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Synergies among ownership forms and cooperating territories: The case of wine

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ABSTRACT

This paper investigates the effectiveness of cooperative ownership and its enhancement through territorial cooperation by analysing Italian wine firms (2012–2022) using a novel dataset and matching strategies. Results reveal that, when economic performances are properly measured, cooperative ownership generates more economic benefits and can thus become a driver of local development. The effect of cooperating territories goes above and beyond institutional quality, capturing a different measure of firm-level territorial cooperation, not strictly and only mediated by better public institutions. The paper supports the relevance of cooperative ownership for local economies and advocates policies fostering social networks and community-led initiatives.

1. Introduction

In the European agrifood institutional landscape, two cooperative behaviours are quite common: forms of cooperative ownership and territorial networks. A natural question, although rather unexplored in the literature, is whether these two cooperation attitudes compete or are complementary. In this paper, we employ quasi-experimental techniques to investigate this question, and more specifically: (i) do cooperatives and non-cooperative firms achieve different economic performances, after properly considering their dual nature? (RQ1); (ii) does territorial cooperation influence the economic results of cooperatives compared to non-cooperative firms? (RQ2). For this purpose, we use Italian data at the firm and territorial levels over the 2012–2022 period, employing matching methodologies for binary and continuous treatment.

Cooperation has often been seen as a strategic asset at the firm level, especially for small and medium-sized enterprises (SMEs), and for community development (Figueiredo and Franco, 2018). However, the empirical literature has provided mixed results on whether cooperatives can perform as well as or even better than non-cooperative firms (see, e.g., Grashuis and Su, 2018; Martinez et al., 2024).[1] Compared to other forms of business organization, such as individual firms and investor-owned firms (IOFs), mainly focused on shareholder external requests and profit maximization, cooperatives aim firstly to satisfy the needs of members and local communities, for example by providing fair remuneration for members' raw materials, providing members with services-at-cost, etc. However, given that establishing a cooperative requires an integrated and holistic strategy with not only economic and monetary aspects (Mills and Davies, 2013), they could appear as less remunerative when compared to other forms of business,[2] if one does not consider the difference in their aims, e.g., profit maximization *vs.* fair remuneration for members' raw materials and local development (D'Amato et al., 2022). Indeed, one critical aspect is how to find the right measures of performance in light of the dual nature of cooperatives, in which members are both investors (patrons) and suppliers (Melia-Marti et al.,2024).

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[1] Cook (1995), for instance, identifies five problems: the common property or free riding problem, the horizon, the portfolio, the control and the influence cost problem. Iliopoulos and Cook (2023) highlight the organizational costs cooperatives may have to face in different phases of their life.

[2] See, e.g., Porter and Scully (1987) for an early reference and Soboh et al. (2009); Soboh et al. (2012) and D'Amato et al. (2022) more recently.

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The relevance of cooperatives is particularly evident in the wine industry in so-called Old-World countries, such as Italy, where several producers have formed and/or joined cooperatives in order to enter a market (Pomarici et al., 2021), actively operating in downstream and final markets (ISMEA, 2025). Through wine cooperatives, smallholders can thus be involved in all the stages of supply chains and play a larger role in both national and international markets. Large cooperatives, moreover, are driving the increasing specialisation of Italy as a supplier of mid-priced bottled wines (ISMEA, 2025). Even in this relatively favourable scenario, over the past decades the number of cooperatives has decreased (see, e.g., Mediobanca, 2023) due to M&As including acquisition by private companies or foreign investors (e.g., Crescenzi et al., 2023).

In this context —- and given that setting up and managing a cooperative requires effort and commitment by many small and medium-sized grape producers – one can conjecture that cooperatives benefit from being located in areas characterised by higher levels of territorial cooperation, such as those with well-structured inter-sectoral networks. Territorial cooperation indeed plays a key role in explaining why firms in some areas achieve better performance (Belso-Martinez et al., 2024; Matti et al., 2023; Meliciani and Tchorek, 2019; Archibugi and Filippetti, 2011). Among others, networking (Putnam, 1993), social norms (Coleman, 1990),[3] and cultural identity can be contributing factors in the generation of fertile territorial cooperation (Ganau and Rodríguez-Pose, 2023).

