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Does the presence of inner areas matter for the registration of new Geographical Indications? Evidence from Italy

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Abstract. Remote areas have been progressively obtained greater attention. Since 2014, the Italian National Strategy for Inner Areas has tackled remote areas with the aim of promoting local development. A tool to foster economic development in these areas is valorisation of those high-quality agri-food products that are characterised by unique features, through the use of geographical indications. This study addresses this topic, by considering the geographical indications registered in Italy since 2014. The study considers municipality-level (LAU2) data, taking the number of geographical indications that each municipality is eligible to produce as a dependent variable. Hurdle models are used to assess the effect of inner areas and other covariates (i.e., agriculture and food industry features, socio-economic characteristics, regional settings). The results suggest that geographical indications still represent a sort of untapped resource across inner areas, even when controlling for regional settings across Italy. Thus, a more effective policy intervention is requested.

Keywords: geographical indications, inner areas, rural development.
JEL Codes: Q18, R50.

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HIGHLIGHTS:

- GI registration can promote economic development in inner areas.
- Degree of remoteness negatively affects GI registration in Italian municipalities.
- Socioeconomic features of agriculture and regional differences also play a role.
- Policymakers should favour GI registration in inner areas.

1. INTRODUCTION

Due to its geographical characteristics, Italy shows large heterogeneity in terms of landscape and territory composition, turning into different conditions of accessibility to essential services, which represents a critical issue

when considering territorial imbalances (Christaller, 1933; Bonifazi and Heins, 2003; Barca et al., 2014; Mantino, 2021). Thus, some municipalities, placed at further distance from major urban poles, suffer from socioeconomic marginalisation and underdevelopment, in comparison with larger urban areas (Bertolini and Pagliacci, 2017; SVIMEZ, 2019; Iammarino et al., 2018; De Renzis et al., 2022). For this reason, in 2014 a specific national-level strategy was included in the National Reform Programme in Italy. The National Strategy for Inner Areas (hereinafter, NSIA), supported with public funds, has targeted inner (i.e., remote) Italian municipalities, with the aim of reversing depopulation trends and socioeconomic remoteness. To achieve this goal, inner areas have been supported in the capitalisation of the existing local assets and resources, through the activation of specific place-based policy measures (Barca et al., 2014).

Among the available local resources inner areas can capitalise on, localized agri-food systems (LAFSs) can play a pivotal role (Arfini and Mancini, 2018). As other remote regions, inner areas are rich in high-quality and traditional agri-food products, whose value is based on the link between territorial features and production techniques (Barca et al., 2014). In particular, some of the pilot inner areas identified by the NSIA have already implemented some measures aimed at the valorisation of agro-food local products through the recognition of new Geographical Indications (GIs).

Originally introduced in 1992 in the EU, GIs are currently regulated under the EU Regulation 1151/2012. GIs stress the unique characteristics of the agro-food (and wine) products they protect, being a strategic tool to increase the income of the producers (Cei et al., 2021; Crescenzi et al., 2022). With 315 registered agro-food GIs and 526 registered wine GIs, Italy is the forerunner in the EU for GI registration. In terms of value-added, agro-food GIs amount to €7.97 billion, while wine GIs amount to €11.16 billion (ISMEA Qualivita. 2022). Among other goals (e.g., addressing the problem of asymmetric information between consumers and producers) (Cei et al., 2018), GIs can have positive economic effects for the involved territories, eventually favouring population and economic growth (Crescenzi et al., 2022). To this regard, registering new GIs really represent key opportunity for inner areas.

In particular, this study explores if this opportunity is actually exploited by Italian inner areas. It adopts a territorial approach, considering the agro-food GIs registered in Italy from 2014 onward (i.e., after the introduction of the NSIA) and the set of the municipalities (i.e., LAU2 areas) that are included within the boundaries of their eligible areas. By referring to municipality-level data, the analysis aims to investigate whether both territorial and socioeconomic features (e.g., characteristics of the agricultural sector and food industry; socioeconomic characteristics; regional settings and quality of the public governance) matter in the process of new GI registration, with a particular interest on the role of inner municipalities.

This paper aims to contribute to the rather scant literature that quantitatively addresses the drivers of GI registration at territorial level (Crescenzi et al., 2022; Vaquero Piñeiro, 2021; Resce and Vaquero Piñeiro, 2022; Cei et al., 2021). However, compared to previous studies, its novelty is twofold. Firstly, it explicitly addresses the role of inner areas, as defined and mapped by the NSIA (Barca et al., 2014), while previous paper mostly addressed rural areas (e.g., Vaquero Piñeiro, 2021). Secondly, its empirical strategy is grounded on the use of hurdle model, which properly handles skewed data with many zeros and admits different underlying processes to explain the zero values (i.e., registering no GIs at all at municipality level) and the positive values (Mullahy, 1986).

The rest of the paper is structured as it follows. Section 2 discusses the theoretical background, with an overview on both inner areas and the concept of GI. Section 3 describes data and the adopted method. Section 4 shows the results of the analysis, discussing them in comparison with previous studies. Section 5 concludes the work, with possible policy implications.

