figure shows some changes compared to 2000: Verbano-Cusio-Ossola (VB) is characterized by a high-high relation, and Crotone (KR) and Genova (GE) do not result more influential on the definition of the Global Moran's I. The global Moran's I is equal to 0.36 in 2010, with an increase of the global spatial autocorrelation compared to 2000 in terms of specialization.

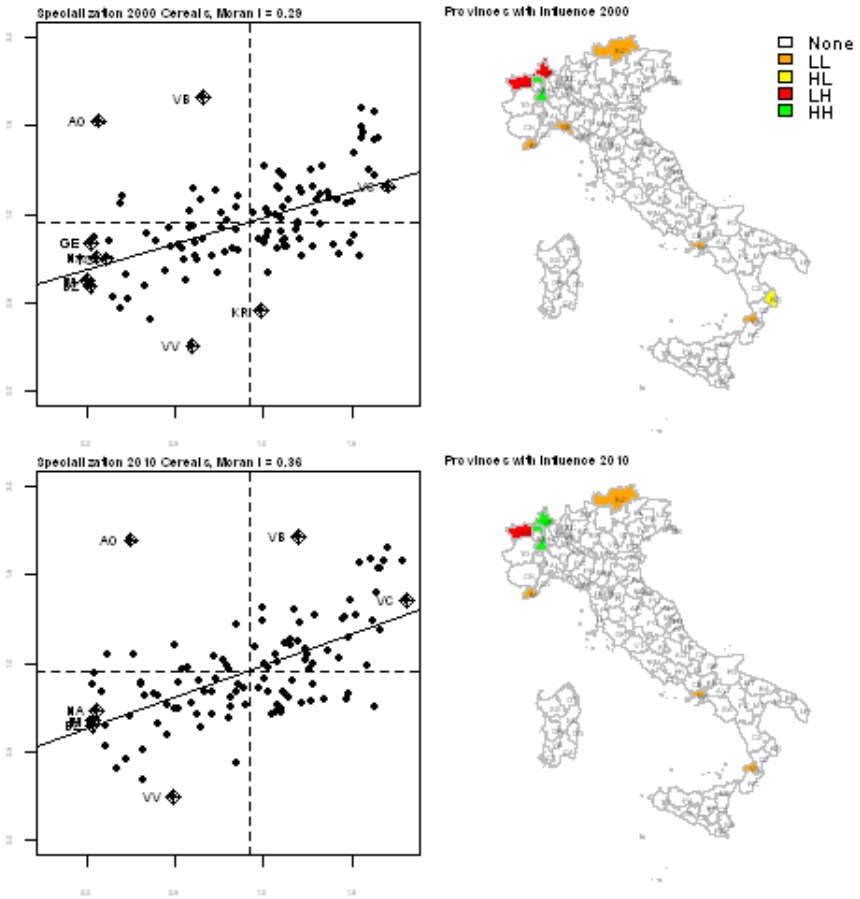

Fig. 4: Cereals Specialization and Moran I

In figure 5 clusters and hotspots are detected. It is evident a differentiation among the north and the south of the country. A high specialized cluster is

detected among a considerable number of northern provinces. Instead, on the south of Italy there are only clusters of low specialized provinces.

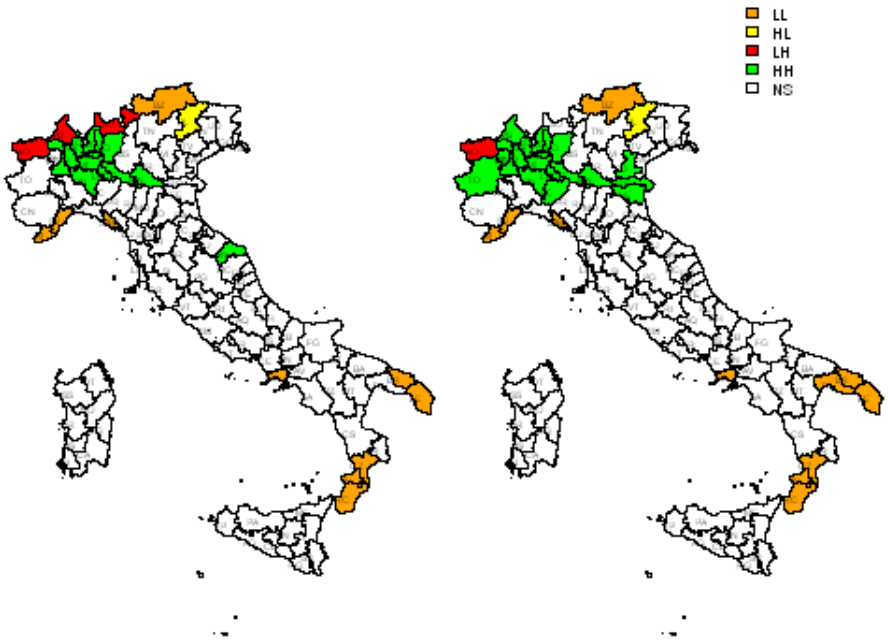

Fig. 5: Cereals Specialization hotspots and clusters: 2000 on the left; 2010 on the right

2.2 Olives

In figure 6 it is shown the location quotient statistic for olives in 2000 and 2010. Italy dedicates 1066396 hectares olive production in 2000 and 1123330 hectares in 2010. The UAA used for olives has been increased 469 times in Belluno - ITD33 (BL) (from 0.05 hectares in 2000 to 23.45 hectares in 2010); it decreased of 3.12 times in Pavia-ITC48 (PV) (from 64.4 to 20.65 hectares). The province with the larger UAA in olives is Lecce - ITF45 (LE) with 83822 hectares in 2000 and 97329 hectares in 2010. It has a specialization index equal to 4.16 in

2000 and 4.3 in 2010, that means is roughly 4 times more specialized than the whole country. Within the production of olives, the dimension of enterprises at Italian level increases in average of 29.75 %: it was of 0.96 hectare per enterprise in 2000 and it is 1.25 hectares in 2010. The province with the larger UAA dedicated to olives (Lecce - ITF45) has an average dimension of enterprises equal to 1.3 hectares in 2000 (64475 enterprises for 83822 hectares in 2000) and equal to 1.5 hectares in 2010 (65738 enterprises for 97329 hectares). The province with the bigger dimension within olives specialization in 2000 is Pavia with 9.2 hectares per enterprise (7 enterprises for 64.4 hectares), while in 2010 is Alessandria (AL) with 3.41 hectares per enterprise (158 enterprises for 540 hectares).

The province with the lowest enterprises dimension in 2000 is Novara-ITC15 (NO) with an average dimension of 0.045 hectares per enterprise (2 enterprises for 0.09 hectares); while in 2010 the smaller enterprises are in Fermo - IT109 (FM) with 0.4 hectares per enterprise (4520 enterprises for 1655.86 hectares). The province with the biggest growth is Belluno - ITD33 (BL) with 0.05 hectares per enterprise in 2000 (1 enterprise for 0.05 hectares) and 1.4 hectares per enterprise in 2010 (17 enterprises for 23.45 hectares). Imperia - ITC31 (IM) is the province with the highest location quotient, in 2000 it is equal to 5.8 and in 2010 to 5.2: that means that it was roughly 6 times more specialized than the whole country in 2000 and 5.2 times in 2010.

In figure 7 we see that the spatial autocorrelation for 2000 is always positive when considering different orders of contiguous neighbours. While the spatial autocorrelation with the first order neighbor is equal to roughly 0.5, the autocorrelation with the second order is 0.2. The autocorrelation with the sixth order neighbor is equal to 0.2. For all the neighbour orders considered the Moran's I statistic is significant. In 2010 we have a very similar situation. Looking at the distance bands, in 2000 we see that the spatial autocorrelation is significant when considering neighbours within 50 km, both in 2000 and 2010. Then, in global terms, the spatial autocorrelation for the specialization in olives do not

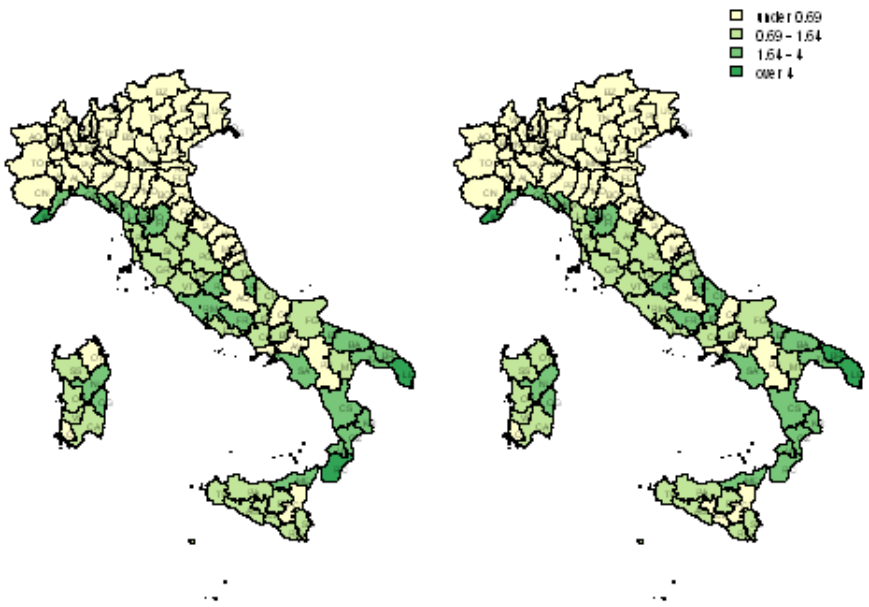

Fig. 6: Olives Specialization: 2000 on the left; 2010 on the right

show differences between 2000 and 2010.

In figure 8 we show the Moran scatter-plot with the most influential observations. In 2000, the global Moran (considering th e first order contiguity matrix) is equal to 0.46. There are 9 influential observations, 8 observation with a high-high spatial relation with neighbors: Brindisi (BR), Catanzaro (CZ), Genova (GE), Imperia (IM), Crotnone (KR), Lecce (LE), Vibo Valentia (VV), Reggio di Calabria (RC). On the contrary, Cuneo (CN) is characterized by a low-high relation, being a contiguity neighbour Imperia (IM). In 2010 there are some differences in the spatial relation among neighbours: Genova (GE) is no more influential on the global Moran's I statistic, L'Aquila (AQ) is characterized by a low-high spatial relation, Salerno (SA) by a low-low relation. All the other influential provinces on the south maintain a high-high relation. This indicates that

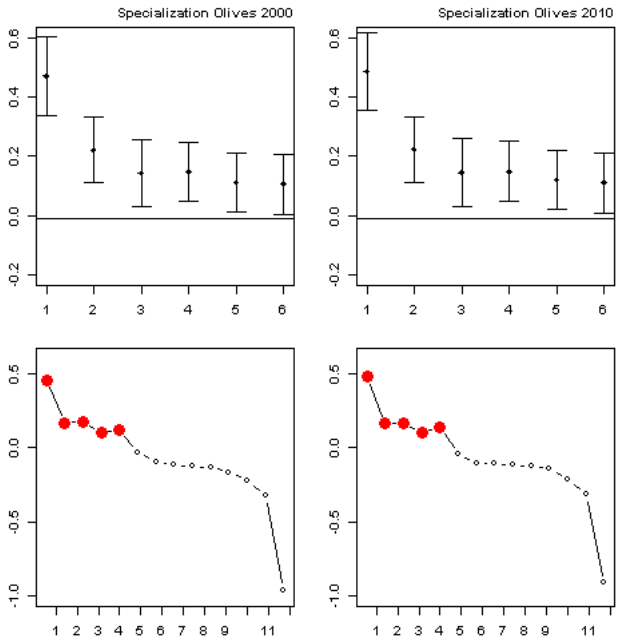

Fig. 7: Olives Spatial Correlograms and Moran I

while in the south of Italy the production of olives is spread in all the territory, in the center and north of the country only some provinces are larger producer of olives representing an exception compared to their neighbours.

In figure 9, the Local Moran's I shows the presence of two spatial regimes in the north and in the south of the country. A cluster of specialized provinces in the south and a cluster of no specialized provinces in the north of the country.

