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Cristina Vaquero-Piñeiro

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REDAZIONE:
Dipartimento di Economia
Università degli Studi Roma Tre
Via Silvio D'Amico, 77 - 00145 Roma
Tel. 0039-06-57335655 fax 0039-06-57335771
E-mail: dip_eco@uniroma3.it
http://dipeco.uniroma3.it

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Cristina Vaquero-Piñeiro

A voyage in the role of territory: are territories capable of instilling their peculiarities in local production systems

Cristina Vaquero-Piñeiro[1]

Abstract

Are territories capable of instilling their peculiarities on local production systems? Which are the territorial determinants that support this linkage? We answer to these questions theoretically and empirically.

Firstly, this paper presents a conceptual voyage in the notion of territory by tapping into two different research branches: regional and agricultural economics. Thereafter, the integrated framework developed through the literature review is used to investigate the relevance of territory from an empirical point of view. We do that looking at Protected Designation of Origin (PDO) as proxies of local productions due to their intrinsic and official relation with their region-of-origin. The analysis focuses on Italy, is conducted at municipality level and exploits logit dynamic panel models.
Findings confirm that embedded productions reflect the combination of socio-economic, historical, institutional, natural and cultural features. In some cases, an ex-ante level of development is a relevant precondition for establishing successful agri-food systems.

Keywords: Integrated approach, local development, Geographical Indications, agri-food systems, Italy
JEL Codes: O130, O200, P250, Q180, C230

[1] Cristina Vaquero-Piñeiro, PhD Candidate Department of Economics, RomaTre University
cristina.vaqueropineiro@uniroma3.it

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Introduction

In the traditional framework of economic competitiveness and growth, economists have been moving towards a broader conceptualisation of local and regional development (Pike et al. 2017; Morgan 2004; European Commission 2001; Sen 1999). Reducing social inequalities, promoting environmental and social sustainability, supporting inhabitants' well-being and encouraging cultural cross-fertilization have been encompassed in the definition of economic development (Haughton and Counsell 2004). Stiglitz et al. (2010: 10) shift the emphasis "from measuring economic production to measuring people's wellbeing". In the same way, the role of space proposed by the pioneering localization studies has been more and more emphasized (Brakman and Van Marrewijk 2008; Friedman 2005). Territorial peculiarities become fundamental factors for understanding local production systems and development paths (Canzanelli 2001). Capello (2009) recognizes the capability of space to generate static and dynamic advantages for firms, while Scott and Storper (2003) conclude that regions and localities are active and casual elements in growth processes, rather than passive backdrops.

Nowadays, the predominant interpretation of territory is grounded on the concept of identity proximity. The identity of a region is the primary element that makes a territory unique (Hannon and Curtin 2009). Zimmerbauer (2011, p. 246) refers to the identity of a region as the set of "certain characteristics and distinctive qualities, which are visible and brought out by communicative means" that distinguish one region from the other.
Regional identity represents the way of life of a group of people at a specific time; it is the sense of belonging to communities that share customs and beliefs, habits and attitudes, landscapes and environment. According to Vainikka (2012: 59), 'symbolic landscapes that root people in distinct space are important mediators of collective regional identities'.

Using a more mainstream economic standpoint, we can refer to social capital understood as social norms, cooperation and trust existing at local level. Several studies highlight to what extents social capital plays a key role for economic activities. For instance, Rivera et al. (2019) stress how social capital materialises in rural development, while Crescenzi et al. (2013) recognize social capital as the driver of knowledge generation, circulation and accumulation. In this perspective, territory assumes an active role in determining the economic development, the specialization and the quality of local productions (Crescenzi and Rodriguez-Pose 2012; Storper 1997).

Nevertheless, regional economics is not the only standpoint from which the role of territorial peculiarities can be investigated. Agricultural economists have often advocated for the importance of territorial peculiarities for agri-food productions (Fabiani 2015; De Benedictis 2002). In the agri-food sector, space plays a key role not only in terms of land or localization strategies, but also for the intrinsic value that the region of origin transfers to its productions. The quality of agri-food products is, in fact, ubiquitous determined by the contextual territorial factors of localities.
These two research branches have some synergic and interdependent affinities in understanding the role of territory. However, one thing is acknowledging that territory matter, another is agreeing on which are the territorial determinants crucial for supporting local economic activities.

The first part of this study is thus devoted to a conceptual voyage in the notion of territory and its determinants, from the most abstract and stylized interpretation to the most comprehensive and holistic one. The methodologies used to evaluate which are the territorial strengths that make regions more prone

to establish successful local production systems are also revisited. Indeed, if over the years, several theories have converged on the potential effect of the territory on productions, existing studies have not yet identified a common way to investigate its relevance.

Starting from this theoretical framework, in the second part we attempt to provide an empirical evidence of the role of territory. We make use of the case of Geographical Indications (GIs), especially of Protected Designation of Origin (PDO), as a laboratory to study which are the most relevant territorial determinants that affect the aptitude of regions for successful place-based production systems. GIs are signs used on agri-food products that have a specific geographical origin and possess qualities that are essentially, or exclusively, due to a particular geographical environment, made of natural and human factors (Reg. EU No 1151/2012).
In practice, we test the hypothesis that some areas characterized by an ex-ante economic development and dynamic agricultural sector are more prone to achieve PDOs and convert them into successful experiences.

Results confirm that territorial factors drive the opportunity of establishing successful place-based productions. The presence of the most economically relevant PDOs tend, in fact, to be positively correlated with propulsive socio-economic factors. However, the relevance of economic development factors cannot be taken for granted, as in the case of wine PDOs the positive correlation seems to be no longer evident.

This paper is organized in five sections. The theoretical framework is reviewed in the first two sections regarding how space is understood by local and regional economic development theories and by agricultural economics. Section three introduces the case of Geographical Indications as a concrete case of product-territory linkage. The empirical analysis is presented in section number four, whereas findings are discussed right after. Lastly, concluding remarks are provided.

1. Territory in local and regional economic literature

Are territories capable of instilling their peculiarities in the products produced in their lands? This is a question that has been fundamentally overlooked by mainstream economic and growth theories. Under the neoclassical framework, space was conceived as "uniform and abstracted" (Capello 2009, p. 11): discrete areas, internally uniformed, whose territorial characteristics are synthesized into a stylized vector and without concrete role in development paths. The disparities, within and across regions, are accounted only in terms of synthetic indicators, such as income and GDP levels. Where the development process is taking place does not matter.[1]
The development of the endogenous growth theory (Romer 1986 and 1994; Lucas 1988) around the mid-1980 led to the "diversified-stylised" interpretation of space (Capello 2009, p. 17).[2] It is defined as diversified due to the assumption of a dis-homogenous spatial distribution of economic activities across and within regions, whereas stylized because of the abstract conceptualization of contextual factors void

[1] According to the neo-classical approach, economic growth is driven by the accumulation of production factors, namely capital, labour and exogenous technology. Development is due to a long-run automatic convergence of a free-market, without failures, towards a steady state (Solow 1957). Convergence can be absolute or conditional. The former one results in equal per capita income levels across countries – richer countries will tend to growth slower- while the latter refers to movements towards different steady state levels.