2. THEORETICAL BACKGROUND

This section aims to introduce some of the key concepts used in the analysis. Firstly, the characteristics of inner areas, as described and referred to by the NSIA, are introduced; then, the GIs, and their role for inner areas' development are described.

2.1 The National Strategy for Inner Areas

The NSIA represents an innovative place-based policy, aimed at promoting territorial development and cohesion in Italy. Launched in 2014 by the Italian government, it represents a nation-wide support scheme aimed at addressing remote areas' main problems, such as: remoteness, underdevelopment, marginalisation, low level of education and employment, depopulation trends (Colucci, 2019; SVIMEZ, 2019; ISTAT, 2019). More in general, it aims to reduce urban-rural disparities (Barca et al. 2014; Lucatelli 2016; Urso 2016; De Renzis et al., 2022).

Firstly, the NSIA contributes to the mapping of the Italian municipalities with the aforementioned characteristics of inner areas. A peripherality indicator – expressed as the travel-time distance from the nearest urban centre providing essential services (i.e., health, education, and transportation services) – is used to define them (De Renzis et al., 2022). In particular, a 6-class taxonomy is produced, distinguishing: urban poles (A), intermunicipal poles (B), belt areas (C), intermediate areas (D), peripheral areas (E), ultraperipheral areas (F). Classes D-F are generically labelled as 'Inner areas' (Bertolini and Pagliacci, 2017).

Secondly, since 2014 the NSIA has supported (and funded) the implementation of local development projects, based on more integrated approaches, to overcome the traditional weakness of project management in these areas (Lucatelli, 2016), and to reinforce local territorial identities (Capello, 2018). In particular, 72 pilot areas – involving at least one inner municipality – were selected on a regional basis, each of them being requested to develop its own strategy through a Project Framework Agreement. According to it, several types of local interventions were suggested as tools to promote development processes. They have involved land management, territorial safeguarding, promotion of natural and cultural assets (i.e., through sustainable rural tourism), agricultural activities (Bertolini and Pagliacci, 2017). However, to be successful, each of these interventions must capitalise on the local specificities and local resources of the involved areas, i.e., some "latent development factors" (Barca et al., 2014: 40).

Among the existing available local resources that deserve valorisation, Arfini and Mancini (2018) suggest the importance of LAFSs. In particular, valorisation of traditional high-quality agri-food products – through local participation and close cooperation among economic agents – can represent a valuable opportunity for local development across inner areas, as explicitly emphasized by the NSIA (Barca et al., 2014). Thus, it is not a case that some of the pilot areas (e.g., Alto-Medio Sannio, in Southern Italy, and Valchiavenna, in Northern Italy) have implemented their local strategies with a focus on the valorisation of agro-food products through the recognition of GIs (Agenzia per la Coesione Territoriale and Regione Molise, 2021; Agenzia per la Coesione Territoriale and Regione Lombardia, 2017).

2.2 GIs and inner areas

GIs are distinctive signs used to identify a product whose quality, reputation and traditional production techniques relate to its geographical origin (OECD, 2000; Cei et al, 2018). After having originated in Mediterranean Europe (Cei et al., 2021; Crescenzi et al., 2022), in 1992 they were introduced in the EU. Currently, they are regulated under the EU Regulation 1151/2012, hence representing one of the main elements of the EU quality policy (European Commission, 2012; Resce and Vaquero Piñeiro, 2022). GIs stress the unique characteristics of the products they protect, also addressing the problem of asymmetric information between consumers and producers (OECD, 2000; Cei et al, 2018), and affording a product protection against conflictual uses, frauds and fake imitations (EUIPO, 2017; Wirth, 2016; Crescenzi et al., 2022). As part of the high-quality schemes, GIs represent one of the pillars of the EU agricultural and food policy. For 30 years, registered GIs have steadily increased in number: in 2022, and only considering agro-food GIs, there were 1,463 registered GIs in the EU (+ 50% from 2010, according to AND-International (2019)), suggesting the ever-growing EU attention to those quality labels (Cei et al. 2021).

GIs not only prevent frauds and fake imitations. They also represent strategic tools to increase producers' income and to promote development in the territories where GI production occurs (Gangjee, 2017; Cei et al., 2021; Resce and Vaquero Piñeiro, 2022; Török et al., 2020). With regard to single producers, the price premium recognised to a GI can compensate not only the greater costs of the GI certification but also a weakness of local farmers in successfully participating in the globalized economy, hence working as a collective property right (Bojnec and Ferto,2015; Crescenzi et al., 2022). Moreover, GI implementation is proved to positively affect also the broader local communities, and the territories involved, in terms of value distribution (Belletti and Marescotti, 2017), socio-economic and environmental sustainability (Belletti et al., 2015; Cei et al., 2018), rural development (Vaquero Piñeiro, 2021), and population growth (Crescenzi et al., 2022). Given such a positive impact, they are attractive for those remote areas, looking for a "new rural development paradigm" (Ilbery and Kneafsey, 1999; Marsden, 1998). Actually, the link between GIs and the place in which they are made suggests that geographical factors – e.g., climate, soil, biodiversity – play a role together with the human factor in assuring product quality (van Leeuwen et al., 2018). Such a link is stronger for Protected Designation of Origin (PDO) than for Protected Geographical Indication (PGI)[1], but in both cases GIs represent an effective way to preserve local cultural heritage (European Commission, 2020).