2.3 Grapes

In figure 10 is represented the specialization map for grapes. Hectares dedicated to Grapes are 717334 in 2000 and 664296 in 2010. UAA used for Grapes has increased of 52.24 % in Brescia - ITC47 (BS) (from 3968.5 hectares in 2000 to 6042 hectares in 2010) and reduced of 67 % in Messina - ITG13 (ME) (from 2688 hectares in 2000 to 893 hectares in 2010). The province with the large UAA used for Grapes is Trapani - ITG11 (TP) with 59507 hectares of grapes in 2000 and 62017 hectares in 2010, with a specialization index of 5.6 in 2000 and 6.1 in 2010, meaning that it is roughly 6 times more specialized in grapes

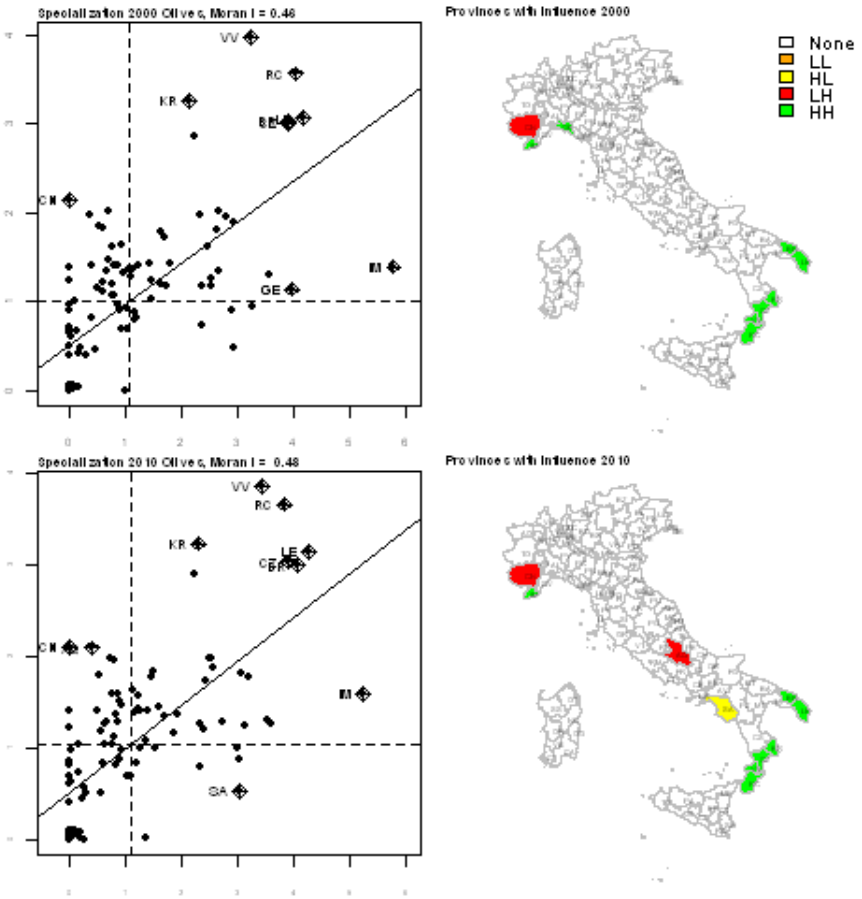

Fig. 8: Olives Specialization and Moran I

than the whole country. In 2000, the most specialized province in grapes is Trieste - ITD44 (TS), with a location index equal to 5.63 (190 hectares with total UAA equal to 345 hectares). Within the production of grapes, dimension of enterprises at Italian level increases in average of 1.9 times between 2000 and 2010 (0.91 hectares per enterprises in 2000 and 1.7 hectares per enterprises in 2010). The province with the larger UAA dedicated to Grapes (Trapani-ITG11) has an average dimension of enterprises equal to 2.8 hectares in 2000 (21358 enterprises for 59507 hectares) and of 3.8 hectares in 2010 (16298 enterprises for 62017 hectares). The province with the bigger dimension within grapes specialization is Gorizia (GO) both in 2000 than in 2010 with 3.5 hectares per enterprises in 2000 (1004 enterprises for 3498 hectares) and 5.3 hectares per enterprise in 2010 (772 enterprises for 4070 hectares). The province with the

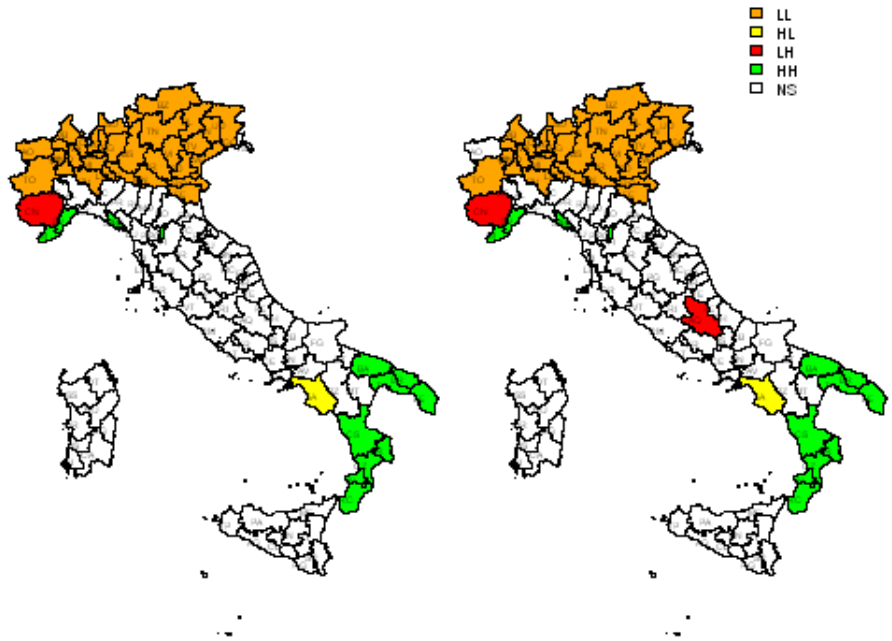

Fig. 9: Olives Specialization hotspots and clusters: 2000 on the left; 2010 on the right

lowest enterprises dimension in 2000 is Belluno - ITD33 with 0.07 hectare per enterprise (1072 enterprises for 78.66 hectares) and 0.24 hectares per enterprise (160 enterprises for 38.32 hectares). In 2010 it is Verbano-Cusio-Ossola - ITC14 (VB) with 0.24 hectares per enterprise (160 enterprises for 38.32 hectares). The province with the biggest increase in the dimension of enterprises between 2000 and 2010 is Belluno - ITD33 with an increase of 6.6 times between 2000 and 2010. In 2010 the dimension of enterprises in average is of 0.48 hectare with 117 enterprises for 56.64 hectares).

In figure 11 we show two kinds of correlograms for grapes production in 2000 and 2010. Both in 2000 and 2010, only the Moran's I measure, considering the first contiguity neighbours, is positive and significant. Among 2000 and 2010

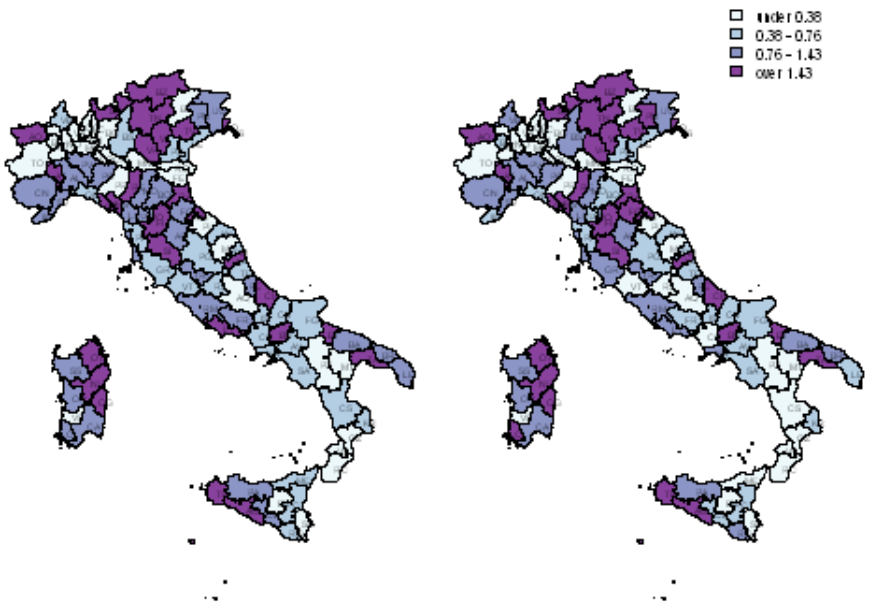

Fig. 10: Grapes Specialization: 2000 on the left; 2010 on the right

the global spatial autocorrelation reduces very little from 0.2 to 0.19. Coherently, the Moran's I is significant among neighbors within a distance of 0 - 10 km.

In figure 12 Moran's I scatter-plot for grapes production. In 2000 the global Moran's I statistic is equal to 0.2. There are 10 influential observations: a high-high spatial relation hugely characterize Trieste (TS). A high-high relation is noticeable also for Gorizia (GO) that has contiguity neighbours more specialized. Trapani (TP) has roughly the same level of specialization compared to Trieste and it have a high-high relation with neighbours, even if they have a lower specialization. Also Agrigento (AG), Bolzano (BZ), Trento (TN) and Sondrio (SO) have a high-high spatial relation. Instead, Belluno (BL) has a low specialization in grapes but it is surrounded by high specialized provinces,

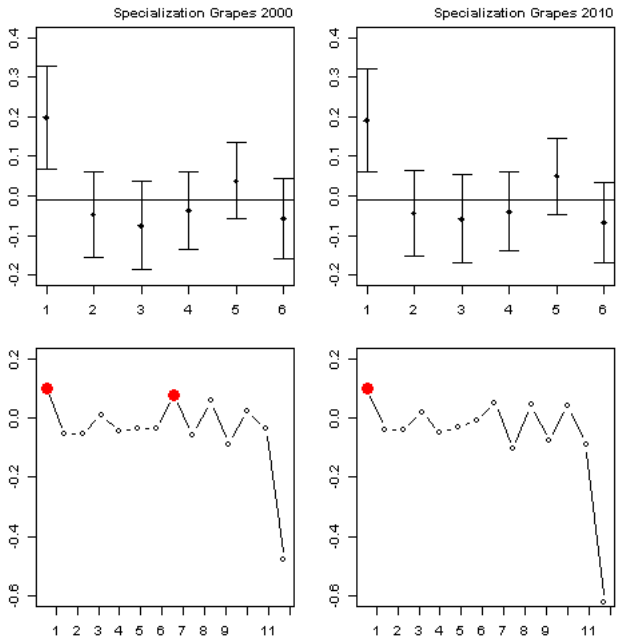

Fig. 11: Grapes Spatial Correlograms and Moran I

then it has a low-high spatial relation. Finally, Aosta (AO) and Asti (AT) are characterized by a high-low relation with their neighbors, since they have a high specialization in grapes but their neighbours have not. In 2010 the global Moran's I is roughly equal to 2000. Compared to 2000 the observation referred to Olbia-Tempio (OT) is influential and characterized by the high-high spatial relation, while Asti (AT) does not more result influential.

As evident with figure 13, there are two clusters of high specialized provinces in the country. One cluster is composed by the two provinces of Trentino Alto Adige (Bolzano - BZ and Trento - TN), the other includes two Sicilian provinces (Trapani - TR and Agrigento - AG).

2.4 Citrus Fruit

In figure 14 we show specialization in citrus fruit production. Italy dedicates 132566.4 hectares in 2000 and 128921.1 hectares in 2010 to the production of Citrus Fruit.

UAA used for Citrus Fruit has increased of 110 times in Firenze-ITE14 (FI)

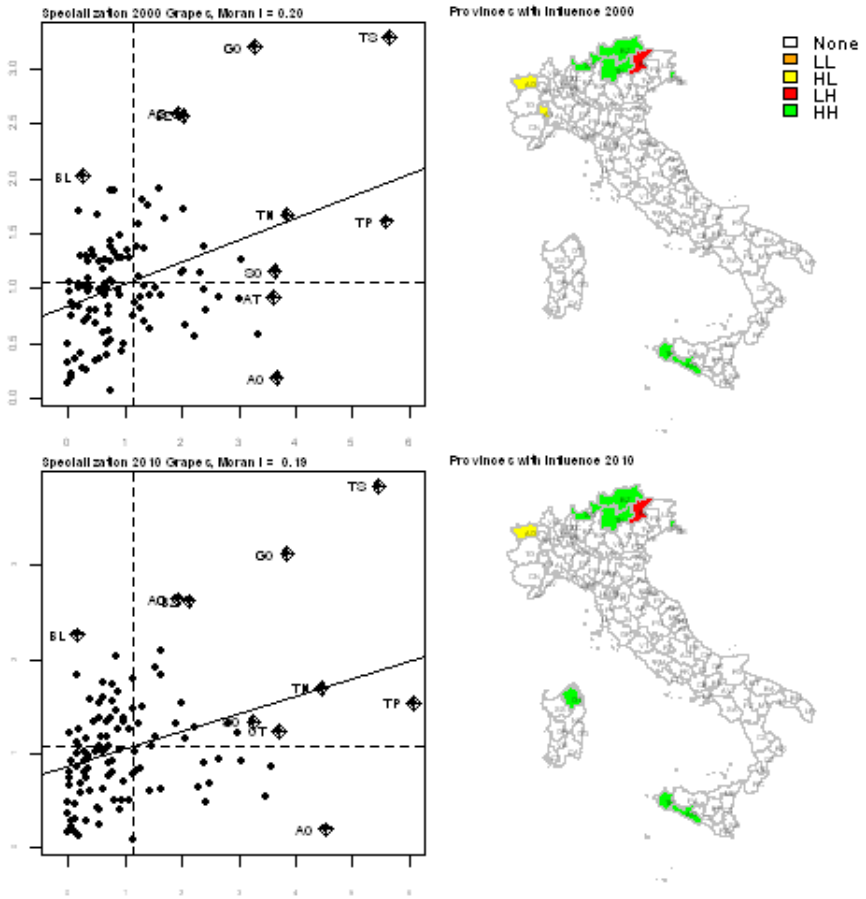

Fig. 12: Grapes Specialization and Moran I

(from 0.15 hectares in 2000 to 16.46 hectares in 2010) and a specular reduction of 109.4 time in L'Aquila - ITF11 (AQ) (from 5.47 hectares in 2000 to 0.05 hectares in 2010). The province with the larger amount of UAA used for Citrus Fruit is Catania - ITG17 (CT) with 28784 hectares in 2000 and 30255 hectares in 2010. Within the production of citrus fruit, dimension of enterprises at Italian level increases in average of 1.9 times between 2000 and 2010 (0.86 hectares per enterprises in 2000 and 1.6 hectares per enterprises in 2010). The province with the larger UAA dedicated to citrus fruit (Catania - ITG17) has an average dimension of enterprise equal to 1.54 hectares per enterprise in 2000 (18618 enterprises for 28784 hectares) and 2.6 hectares per enterprise in 2010 (11596 enterprises for 30255 hectares). It has a location quotient equal to 15.1 in 2000 and 14.4 in 2010. The province with the higher specialization