[2] The endogenous growth theory introduces increasing returns to scale at external level, endogenous technical process, knowledge as direct factor of production function, human capital and knowledge as not a pure public goods. Spending time in innovation and research activities, in fact, leads to not only public positive externalities, but also to individual benefits in terms of cost reduction and higher profit.

of territorial dimension. It was a step forward, but where the process takes place is still not considered as an active factor.
The diversified-stylized notion of space persists in the New Economic Geography perspective.[3] This approach blames the uneven local distribution of economic activities and their concentration in polarities where a cumulative development process has been activated (Ottaviano and Puga 1998; Fujita et al. 1999). Agglomeration and dispersion forces, trigged by physical connections, encourage economic activities and individuals to cluster or disperse and, in the long-run, they generate what Krugman (1991) defined the polarization between core and periphery regions (Combes et al. 2005; Boschma and Frenken 2006; Duranton and Puga 2004).[4] The similarity of contextual features does not, in fact, seem to be a sufficient condition to turn out to achieve the same level of development (Krugman and Venables 1990, 1995).
In this approach, space is, therefore, assumed diversified to emphasise the uneven distribution of economic activities, but it persists to be mentioned only in quantitative terms without any references to non-quantitative factors, such as social and historical peculiarities (Scott 2004).

The role of territorial factors on economic development was fundamentally neglected until the early 2000s when the "diversified-relational" dimension of space was introduced (Capello 2009: p. 12). Places are consequently no longer coincident with stand-alone administrative units, but they are understood as geographical areas that interact and influence each other (Combes et al. 2005). This comprehensive interpretation leads to a shift from the mere notion of space to the notion of territory, which explicitly stresses the multidimensional nature of places. Lopez and Muchnik (1997) affirm that territory reflects a developed space, socially constructed, culturally labelled and institutionally regulated. In the same year, Storper (1997) recognizes territory as the root of economic activities. Some years later, Canzanelli (2001) and Scott and Storper (2003) argue for territory, with its potential endogenous resources, as active and casual elements of development processes. For Savage et al (2005: 29), places are 'sites for performing identities'. By embedding their own community practices in existing rituals of place-making, people transform space in places rich in identity and social values.

In view of the above, territory is no longer perceived as fix in space or time, but it is conceived as territorial capital, meaning the combination of social, political and intellectual capital within any given region (Camagni and Capello 2013; Camagni 2009; Morgan 1997). Following Bauman (2000), this heterogenous combination of exogenous and endogenous features coexisting within localities is the liquid aspect of territories, which creates what can be named a sense of place. [5]
The literature that has attempted to identify which are the territorial determinants of economic development is quite vast. Existing studies have stressed the crucial role of human and social capital (Crescenzi and Rodríguez-Pose 2012; Leamer and Storper 2001), spatial proximity (Rodriguez-Pose and Crescenzi 2008; Boschma 2005; Iammarino 2005), rurality (Wiggins and Proctor 2001), innovation

[3] The New Economic Geography introduces increasing returns to scale at both firm and regional level, the consideration of both transaction costs and externalities and the assumption of monopolistic competition as a possible market scenario. Development is explained by the cumulative process of growth in demand and supply (Boschma and Frenken 2006). If the initial regional endowment is ex-ante identical is identical, the agglomeration process is driven by factor mobility (Ottaviano and Puga 1998), factor accumulation (Baldwin 1997) and both input-output and demand linkages (Venables 1996; Krugman and Venables 1995). On the other hand, if it is different, market access is the mechanism driving the agglomeration process (Krugman and Venables 1990).

[4] Economies of encourage firms to concentrate to benefit from spatial agglomeration and concentration thanks to economies of scale, technological spill-overs, supply-demand linkages, labour market pooling. Conversely, transport costs induce them to widespread their production plants in order to tackle rent and land prices, costs of non-trade services, market competitions and other market failures.

[5] Exogenous factors have a deliberately or causally cause external to specific places, while the origin of endogenous ones is internal to the geographical area.

systems (Chaminade and Vang 2008; Gertler and Wolfe 2002) and quality of governments (Rodriguez-Pose and Garcilazo 2015; Charron et al. 2014). Cooperation, trust and cultural proximity have also been recognized as determinants of economic development thanks to their role in facilitating the share of knowledge (Bathelt 2004; Gertler 2003) and innovations (Coe and Bunnell 2003). Rabellotti (1995) suggests that face-to-face interactions are necessary to trigger economic opportunities and support those smaller firms that deal with market bottlenecks and foreign competition. This claim is endorsed by Storper and Venables (2004) who conclude that face-to-face interactions are an efficient communication technology, help solve incentive problems, facilitate socialization and learning and support psychological motivation.
Furthermore, Crescenzi et al. (2016) point out the key role of multinational and FDI investments, while the World Bank (2009), and other national institutions, advocate for an efficient infrastructure endowment as a precondition for economic development.
Last but not least, the relevance of institutions, formal and informal, is highlighted by Rodriguez-Pose (2013) and confirmed by several contributions (Rodrik et al. 2014; Sforzi 2012; Döring and Schnellenbach 2006).

With the aim of better understanding which are the conditioning factors of regional development, Crescenzi and Rodriguez-Pose (2012) propose an integrated framework based on the cross-fertilization of all the different economic theories endorsed over the years. They conclude that development paths are affected by innovative activities, socio-economic conditions, geographical density and accessibility, international linkages and sub-national policies and investments. In this perspective, development is no longer conceived as exogenous in origin, but as the result of the interaction between these contextual features and local agents (Pike et al. 2017; Rodrik 2010; Bathelt 2004). As Pike et al. (2017) claim, development is made of people and places and, therefore, growth potentials exist in every region. The challenge is to identify strength and weaknesses of each of them (ESPON 2017; Barca et al. 2012; OECD 2009; Barca 2009).

From a methodological point of view, dealing with the heterogeneous, unmeasurable and sometimes unobservable dimension of territory is however a very demanding task. Even if most of existing contributions tend to address the territorial issue from a conceptual standpoint focusing especially on its socio-anthropological and ethical aspects, some different econometric strategies have sometimes been exploited. Spatial econometrics is the most valuable approach to clearly take into account where the phenomenon takes place, the presence of spatial spill-over effects and the potential geographical endogeneity. [6]
Spatial models, regardless of the estimation procedure exploited, consider administrative or economic functional regions as units of analysis (e.g., Wicht et al. 2019; Lobianco and Esposti 2010). The geographical unit of analysis is not however the only relevant aspect for empirical models; the choice of the control variables is also crucial. Indeed, to capture the conditioning effects of contextual factors, models should include a set of positional data regarding demographic, geographical and socio-economic conditions. These positional data are often calculated thanks to Geographical Information System techniques (GIS) to tackle the unviability or lower precision of official data (Henderson et al. 2012). This

[6] Spatial spill-over effects are captured thanks to what is conventionally named spatially lagged variables. Given a specific observation, such as a region or a district, and its value for a variable, spatially lagged variables represent the average value of that variable for neighbouring observations. The effect of this spatially lagged variables corresponds, therefore, to the indirect effect of surrounding areas on the value of the specific unit of observation.

strategy is widely used in the literature. For instance, Crescenzi and Giua (2016) include a set of territorial factors, such as socio-economic and demographic conditions, to estimate the relation between the Cohesion Policy expenditure and regional growth. In Garcia Alvarez-Coque et al. (2013), variables regarding firms' characteristics are joint with territorial information to evaluate the impact of geographical context on the propensity to innovate. They include variables regarding local labour systems, infrastructure endowment, access to education, knowledge diffusion, economic specialization and population dynamics. Spatial analysis techniques are often joined with quasi-experimental methods. Territory is here captured by either the presence of a specific territorial treatment or the effect that a specific treatment can have on territorial context. The aim is to estimate the difference between treated and non-treated observations given that only one group of observations is treated. Being or not within a specific area and receiving or not European funds for rural areas are only a few examples of possible treatments. The potentiality of these techniques to evaluate spatial heterogeneity has been widely stressed by the literature. For instance, Daunfeldt et al. (2017) investigate how Swedish municipalities react to the presence of a multinational leader in the furniture market, while Bondonio and Greenbauman (2018) examine local economy resilience to natural disasters.