[1] In the case of PDOs, every part of the production, processing and preparation process must take place in the defined region. In the case of PGIs, at least one of these stages must take place in the defined region.

In more general terms, registering a new GI can be considered as a "collective" production process (Teil, 2012: 497), turning into a "type of collective property" (Barham, 2003). Due to the length and the cost of the application procedure (Cei et al., 2021), the whole local-level community must be actively involved in this process (Prévost et al., 2014), which must be driven by the interests of multiple stakeholders, including local policymakers, local communities, agri-food producers, and even marketers and consumers (Castellò, 2021). Such a collective organization is crucial not only for the initial registration of a GI but also for its ongoing management over time (Reviron and Chappuis, 2011), for example in the case of non-minor amendments involving changes in the boundaries of the production area (Landi and Stefani, 2015). Mantino and Vanni (2018) also show the importance of the support from local administrations and local politics, by means of two case studies from Northern and Southern Italy.

Thus, it is clear that, when analysing the process of registration of new GIs, several factors play a role. Actually, analysing the main conditions that favour GI registration is complex, due to little availability of economic data on GIs at the local level. Because of these limitations, previous studies addressing this nexus were mostly qualitative (see, for example, Torok et al., 2020; Bonanno et al., 2019). However, they all confirm that socio-economic determinants (e.g., infrastructure endowment and consumer demand), dynamism of the local agri-food sector, and favourable institutional context all matter (Huysmans and Swinnen, 2019; Meloni and Swinnen, 2018; Vaquero Piñeiro, 2021; Resce and Vaquero Piñeiro, 2022). Also, farmers' characteristics matter for GI registration, and in particular: famers' education level (Marongiu and Cesaro, 2018), and propensity to cooperate (Charters and Spielmann, 2014; Cei et al., 2021; Vaquero Piñeiro, 2021). Lastly, also pre-existing experience in GI registration matters: traditional GI regions tend to be more active in new GI registration, thanks to accumulation of skills among producers and improved institutional capacity (Cei et al., 2021; Tregear et al., 2016; Huysmans and Swinnen, 2019). Also, Kizos et al. (2017) claim that implementation of GIs in those territories having experienced GIs registration for decades is even more developed thanks to the presences of consortia and pre-existing collective actions.

All these elements can be grouped under the general (albeit rather fuzzy) definition of social and territorial capital, whose importance for agricultural and rural development has been largely emphasized over time (Putnam et al., 1994; Capello, 2018; Rivera et al. 2019; Cortinovis et al. 2017; Pagliacci et al., 2020).

When considering the aforementioned territorial and socioeconomic characteristics, remoteness cannot be ignored as a major driver, due to the specificities that characterize inner areas. Indeed, when considering GI registration in inner municipalities, contrasting findings emerge. These areas are endowed with some crucial factors, but can lack some others. At EU level, many studies have claimed that GI registration represents an economic opportunity largely exploited by remote and other less favoured areas (Parrott et al., 2002; Santini et al.; 2015; van de Pol, 2017; Cei et al., 2021). However, in the case of Italy, a positive nexus between GIs and inner areas is less obvious. According to Marongiu and Cesaro (2018), Italian farmers located in the less favoured areas (i.e., remote and inner regions, among other) are less likely to engage in GI schemes than those located close to the flatlands, hence benefitting from a larger infrastructure endowment. Similarly, Vaquero Piñeiro (2021) claims that the Italian food PDOs with the highest revenues come from those municipalities that show better socio-economic conditions, a more diversified economy and a more competitive agri-food sector.

3. DATA AND METHODS

This section aims to discuss the data adopted into the analysis together with the suggested method.

3.1 Data

This study considers all the agro-food GIs (both PDOs and PGIs) that have been registered in Italy, since 2014, i.e., the year of introduction of the NSIA. Specifically, the study takes into account all GIs registered in both northern and southern Italy, regardless of the extent of the territory specified by each GI's Product Specification (i.e., considering both GIs produced in only a few municipalities and those produced in entire regions[2]), in order to have a more general overview of the possible different factors playing a role in new GI registration.

However, this study only considers agro-food GIs, excluding wine GIs. Two main reasons drive this choice. Firstly, previous studies tackling GIs and their territorial distribution have favoured wine GIs more than food GIs

[2] Despite its focus, this analysis also includes the GIs produced over entire regions. Actually, although inner municipalities usually play a limited role in the decisions to register new large-scale GIs, however their inclusion within the boundaries of the area of production can still represent an important decision, eventually prompting local economic development.