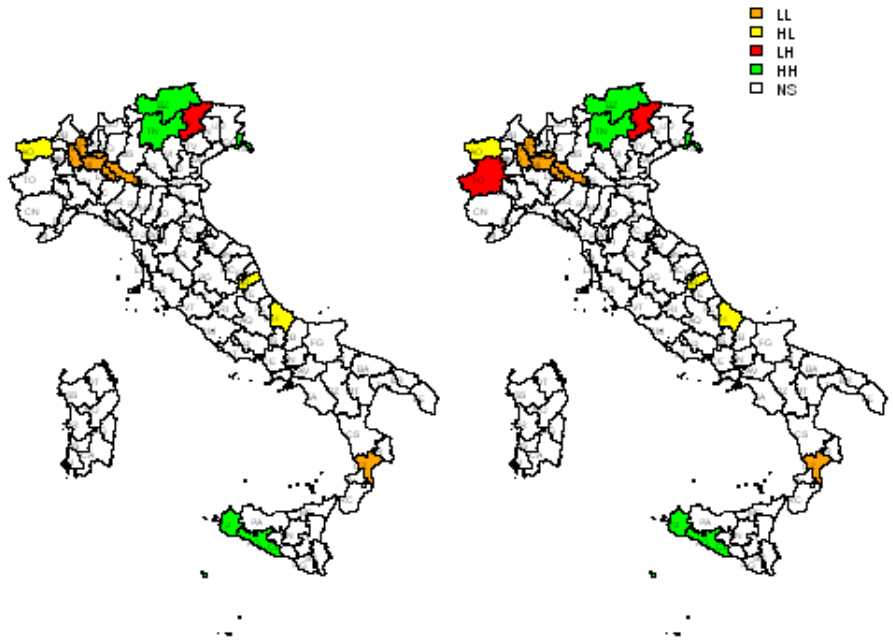

Fig. 13: Grapes Specialization hotspots and clusters: 2000 on the left; 2010 on the right

in Citrus fruit is Siracusa - ITG19 (SR) with a specialization index equal to 18.1 in 2000 (19403 hectares on 59209 as total) and 18.2 in 2010 (21242 on 61114 in total). The province with the bigger dimension within citrus fruit specialization is Taranto - ITF43 (TA) in 2000 with 2.1 hectares per enterprise (3230 enterprises for 6777 hectares) and Sondrio - ITC44 (SO) in 2010 with 5.5 hectares per enterprise (3 enterprises for 16.54 hectares). The province with the lowest enterprises dimension in 2000 is Como - ITC42 with 0.01 hectares per enterprise (1 enterprise for 0.01 hectares), while in 2010 is L'Aquila - ITF11 with 0.05 hectares per enterprise (1 enterprise for 0.05 hectares). The province with the larger increase of dimension is Como- ITC42 (CO) with an increase of 17.5 times, since in 2010 the average dimension is of 0.175 hectares (1 enterprise for

0.175 hectares).

Figure 15 shows the spatial correlogram for citrus fruit in 2000 and 2010. Both

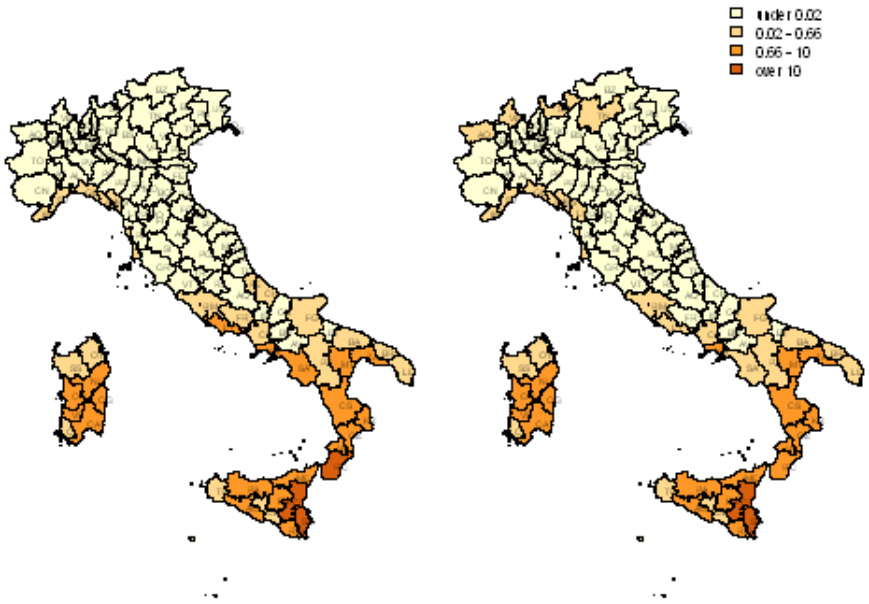

Fig. 14: Citrus Fruits Specialization: 2000 on the left; 2010 on the right

in 2000 and 2010 the first three orders of contiguity neighbours are significantly autocorrelated. In 2000 the Moran's I considering the first order of contiguous neighbours is equal to 0.57 considering two orders it is equal to 0.25 and with the third order it is equal to 0.13. In 2010 with the first order the Moran's I is equal to 0.52, with the second it is 0.24 and with the third it is equal to 0.12. Then, there is a little decrease in the spatial autocorrelation. Looking at the distance, there is a significant spatial autocorrelation within 40 km.

Figure 16 shows the Moran's I scatter-plot for Citrus fruit production. The global Moran's I is equal to 0.57 in 2000.

It is evident that the most influential units are located in the south of Calabria

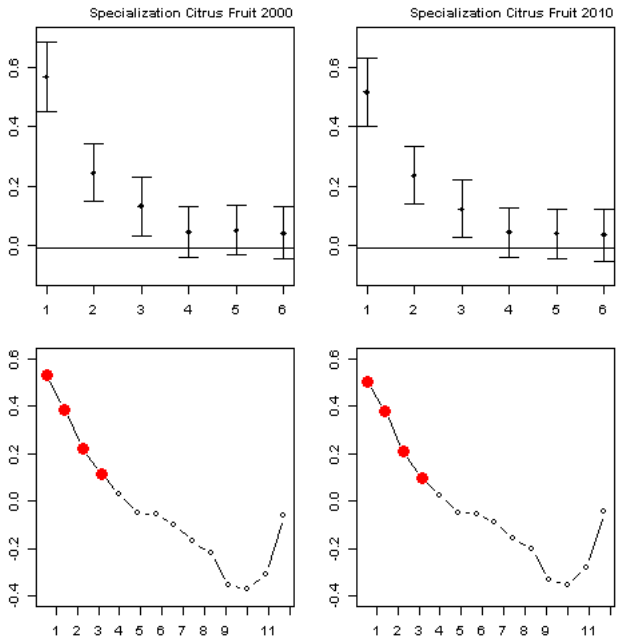

Fig. 15: Citrus Fruit Spatial Correlograms and Moran I

region with Crotone (KR), Vibo Valentia (VV), Reggio di Calabria (RC) and in east Sicily with Messina (ME), Catania (CT), Enna (EN), Siracusa (SR) and Ragusa (RG) with a high-high spatial relation. On Instead, Caltanisseta (CL), is characterized by a low specialization compared to its contiguous neighbours and then have a low-high spatial relation. In 2010 the global Moran's I slowly reduces to a value of 0.52. Influential observations are the same plus Catanzaro (CZ) characterized by a high specialization and surrounded by high specialized provinces. In practice the spatial relations remain the same.

In figure 17 we observe the cluster of high specialized provinces including provinces of Calabria and Sicilia regions. In 2010, the number of provinces part of the cluster increases.

2.5 Fruits

In figure 18, we show specialization in the production of fruits. For Fruits we have 498406 hectares in 2000 and 424303.8 hectares in 2010. UAA used for Fruits has increased of 559 times in Lodi - ITC49 (LO) (from 6.02 hectares

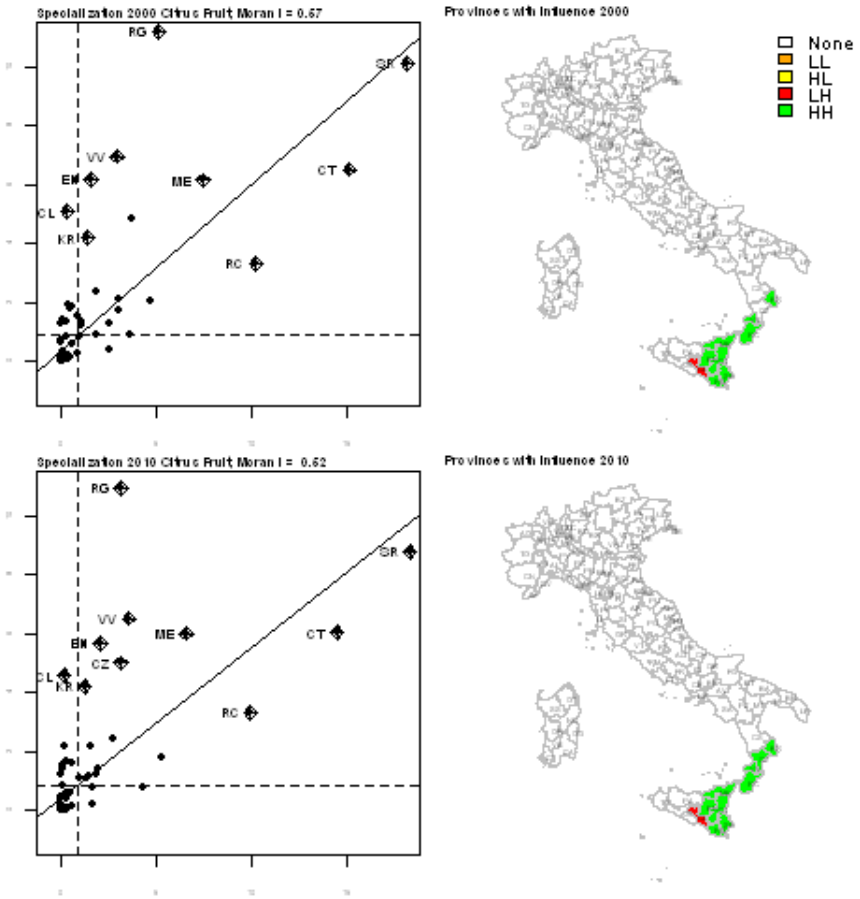

Fig. 16: Citrus Fruits Specialization and Moran I

in 2000 to 3370.05 hectares in 2010) and reduced 6.1 times in Verbano-Cusio-Ossola - ITC14 (VB) (from 230 hectares in 2000 to 37.73 hectares in 2010). The province with the larger amount of UAA used on Fruits is Cuneo - ITC16 (CN) with 31739 hectares of fruit in 2000 and 33021 hectares in 2010. It has a location quotient equal to 3.4 in 2000 and 4 in 2010. The most specialized province in fruits is Bolzano - ITD10 (BZ) with a location quotient of 11.1 (18325.62 hectares on a total of 24385) in 2000, while a specialization index of 11.9 in 2010 (18973 hectares on a total of 25479). Within the production of fruits, dimension of enterprises at Italian level increases in average of 1.8 times between 2000 and 2010 (1 hectare per enterprises in 2000 and 1.8 hectares per enterprises in 2010). The province with the larger UAA dedicated to fruit (Cuneo - ITC16) has an average dimension of enterprise equal to 1.8 hectares

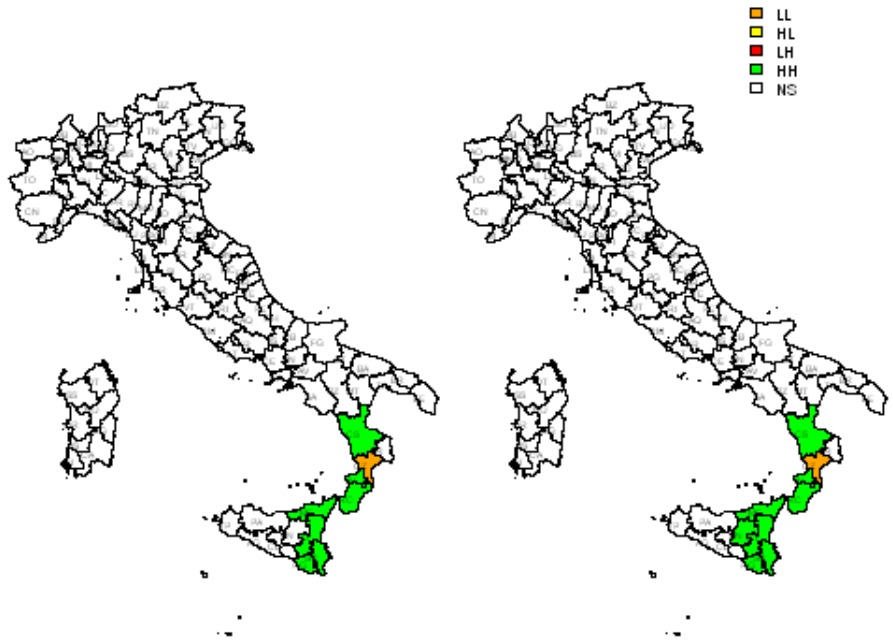

Fig. 17: Citrus Specialization hotspots and clusters: 2000 on the left; 2010 on the right

per enterprise in 2000 (17578 enterprises for 31739 hectares) and 2.8 hectares per enterprise in 2010 (11870 enterprises for 33021 hectares). The province with the bigger enterprise dimension within fruit specialization is Cremona - ITC4A (CR) in 2000 with 5.4 hectares per enterprise (46 enterprises for 248 hectares) and Ferrara - ITD56 (FE) in 2010 with 6.3 hectares per enterprise (2231 enterprises for 14017 hectares). The province with the lowest enterprises dimension in 2000 is Belluno - ITD33 (BL) with 0.12 hectares per enterprise (934 enterprises for 117 hectares), while in 2010 is Trieste - ITD44 (TS) with 0.18 hectares per enterprise (51 enterprises for 9 hectares). The province with the large increase in the average dimension of enterprise for fruit is Belluno - ITD33 with an increase of 11.5 times, with the dimension in 2010 of 1.4 hectares

per enterprise (133 enterprises for 191 hectares).