If spatial analysis is a valid approach to consider territory as a geographical entity, it is not suitable in micro-economic models that focus on individual equilibria and their interactions. In these analyses, territory is conceived as an element beyond the actors' making processes. For instance, Altomonte et al. (2016) estimate the non-linear relations between productivity, economic size and exports by taking into account the horizontal differentiation generated by being located in areas with outstanding local peculiarities. In the same way, Callois (2004) uses the product differentiation derived from quality labels to proxy territorial peculiarities to demonstrate that some territorial characteristics can work as levers for local development. These utility models have been are recently overtaken by agent-based models that allow to simulate the response of local actors to different events and contexts (Kremmydas et al. 2018).

2. Territory in agricultural economic literature

Agricultural economics has also advocate for the importance of territories. Due to its structural characteristics, the agri-food systems are the most rooted in territories and, therefore, prone to reflect the heterogeneity of their observable (e.g., soil, climate, infrastructures and multinational) and unobservable factors (e.g., social capital and informal institutions) (Fabiani 2015; De Benedictis 2002).

If we look at how agricultural economic theories understand space, and territory, we can identify three main approaches.

The first group of studies mentions space in the debate about supply-chains and the management of production processes (Marsden et al. 2000).[7] In this perspective, space acquires a distributional-positional meaning. It accounts only in a pure physical term, i.e. kilometres and natural boundaries, separate from other socio-economic and cultural values. The geography of agri-food productions is, thereby, not tied to the territorial features of the areas where agri-food production come from. Conversely, it is set up in response of market challenges and obstacles, such as land availability, short expiry dates, market access and sustainability (Bowen and Mutersbaugh 2014). The increasing relevance of international trade and the participation to global value chains play also a key role in the localization process (Swinnen and Vandeplas 2009).

[7] Agri-food supply chains are complex entities ubiquitously populated by many farms, firms and diverse economic agents contributing to deliver the final good to consumers (Carbone 2017).

At a lower geographical level, alternative agri-food systems, such as Km0 farmers' markets, encroach upon conventional models of supply-chain. These non-traditional organizations attempt to enhance the competitiveness and the sustainability of local farmers by drawing a direct link between producers and consumers (Carbone 2017; Galli and Brunori 2013; Pretty et al. 2005; Varley 2001).
Space assumes here a key role for the organization of the production processes; however, it remains anchored to its metric dimension.

The second group of existing contributions concerns marketing and territorial-brand issues according to which space is a catalysator of added value inferred from reputation and diversification strategies. This interpretation tackles the cultural and hedonistic dimension of space that becomes a strategical reputational asset (San Eugenio-Vela and Barniol Carcasona 2015; Charters and Spielmann 2014). "A firm has a good reputation if consumers believe its products are high in quality", reports Shapiro (1983, p. 1). Lindgreen and Wynstra (2005) endorse his statement and claim that the consumers' perception of the value and quality of agri-food products is mainly related to the reputation of each agri-food firm, rather than to the characteristics of each product. Tangible and intangible territorial features support this reputational improvement by creating a perception of exclusiveness and uniqueness (Charters and Spielmann 2014; Pike 2011; Zimmerbauer 2011). Noguè and San Eugenio-Vela (2015) conclude that territorial branding is the way in which the evocative power of landscape is used to create a competitive territorial reference in terms of symbolic and experiential consumption. In this process, the engagement of local actors, and their interiorization of such an identity, is indispensable (Vuorinen and Vos 2013; Paasi 2013). Not surprisingly, the public buzz for territorial brands increases in parallel with the shift in the paradigms of regional and agricultural policies towards a more place-based and bottom-up approach.

The last group of studies emphasises the role of territorial peculiarities as conditioning factors (Fabiani 2015; Tregear et al. 2007; De Benedictis 2002). Space is considered as territory meaning the combination of material and immaterial elements co-existing within the same area in a given moment of time (Pampanini 2005; Esposti and Sotte 2002). Sonnino (2007, p. 63) argues that territoriality is "the ecological and cultural relationships that a food system has with its territorial context". In this integrated conceptualization, territorial characteristics convert agricultural products in cultural commodities. Local food systems are therefore triggered by territory features, rather than by products. (Bowen and Muterbaugh 2014; Sforzi and Mancini 2012). Following Muchnik (2009, p. 9) local agri-food systems refer to "an inherent quality system located in a place at any given moment" that evokes a special link between places and the unique quality of agri-food productions, like the French notion of terroir (Cross et al. 2011; Josling 2006).
Natural and environmental resources, such as soil texture and climate, are the most intuitive features that affect agri-food productions, but the socio-economic conditions and cultural contents play also a key role (Hannon and Curtin 2009). The importance of socio-economic, historical and cultural factors advocated by regional and local economists (Crescenzi and Jaax 2017; Rodrik 2010; Rodriguez-Pose 1999) is, thus, often recalled by agricultural economists (Pampanini 2005; Esposti and Sotte 2002). This conceptual cross-fertilization would be more evident if we go beyond the theoretical aspects and look at real practices, such as policy design and interventions. The structure and aims of European regional and agricultural policies show significant synergies, conceptual convergences and territorial overlapping (Crescenzi et al. 2015). The territorial intersection between regional funds and CAP policies measures has been pointed out by different papers and studies, such as Rodríguez-Pose and Fratesi (2004) and Crescenzi et al. (2015). However, we decide not to discuss the political perspective in this paper.

Capturing the territorial dimension of agri-food systems is quite hard, and econometric literature faces with this issue. As in the case of regional and local development analysis, spatial approaches are the most suitable framework to deal with the consideration of territory.
Since Nelson (2002) has introduced spatial analysis to agricultural economics, many contributions have applied this perspective, such as Fastelli et al. (2017) and Lewis et al. (2008).
Considering socio-economic and contextual factors as controls variables is also a common strategy inspired by the territorial integrated approach of economic geographers. The use of such variables to investigate the effect of local territorial factors on quality-wine systems is exploited by De Filippis et al. (2017). As control variables, they introduce also a regional dummy to better capture the difference in the results determined by being localized in one region rather than in another. Similarly, Marchini et al. (2014) follow the same strategy to investigate the impact of both internal and external factors on the reputation of Italian PDO wines. Recently, OECD (2019) has formalized counterfactual analyses as efficient methodologies to evaluate how effects of agricultural and rural policies interventions may vary across space, confirming the validity of what a great number of empirical studies have been done. For instance, Michalek and Zarnekow (2012) study the impact of receiving rural structural funds on Polish and Slovakian farms, whereas the effect of household electrification on employment in rural African communities is estimated by Dinkelman (2011).
Also in the case of agricultural policies, the number of simulations of agent-based models are increasing with the aim of studying what farmers and rural inhabitants could react to specific circumstances. For example, Brady et al. (2012) use the agent-based approach to investigate the consequences of agricultural policy reforms for farmers and the concomitant impacts on landscape, biodiversity and ecosystem. Territory is here reflected in agents' choices and their reactions; territorial context is likely to affect people's decision and, consequently, people located in different areas are likely to respond differently.