Table 1. Number of GIs, by type (PDO and PGI) and product category.

	PDO	PGI	Total
Fruit, vegetables and cereals	4	16	20
Cheeses	8	1	9
Bread, pastry, cakes, …	1	7	8
Oils and fats		6	6
Meat products		6	6
Pasta		3	3
Other products of animal origin	1		1
Fresh meat (and offal)		1	1
Chocolate and derived products		1	1
Fresh fish, molluscs, and crustaceans	1		1
Total	15	41	56

(see for example Resce and Vaquero Piñeiro, 2022; Crescenzi et al., 2022). Secondly, an analysis on agro-food GIs – which include very different products (e.g., fruits and vegetables, cheeses, meat-based products) – can shed light on a broader set of territorial and social determinants of the degree of protection sought through GI labels, hence favouring more generalisable findings.

In total, we consider 56 GIs, of which 15 are PDOs and 41 are PGIs. As shown in Table 1, 10 different product categories are included. Most of the GIs under analysis are fruit, vegetables and cereals. However, when considering PDOs only, most of them are cheeses. For each of them, we retrieved the list of municipalities included within the boundaries of the eligible area of production according to each single GI's Product Specification (as retrieved by the eAmbrosia dataset[3]).

Considering the agro-food GIs registered in the 2014-2022 period, there are 4125 Italian municipalities (out of 7926) that are eligible for the production of at least one of them. In particular, some municipalities in Tuscany and in Apulia are eligible to produce even four different newly registered GIs (Figure 1).

GI eligibility at municipality level can be jointly analysed with the Italian inner municipalities (Table 2). On average, 46.8% of the Italian municipalities are included in the production area of none of the GIs registered in the period 2014-2022. However, this share is the largest in the intermunicipality poles (B) and belt areas (C), i.e., across some types of non-inner areas. Conversely, it is definitely lower in type D, E, and F municipalities. These results seem suggesting that inner areas are more likely to adopt new GIs than non-inner areas.

[3] Available at https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels/geographical-indications-register/.

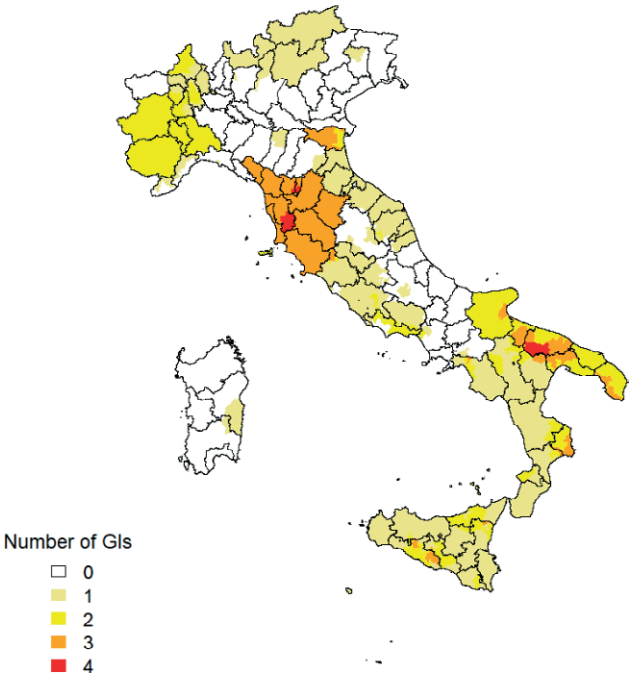

Figure 1. Number of registered GIs (2014-2022), by municipality.

Table 2. Share of municipalities with no registered GIs, by type of inner-area municipality, out of the number of municipalities in each type of inner-are

	Value (%)
A – Urban poles	41.9
B – Intermunicipality poles	59.0
C – Belt areas	54.1
D – Intermediate areas	40.4
E – Peripheral areas	42.0
F – Ultraperipheral areas	32.9
total average	46.8

Source: own elaboration.

3.2 Methods

To assess the role of the drivers that may affect the number of newly registered GIs at municipality level, the following empirical strategy is adopted.

As a dependent variable, the number of agro-food GIs registered in the 2014-2022 period, by Italian municipality, is a count variable. It is not normally distributed, as it includes many zero observations (46.8% of the total observations). In this case, it is common to adopt a count regression approach. The basic distribution for a count variable is a Poisson distribution, with the conditional mean (the mean of the outcome variable

Y given the values of the predictor variables X) being equal to the conditional variance (Cameron and Trivedi, 2013). However, given the clear stack of zero values in the dependent variable in this case, Poisson models tend to show poor fitting. Thus, the hurdle model, i.e., a modified count model, can help (Mullahy, 1986). It is a two-part model. Firstly, the zero hurdle part is adopted to model a right-censored outcome variable indicating municipalities being eligible for not even a single GI (Y = 0) or with at least one of them (Y = 1, where all values larger than 0 are censored, i.e., are fixed at 1). The second part is a truncated count, which is adopted to model the exact number of GIs for those municipalities that are eligible for producing at least one of them (municipalities with Y > 0).