In figure 19 the correlogram for higher spatial lag order is shown considering

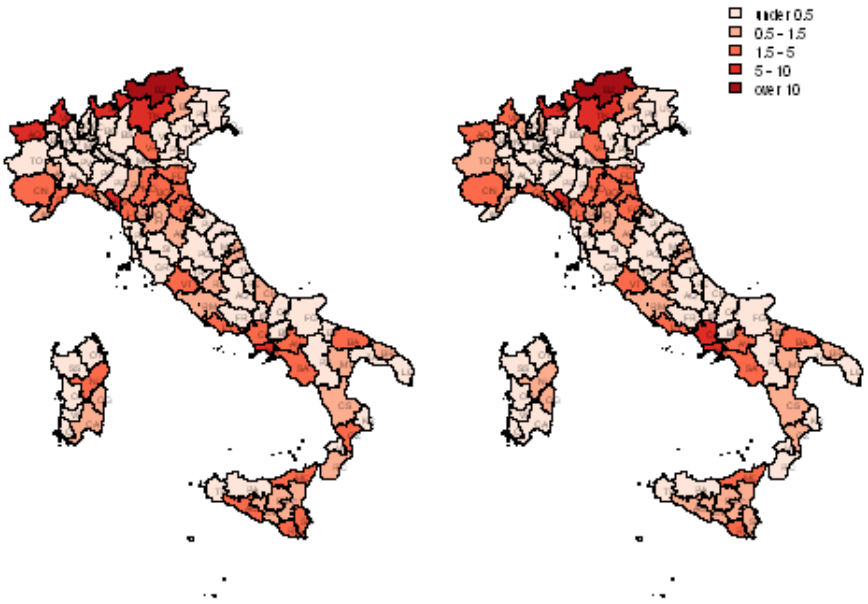

Fig. 18: Fruits Specialization: 2000 on the left; 2010 on the right

the specialization of provinces in the production of fruits. In 2000 Moran's I is significant only when considering the first contiguity neighbour, and the value is of 0.23. In 2010 the spatial autocorrelation increases with a value of 0.27, and as in 2000 only the first order of contiguity neighbors are significantly spatial autocorrelated. This is coherent when considering distances. In fact, only on the first band we have a significant autocorrelation.

In figure 20 the Moran's I scatter-plot referred to the production of fruits is shown. In 2000 the global Moran's I statistic is equal to 0.23. Bolzano (BZ) is highly specialized and surrounded by high specialized provinces. The same is for Trento (TN), Sondrio (SO), Napoli (NA) and Salerno (SA). Aosta (AO),

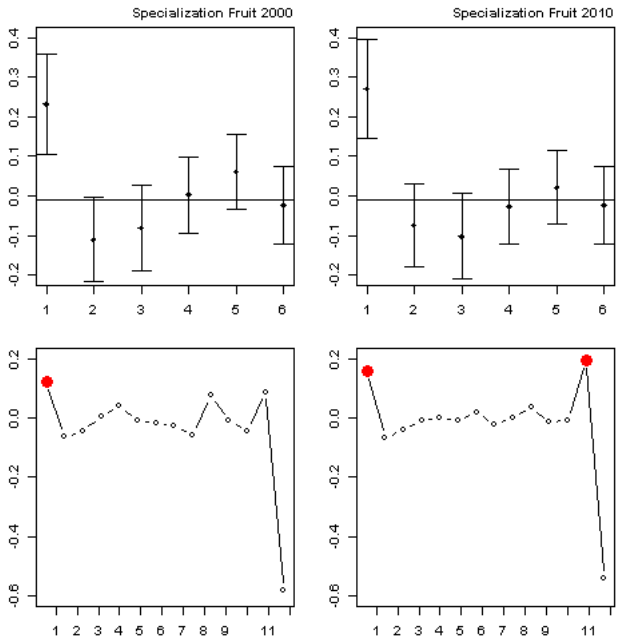

Fig. 19: Fruit Spatial Correlograms and Moran I

Verbano-Cusio-Ossola (VB) and Massa Carrara (MS) are highly specialized but surrounded by low specialized provinces. Finally, La Spezia (SP), Imperia (IM), Brescia (BS), Belluno (BL) and Benevento (BN) have a low specialization with specialized contiguous neighbours. In 2010, the global spatial autocorrelation increases to 0.27, and it is evident also with an increase of specialization of those provinces surrounded by high specialized provinces: La Spezia (SP), Benevento (BN) and Caserta (CE) raise their specialization in fruit production.

In figure 21 it is shown the Local Moran's I for fruits. In 2000, it is evident a cluster among the provinces by Trentino Alto Adige and Sondrio (SO), with also two high specialized clusters in Ravenna - RA and in Napoli - NA. The latter increases its territorial dimension in 2010.

2.6 Vegetables in Open Fields

In figure 22 we show the specialization in the vegetables in open fields. To Open field vegetable all the provinces dedicate 236823.7 hectares in 2000 and 266737.3 hectares in 2010. UAA used for Open Veg increased of 2.26 times in

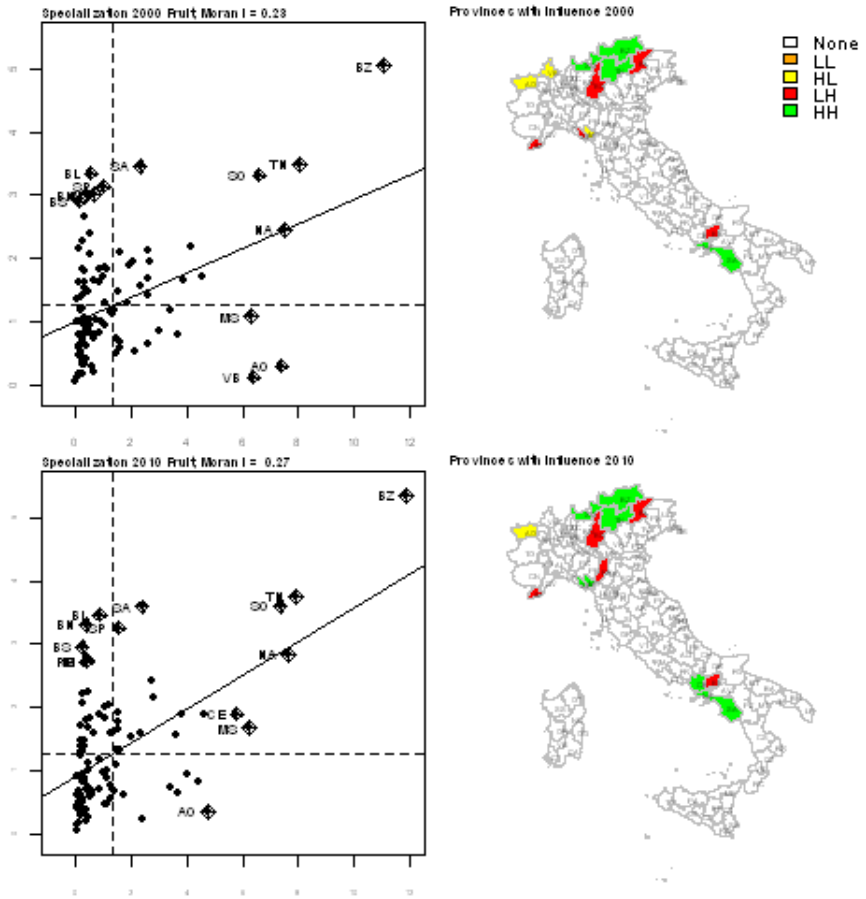

Fig. 20: Fruits Specialization and Moran I

Enna - ITG16 (EN) (from 4750 hectares in 2000 to 5160 hectares in 2010) and was reduced of 9 times in Sondrio - ITC44 (SO) (from 140.6 hectares in 2000 to 15.6 hectares in 2010). The province with the larger amount of UAA used for open field vegetables is Foggia - ITF41 (FO) with 20860 hectares in 2000 and 33232 hectares in 2010. It has a specialization index equal to 1.6 in 2000 (total hectares equal to 401031) and 1.2 in 2010 (total hectares equal to 385735). Within the production of vegetables in open fields, dimension of enterprises at Italian level increases in average of 2.86 times (from 0.94 hectares per enterprise in 2000 to 2.7 hectares of 2010). The province with the larger UAA dedicated to vegetables in open fields (Foggia - ITF41) has an average dimension of enterprise equal to 4.2 hectares per enterprise in 2000 (4930 enterprises for 20860 hectares) and 8.8 hectares per enterprise in 2010 (3791 enterprises for 33232

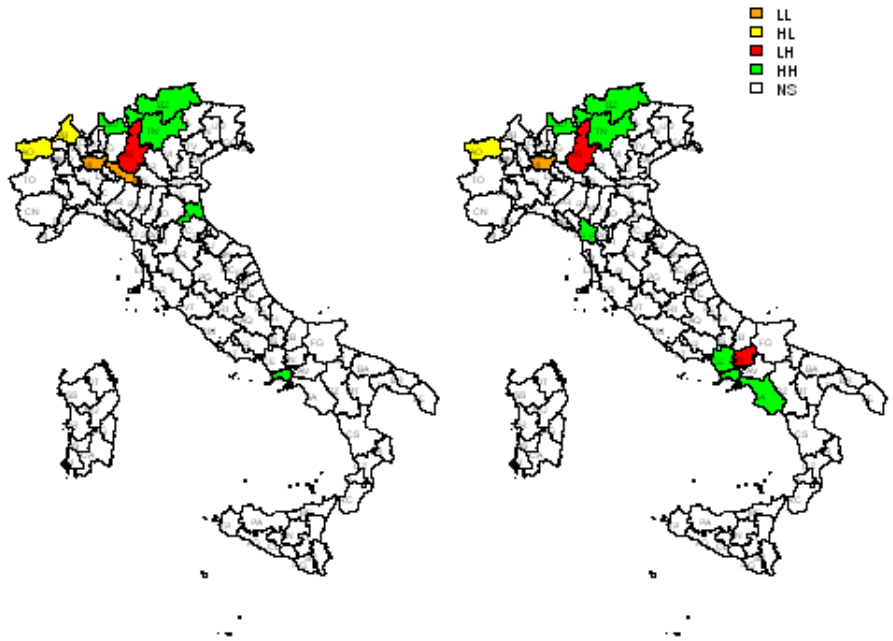

Fig. 21: Fruits Specialization hotspots and clusters: 2000 on the left; 2010 on the right

hectares). The province with the bigger enterprise dimension within vegetables in open fields specialization in 2000 and 2010 is Piacenza - ITD51 (PC) with 14.1 hectares per enterprise in 2000 (1135 enterprises for 16044 hectares) and 19.15 hectares per enterprise in 2010 (804 enterprises for 15399 hectares). Piacenza is also the most specialized in this production, with a specialization index of 7.6 in 2000 (a total of 65646 hectares). In 2010 L'Aquila - ITF11 (AQ) becomes the most specialized province, with a specialization index of 7.3 (7747 hectares on a total of 26781). The province with the lowest enterprises dimension in 2000 is Frosinone - ITE45 (FR) with 0.11 hectares per enterprise (4698 enterprises for 562.3 hectares), while in 2010 is Genova - ITC33 (GE) with 0.2 hectares per enterprise (903 enterprises for 195 hectares). The province with

the large increase in the average dimension of enterprise for vegetables in open fields is Potenza - ITF51 (PZ) with an increase of 5.4 times: 0.5 hectares per enterprise in 2000 (6350 enterprises for 3183 hectares) and 2.7 in 2010 (1294 enterprises for 3541 hectares).

Figure 23 shows the spatial correlogram for open field vegetables. Spatial

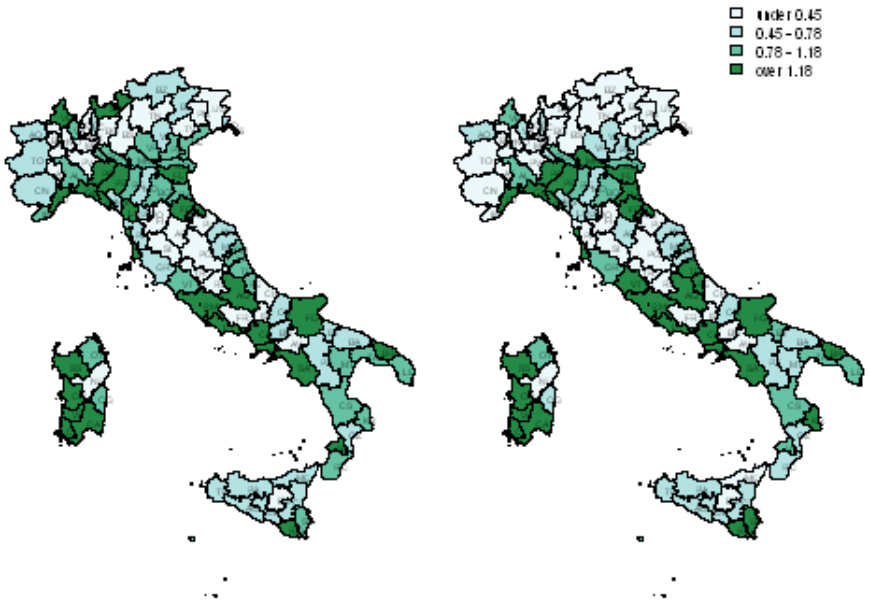

Fig. 22: Veg in open field Specialization: 2000 on the left; 2010 on the right

autocorrelation is significant in 2000 only when considering the eighth order of contiguity neighbors. On the countrary, in 2010 there is not a significant spatial autocorrelation. Looking at the distance, there is a significant spatial autocorrelation when considering neighbors within 100-110 km in both 2000 and 2010.