Clear examples of this in the agrifood sector are the territories that share and manage collective reputation schemes, such as Geographical Indications (GIs).[4] GIs are the formal institutionalisation of a fertile territory based on the active participation and collaborative behaviour of local actors. In other words, GIs are "*a case of local informal institutions associated with spatially embedded production systems which are therefore acknowledged within the globally recognized formal institution of the GI scheme*" (Crescenzi et al., 2022, p. 382).[5] Therefore, GIs have a dual nature. On the one hand, GI labels represent, in concrete terms, the legal framework and formal regulations of the scheme. On the other, they can also be seen as a good proxy of informal networks, based on territorial cooperation, in their regions of origin, which transcend the standard measures of administrative institutional quality. Given the cooperative nature of the GI scheme, hence it can be posited that location in a territory formally included in a GI scheme improves performance and greater resilience, through shared norms, co-marketing, production linkages and knowledge flows (Belussi and Caldari, 2009).

This study focuses on Italy, an excellent case because, first of all, the role of cooperatives is a structural peculiarity of its wine sector (Corsi et al., 2019; Pomarici et al., 2021): in effect, about 50 percent of total Italian grape production is handled by cooperatives (37 percent in France and 60 percent in Spain) (Albisu et al., 2019; Alonso Ugaglia et al., 2019). Second, together with France, Italy is one of the pioneers, of GI quality schemes for wine, as established in the early '60 s, more than 30 years before adoption by the EU in 1992. In 2024, for instance, Italy accounted for 528 wines certified as a GI (409 PDO and 119 PGI), representing 62 percent of total certified agrifood products (ISMEA, 2024).[6] These features in Italy enable us to use the presence of GIs as a proxy of territorial cooperation and to investigate its effects on cooperative firm performance.

Given that cooperatives do not simply maximize profits, the first order of business is to find an appropriate measure of performance that, while taking their dual nature into account, still enables the comparison of cooperatives with other firms.

The analysis conducted in this paper shows that – all else being equal – cooperatives can and do perform better than other types of firms. This effect is even greater in the territories with a critical mass of territorial cooperative networks (GI areas), especially in relation to gross profitability. Results suggest, therefore, that the economic performance of cooperatives does not depend on territorial cooperation but can be enhanced by it. The estimated effect is not mediated by the economic size (value and volume) of specific GIs or the total number of products certified in an area. This evidence highlights that cooperatives, therefore, seem to be an organisational format impacting not only on associated members as such but generating greater benefits when working in tandem with fertile territorial socio-economic conditions, i.e., they seem to exert a synergistic effect.

The methodologically innovative contribution of our paper relies on the use of a quasi-experimental quantitative approach based on a representative set of data for an entire country, rather than case studies or qualitative analysis. For instance, Figueiredo and Franco (2018), investigated the role of wine cooperatives as social entrepreneurs, (i) using data from interviews which can suffer from selection bias (interviewer sample selection and the number of respondents), (ii) without considering economic performance indicators for firms and (iii) without conducting a causal analysis preferring descriptive statistics and factor analysis.

The rest of the paper is structured as follows: Section 2 summarises the background and reviews the literature, Section 3 introduces the empirical setting (data, sample, and model), Section 4 presents the results and robustness checks, Section 5 reflects on the policy implications of the study and provides some final remarks.

2. Background and review of the literature

2.1. Cooperative ownership

Historically, the development of the wine industry in Italy has essentially been a bottom-up process driven by local traditions, family farmers and cultural habits (Giua et al., 2024, Uguaglia et al., 2019; Anderson and Pinilla, 2018). The Italian industry is also characterised by the historical relevance of wine cooperatives, dating back to the 1920 s and linked to Catholic activism, political parties, groups of producers, landowners, and wine experts. Public policies and national institutions have contributed to the spread of these business organizations. For instance, at the beginning of the 90 s, the Italian Ministry established specific economic support for producers affiliated with wine cooperatives wishing to modernize their production processes. In comparison with other countries, where cooperatives have been absorbed by private businesses (e.g., the US or Latin America), in Italy the bargaining power of cooperatives has become one of the strengths of the sector (Pomarici et al., 2021).

[3] Social norms can be considered a set of informal and unwritten codes of conduct among citizens and economic actors.

[4] The GI scheme was introduced in the EU in the 1992, reformed in 2006, 2012, and again recently in 2024. The new EU Law came on stream in May 2024 (Regulation (EU) 2024/1143).GIs are used for wines with an essential or exclusive relationship with their region of origin (i.e., at least one local administrative unit – LAU) (EU Reg. No.2013/1308). They include Protected Designation of Origin (PDO) for wines that are entirely produced within the area (100 percent of the grapes from that area) and Protected Geographical Indication (PGI) for wines that are mainly produced within the area (at least 85 percent of the grapes from that area).