Due to the inconsistence of existing formal data, especially in the agricultural economics field, the role of territory is sometimes investigated by exploit surveys, focus groups, ethnography experiences or thematic analysis. For instance, Lourenco-Gomes et al. (2015) administrate a survey to deepen their understanding of the economic specialization of Alto Douro Wine Region and the visitors' utility associated to different landscape aspects, such as schist walls and natural mosaic. Barjolle and Sylvander (2003) study twenty agri-food products in seven European Member States to highlight some common institutional factors of GIs regions. More qualitative oriented approaches are often appreciated for their suitability to capture the multidimensional nature of territory, to unpack the unobservable factors and to understand perceptions, experiences and personal behaviours. Dedeurwaerdere et al. (2015) conduct semi-structured interviews to investigate networks bridging organizations in fostering agricultural sustainability transaction, whereas Tregear et al. (2007) undertake preliminary documentary analysis and, thereafter, in-depth interviews to study what happens to rural areas after that their products have achieved Geographical Indications qualification. San Eugenio-Vela and Carcasona (2015) complement the documentary analysis by organizing a focus group to investigate the feeling of being part of a regional community in Catalonia, Spain. Thematic analysis of documentary sources is, instead, conducted by Haeck et al. (2019) who use first source historical documents to reconstruct the evolution of four of the most famous European wine terroirs, namely Port, Chianti, Champagne and Burgundy.

3. Geographical Indications as evidence of product-territory linkage

Our voyage in the relevance of territorial determinants must dedicate a specific leg to Geographical Indications (GIs), more familiarly known as labels of origin.

GIs refer to Protected Designation of Origin (PDO) and Protected Geographical Indications (PGI) legally tied to a specific production area, and therefore not reproducible everywhere.[8] While PDOs represent the strongest linkage between product and territory, for PGI the link exists but only to a limited number of attributes, and not for the entire production process. GIs come from specific restricted areas officially delineated and can be produced only according to traditional recipes formally codified. GIs draw attention to product quality, local identity and cultural traditions.[9] Hence, GIs are the institutional formalization of local agri-food systems.

The higher quality of these agri-food products is assumed as the result of the interaction of local peculiarities, such as natural resources, traditions and cultural habits, institutions and inhabitant's behaviours (Liu et al. 2016). Inherent natural and human contextual factors become the drivers of quality (Rocchi and Romano 2006).[10] The relevance of biophysical and environmental elements to produce place-based tastes is, therefore, extended to socio-economic and institutional factors. For many GIs, tacit knowledge, informal networks, historical traditions and cultural habits are important as much as environmental factors, if not more. Natural, human and historical factors cross-fertilize themselves creating a fertile and proactive area for high-quality productions (e.g., Tomasi and Gaiotti 2011; White et al. 2007; Van Leeuwen and Seguin 2006). Some contributions have also investigated the individual causes for the introduction of GIs, such as the historical analysis conducted by Haeck (2019). Among others, the key role of individual propensity to cooperate is pointed out by Charters and Spielmann (2014). Conceptually, GIs recall the French notion of terroir. Casabianca et al. (2005) refer to terroir as a delimited geographical space, where thanks to the informal interactions between natural and human elements over the years a collective tacit know-how has been constructed. In 2010, the International Organization of Vine and Wine recognizes terroir as referred to an area in which collective knowledge of the interactions between the identifiable physical and biological environment and applied vine practices develops, providing distinctive characteristics for the products originating from that area. Terroir includes specific soil, topography, climate, landscape characteristics and biodiversity features.[11] The interpretation of territory as the set of exogenous and endogenous factors co-existing and capable in shaping local economic specialization is thus backed up (Crescenzi and Rodriguez-Pose 2012; Pampanini 2005; Esposti and Sotte 2002; Storper 1997).

Therefore, being an area with GIs may be affected by pre-existing conditions, and some territories could be more prone to achieve GIs (Liu et al. 2016). According to the European regulation, the decision of designating an agri-food product as GIs is based on three main points: (1) the specific nature of local resources used in the production process; (2) the application of traditional production techniques and (3) the presence of local identity. The process whereby an agri-food product become a GI is a place-based

[8] Foodstuffs: Regulation (EU) No 1151/2012 of the European Parliament and of the Council on quality schemes for agricultural products and foodstuffs (OJ L 343, 14.12.2012); Wine: Regulation (EU) No 1308/2013 of the European Parliament and of the Council establishing a common organisation of the markets in agricultural products and repealing Council Regulations (EEC) No 992/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007; Spirits: Regulation (EC) No 110/2008 of the European Parliament and of the Council on the definition, description, presentation, labelling and the protection of geographical indications of spirit drinks and repealing Council Regulation (EEC) No 1576/89; Aromatised wines: Regulation (EU) No 251/2014 of the European Parliament and of the Council on the definition, description, presentation, labelling and the protection of GIs of aromatised wine products and repealing Council Regulation (EEC) No 1601/91

[9] https://www.wipo.int/geo_indications/en/

[10] Authors are conscious that there is not a unique definition of quality, and that it could be extremely subjective. Food quality can be coded into a disciplinary or a well-defined traditional recipe or either moved from the pure organoleptic peculiarities or the consumers' evaluation. High quality can be exogenous and immutable, vulnerable and sometimes random as, in the agricultural sector, fluctuations between positive and negative years are not so rare.

[11] Resolution OIV/Viti 333/2010 OIV

procedure driven by local actors and institutions. It requires a long-time investment. It starts with the spontaneous proposal application of local actors, who propose a preliminary draft of the code of conduct and concludes with the European Commission's endorsement. The assignation puts forward a potential limitation in establishing the chain of causality between GIs and contextual factors. Although GIs are often assumed as drivers of local development and levers of positive spatial externalities (e.g., FAO 2018; Callois 2004 Pacciani 2001), they certainly refer to agricultural systems valuable for their history, their national and international success and the strong coordination between local actors. According to Belletti and Marescotti (2011), GIs and contextual conditions strengthen each other. Under this perspective, GIs could be considered as a final recognition of pre-existing conditions: some regions may be more prone than others to achieve GIs and boost its success. However, there is not enough empirical evidence of this link to date.

Not by chance, the spatial distribution of GIs across countries and regions is uneven and they tend to be concentrated in the most developed areas. If we look at the first ten most important PDO in Italy, they are spatially concentrated in the North and the North-Central Italy (Fig. 1) which are also the most developed Italian regions as the maps in Appendix show (Fig. A1, Fig A2 and Fig A3). However, it is also true that this concentration is not evident for all Italian GIs. For instance, the wine sector shows a different scenario. The 73 top-quality wine-GIs, labelled as DOCG, are heterogeneously distributed across regions (Fig. 2) and the overlapping between GIs areas and more developed areas is no longer evident (Fig. A4, Fig. A5 and Fig. A6).[12]

Figure 1 Ten most important PDO in Italy

Source Authors' elaboration

Figure 2 DOCG wines in Italy

[12] DOCG: Denominazione di Origine Controllata e Garantita. This is the highest classification Italian wines can be awarded. It means that there are controlled production methods and guaranteed wine quality . DOCG wines are subject to official tasting procedures every year.