In figure 24 the Moran's I scatterplot and the influential provinces are shown. The global Moran's I is equal to 0.11. Piacenza (PC) is the most specialized province, surrounded by specialized neighbors: Parma (PR), Genova (GE),

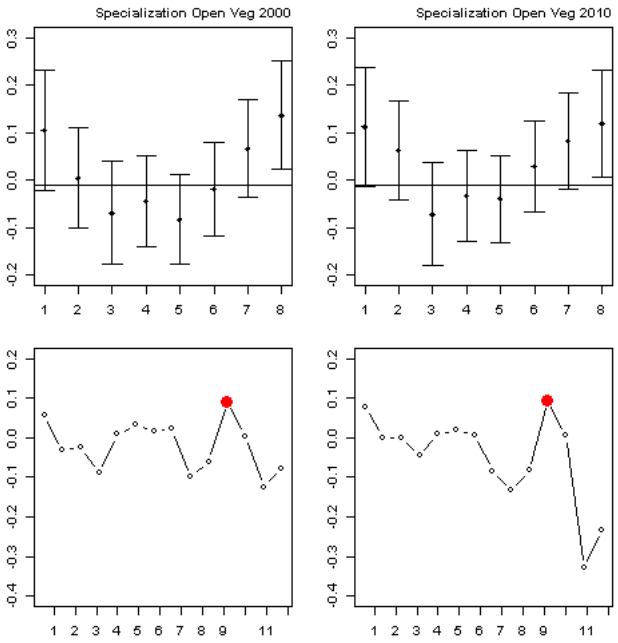

Fig. 23: Open Veg Spatial Correlograms and Moran I

La Spezia (SP). Notwithstanding it is high specialized and in contiguity with Genova, Savona (SV) is in average surrounded by low specialized neighbours. L'aquila (AQ) has a high specialization but it is surrounded by low specialized provinces, including Frosinone (FR), which has Latina (LT) as contiguous neighbour with high specialization surrounded by other specialized provinces. Finally, Napoli (NA) is highly specialized as its neighbours in open field vegetables. In 2010 the global Moran's I increases to 0.12, and Roma (RO) increases its index of specialization being more specialized compared to the rest of the country, with high specialized neighbors.

In figure 25 are shown the hotspots and clusters referred to the specialization in the cultivation of vegetables in open field. A consolidated cluster of high specialized provinces is present between the provinces of Genova (GE), Parma (PA), Piacenza (PC) and La Spezia (SP) in the north of Italy. In the south a cluster of high specialized provinces includes Caserta (CE), Napoli (NA), Salerno (SA) in 2000, while in 2010 this cluster shifts towards north including Roma (RM) and Latina (LT) and loosing Salerno (SA). Moreover, in 2010 in Sardinia

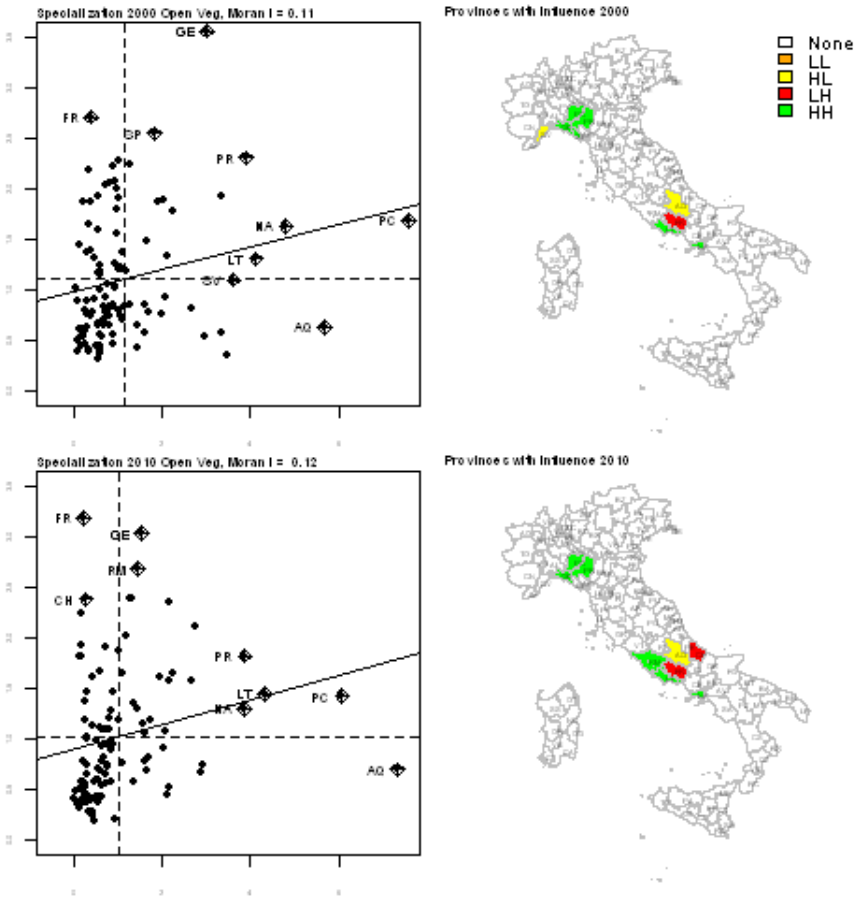

Fig. 24: Veg in open field Specialization and Moran I

there is a specialized cluster by Oristano (OR) and Medio Campidano (VS).

2.7 Greenhouse Vegetables

In figure 26 we show Italian provinces specialized in greenhouse vegetables. To the greenhouse vegetables, 22472 hectares in 2000 and 32944 hectars in 2010 are dedicated. UAA used for Close Veg increased of 548 times in Aosta - ITC20 (AO) (from 0.09 hectares in 2000 to 49.3 hectares in 2010) and reduced of 12.8 times in Pordenone - ITD41 (PN) (from 155.49 hectares in 2000 to 12.12 hectares in 2010). The province with the larger amount of UAA used for Greenhouse Vegetables is Ragusa - ITG18 (RG) with 4459 hectares in 2000 and 5701 hectares in 2010. It is also the most specialized one in 2000 with a location quotient of 30.4 (47895.53 total hectares) and 27.2 in 2010 (43031 total hectares).

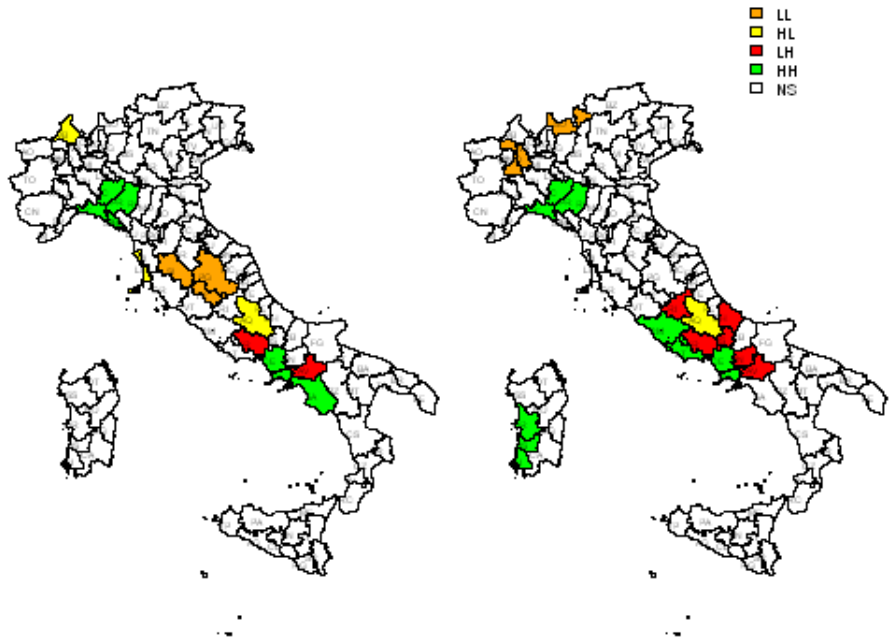

Fig. 25: Veg in open field Specialization hotspots and clusters: 2000 on the left; 2010 on the right

Within the production of greenhouse vegetables, dimension of enterprises at Italian level increases in average of 1.7 times, from 0.9 hectares per enterprise in 2000 to 1.5 in 2010. The province with the larger UAA dedicated to greenhouse vegetables (Ragusa - ITG18) has an average dimension of enterprise equal to 1.15 hectares in 2000 (3871 enterprises for 4459 hectares) and of 1.7 in 2010 (3331 enterprises for 5701 hectares). The province with the bigger enterprise dimension within greenhouse vegetables specialization in 2000 is Lodi - ITC49 (LO) with 12.9 hectares per enterprise (6 enterprises for 77.6 hectares). The province with the lowest average enterprise dimension in 2000 is Aosta - ITC20 (AO) with 0.045 hectares for enterprise (2 enterprises for 0.09 hectares). In 2010, the province with the bigger enterprise dimension

is Mantova- ITC4B (MN) with 9.4 hectares for enterprise (284 enterprises for 2670.11 hectares), while the province with the smaller dimension is Verbano-Cusio-Ossola - ITC14 (VB) with 0.03 hectares for enterprise (7 enterprises for 9.6 hectars). The province with the large increase in the average dimension of enterprise for greenhouse vegetables is Avellino - ITF34 (AV) with an increase of 7.5 times, from 0.1 hectares per enterprise (208 enterprises for 19.5 hectares) in 2000 to 0.7 hectares per enterprise (49 enterprises for 35 hectares).

The spatial correlogram for provinces specialized in greenhouse vegetables is

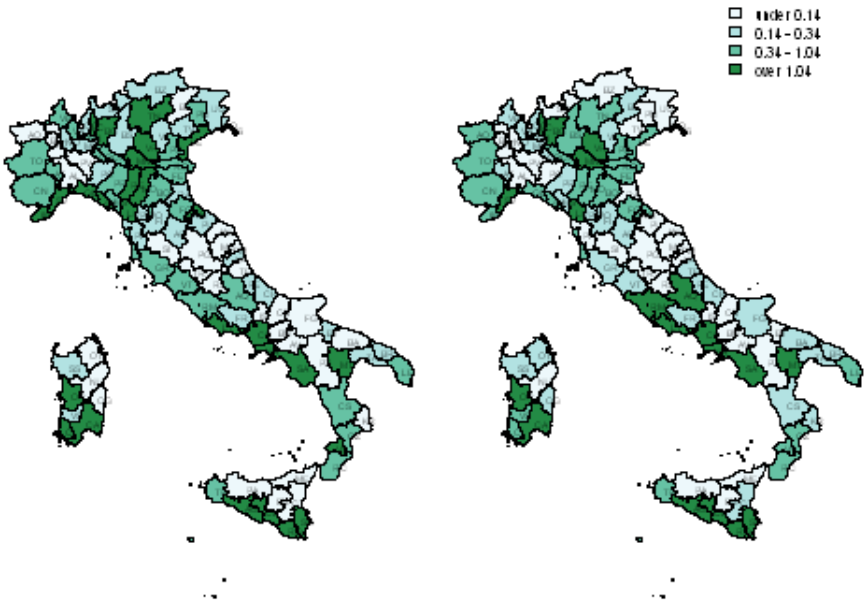

Fig. 26: Greenhouse Veg Specialization: 2000 on the left; 2010 on the right

shown in figure 27. In 2000 there is no significant autocorrelation whatever order of contiguity we consider. In 2010, instead, there is significant spatial autocorrelation among the first order of contiguous neighbours equal to 0.15. In terms of distance, there is significant spatial autocorrelation within a distance

band of 40-50 km in 2000, while in 2010 there is significance within a distance of 0-10 km and 40-50 km.

Figure 28 shows the Moran's I scatter-plot. The Moran's I statistic in 2000

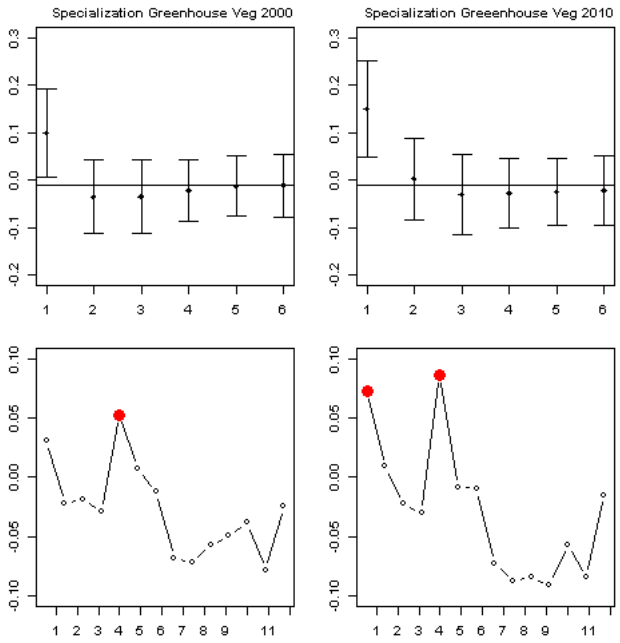

Fig. 27: Greenhouse Veg Spatial Correlograms and Moran I

is equal to 0.10. The most specialized province is Ragusa (RG), surrounded in average by specialized provinces. A high - high spatial relation characterized also Siracusa (SR) and Caltanissetta (CL), both contiguous of Ragusa, while Catania (CT) is not specialized more than the average. Moreover, Salerno (SA) and Latina (LT) are highly specialized and surrounded in average by specialized provinces. In 2010, the global Moran's I increases to 0.15. Frosinone (FR) becomes influential, and it is surrounded more than before by highly specialized provinces, but it still has not specialization in greenhouse vegetables.