The hurdle model is also based on the idea that different underlying processes – driven by different sets of regressors – can explain either the zero values and the positive values of this variable. If a municipality does not produce a single GI, then the threshold (i.e., the 'hurdle') to the truncated count part is not crossed, and a zero value is observed. Otherwise, the hurdle to the truncated count part is crossed, and any given number can be observed. In the case of GI registration, it might be expected that those municipalities that have already been included in the area of production of one GI, might benefit from further facilitation in registering additional GIs, compared to other municipalities (see Cei et al., 2021; Kizos et al., 2017).

Dealing with the research question of this study, the hurdle model combines a binomial probability model – governing the binary outcome of whether a count variable has a zero or a positive value – with a zero-truncated Poisson count-data model, for those observations that cross the hurdle (Y >0). Formally, we have (Zeileis et al., 2008):

$$f_{hurdle}(y; x, z, \beta, \gamma) = \begin{cases} f_{zero}(0; z, \gamma) & if\ y = 0 \\ 1 - f_{zero}(0; z, \gamma) \cdot \frac{(f_{count}(y; x, \beta))}{(1 - f_{count}(y; x, \beta))} & if\ y > 0 \end{cases} \quad (1)$$

Where the model parameters are estimated by Maximum Likelihood, and where the specification of the likelihood has the advantage that the count and the hurdle component can be maximized separately (Zeileis et al., 2008). The corresponding mean regression relationship is given by using the canonical log link, resulting in a log-linear relationship between mean and linear predictor (Zeileis et al., 2008):

$$\log \mu_i = x_i^T \beta + \log(1 - f_{zero}(0; z_i, \gamma)) - \log(1 - f_{count}(0; x_i, \beta)) \quad (2)$$

With regard to the empirical strategy implemented here, different models, including different sets of regressors, grounded on the literature review carried on in Section 2, are used.

Model 1 focuses on the role of inner areas, referring to the 6-class taxonomy of the Italian municipalities produced by the NSIA. Model 2 considers the characteristics of the agriculture sector (i.e., utilised agricultural area per inhabitant, share of cooperative agricultural holdings out of the total, share of agricultural holders aged 40 years and less out of the total, share of agricultural holders having achieved tertiary education) and of the food industry (i.e., share of employment in food industry of the total manufacturing industry employment). Moreover, the share of agricultural holdings being already involved in PDOs or PGIs production (considering 2010 Census data) is included as a proxy of any pre-existing experiences in GI registration. Model 3 includes socio-economic characteristics of the municipality, addressing average per capita income (in 2014) as a proxy for the local-level socioeconomic dynamism, and share of electoral turnout in the EU 2014 vote, as a more general proxy for social capital at local level[4]. Lastly, Model 4 is the most comprehensive model, including all the aforementioned covariates. Lastly, it can be noticed that in all the Models 1-4, a categorical variable distinguishing the Italian Macro-regions (i.e., North-West, North-East, Centre, South and the Islands) is also included. Such a variable is important to address different regional settings. Indeed, Italian macroregions largely differ in terms of climatic conditions, characteristics of the agricultural sector and of the supply chains, and institutional settings (eventually affecting overall governance and politics quality). This categorical variable is expected to control for all these aspects.

For each of the aforementioned regressors, Table 3 provides variable specification as well as data source.

4. RESULTS AND DISCUSSION

The results of the hurdle models, in each specification, are returned with regard to the coefficients of the variables (Table 4) and the estimated odd ratios (Table 5).

In Model 1, the baseline odds of having a positive count (i.e., at least one eligible GI, by municipality) are 1.27. The odds are affected negatively by being either

[4] Actually, EU voting does not lead to any direct economic rewards, being mostly driven by a sense of public duty (Bigoni et al., 2016; Guiso et al., 2004; Putnam et al., 1994). Moreover, one could also argue that a higher electoral turnout in the elections could refer to the presence of a higher-quality political class as well.

Table 3. Covariates for the analysis at municipality level.

Group	Label	Descriptions	Specification	Source	Year
Remoteness	INNER AREAS	Categorical variable, reflecting inner area type of Italian municipalities (A-urban poles, B-intermunicipal poles, C-belt, D-intermediate, E-peripheral, F-ultraperipheral), according to the NSIA classification	6 factors	Own elaboration on Barca et al. (2014)	2014
Agriculture and food industry	UAA	Hectares of Utilised Agricultural Area (UAA) per inhabitant (2010)	Ratio	Italian Agricultural Census (Istat)	2010
	COOP	Share of cooperative agricultural holdings out of the total	Ratio	Italian Agricultural Census (Istat)	2010
	YOUNG	Share of agricultural holders aged 40 years and less	Ratio	Italian Agricultural Census (Istat)	2010
	UNIVERSITY	Share of agricultural holders having achieved tertiary education	Ratio	Italian Agricultural Census (Istat)	2010
	FOOD_IND	Share of employment in food industry of the total manufacturing industry employment	Ratio	Italian Population and Housing Census (Istat)	2011
	PAST GIs	Share of agricultural holdings being involved in PDOs or PGIs production in 2010	Ratio	Italian Agricultural Census (Istat)	2010
Socio-economic characteristics	INCOME	Average gross taxable income (thousand €), for year 2014	continuous (1000€)	Ministero dell'Economia e delle Finanze	2014
	ELECTION	Share of electoral turnout in the 2014 EU vote	Ratio	Ministero dell'Interno	2014
Regional settings	MACRO_REG	Categorical variable, for the Italian macroregion (North-west, North-east, Centre, South, the Islands)	5 factors	ISTAT	2011