Source Authors' elaboration

The hypothesis that less developed regions struggle to convert a GI in a strategic tool, cannot be thus excluded *a-priori*. Although places could benefit from GIs in terms of socio-economic development, to isolating the real role of GIs is challenging. The current bourgeoning contributions on GIs are mainly focused on discussing which are the outstanding GIs ex-post economic impacts, such as with respect to premium pricing, (Haeck et al. 2019), market access (Altomonte et al. 2016) or value distribution (Belletti and Marescotti 2011). In the majority of these contributions, however, the role played by the ex-ante socio-economic conditions are overlooked. Even though contextual factors are unarguably determinant to achieve GIs, analysis have rarely explored the possibility that they may be a final award of something that already exists, such as thriving economic activities, well-being conditions or high education. What we are attempting to explain is that, maybe, sometimes GIs might reflect territorial pre-conditions which lead to this award. These ex-ante conditions are often associated to socio-economic development, but they should be related also to a set of different peculiarities, such cultural and historical habits. Without taking into account this endogeneity issue, the estimation may, thus, be biased, and the positive effect of this scheme overestimated.

The innovative contribution of this paper is precisely to reverse the problem, and investigate which are the territorial determinants that can play a role for developing successful agri-food systems.

4. An empirical evidence of product-territory linkages: data and methodology

We attempt to provide an empirical evidence of the role of territory by investigating to what extents socio-economic development factors support the intrinsic link between agri-food products and local peculiarities.

With this aim, we estimate the relation between being a municipality within the production area of one of the ten most relevant and profitable Italian PDO, food and wine, and a set of socio-economic factors.[13] The empirical analysis is conducted on a of 7,755 Italian municipalities during the period 1991-2011.[14] 15% of these municipalities are included within one of the areas considered. The analysis is based on an original geo-referenced database that connects censuses, remote sensing data and data that we collect directly by PDO codes of practice with geographical units. Territorial context is represented by a set of variables regarding the agricultural sector and socio-economic conditions of each municipality (Appendix-A1). The response variable is binary and takes value 1 if the municipality is included within the production area and 0 otherwise. Control variables are the contextual determinants that existing literature conventionally associates to socio-economic development. We exploit spatial logit-panel model with fixed effects. Hausmann's standard test was carried out and, the fixed effects are preferable to random effects.

The model is specified as follows:

$$(1)\quad PDO_{it}=\beta_0 + \beta_1 LocalAgriculture_{it} + \beta_2 LocalContext_{it} + \beta_3 LocalEconomy_{it} +$$

[13] We use the 2018 official classification provided by ISMEA-Qualivita on the base of value of production. According to 2018 classification, the ten most important PDOs are: Parmigiano Reggiano DOP, Grana Padano DOP, Prosciutto di Parma DOP, Prosecco DOP, Mozzarella di Bufala Campana DOP, Gorgonzola DOP, Prosciutto di San Daniele DOP, Conegliano Valdobbiadene – Prosecco DOP, Pecorino Romano DOP and Asti DOP. The ten most relevant wine-PDOs are: Prosecco DOP, Conegliano-Valdobbiadene Prosecco DOP, Asti DOP, Amarone della Valpolicella DOP, Chianti DOP, Alto Adige DOP, Barolo DOP, Valpolicella Ripasso DOP.

[14] We restrict our sample to those municipalities whose administrative borders have been never change since 1951.

$$+ \beta_4 m\,(\text{LocalEconomy}, s)_{it} + \varepsilon_{it}$$

where the dependent variable PDO represents the fact that the municipality i is within a PDO area at the census year t. Being a PDO area is regressed on LocalAgriculture, LocalContext and Local Economy which are the vectors of independent variables proxies of socio-economic development. To control for spatial correlation, we include the variable m(LocalEconomy) that is the spatial lag accounting for the economic prosperity of neighbouring areas. Since spatial lags take into consideration the interaction between neighbouring municipalities, their inclusion allows us to minimize spatial autocorrelation. ε is the idiosyncratic error.

While population density refers to the concentration of people living within the same municipality, the share of illiteracy rate captures its local human capital endowment. Moreover, the rural dimension of the area is measured by the share of people living in remote houses, or in houses with a small number of neighbourhoods, and by a dummy variable accounting 1 for rural areas. Information on the labour market is included by using the percentage of economically active population working in different sectors.
The share of Utilized Agricultural Area (UAA) on total agricultural area is a proxy for agricultural intensity. Conversely, the share of people working in agriculture capture the relevance of the primary sector for the area. The production structure of the agricultural sector is proxied by the average physical size of farms and the share of family workers. An economic and social vulnerability index is included in order to control for the economic prosperity and wellbeing of inhabitants. The index is provided by the Italian Statistic Institute (ISTAT) and summarises the socio-economic condition of each municipality related to some principal components, namely education, income, employment and housing. Lastly, we include in the model the spatially lagged values of this index to minimize spatial autocorrelations that is the possible absence of independence between the error terms of neighbouring municipalities. The socio-economic condition of surrounding areas might affect local economic performance and wellbeing through indirect effects and, consequently, influence the potential presence of PDO products.

Potential concerns can be related to the selection procedure and the treatment definition. We have limited the treatment to being one of the first ten PDO, foodstuff and wine, rather than considering all the GIs, and considered the treatment as being, or not, within one of these areas, regardless of which that area is and which is the place of its product in the ranking of PDOs.
The choice of selecting these PDOs is due to the fact that they represent first ten represent 36% of the value of production of the entire GIs sector (i.e. PDO and PGI) by themselves, and therefore are characterized by an extremely relevant value of production. We could have considered all the Italian PDOs, but the majority of Italian municipalities would become treated, and there would not be enough spatial heterogeneity for the analysis. Regarding the treatment definition, considering the status of being a PDO area without differentiations allows us to compare the status of "being a PDO area" regardless of the structural differences between productions. Potential endogeneity is, therefore, reduced.
The fact that we control for long-term territorial characteristics also allow us to minimized endogeneity.

5. Results and interpretations

Overall, the higher number of profitable PDOs have been recognized in the Northern and the North-Central regions of Italy. Less developed regions, in the Southern areas, accounts for a lower number of high-quality important PDOs. The determinants of such spatial concentration would seem to reside in the local contextual characteristics. Findings are provided and interpreted in the next two subsections, while descriptive statistics regarding independent variables are detailed in Appendix-A2. Conscious that

estimations do not represent casual mechanism, in the interpretation we focus on the comprehensive significance of both signs and coefficients.

5.1 Estimation results

As shown by Table 1, estimations reveal that successful Italian PDO products tend to be localized in municipalities which are more developed, with a diversified economic fabric and characterized by a dynamic and active agri-food sector.