In figure 29 it is presented the Local Moran's I for the specialization in greenhouse vegetables. In 2000 a cluster is present in all the country, represented by two Sicilian provinces: Ragusa (RG) and Siracusa (SR). In 2010 this cluster develops including Caltanissetta (CL). Moreover, in 2010 another cluster of high specialized provinces is composed by Caserta (CE), Salerno (SA), Napoli (NA),

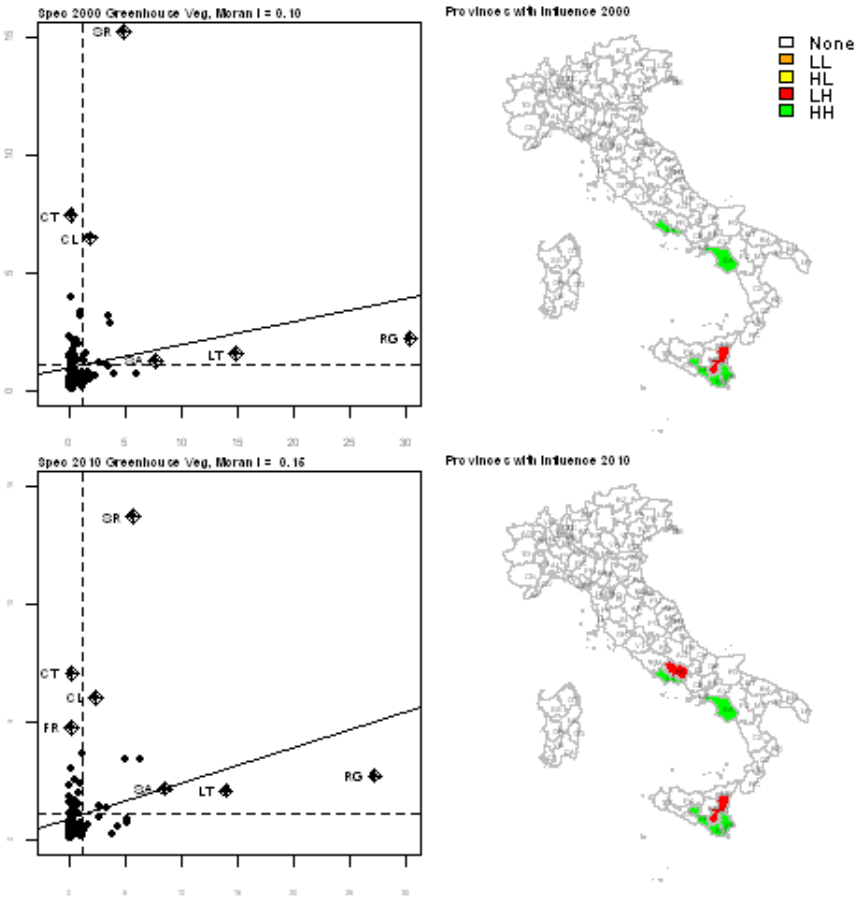

Fig. 28: Greenhouse Veg Specialization and Moran I

Latina (LT).

2.8 Industrial Crops

In figure 30 we show the specialization map for industrial crops. 510992 hectares in 2000 and 342794 hectares in 2010 are dedicated to industrial crops. UAA used for Industrial Crops increased of 292 times in Olbia-Tempio - ITG29 (OT) (from 0.17 hectares in 2000 to 49.62 hectares in 2010) and reduced of 183.8 times in Oristano - ITG28 (OR) (from 3641.3 hectares in 2000 to 19.8 hectares in 2010). The province with the larger amount of UAA used for Industrial crops in 2000 is Perugia - ITE21 (PG) with 34664 hectares, while in 2010 the 'leader' in those crops is Venezia - ITD35 (VE) with 26696 hectares. It is the most specialized province with a location quotient equal to 3.9 in 2000 (total

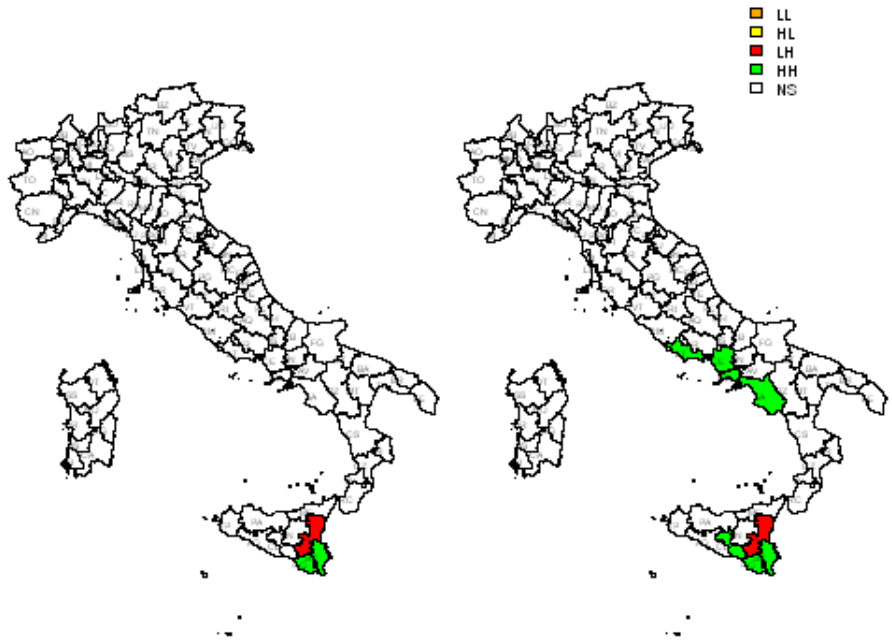

Fig. 29: Greenhouse Veg Specialization hotspots and clusters: 2000 on the left; 2010 on the right

hectares equal to 94438). In 2010, instead, Pordenone - ITD41 (PN) is the most specialized province in industrial crops with an index of 5.5 (with 14655 hectares use for industrial crops up to a total amount of 51897). Within the production of Industrial crops, dimension of enterprises at Italian level increases in average of 1.1 times: from 5.3 hectares per enterprise in 2000 to 5.9 hectares per enterprise in 2010. The province with the larger UAA dedicated to industrial crops in 2000 (Perugia - ITE21) has an average dimension of enterprise equal to 6.4 hectars per enterprise (5453 enterprises for 34664 hectares), while the "leader" in 2010 (Venezia - ITD35) has an average dimension of 5.2 hectares per enterprise (5149 enterprises for 26696 hectares). The province with the bigger enterprise dimension within industrial crop in 2000 is Barletta-Andria-Trani

- IT110 (BT) with 15.7 hectares per enterprise (40 enterprises for 626 hectares) and the province with the smaller dimension is Verbano-Cusio-Ossola - ITC14 (VB) with 0.01 hectares per enterprise (1 enterprise). In 2010 the province with the largest enterprises is Matera - ITF52 (MT) with 19 hectares per enterprise (13 enterprises for 248 hectares), while the smallest is Trapani - ITG11 (TP) with 0.2 hectares per enterprise (329 enterprises for 72 hectares). The province with the largest growth in the dimension of enterprises is Olbia-Tempio - ITG29 with an average dimension of 0.03 hectares per enterprise (6 enterprises for 0.17 hectares), while in 2010 the average dimension is of 2.8 hectars per enterprise (18 enterprises for 49.6 hectares).

Figure 31 shows the spatial correlogram for industrial crops for 2000 and 2010.

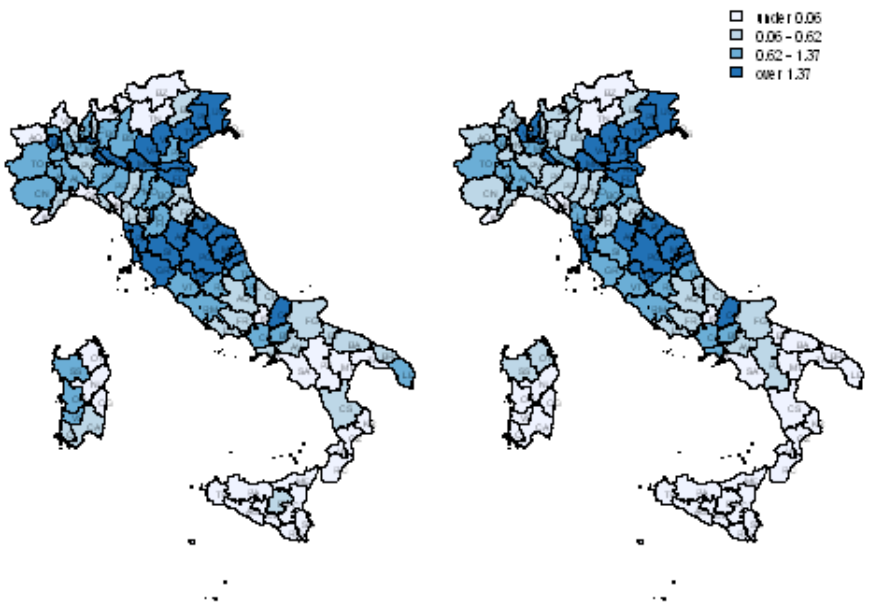

Fig. 30: Industrial Crops Specialization: 2000 on the left; 2010 on the righ

In 2000 there is significant spatial autocorrelation among the first three order

of contiguous neighbours. While the Moran's I statistic is equal to 0.55 among first order contiguous neighbour, it is equal to 0.32 among the second order and to 0.15 among the third. In 2010 the first two order of contiguous neighbours are significantly spatially autocorrelated, with the Moran's I equal to 0.62 among the first order and to 0.33 among the second order. There is big raise in the spatial autocorrelation among 2000 and 2010. Looking at the distance, the spatial autocorrelation is significant among the bands that go form 0-10 to 30-40 km, and then to 130-140 km. In 2010, instead, there is a significant spatial autocorrelation within distance bands that go from 0-10 to 30-40 km.

Figure 32 shows the Moran's I scatter-plot for 2000 and 2010 and the most

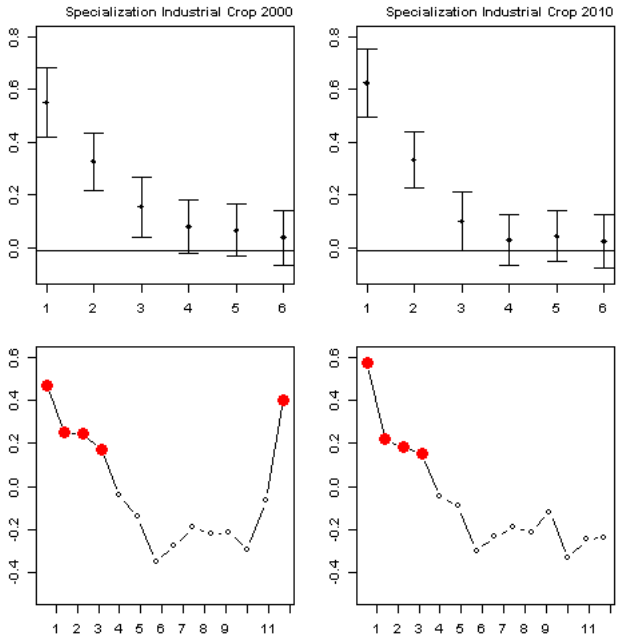

Fig. 31: Industrial Crops Spatial Correlograms and Moran I

influential observations. The global Moran's I in 2000 is equal to 0.53. It is evident the presence of two clusters of provinces. One includes Perugia (PR), Arezzo (AR) and Terni (TR) in center Italy. The other cluster includes Venezia (VE) that is the most specialized, Padova (PD), Pordenone (PN), Udine (UD), Gorizia (GO). Even if surrounded by high specialized provinces, Trieste (TS) is not itself specialized in industrial crops. In 2010 the global Moran's I statis-

tic increases to 0.61. The most specialized province is now Pordenone (PN). The central cluster includes shifts to east, since Terni (TR) and Arezzo (AR) reduce their specialization, while Ancona (AN) and Fermo (FM) increase their specialization in industrial crops.

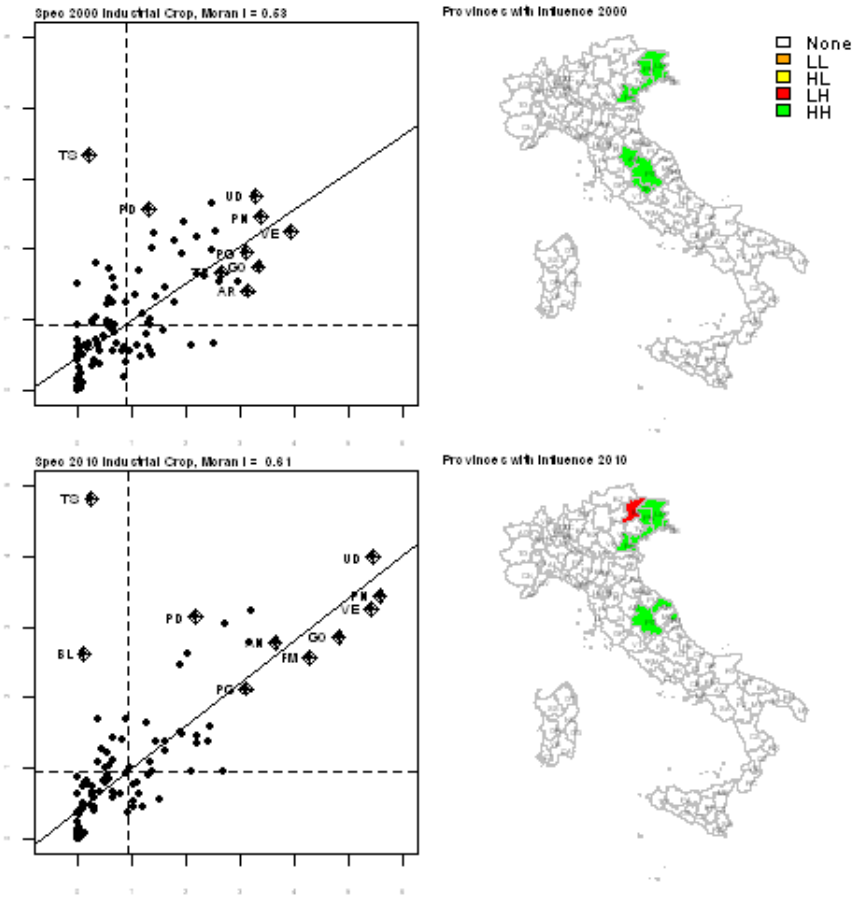

Fig. 32: Industrial Crops Specialization and Moran I

In figure 33 it is shown the Local Moran's I statistic for 2000 and 2010 in Industrial crops. Two clusters of high specialized provinces are stable during the time, and both reduce their territorial dimension among 2000 and 2010. The first cluster includes several provinces of central Italy, and it experiences a territorial reduction between the 2000 and 2010. The same happens for the cluster in the northeast of Italy.