an intermunicipal pole (type B) or a belt area (type C), while this odds ratio is 1.805 times higher in the ultraperipheral municipality (type F). Controlling for *MACRO_REG*, odds ratio is 8.030 times higher in Central regions while being located in the North-East decreases it by 0.399 times. Given the response is positive (i.e., the hurdle is crossed), the negative effects played by *INNER AREA* are largely observed: intermediate (type D), peripheral (type E) and ultraperipheral (type F) municipalities are associated with a smaller number of newly registered GIs. When controlling for *MACRO_REG*, North-Eastern regions, Southern regions and the Islands are associated to a smaller number of GIs as well.

In Model 2, the baseline odds of having a positive count are positively affected by *UAA* and *FOOD_IND*, while *COOP* has a negative effect, despite common expectations. Controlling for *MACRO_REG*, these odds is higher in Central regions and smaller in the North-East, as observed in Model 1. Given the response is positive, *UAA* and *PAST GIs* increase the number of registered GIs in each municipality, while *YOUNG* and *FOOD_IND* negatively affect it. With regards to *MACRO_REG*, same effects, as observed in Model 1, are found.

In Model 3, the baseline odds of having a positive count are negatively affected by *INCOME* and *ELECTION*, also when controlling for *MACRO_REG* (whose coefficients are all significant). However, given the response is positive, both *INCOME* and *ELECTION* turns to positively affect the number of registered GIs in each municipality.

In Model 4, most of previous effects are largely confirmed. The baseline odds of having a positive count are 21.957. Compared to urban poles, all other municipality types reduce these odds, with the only exception of ultraperipheral municipalities (type F), showing no significant effect at all. Moreover, it is also significantly decreased by *COOP*, while both *UNIVERSITY* and *FOOD_IND* positively affect it. Among socioeconomic characteristics of the municipalities, *ELECTION* negatively affects it. When considering *MACRO_REG*, North-East is confirmed to have a negative effect on these odds, as South and the Islands have. Conversely, being a municipality in the Centre increases the odds. Given the response is positive (i.e., the hurdle is crossed), the negative effects played by *INNER AREA* is much broader and generalised. Inner municipalities (D-F) show a lower number of registered GIs. Conversely, *UAA* and *PAST GIs* increase the number of registered GIs in each municipality (confirming the findings form Model 2), and also *ELECTION* turns to positively affect this number.

The results about the new GI registration in Italy, in years 2014-2020, confirm most of the findings from pre-

Table 4. Model estimates for the number of GIs at municipality level.

Variable	M1				M2				M3				M4			
	Count model		Zero hurdle model		Count model		Zero hurdle model		Count model		Zero hurdle model		Count model		Zero hurdle model	
(Intercept)	0.380	***	0.243		0.144	*	-0.054		-0.968	***	2.800	***	-0.355		3.089	***
	(0.102)		(0.154)		(0.057)		(0.064)		(0.182)		(0.221)		(0.243)		(0.320)	
INNER AREAS _ type B	0.369	*	-0.898	***									0.374	*	-1.018	***
	(0.154)		(0.154)										(0.154)		(0.257)	
INNER AREAS _ type C	-0.166		-0.389	*									-0.158		-0.630	***
	(0.102)		(0.155)										(0.105)		(0.158)	
INNER AREAS _ type D	-0.389	***	0.070										-0.358	**	-0.360	*
	(0.104)		(0.157)										(0.110)		(0.165)	
INNER AREAS _ type E	-0.491	***	0.082										-0.451	***	-0.438	*
	(0.111)		(0.160)										(0.119)		(0.171)	
INNER AREAS _ type F	-0.870	***	0.590	**									-0.852	***	0.104	
	(0.178)		(0.198)										(0.185)		(0.206)	
UAA					0.008	°	0.030	*					0.021	***	-0.008	
					(0.005)		(0.013)						(0.005)		(0.011)	
COOP					0.013		-0.077	**					0.010		-0.077	**
					(0.025)		(0.028)						(0.025)		(0.028)	
YOUNG					-0.007	**	0.000						-0.004		-0.004	
					(0.003)		(0.003)						(0.003)		(0.003)	
UNIVERSITY					0.002		0.000						-0.004		0.014	***
					(0.003)		(0.004)						(0.004)		(0.004)	
FOOD_IND					-0.002	*	0.005	***					-0.001		0.003	**
					(0.001)		(0.001)						(0.001)		(0.001)	
PAST Gis					0.006	***	0.000						0.006	***	-0.001	
					(0.001)		(0.001)						(0.001)		(0.001)	
INCOME									0.033	***	-0.116	***	0.015		-0.109	
									(0.008)		(0.010)		(0.009)		(0.011)	
ELECTION									0.007	***	-0.008	***	0.006	***	-0.006	**
									(0.002)		(0.002)		(0.002)		(0.002)	
MACRO_REG_North-east	-1.806	***	-0.919	***	-1.978	***	-0.835	***	-1.776	***	-1.002	***	-1.831	***	-1.020	***
	(0.163)		(0.070)		(0.163)		(0.071)		(0.164)		(0.071)		(0.165)		(0.074)	
MACRO_REG_Centre	0.040		2.083	***	0.021		2.128	***	0.092	°	1.914	***	0.089		1.809	***
	(0.049)		(0.114)		(0.052)		(0.114)		(0.050)		(0.115)		(0.057)		(0.118)	
MACRO_REG_South	-0.258	***	0.002		-0.283	***	0.076		-0.051		-0.623	***	0.003		-0.757	***
	(0.056)		(0.063)		(0.061)		(0.066)		(0.074)		(0.086)		(0.083)		(0.094)	
MACRO_REG_Islands	-0.664	***	-0.123		-0.720	***	-0.001		-0.452	***	-0.745	***	-0.342	***	-0.928	***
	(0.097)		(0.087)		(0.100)		(0.086)		(0.111)		(0.111)		(0.119)		(0.117)	