[5] While formal institutions include rules and regulative frameworks, informal institutions refer to socio-cultural elements (North, 1990).

[6] In Italy, PDO includes both Denominazione di Origine Controllata (DOC) and Denominazione di Origine Controllata e Garantita (DOCG) wines. Italy is the only country in Europe to have this additional category since the EU has authorised Italy to maintain the historical quality regulation established in the early '60s (L.238/2016) (Corsi et al., 2019).

The result is a highly fragmented structure in the wine sector, characterized by a large number of small actors, different levels of integration and capillary distribution throughout the country, as clearly described by Pomarici et al. (2021)[7]: a large number of farms (310,428), but overall a small average size (2.1, ha).[8] In this scenario, cooperative ownership may represent a good strategy to delegate wine-making and sales. Especially for grape growers, cooperatives may provide a better market position, more bargaining power and, possibly, an overall fairer return for their products along the supply chain (Couderc and Marchini, 2011). Today, cooperatives still account for a huge portion of the Italian wine industry.[9] In 2021, for instance, cooperatives accounted for about 42 % of the total turnover of the biggest Italian wine firms.[10]

The cooperative form of wineries still has some comparative advantages regarding benefits for members. First, it helps to address sectorial challenges, such as quality upgrading, environmental sustainability, structural weaknesses (e.g., financial constraints) and international competition (i.e., from New-World wine producing countries). For instance, looking at cooperatives located in the Umbria region, Couderc and Marchini (2011) noted that market changes are pushing cooperatives towards more flexible supply chains allowing them to better adapt to external shocks.

Regarding quality markets, in particular, the cooperatives' involvement in producing high-quality wines has increased over the years, often changing their internal organizations (Russo, 2019).

Second, the cooperative form of business has been recognised as supporting the economic resilience of local actors during economic downturns, well beyond the wine and agricultural sector (Cooperatives UK, 2021; Delbono and Reggiani, 2013; Wang et al., 2021), by vertical integration and quality upgrading.

Third, through solidarity, as in the case of another form of inter-branch cooperation (Gori and Sottini, 2014; Matei and Matei, 2012), cooperatives are drivers of economic resilience. Thanks to the social dimension, this form of business collaboration facilitates the exchange of experience and knowledge strictly related to a single area, generating positive spillovers not only for producers, but also for civil society (Figueiredo and Franco, 2018).

Although cooperatives are significant in the wine sector, few studies have specifically evaluated whether being a wine cooperative generates economic benefits compared to non-cooperative firms (RQ1).

2.2. Cooperating territories

In addition to management choices and governance structures developed inside firms, several external territorial features can influence firm-level economic performance (Gartzou-Katsouyanni, 2024; Pike et al., 2017). Of these, intangible assets and informal networks are assumed to be crucial in supporting economic development (Boschma et al., 2017).

In the wine industry, intangible assets such as knowledge and trust, together with interactions with local actors, have been recognised as relevant in affecting the quality of wines (Andini and Andini, 2019). Small and medium firms can benefit from this compound localization characterized by a peculiar combination of competition and cooperation among geographically close firms that dates back to Marshall's industrial districts (Belussi and Caldari, 2008). Drawing on these arguments, wine growers and makers organised in cooperatives may benefit from cooperating in the territory in which they operate. In this sense, GI regions are a real example of areas where sectoral and territorial relationships create intangible added value for the entire economic system (Crescenzi et al., 2022, 2023; De Simone et al., 2024).

Established in the early 60 s in Italy, adopted at the EU level in 1992 and recently reformed in 2024, the GI system sought to preserve, high-quality local production, its reputation and economic performance, while supporting small farmer incomes and bolstering international competitiveness. In the case of wine, GIs emphasize the quality value of grapes, the traditions of historical communities and the peculiarities of the environmental characteristics of the region of origin. According to Dei Ottanti (2018), these strong community bonds contribute to a business environment with higher levels of social interactions. The connections and interactions between actors in the supply chain are the basis of the GI scheme. The presence of a GI captures a community-specific set of intangible production assets making territories informal institutional frameworks where region-specific intangible assets induce cooperative behaviour, enhancing the local reputation and economic competitiveness (Resce and Vaquero-Piñeiro, 2022). In GI territories, formalized inter-organizational relationships between actors coexist with informal territorial networks based on cultural habits, historical tradition and trust, characteristics of the Marshall industrial district (Belussi and Caldari, 2008).