Table 1 – Effects of contextual factors on PDO productions

	PDO	PDO	PDO	PDO
	(1)	(2)	(3)	(4)
Utilized Agricultural Area (UAA)	-0.003***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Agricultural intensity	5.820***	6.769***	5.156***	5.586***
	(0.378)	(0.474)	(0.682)	(0.837)
Big farms	39.007***	39.455***	24.340***	25.347***
	(1.755)	(1.880)	(2.253)	(2.695)
Family farms	1.422***	0.619	-0.674	-2.373*
	(0.451)	(0.577)	(1.009)	(1.305)
Livestock	-4.505***	-4.066***	-2.913***	-3.790***
	(0.222)	(0.253)	(0.455)	(0.545)
Vineyards		-	-	-
		-	-	-
Rurality		-1.322*	-0.589	-1.610***
		(0.767)	(1.140)	(2.181)
Population density		0.016***	0.004***	0.004**
		(0.001)	(0.001)	(0.002)
Illiteracy rate		-2.348***	-1.640***	-1.203***
		(0.121)	(0.166)	(0.181)
Employment rate			0.547***	0.533***
			(0.038)	(0.044)
Employed people in agriculture, forestry and fishing			-0.341***	-0.357***
			(0.031)	(0.038)
Employed people in tradable sectors			0.433***	0.408***
			(0.024)	(0.029)
Employed people in services sectors			0.229***	0.263***
			(0.031)	(0.037)
Economic vulnerability index				-0.783***
				(0.091)
Economic vulnerability index – Spatial lag				-0.894***
				(0.103)
Year dummies	✓	✓	✓	✓
Observations	9,166	9,166	9,166	9,166
Municipalities	4,583	4,583	4,583	4,583

Note: fixed effects; standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Test for multicollinearity has been performed

Source Authors' elaboration

In the first model (1), we control only for the agri-food sector characteristics. The presence of PDOs seems to be positively correlated with the productivity rate of agricultural areas, but, conversely, negatively correlated with the absolute amount of UAA. This evidence suggests that the capacity utilization rate, given the total agricultural land available, matters more than the hectares devoted to the agricultural sector. Moreover, being a PDO area is correlated with the economic dimension of local actors and positively affected by a higher share of commercial farms. Indeed, although in the first model subsistence farming and family farms seem to have a positive correlation, this correlation becomes negative after controlling for more variables.

The second estimation (2) includes some demographic and contextual controls, such as population density and illiteracy rate. In this case, the most noticeable result is the negative correlation with the illiteracy rate. This evidence highlights how there is a negative correlation also with an increase in the rate of illiterate residents. Variables regarding the structure of the sector do not change their evidence.

Next estimation (3) suggests that municipalities with a more diversified and interconnected economic structure are likely to establish successful PDO certifications. They are, in fact, positively correlated with the incidence of people working in services and tradable sectors, while negatively correlated with the incidence of the primary sector.

The role played by the socio-economic conditions is confirmed by the significant, but negative, correlation with the vulnerability index considered in the last model (4). More developed municipalities are, therefore, more frequently included within a successful PDO area.

In order to capture the potential spatial effects of the socio-economic condition of neighbouring areas, we include the spatially lagged variable of this index. In this way, we control for what extents the output is affected by the condition of their surrounding areas. We found that the spatially lagged vulnerability index is negatively correlated with our outcome. Municipalities which are faced with neighbouring municipalities having a higher vulnerability index tend to be not included within these ten successful PDO areas.

With regards to the variables included in the previous models, the majority of them does not change their significance and the sign of coefficients. The only two exceptions are the variables regarding family farming and rurality, which become both significant and negatively correlated.[15]

To summarize, our findings suggest that an ex-ante level of socio-economic development is relevant in driving the opportunity of converting a regional agri-food product into a certified and successful PDO scheme.

Taking in mind these results, we repeat the analysis by using the presence of one of the ten most relevant wine-PDOs as outcome variable and restricting the sample only to those municipalities with vines agricultural areas. In comparison with what we have obtained for general PDOs, these estimations point out a different story (Table 2).[16]

Table 2 – Effects of contextual factors on PDO-wine productions

	PDO-wine	PDO-wine	PDO-wine	PDO-wine
	(5)	(6)	(7)	(8)
Utilized Agricultural Area (UAA)	-0.001***	0.000	0.001	0.001

[15] The odd-ratio estimations are coherent.

[16] We restrict our sample to only municipalities with vineyards as they are the only municipalities which could achieve wine-PDO designations.

	(0.000)	(0.000)	(0.001)	(0.001)
Agricultural intensity	10.581***	9.775***	8.252**	7.827**
	(1.893)	(1.925)	(3.439)	(3.768)
Big farms	-290.965***	-107.477***	3.007	3.949
	(45.269)	(34.932)	(21.661)	(21.477)
Family farms	-14.599***	-12.317***	-7.963**	-7.197
	(1.947)	(2.328)	(4.027)	(4.225)
Livestock	-	-	-	-
	-	-	-	-
Vineyards	-0.007*	-0.003	-0.007	-0.007
	(0.002)	(0.002)	(0.004)	(0.004)
Rurality		-13.025	-12.581	-12.344
		(1,418.19)	(2,608.886)	(2,300.424)
Population density		0.037**	0.012	0.012
		(0.006)	(0.008)	(0.008)
Illiteracy rate		-3.450***	2.259	2.380
		(0.720)	(1.386)	(1.584)
Employment rate			0.146	0.136
			(0.220)	(0.229)
Employed people in agriculture, forestry and fishing			-0.769*	-0.802*
			(0.422)	(0.426)
Employed people in tradable sectors			0.550***	0.540***
			(0.157)	(0.162)
Employed people in services sectors			-0.003	0.001
			(0.156)	(0.157)
Economic vulnerability index				0.130
				(0.640)
Economic vulnerability index – Spatial lag				0.367
				(0.565)
Year dummies	✓	✓	✓	✓
Observations	1,586	1,586	1,586	1,586
Municipalities	532	532	532	532

Note: fixed effects; standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Test for multicollinearity has been performed
Source Authors' elaboration

The positive correlation with ex-ante developed conditions is no longer evident. Most of conditioning factors are, in fact, not statistically significant and also the few variables that are initially significant lose their statistical relevance after controlling for all the contextual determinants. This is the case of UAA, the size of farms and the illiteracy rate. The only two variables that show a statistical significance correlation are agricultural intensity and the employment rate in tradable sectors, but they are not enough to conclude that there is an overall effect of contextual factors on obtaining one of the most successful wine-PDOs.[17] Whereas the most economically relevant food PDO tend to be localized in areas with a

[17] The validity of our results is tested by investigating what happens if we consider the presence of one of these PDOs as a driver of local development, rather than the result. In practice, as a robustness check we use the dummy accounting for the presence of PDOs no longer as the outcome variable, but as a control variable. Its value remains 1 for those municipalities

propulsive territorial context and vibrant agriculture, the distribution of PDO wines seems to be explained by other factors.

5.2 Interpretations

What our estimations have highlighted reflects the structural and historical differences of the agri-food sector.

In the case of the most important PDO productions, the establishment of a successful GIs scheme would seem to be brought forward from the presence of a dynamic economy and a well-established local agri-food sector. Socio-economic preconditions are the determinants that mainly seem to explain the spatial concentration of these productions.

The presence of educated human capital is an evident advantage for understanding the strengths of new regulations, like GIs. In the case of agri-food sector, where the formal education is often overtaken by tacit knowledge and caveats passed down from one generation to another, having higher education might help to recognize the potential benefits of such international certifications, given that they go further the mere agricultural reality.

The relevance of a dynamic local economy is, at least partially, captured by the positive effect of the share of people working in higher added value sectors. This trend can be interpreted in the light of the effort that farmers, supported by policies, put into diversification activities. Nowadays, diversification is no longer considered as a survival pluri-activity, but it has become a strategy to enhance international competitiveness, income and the production of public goods. However, since diversification means going beyond conventional farming, adopting innovative strategies and accepting economic risks, differentiation strategies are more common in farms that have better economic performances and stable economic structures (Salvioni et al. 2013).