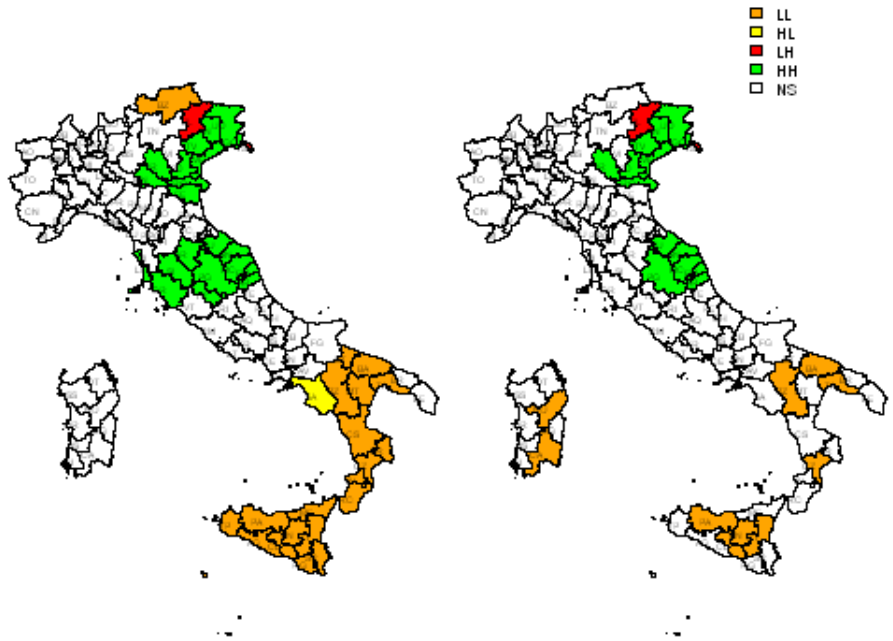

Fig. 33: Industrial Crops Specialization hotspots and clusters: 2000 on the left; 2010 on the right

3 Specialization and Productivity

Considering the term of 'cluster' as something vague, Iammarino and McCann (2006) propose a 'knowledge-based taxonomy of clusters' that is 'independent of either the sector or the location, but instead is based on the microeconomic behavior and objectives of the clustered firms, and on the relations and transactions existing in the cluster'. From an 'evolutionary' standpoint, they propose four ideal types of clusters: firstly, 'pure agglomeration' with Jacobs externalities, related to the ideas shown in the literature by the new economic geography on agglomeration and dispersal forces acting at local and regional levels. This cluster is characterized by a codified, explicit and mobile technical

knowledge. The examples of industrial specialization are represented by finance, banking and insurance, while a cluster example is the 'Silicon Valley' in California. Secondly, the 'industrial complex' theorized by the neo-classical theorists, where knowledge has the characteristics to be systemic and routinized, specific and non-transferable. Examples of industrial specialization are the automotive, chemicals, pharmaceutical, ICT and a cluster example would be the 'Silicon Glen' (Scottish Electronics Industry). Lastly, the 'social network cluster' based on the literature of Regional Innovation Systems by Cooke, Gomez Uranga and Etxebarria (1997), based on trust and social capital, that may be split in Old and New Social Network. The New social network cluster is characterized by a tacit, new, generic, non-systemic knowledge, that is transmitted within cognitive networks. The typical industrial specialization are the high tech clusters in general purpose technologies, composed by science-based firms. The Old social network cluster is characterized by a mixed, mature and incremental knowledge. Examples of industrial specialization are the customized traditional goods textiles, tourism, furniture. The "classic" Italian industrial district would be an example of old social network, with the characteristic of being composed by supplier dominated firms. Lindgaard Christensen et al. (2011) demonstrate that the agricultural sector is characterized by an extended knowledge base, representing a source of information and knowledge useful for innovation processes. This may explain why traditional survey do not capture the external sources of innovation in agriculture.

Avermaete et al. (2003) underline how in the small Belgian food firms, innovation is quite different from high technology industries. In fact, in the agricultural sector, innovation is related to the introduction of something new that already exists by firms, rather than innovation in the sense of invention. In such a cluster, specialization influences an exchange of ideas and innovation, thus raising the productivity. Within clusters of small farmers, factors driving economic growth are essentially related to the network of relationships, the norm of open share of information, trust among members of the community, a shared com-

mitment towards the cluster, as underlined by Brasier et al. (2007), studying several small farmers communities in Northeast United States. The same is found by Glowacki-Dudka, Murray and Isaacs (2013), when make a qualitative study on the local food system in the Midwest in the United States. In fact, it is the "coalitions and partnerships with each other, with other businesses, with government entities, and with the consumers" that allows the entire community to develop economically. As stated by Lyson (2004), the "most fundamental needs of the local agricultural community is its ability to solve problems cooperatively". It is evident that clusters in the agricultural sector are characterized by tacit knowledge exchanges where trust and social capital are key channels for triggering the innovation process. Then, the agricultural clusters have the typical characteristics of an old social network typology of cluster as defined by Iammarino and McCann (2006). A vast literature exists on the relation between clusters and innovation processes and earlier studies bind the two concepts. If a cluster is defined as the "agglomeration of specialized actors that compete and cooperate" by Porter (2000), the process of innovation is seen by Coe and Bunnell (2003) as "a system enacted through actors in networks of social relations". In literature agglomeration is considered an enhancer for innovation and productivity. In this context, Storper and Venables (2004) underline that "face to face is important in environments where information is imperfect, rapidly changing and not easily codified, key features of many creative activities". Different kinds of proximity, not just in terms of geographical distance, are involved in interactive learning and innovation processes. Boschma (2005) claims that geographical proximity is "neither a necessary nor a sufficient condition for learning to take place". "It facilitates interactive learning by strengthening the other dimensions of proximity" (cognitive, organizational, social, institutional). As Boschma (2005) underlines, "proximity may also have negative impacts on innovation" due to the problem of lock-in.

Furthermore, the most important linkages enhancing innovation process are those among 'related varieties' in the technological pattern (Iammarino and

McCann, 2006). The dynamics of clusters are not standardized, but dependent on technological regimes, industrial structures and organizational practices (Iammarino and McCann, 2006). As underlined by Malerba and Orsenigo (1997), a relationship exists between the "observed patterns of innovative activities within a sector and the related context and underlying microeconomic processes that might account for them". This analysis account for these different patterns within the agricultural sector, taking into account different crop production separately. Absorptive capacity (a concept by Cohen and Levinthal, 1990) is the capacity to acquire new knowledge, and it is dependent on the process of interactive learning. The creation of knowledge and the process of learning has a cumulative nature. Consequently, it features an implicit risk because it is difficult to change efficiently the process, once it is started (ibid.). As underlined by Breschi, Lissoni and Malerba (2003), only the participation in a network gives the opportunity to access a local 'pool of knowledge' giving rise to "localised knowledge spillovers". In fact, the participation in different networks may generate new ideas (Utterback, 1971). The extra local knowledge flows and the local buzz (Storper and Venables, 2004) are 'mutually reinforcing' (Bathelt, Malmberg and Maskell, 2004). Moreover, not all the external knowledge linkages have the same effect in the cluster and in each firm.

Given these features of the agricultural clusters, our analysis aims to assess the impact of specialization on the productivity when considering separately agricultural sub-sectors. In particular we want to check if specialization in agriculture may be the cause of a typical 'lock−in' situation and, if it is the case, in which particular crop. We consider also an index of diversification, taking into account the possibility that diversification in agriculture might generate circulation of new ideas (innovation) and then it may be cause of a positive effect on productivity. Moreover, we consider the interaction among specialization and diversification since specialization and diversification together might guarantee the circulation of new ideas (innovation), at the same time generating a specialized knowledge on particular productions. Studying the whole

agricultural sector in European regions, Ezcurra et al. (2011) underline that specialization may affect productivity both negatively and positively. Specialization may affect productivity positively since it translates to a great effort by agents involved, with greater investments that, in turn, affect the introduction of technology. On the other hand, specialization in agriculture could also mean that there is not capacity in the region to make business through other economic sectors. Furthermore, the effect of specialization on productivity may depend by the agricultural sub-sector. Ezcurra et al. (2011) find a positive relation among specialization and productivity analysing the whole agricultural sector, as a positive impact by the farm size.

Following Millo and Piras (2012), a generic spatial panel model may be written as:

$$y = \lambda(I_T \otimes W_N)y + \mathbf{X}\beta + u$$

Where: y is an $NT \times 1$ vector of dependent variable observations; **X** is an $NT \times k$ matrix of exogenous regressors observations; I_T is an identity matrix; W_N is the exogenous matrix of spatial weights and λ is the corresponding parameter.

$$u = (\iota_T \otimes I_N)\mu + \varepsilon$$

where: ι is a $T \times 1$ vector of ones; I_N an identity matrix; μ is a vector of individual effects, not spatial autocorrelated and time invariant, ε is a vector of spatial autocorrelated innovations:

$$\varepsilon = \rho(I_T \otimes W_N)\varepsilon + v$$

with $\rho < 1$, $v_{it} \sim IID(0, \sigma_v^2)$ and $\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2)$.

3.1 Empirical Model

The empirical model used in the analysis is:

$$Pro_{it} = \lambda \sum_j w_{ij} Pro_{it} + \beta_0 + \beta_1 ln(SPE_{it}) + \beta_2 ln(DIV_{it}) + \\ + \beta_3 ln(DIV_{it}) ln(SPE_{it}) + \beta_4 ln(DIM_{it}) + \varepsilon_{it} \quad (2)$$

$$\varepsilon_{it} = \rho \sum_j w_{ij} \varepsilon_{it} + \epsilon_{it} \quad (3)$$

where:

Pro_{it} is the land productivity expressed as the ratio among the number of hectares used for producing a crop i and the total obtained production;

SPE_{it} is an index of specialization as described in the precedent section;

DIV_{it} is an index of diversification as described in the precedent section;

DIM_{it} is the dimension of enterprises that is the UAA used for the cultivation of crop i divided by the number of enterprises cultivating the crop i;

λ is the is the spatial autoregressive parameter for the dependent variable;

ρ is the is the spatial autoregressive parameter for the disturbance vector ε_{it};

ϵ_{it} is the innovation vector correspondent to ε_{it}.

We use land productivity (production on the hectares cultivated) as *proxy* for productivity in agriculture. As highlighted by Dharmasiri (2012), the use of this *proxy* is criticized by several scholars since agricultural productivity should contain other factors influencing the production process, such as "labor, farming experiences, fertilizers, availability and management of water and other biological factors". Our analysis controsl for fixed effects by provinces through a spatial panel model, in order to explain exclusively the role of relative specialization (as

land specialization) and diversification (as land diversification) on productivity, hypothesizing that higher specialization should contribute to higher circulation of knowledge and, in turn, higher productivity. We use the Herfindahl concentration index based on UAA as measure of crop diversification in the provinces with two important modifications (Marrocu, Paci and Usai, 2013): we make use of the inversed index in order to interpret the sign of the coefficient more simply; moreover, as in Combes (2000), the sum of the squares of UAA for a given province and a given sub-sector does not include the UAA of that sub-sector. Then , the measure of diversity (DIV) of sector j in region i is calculated respect to the rest of the agricultural sector $(j \neq j')$:

$$DIV_{ij} = \frac{1}{\sum_{j'=1}(L_{ij'}/L_i - L_{ij})^2} \tag{4}$$

where i relates to provinces and j to the sub-sector.

The model estimates two spatial processes: direct spatial spillovers between levels of productivity and spillovers between idiosyncratic features of the environment affecting productivity. We are primarily interested in the former (captured by the parameter λ), which reflects the typology of the diffusion of productivity among provinces. However, the inclusion of the latter (captured by the parameter ρ) is justified on an economic basis, because neighboring provinces do share idiosyncratic characteristics, and as a consequence their inclusion in the model is necessary for a consistent estimation of the standard errors of the other parameters (Kelejian, Murrell and Shepotylo, 2013).

The estimation is conducted following an ML implementation by Millo and Piras (2012).