Studies of the effects of GIs indicate their positive economic impact, especially in terms of premium pricing (Antonioli et al., 2023), production-added value (Cei et al., 2018), exports (Giua et al., 2024; De Filippis et al., 2022, for a more detailed review) and the adoption of innovation (Vaquero-Piñeiro and Pierucci, 2025; Stranieri et al., 2017). Conversely, there are no studies that investigated whether being a wine cooperative localised in a cooperating territory may enhance the economic benefits compared to cooperative operating in different territorial contexts (RQ2).

3. Empirical setting: Data and sample, performance measures and identification strategy

This paper uses a firm-level panel dataset from 2012 to 2022 and a pooled *one-to-one* nearest neighbour Propensity Score Matching approach (PSM) with replacement and logit form.[11]The nearest-neighbour PSM is a popular procedure for estimating the *unobservable potential outcomes of one treated unit using the observable outcome of the closest untreated similar units* (Rosenbaum and Rubin, 1983). Units are matched based on the propensity score, which is the probability of being

[7] In supply chains with vertical integration, a single entity oversees every stage of production, including grape-growing, winemaking, and bottling/packaging. Conversely, de-integrated supply chains feature distinct companies specializing in various segments. In this case, the industrial wineries primarily guide the industrial chain, while pure bottlers lead the bottler chain. In Italy, most cooperatives bottle a small portion of their production and sell the rest of the bulk wine to industrial wineries, bottlers, or wholesaler exporters (Pomarici et al., 2021). Even with the decrease in volumes over the past decades, the intermediate market of bulk wine is still significant in Italy with several industrial wineries that buy bulk wine on the intermediate market, bottling it together with the wine they produce directly.

[8] The data was last checked on March 2024. Data are constantly updated from ISMEA (https://www.ismeamercati.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/4051).

[9] Cooperatives are important in several sectors: Kalaitzis (2015), for instance, reports that the market share of agricultural cooperatives is around 55% in dairy, 42% in wine and fruit & vegetables, 38% in olives, 34% in cereals, 27–28% in sugar and pork. Table 1 in Melia-Marti et al. (2024) illustrates the most recent applications of the comparative performance of cooperative and non-cooperative firms in different agricultural sectors.

[10] Our calculation based on Mediobanca (2022) data for firms with turnover of at least 50 million euros.

[11] Starting from the panel dataset, we collapsed data at the firm level to obtain the average effect over the period. From various matching algorithms suggested in the literature (Caliendo, 2008), we opted for one-to-one nearest neighbour matching with replacement. This choice is motivated by its ability to reduce bias when compared to radius and kernel matching. Moreover, we used the logit specification because it is the appropriate model for binary treatments, effectively capturing the relationship between covariates and treatment assignment.

Table 1
Summary of treatment definitions.

	RQ1	RQ2	
	Wine firms (1)	Wine firms in municipalities not involved in a GI scheme or only in one of the GI schemes (PDO or PGI) (2)	Wine firms in municipalities involved in both GI schemes (PDO and PGI) (3)
Cooperatives	Treated	Untreated	Treated
Non-cooperatives	Untreated	Untreated	Untreated

Source: processing by the authors.

treated conditional on a set of observable covariates. With the PSM, therefore, we estimate the overall treatment effect on observations receiving treatment to answer the question: among firms, how much did treatment change their outcomes (on average)?

To investigate the effect of cooperative ownership on economic performance (RQ1), we identify the treatment as "*being a cooperative*" (yes/no), and to estimate the joint effect of cooperative ownership and territorial cooperation (RQ2), we consider firms located in wine GI areas (yes/no) as treated cooperatives. Table 1 summarises the treatment definitions.

Moreover, when moving to disentangle the potential magnitude effects of location in an area with several GIs, we adopt a Generalised Propensity Score approach and consider the number of GIs as the treatment (Section 4).

We then estimate the effect of the treatment on a set of economic outcomes and extended profitability ratios fitting the dual nature of cooperatives.

3.1. Data and sample

The economic data for firms are from the Orbis database (last access: July 21, 2023), while data on GIs have been directly collected from Product Specifications (source: eAmbrosia, EC) and organized in a machine-readable format (Crescenzi et al., 2023). Lastly, the dataset was augmented with contextual characteristics obtained from ISTAT and Eurostat databases.