The positive correlation between the presence of successful PDOs and other economic sectors may thus reflect the potential linkage between PDOs and an ex-ante economic development and commercial agricultural system. The probability of achieving this certification is strongly connected not only with the agricultural sector, that can become even counterproductive, but with the whole economic system of the region-of-origin. And this is the case of some Italian Central and Northern regions, such as Emilia Romagna region. Over the years, these regions have been experiencing an outstanding performance in the agri-food business, at both national and international level. A regular and efficient management of local resources, organization of collective actions and dialogue with local institutions has allowed small farmers and entrepreneurs to organize an agri-food industry focused not only on the production of agricultural commodities, but also expert on processing them. The activism of agricultural co-ops in these areas and the flourished institutional context have supported small and medium farmers to tackle the global shift toward a more industrialized and technological agri-food sector (INEA 2012). The majority of successful PDOs are agri-food products that need at least one stage of processing, e.g., dairy products. Therefore, it is not surprising that they are concentrated where the cooperation along the supply-chain and the presence of procession expertise already exist. Conversely, this modernization recipe has had a different effect on the Southern regions. For different reasons regarding structural characteristics and policy orientations, they remain more oriented to human-intensive productions and local markets (De

included in the region-of-origin, and 0 otherwise. The outcome variable is now local development that we measure in terms of population and employment. The test is conducted over the same sample over the same time period, 1991-2011. In line with the existing literature, we measure the overall development with the growth rates of population and employment. Results are available on request.

Filippis and Henke 2014). In the long-run, this creates a path dependence that negatively affect the performances of the agri-food sector in the South, and decreases its competitiveness in comparison with other Italian regions.
A similar evidence arises from the positive correlation with the presence of bigger farms as well as from the negative correlation with the share of family farms. Since the Italian agri-food has been historically characterized by small farmers and entrepreneurs, the capacity of setting up a big commercial reality, was, at least partially, driven by the prosperous context described above.

The history of the wine sector is, however, quite different: the high-quality wine tradition is ubiquitous uncorrelated with the ex-ante developed conditions. Other factors seem to be hidden behind the establishment of successful PDO wines.

First of all, a productive and high-quality vineyard is a long-time investment strongly hard to replicate either elsewhere or in a short time. Indeed, vineyards are permanent crops that occupy the yielding for centuries and do not grown in rotation. The effective production starts years after vines have been planted. During these years, vineyards are inevitably affected by the geographical and pedological factors of the region, such as minerals, organic matters and micronutrients. Natural factors become therefore so crucial for growing quality grapes that wine flavours are often associated with aspects of the soil, bedrocks and sun exposure (Lee et al. 2016; Koundouras et al. 2006; Huggett 2006). Climate and morphological features combine with cultural habits, tacit knowledge and historical traditions of local communities which, for their part, also affect quality. As a result, each vineyard has its own peculiarities, strengths and added values, which are enhanced over the years establishing what we call *terroir*. Local winegrowers have often continued their activity over the decades, sometimes regardless of its economic returns thanks to the fact that viticulture is not a space intensive production and does not require a specific morphology. Vines can be grown in mountain as well as in hilly and land areas. Consequently, nowadays the wine sector is strongly differentiated and characterized by a heterogenous production. In Italy, this heterogeneity is particularly evident not only from the number of different wines produced, but also from the capillary spatial distribution of their production. Although all the Italian regions have at least one PDO wine, the codes of practise are particularly demanding in stressing this spatial heterogeneity. They report which municipality, or which part of it, should be included, or not, within the production areas.

Secondly, the history of the Italian wine sector is also fundamental to understand the insignificant role of ex-ante developed preconditions. In Italy, the viticulture has ancient origins. Vine-growing shifts from the popular viticulture that characterized the Roman Empire, to the viticulture managed by churches and monasteries during the Middle Ages to the low-quality wines of local farmers during the XVI and XVII centuries. The unification of Italy in 1861 paved the way to some specific political interventions oriented to strength the entire sector. In 1972 the first oenological experimental centre was opened in Piemonte, *Scuola Enologica di Asti,* and four years later in 1976 the first high school entirely devoted to viticulture was opened in Conegliano, Veneto Region. However, the decisive high-quality orientation was adopted after the Second World War when Italy had to decide which would be an efficient strategy to re-establish the sector. Italy could have chosen between two different strategies: import French grapes or attempt to recover the Italian historical grapes. The Government chose the second option and reorganized the Italian wine-sector oriented towards quality productions. The code of practise of *Brunello di Montalcino* describes part of this history.[18] The text reveals that this wine has achieved its fame thanks to a small number of local farmers who have been continuing the production over the two World Wars. After the

[18] DM 07.03.2014

Second World War, when the strategy to reintroduce historical grapes was established, *Brunello di Montalcino* was chosen, as a result, it was one of the first Italian wines to receive the DOC certification in 1966, to be recognized a DOCG wine in 1980 and, nowadays, to be sold worldwide. Most of the current PDO wines are therefore rooted in their historical presence, but this does not mean that they have been well-known and successful wines since the beginning, it means that their grapes have a century-old history. The historical linkage between wines and their territories, moreover, hides the unobservable presence of common habits, local informal institutions and cultural proximity. All these factors, not always synonymises of an ex-ante development, seem, however, to strongly affect the production of high-quality wines.

Summing up, being a PDO area would seem to be affected by territorial conditions, but they are not only related to the socio-economic conditions. In the case of foodstuff, lagged and inner regions seem to be less prone to establish a GI scheme, and convert it in successful reality. However, the wine sector acts in a different way, due to its structural peculiarities and its century-old traditions. In some cases, ex-ante local development was not the trigger of PDO designations, but conversely PDOs worked as important drivers of local development. Which local agri-food system analyse should be choice very carefully. Endogeneity can be considered as one of the main limitation of contributions evaluating local productions. Focusing on the wine sector, for instance, seems reduces part of the potential endogeneity generated by contextual preconditions.

Conclusion

Are territories capable of instilling their peculiarities in local production systems? This paper says yes, territory matters.

Our voyage in the notion of territory has led us to recognize that the differences among economic activities across regions, both in terms of performance and sectors, are driven by the heterogeneity of territorial factors hidden behind. Territory, meaning the integrated and complex structure of linkages between environmental resources, socio-economic factors and cultural relations, plays a fundamental role for production systems. The intrinsic relation between products and territory allows, in fact, local productions to obtain added value and distinguish themselves form standard and industrialized products. Firms can benefit from the place where the production is localized or, conversely, lose ground among their competitors.

The case of the agricultural sector is evocative. Due to its own structural characteristics, agri-food products are inextricably intertwined with their region of origin. Environmental peculiarities and human know-how create added value that is passed down to local productions. This is the case of GIs, which stand above all for their historical, cultural and natural values. Among GIs, PDOs have the closest linkages with their territorial context and, as our results shows, their presence and success can be driven by different territorial factors. In the case of PDO-food the economic dimension of farms, skilled human capital, economic vulnerability, employment rates and rurality arise as the contextual strengths that mainly drive the economic prosperity of GIs. Conversely, cultural traditions, social proximity and local identity seem to drive the establishment of successful PDO-wines.