Note: For count model, truncated Poisson with log link; For Zero hurdle model, binomial with logit link.
For INNER AREAS: omitted type A single 'poles'
For MACRO_REG: omitted type North-West
Significance: °p<0.1; *p<0.05; **p<0.01; ***p<0.001
Source: own elaboration.

vious studies. Surely, geographical and territorial divides across Italy matter. The results about inner areas are somehow contrasting. Also, when controlling for other socioeconomic covariates, being an inner municipality generally decreases the chance of having a GI registered. Moreover, even when one new GI is registered, inner areas tend to be associated to a smaller number of registered GIs, per municipality. In fact, this finding contrasts with what observed by Parrott et al. (2002) and by Cei et al. (2021), who considered Gi adoption in the EU

Table 5. Results of the models: odd ratios.

Variable	M1		M2		M3		M4	
	Count model	Zero hurdle model	Count model	Zero hurdle model	Count model	Zero hurdle model	Count model	Zero hurdle model
(Intercept)	1.462	1.274	1.155	0.948	0.380	16.442	0.701	21.957
INNER AREAS _ type B	1.447	0.408					1.453	0.361
INNER AREAS _ type C	0.847	0.678					0.853	0.533
INNER AREAS _ type D	0.678	1.072					0.699	0.698
INNER AREAS _ type E	0.612	1.086					0.637	0.646
INNER AREAS _ type F	0.419	1.805					0.426	1.110
UAA			1.008	1.031			1.021	0.992
COOP			1.013	0.926			1.010	0.926
YOUNG			0.993	1.000			0.996	0.996
UNIVERSITY			1.002	1.000			0.996	1.014
FOOD_IND			0.998	1.005			0.999	1.003
PAST Gis			1.006	1.000			1.006	0.999
INCOME					1.034	0.891	1.015	0.897
ELECTION					1.007	0.992	1.006	0.994
MACRO_REG_North-east	0.164	0.399	0.138	0.434	0.169	0.367	0.160	0.361
MACRO_REG_Centre	1.041	8.030	1.022	8.396	1.096	6.778	1.093	6.102
MACRO_REG_South	0.773	1.002	0.754	1.079	0.951	0.536	1.003	0.469
MACRO_REG_Islands	0.515	0.884	0.487	0.999	0.636	0.475	0.711	0.395

For INNER AREAS: omitted type A single 'poles'
For MACRO_REG: omitted type North-West
Source: own elaboration.

less favoured areas. Rather, this finding is more in line with the results by Marongiu and Cesaro (2018). A possible explanation for these contrasting results might lie in the different geographic areas (i.e., considering Italy only) and in the different territorial scale adopted (the municipality level, i.e., a narrower territorial area).

When considering other socioeconomic and territorial drivers, the findings from this study seem confirming previous ones. For example, the results about farmers' education, proxied by the share of agricultural holders with tertiary education, confirm those by Marongiu and Cesaro (2018). Conversely, cooperation in the agricultural sector shows detrimental effect in having at least one registered GI at municipality level. This finding is contrasting with previous results (Charters and Spielmann, 2014; Cei et al., 2021; Vaquero Piñeiro, 2021) and largely unexpected: lack of cooperation among farmers is usually recognised as a major issue in the registration process of high-quality agri-food products, which ground on consortia for their protection and valorisation (see also Fasano, 2021, for a qualitative study analysing some agri-food products of the Molise region and the efforts to register new GIs in Southern Italy's inner areas). It is not a case that improving collective actions in agriculture represents a key objective of the Common Agricultural Policy (CAP) in 2023-2027 programming period. Conversely, the positive role played by pre-existing experience in registering GIs confirms the findings of Cei et al. (2021), Tregear et al. (2016), and Huysmans and Swinnen (2019). Moreover, this study seems suggesting that accumulation of skills among producers and improved institutional capacity is even more important in explaining the registration of more and more GIs, thus confirming the vitality of traditional GI regions.