We use fixed effects and time fixed effects. This is absolutely important to avoid omitted variable bias and to consider the seasonality in the production of crops. As underlined by the literature discussed in the previous sections, geographical concentration of specialized firms is consider as triggering knowledge spillovers and innovation. In this analysis, we consider also the dimension of enterprises

as determinant for productivity. Notwithstanding a large number of researches have been dedicated to this relationship, there is not a consensus on the effect of the enterprises dimension on the productivity in agriculture (Alvarez and Arias, 2004). Considering the Italian case, Galluzzo (2013) underline that small farms, representing the 70 % of Italian agricultural sector, can take advantage according to the indexes of technical efficiency of scale especially through a growth in size of enterprises in the surface grown. Mugera and Langemeier (2011) argue that in the case of Kansas, technical efficiency differ by farm size, but not by specialization. Larger farms are more technically efficient than smaller farms. Moreover, he suggests that inefficiency is due to poor managerial practices rather than to scale of operation. Medium size farms are more efficient compared to large size and small size farms. Moreover, he points at the education as a principal factor to improve efficiency. Olson and Vu (2009), by using different methodologies for analysing Minnesota between 1993 and 2006, find that larger farm size is the only factor explaining higher efficiency, while the measurement of the influence by other factors, such as specialization, depends by the used methodology. Paul and Nehring (2005) argue that the scale and the output diversification seem to be key factors in productivity growth in U.S. agriculture. Halloran and Archer (2008) underline that, in general, the adoption of new technologies fosters expansion of productions to capture economies of size and to specialize.

In Table 1 we observe the results of the spatial panel estimation of the model we described on equation (2). Productivity of land is affected positively by its spatial lag, with a huge effect when considering grapes, olives and open veg production. Dimension of enterprises has a significant and positive effect on productivity only when considering grapes and citrus fruits, while its effect on productivity is still significant but negative when considering fruits and greenhouse vegetables. Specialization has a positive effect on the productivity of olives, grapes and industrial crops. While its effect is significant and negative for cereals, citrus fruits and fruits. Diversification has a significant and nega-

Tab. 1: Spatial Panel regression explaining Crop Productivity

	Cereals	Olives	Grapes	Citrus Fruits	Fruits	Open Veg	GreenHouse Veg	Industrial
λ	0.42 **	0.85 **	0.85 **	0.58 **	0.82 **	0.84 **	-0.32 *	0.70 **
	(2.39)	(32.74)	(21.67)	(4.55)	(19.86)	(20.41)	(-1.82)	(9.87)
ρ	-0.21	-0.81 **	-0.46 **	-1.02 **	-0.58 **	-0.62 **	0.81 **	-0.27
	(-0.78)	(-11.28)	(-2.76)	(-3.75)	(-3.70)	(-3.87)	(14.62)	(-1.32)
log Dim	-0.06	-0.06	0.09 *	0.51 **	-0.10 *	0.02	-0.32 **	0.03
	(-0.72)	(-1.45)	(1.76)	(2.71)	(-1.86)	(0.56)	(-3.20)	(0.83)
log Spec	-0.19 **	0.04 *	0.13 **	-0.31 **	-0.11 *	0.22	0.01	0.06 **
	(-1.12)	(1.89)	(2.02)	(-1.98)	(-1.67)	(1.46)	(0.07)	(1.96)
log Div	-0.06 **	-0.01	0.03 **	-0.02	-0.01	0.01	-0.05	-0.01
	(-2.89)	(-0.80)	(1.99)	(-0.52)	(-0.80)	(0.23)	(-1.51)	(-0.55)
log SpecDiv	0.00	0.01 **	0.02 **	0.01	-0.01 *	0.03 **	0.01	0.00
	(0.38)	(3.50)	(2.92)	(0.88)	(-1.85)	(2.44)	(0.52)	(1.14)
Observations	218	192	218	90	220	218	200	186

Note: * $\alpha = 0.10$; ** $\alpha = 0.05$;*** $\alpha = 0.01$; *standard errors in parentheses.*

tive effect on cereals productivity and a positive effect on grapes productivity. Interaction among specialization and diversification has a significant effect on productivity of olives, grapes and open veg., while its effect is negative for fruits.

4 Conclusions

This paper is divided in two parts. The first part describes the provincial specialization in Italy among ten main crops groups in 2000 and 2010, using censuses data by the National Institute of Statistics (ISTAT). The description is enriched by the discussion about spatial autocorrelation. The analysis makes use of both global and local spatial autocorrelation tests to underline spatial relations among provinces for the main crop groups, and to understand the specialization dynamic within each crop group. In particular, we analyse specialization and spatial relations among the 110 Italian provinces for 2000 and 2010 within the following main crop groups: cereals, olives, grapes, citrus fruits, fruits, vegetables in open fields, greenhouse vegetables, industrial crops. The spatial analysis makes use for each of those of visual instruments: maps describing specialization for 2000 and 2010; diverse types of correlograms in order to show the spatial characteristics of crop specializations; global Moran's I to describe the global spatial autocorrelation; Moran's I scatterplot to detect provinces with unusually strong influence on the global autocorrelation; local Moran's I to detect 'clusters' (provinces specialized similarly to their neighbors) and 'hotspots' (provinces specialized very differently to their neighbors). Overall, it is noticeable a raise of specialization and a raise of spatial autocorrelation in the specializations, mostly in all sectors. At the same time, among 2000 and 2010, there is an increase of territorial dimension by clusters within all the main crop groups but the industrial crops. There is a marked tendency toward clustering influencing the decision by producers about which typology of production to invest on. In particular, it is in place a cluster dynamic in cereals and in the industrial crops. This dynamic is marked among northern and central provinces.

In the southern provinces is evident a cluster dynamic in the production of those crops representing traditionally a 'natural' vocation (such as olives and citrus fruits) of those territories. While a large amount of researches focus on the relation among clusters and innovation/productivity within industrial sectors, small attention has been payed to the agricultural sector. The second part of the paper is dedicated to the discussion about the role of specialization and diversification on productivity of land. An index of relative specialization is built as a Location Quotient (or Balassa Index) and an index of diversification is built as Herfindahl Index for each main crop group. The aim is to analyse, for each main crop group, the effect of specialization and diversification on productivity. The hypothesis is that may happen that too specialized sub-sectors produce the lock in problem. The findings reveal that specialization does not affect equally the land productivity for all the crop groups. It affects positively the productivity of grapes, olives and industrial crops, while it affects negatively the productivity of cereals, citrus fruits and fruits. This may reveal a problem of 'lock−in' in those areas highly specialized in citrus fruits, cereals and fruits. Diversification in sown crops results significant and positive for land productivity when cultivating grapes, while the effect is negative on the productivity for cereals. Therefore, a suggested policy to be implemented in those areas is the stimulation of a greater diversification of productions. Instead, in areas which are prone to the production of olives and grapes, a policy to boost specialization would be more desirable. This analysis has shown that a change in this direction is already in place.

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Conclusions

This work collects three distinct contributions which find a common framework in local economic development theory. The research makes use of quantitative methodologies, to analyse issues related to regional development with a focus on European and Italian regions.

The first contribution finds a main object in the assessment of the influence that administrative continuity exerts on the efficiency by regional governments in Italy. Particular attention has been payed to regional differences in the endowment of social capital, which the model controlled for. Indeed, the effect by administrative continuity on administrative efficiency is conditioned by the quality and the level of social capital in the region. In detail, the analysis distinguishes three typologies of social capital: *bridging*, *bonding* and *linking* social capital, and it makes a distinction between long−term and short−term policies efficiency.

The results of the analysis support the hypothesis stating that administrative continuity affects positively efficiency in both long term and short term policies. This findings confirm that AC plays a positive role in regional governments. In fact, it allows regional administrations to have time for assuming weighted decisions aiming at long term objectives, without the contingent strain for the satisfaction of just immediate needs. When analysing short-term policies and controlling for *bridging*, *bonding*, and *linking* SC, administrative continuity has been found to have a negative effect on administrative efficiency. In other words, when considering policies whose effect is expected to be produced in the short term, administrative dis-continuity in local governments has a positive outcome. This may be due to the need by regional governments to provide the community

with immediate results.

The research also assessed the role and the effect by administrative continuity on the regional government efficiency when interacting with different levels and components of SC. Although AC represents a positive element for regional governments, the analysis showed it has a diversified impact on regions with different levels of *bridging*, *bonding* and *linking* SC.

Indeed, when considering long-term policies, the interaction among administrative continuity and *bridging* SC produces a strong positive effect on the efficiency of regional administrations. A positive effect on efficiency by the interaction among administrative continuity and *linking* SC has been also found. Diversely, the interaction among administrative continuity and *bonding* SC produces a negative effect on the level of efficiency. In fact in this case, AC is likely to encourage inefficiency probably because it results in political patronage. These findings opposes Olson's standpoint (Olson (2008)), whereby administrative continuity is coupled with corruption in every situation and in all contexts. This work showed that the relationship between administrative continuity and administrative efficiency depends on the quality of the SC existing in a region.

The study of policies and regional governance has been at the heart of the European debate for improving regional policies in recent years. The European Commission, in several occasions, has highlighted the institution building as a key issue when defining strategies for bettering the economic and social life of EU citizens (Barca (2009); *Investing in Europe?s future. Fifth report on economic, social and territorial cohesion. Foreword, summary, conclusions, maps and comments* (2010)). In particular, the European Commission prompted the regional institutions to foster innovation in governance and policy making, by developing, defining, and ultimately realising a strategy for sustainable economic and social development (*Investing in Europe?s future. Fifth report on economic, social and territorial cohesion. Foreword, summary, conclusions, maps and comments* (2010)).

The present work is intended to contribute to the understanding those cases in

which administrative continuity might represent a political driver for the implementation of efficient policies. It is also intended to warn against the considering of government continuity as a positive element in every context, providing concrete and useful evidence to support this idea.

The second contribution aims to analyse a key issue for European regional policy discussing the territorial differences affecting the spatial interaction in the quality of governments (QoG) among European regions. In particular, the research distinguishes among the typologies of networks underpinning institutional diffusion between the northern and the southern European countries, thus revealing those mechanisms which allow or limit the diffusion of quality of government. A distinction is made among mechanisms of spatial interaction, with a focus on the "pure" competitive interaction and on the competitive / learning interaction.

The research found evidence of a strong spatial interaction in the competitive learning / imitating mechanism among levels of QoG in European regions, with a stronger autocorrelation in autonomous regions and southern regions. When considering the pure competitive mechanism, a large autocorrelation among northern regions and no autonomous ones has been found to exist. This results show that "leader" regions (those with an high QoG), corresponding to northern regions, do react to changes in QoG levels when they are competing economically, but they are not very sensitive to changes by strictly proximate geographical neighbours, as in the case of learning / imitating mechanism. On the contrary, southern regions are very sensitive to the influence exerted by those competitors that are very close geographically. This indicates that these regions have an higher propensity to learn from and to imitate their competitors. Finally, it has been shown how the influence by the regional level of wealth (GDP per capita) on QoG is not linear. Such effect is indeed characterized by two humps: with a huge influence at both very low and very high levels of GDP per capita.

Notwithstanding increasing attention has been paid by regional scientists in the

context of European regional policies to the relation existing between policy effectiveness and regional institutions in general, the territorial relations among different regional institution has not been of some interest. The issue is, instead, of great relevance.

On the other hand, an increasing attention has been paid to the study of existing mechanisms of diffusion and spillover dynamics of innovation activities aiming to understand how to act effectively in the field of regional innovation policies. Therefore, the design of regional policies for innovation might take advantage of these contributions, by paying grater attention to possible externalities within the development of economic strategies. Similarly, if European regional policies consider the evidence produced within the research about institutional diffusion, they would be able to better exploit the inherent potential of existing networks which drive the interactions by regions underpinning the diffusion of the quality of government.

The third contribution makes a picture of the specialization dynamic in the Italian agricultural sector among 2000 and 2010. The research takes advantage of data coming from the agricultural census of 2000 and 2010. One of the aim of this analysis is to assess changes in the regional geography of agricultural specialization in Italy (NUTS 3 regional level) considering the most important crops. Moreover, the research explores whether a spatial autocorrelation exists among specialized regions and verifies how the spatial autocorrelation changes when considering different productions.

In general, a raise in the level of specialization is noticeable, together with a raise in the existing spatial autocorrelation among Italian regions, mostly in all sectors. This means that there is a marked tendency toward clustering, which influences the decision by producers about what typology of production to invest on. In particular, a cluster dynamic is in place in the cereals and in the industrial crops sectors. This dynamic is generally evident among northern and central regions of the country. In the southern regions a cluster dynamic is clear in the production of those crops which can be considered "natural" clusters,

such as olives and citrus fruits, in those territories.

The other aim of the third contribution is to assess the effect of specialization on productivity of land. The analysis reveal that this effect is varying, depending on the typology of crops considered. Indeed, specialization affects positively the productivity in some of the considered sectors (grapes, olives, and industrial crops), while it affects negatively the productivity in the other sectors (cereals, citrus fruits, and fruits).

This result might indicate the presence of problems of "lock−in" in those areas highly specialized in citrus fruits, cereals, and fruits. Therefore, a suggested policy to implement in those areas would be the encouraging of a greater diversification in agricultural productions. On the contrary, in the areas which are prone to the production of olives and grapes a policy to boost specialization would be more desirable.

This thesis has made use of several quantitative methodologies in order to answer the different research questions. In the first paper, the analysis has been conducted on panel data, with fixed effects and time fixed effects. The second contribution adopted "classic" spatial econometrics methodologies with a spatial autoregressive model (SAR). Furthermore, the analysis conducted in this paper uses an higher order SAR to distinguish two spatial networks among the European regions, and a non linear spatial model (Spatial Autoregressive Semiparametric Model) to assess the non linearities in the independent variables explaining the quality of institutions at regional level in Europe. The third paper makes use of "classic" methods for an exploratory spatial data analysis, to assess the global and local spatial autocorrelation among Italian provinces (NUTS 3 regions) in the productive specialization of the primary sector. Moreover, in order to assess the effect of specialization on productivity, a spatial panel data model has been used. To control for the climate differences and to consider the local vocations, extremely important in the case of the primary sector, the analysis makes use of fixed effects and time fixed effects, with the control for the spatial autocorrelation among both dependent variable and innovations.

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