Being aware of the key role of territories, and of the heterogeneity of their peculiarities, should therefore be a priority for rural development and agricultural policies. Excessive space-blind measures could risk triggering communities towards homogenous economic systems, standardized productions, and similar lifestyles. As globalization and technological innovations have already partially started this process, policies targeting rural development should be keen on territorial heterogeneity, contextual strengths and

competitive assets to safeguard local peculiarities. Enhancing local territorial features is, in fact, crucial to avoid that successful local productions and high-quality regional products will not be crushed by highly industrialized and globalized competitors.

Appendix

Table A1 – Description and sources of variables

Variable	Definition	Source
PDO	Dummy variable equal to 1 if the municipality is included in PDO production area	Authors' elaboration
Population density	Logarithmic transformation of population density - Inhabitants per km²	Population and Housing Census, ISTAT
Illiteracy rate	Share of illiterate residents	Population and Housing Census, ISTAT
Employment rate	Sharee of residents working aged 15 years or over	Population and Housing Census, ISTAT
Employed people in agriculture, forestry and fishing	Share of economically active population working in agriculture, forestry and fishing sectors	Population and Housing Census, ISTAT
Employed people in non-tradable sectors	Share of economically active population working in non-tradable sectors	Population and Housing Census, ISTAT
Employed people in tradable sectors	Share of economically active population in tradable sectors	Population and Housing Census, ISTAT
Rurality	Dummy equal to 1 if municipality is rural	Author's elaboration in line with European Commission guidelines (WP 01/2014)[1]
UAA	Utilized Agricultural Area	Agricultural Census, ISTAT
Agricultural intensity	Share of agricultural area really used	Agricultural Census, ISTAT
Big farms	Share of farms with more than 100 ha	Agricultural Census, ISTAT
Family farm	Share of family employees	Agricultural Census, ISTAT
Livestock farms[2]	Share of farms with livestock	Agricultural Census, ISTAT
Vineyards[3]	Share of UAA utilized for vines	Agricultural Census, ISTAT
Economic vulnerability index	Socio-economic condition of each municipality related to some principal components: education, income, employment and housing	8mila Census, ISTAT
Economic vulnerability index – Spatial lag		Authors' elaboration – Geographical Information System

(1) Dijkstra L. and Poelman H. (2014), A harmonized definition of cities and rural areas: the new degree of urbanization, Regional Working Paper WP 01/2014, European Commission
(2) The variable livestock is included only in the model related to the presence of both PDO food and wines. (3) The variable vineyard is included only in the model related to the presence of PDO-wines

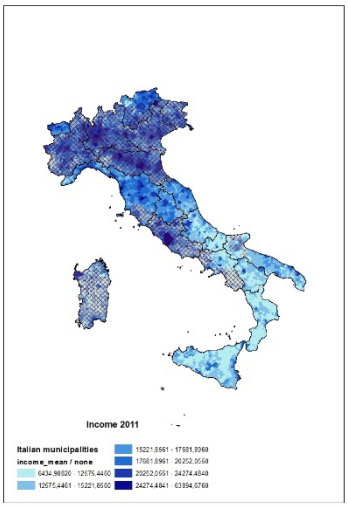
Source Authors' elaboration

Table A2 – Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Utilized Agricultural Area (UAA)	23,265	129.336	2.860.019	0	64246.74
Agricultural intensity	23,265	.7028384	.2349195	0	1
Share of big farms	23,265	.0289075	.0774569	0	1
Share of family farm	23,265	.8618435	.151375	0	1
Livestock	15,479	.4303049	.2768715	0	4
Vineyards	23,265	9.287.468	3.554.367	0	13512.79
Population density	23,265	2.803.519	6.300.887	.9	15164.9
Illiteracy rate	23,265	1.806.323	2.416.572	0	30.1
Employment rate	23,265	4.301.982	8.732.622	11.7	74
Employed people in agriculture, forestry and fishing	23,265	1.117.842	2.504.291	0	225.8
Employed people in tradable sectors	23,265	2.121.588	1.333.387	0	135.8
Employed people in services sectors	23,265	122.696	6.665.578	0	71.4
Economic vulnerability index	23,265	9.902.735	2.497.661	92.4	120.9
Economic vulnerability index – Spatial lag	23,265	9.749.905	.9216358	95.1	102.9

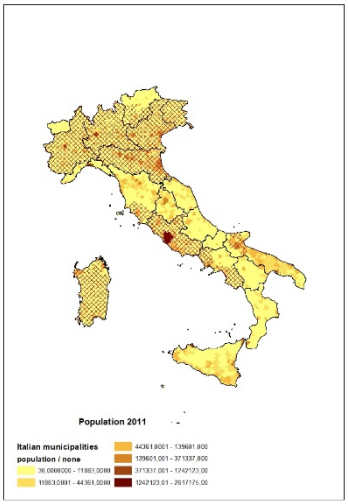
Source Authors' elaboration

Figure A1 PDOs and income



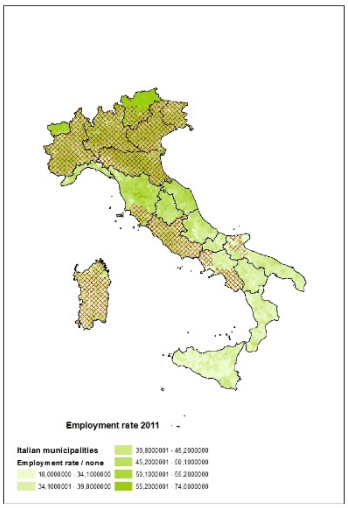
Source Authors' elaboration

Figure A2 PDOs and population



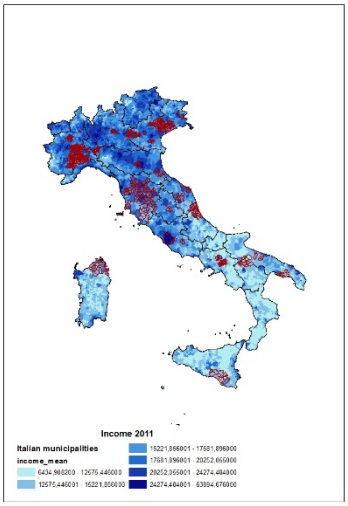
Source Authors' elaboration

Figure A3 PDOs and employment



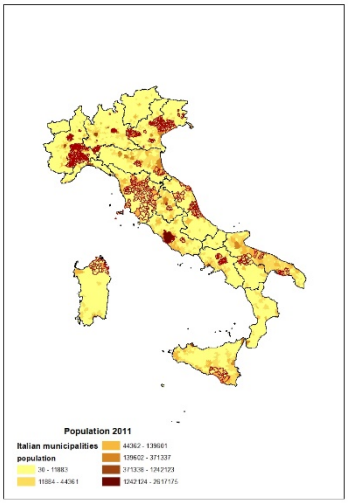
Source Authors' elaboration

Figure A4 DOCGs and income



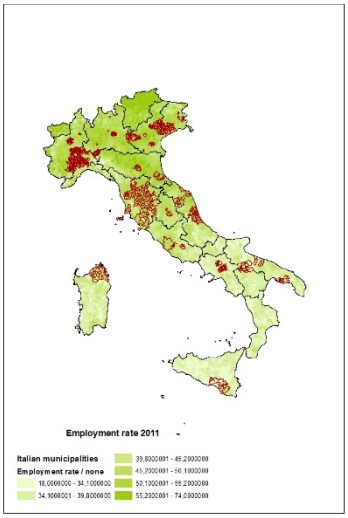
Source Authors' elaboration

Figure A5 DOCGs and population



Source Authors' elaboration

Figure A6 DOCGs and employment



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