In the case of the proxies for social capital endowment at local level, electoral turnout in EU vote shows a significant effect, albeit with contrasting sign in either the zero-part or the count-part of the model. The fact that electoral turnout can play a positive role in explaining the registration of more and more GIs, when at least one is registered, can be explained by the fact that quality of local political institutions also matter, with a sort of multiplying effect. Actually, a greater quality of local institutions can increase citizens' trust in the local political class, positively affecting in turn electoral turnout, also in EU elections. The nexus between electoral turnout, quality of institutions and GI registration is somehow consistent with the idea of GIs as collective proper-

ties (Barham, 2003), which calls for a high level of social capital for their implementation.

These results are somehow consistent with those about the differences observed across Italian macroregions. Southern Italian regions and the Islands tend to show lower propensity to register new GIs, and they are also characterised by a smaller number of registered GIs per single municipality, when at least one has been registered. As already observed, several reasons might explain these differences across Italian macroregions, including different climatic conditions, different structures of the supply chains, different institutional settings and quality of the local governance. In particular, several authors have stressed the importance of this latter hypothesis. Indeed, Vaquero Piñeiro (2021), Meloni and Swinnen (2018) and Crescenzi et al. (2022) point out the role of institutional quality in GI registration. When considering single cases studies, also Mantino and Vanni (2018) suggest the importance of the attitude of the local policy system, finding same differences when comparing Northern and Southern regions.

Overall, these results could perhaps challenge the willingness of the policymakers (both at EU and national level) to provide a tool, such as GIs, to foster remote areas' development. In particular, given the negative relationship between inner areas and the number of registered GIs, the effectiveness of many of the strategies implemented at local level by the 72 pilot inner areas might seem not effective at all (see Dipartimento per le politiche di coesione, 2020). Especially across Southern Italy, promotion of agro-food quality systems is considered relevant and supported by local policymakers. However, the existence of some major weaknesses in the inner areas (e.g., remoteness, scarcity of agricultural modernisation, presence of elderly farmers in the inner areas) seems to overcome any political will. Thus, in the case of Italian inner areas, not even the NSIA has been able to revert these weaknesses, hence turning into a still too limited exploitation of GI registration.

5. CONCLUSIONS AND POLICY IMPLICATIONS

In order to foster socioeconomic development and agriculture diversification of inner areas (as of other marginal areas), EU quality schemes for agro-food products (and GIs in particular) are considered as a key opportunity, by both EU and national policymakers. Actually, inner areas share a large amount of natural resources as well as of traditional agro-food products, which might benefit from GI protection. In particular, this paper has contributed to the empirical debate of the territorial and socioeconomic drivers that can affect GI registration in Italy (i.e., the frontrunner country in the EU), by demonstrating which of them play the most prominent role. By considering the number of agro-food GIs registered across Italian municipalities in years 2014-2022, and by using hurdle models, this study suggests that this opportunity still represents a sort of untapped opportunity for Italian inner areas, despite the strong political commitment to promote them. Moreover, future works will try to extend these findings to other national contexts, as well as to include also the wine sector.

However, it should be noticed that not even the inclusion in the area of production is necessarily a guarantee of production exploitation of the GI for the municipality itself. Actually, GI producers are free to locate in any municipalities within the boundaries of the production area, eventually favouring non-inner municipalities. Nevertheless, being included within the area of production of a GI (even in the case of larger scale GIs) might represent a key element for any communities that aim to create a collective property, as GIs are. Therefore, this inclusion represents a tool to add value to the local agro-food production. As suggested by this study, in addition to geographic remoteness, other factors might hinder this process, e.g., the lack of local-level political commitment, and the limited extent of social capital at local level. However, further studies will also tackle the location of the producers within the boundaries of the production area, to test their effective links with inner areas.

However, even if just considering municipality eligibility, it is clear that, in order to enhance a stronger registration of new GI labels across Italian inner areas, the CAP should put more attention on this nexus. However, the Italian CAP Strategic Plan for the 2023-2027 programming period has not included any radical innovations in the way quality schemes are supported by EU public funds. In addition to specific funds, what seems to be really important to achieve these ambitious goals is fostering cooperation among farmers and between producers and policymakers, who must have an even more proactive role in raising awareness of the GI potential, even in the inner areas. Such an approach would be useful to get the chance to use this untapped potential, hence promoting a more efficient and a more cohesive food chain organisation also across inner areas.

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