The initial sample comprises a panel of 3,472 registered commercial winemakers in the Italian wine industry.[12] Most are in the south of Italy (30 percent), followed by the north-east (25 percent) and north-west (17 percent). In terms of form of incorporation, the majority are Limited Liability Companies (LLC), accounting for 53 percent of observations. Cooperatives, defined as Limited Liability Cooperative Companies (LLCC), Limited Liability Cooperative Companies with Shares (LLCCS) or Consortium Cooperative Companies, total 354 and are mainly located in the Southern regions (29 percent). Over the eleven years under analysis (2012–2022), the private firm with the largest increase in total asset value was *Marchesi Antinori- Cantina Santa Cristina* (registered office in Tuscany, with vineyards in Tuscany and Umbria), while the cooperative with the largest increase was *Cantine Riunite & Civ* (registered in Emilia Romagna). They are also the firms with the highest absolute values. Regarding the turnover (million euros), the largest three cooperatives economically are *Cantine Riunite & Civ (Emilia Romagna), Terre Cevico (Latium) and Cantine Viticoltori Veneto Orientale (Veneto)*.

With the information on firm addresses (available in Orbis), we were able to locate each firm, i.e., in which municipality, and consequently whether it is in a wine GI area or not. This drops some observations for municipalities merged or split into two during the period under analysis. The final sample includes 3,156 firms in the wine sector, including 353 cooperatives.

Regarding GI territories, a municipality can be listed in the region of origin of more than one GI and wineries can produce more than a single GI label. Over the years, Italy has followed a quality-driven approach valorising local specificities, grape heterogeneity, and historical vineyards, making it today the EU country with the highest number of GI wines certified. In our sample, 159 municipalities have only 1 GI. The highest number of GIs is 13, in 3 municipalities. The dimension of GI territories can vary greatly, from a few municipalities, such as for Montefalco Sagrantino PDO, to an entire Province or Region, as for Prosecco PDO.[13]

At the same time, numerous actors can be involved in GI production, such as wineries, cellars, or vine growers. In such a heterogeneous context, it is difficult to provide an absolute statement about the role of cooperatives, which is itself varied.

However, the role of GI for cooperatives is evident from the Italian context. Cooperatives located in GI areas have increased their vertical integration by bottling wine directly in-house, partially reducing their supply of bulk wine to the intermediate market. To be located within a region of origin seems, in fact, to induce cooperatives to manage the entire production process (vertical chain) rather than selling bulk wine to bottlers. This trend is particularly significant for the economic performance of cooperatives since it leads cooperatives to extend their participation in supply-chain stages characterised by higher added value, rather than limit their activities at the farming sector, usually with low added value.

At the same time, GI labels improve reputation by operating as a sort of collective brand and llective quality signal. Collective schemes and individual brands can be used simultaneously, i.e., in 'nested names' (see, e.g., Yu et al., 2018). Menapace and Moschini (2012) recognised that GIs reduce the costs of establishing a reputation compared to a situation where only private brands exist. In addition, in the case of GIs, several promotional activities, such as marketing strategies, are managed collectively by management bodies, i.e., the Consortia and producers' groups (Gori and Sottini, 2014). All these elements may enhance the competitiveness of cooperatives and revenue distribution among members and, consequently, their role in economic development.

In our sample of 353 wine cooperatives. 87.8 percent are located within a municipality with at least one wine GI in 2022, while 11.6 percent are in a municipality with both PDO and PGI schemes (Fig. 1 and Table 2). On the map, the light blue areas are municipalities without cooperatives, red areas municipalities with cooperatives but without GI schemes, and purple areas municipalities with cooperatives and only one GI scheme. In contrast, the green areas represent municipalities with cooperatives and both GI schemes (PDO and PGI). Cooperatives are

[12] The Orbis database provides the address of firms, from which we allocate firms to municipalities. However, the address is given for the head office, with no information on multi-plant firms. Using the head office could induce bias in our estimations, but this is the most detailed and precise data available. Despite the balances sample, some data are not provided for every year, hence the number of observations for the estimation is lower than the the number of firms multiplied by the years under analysis.

[13] Montefalco Sagrantino PDO: municipalities of Bevagna, Gualdo Cattaneo, Castel Ritaldi and Giano dell'Umbria located in the province of Perugia. Prosecco DOC: provinces of Belluno, Gorizia, Padua, Pordenone, Treviso, Trieste, Udine, Venice and Vicenza.

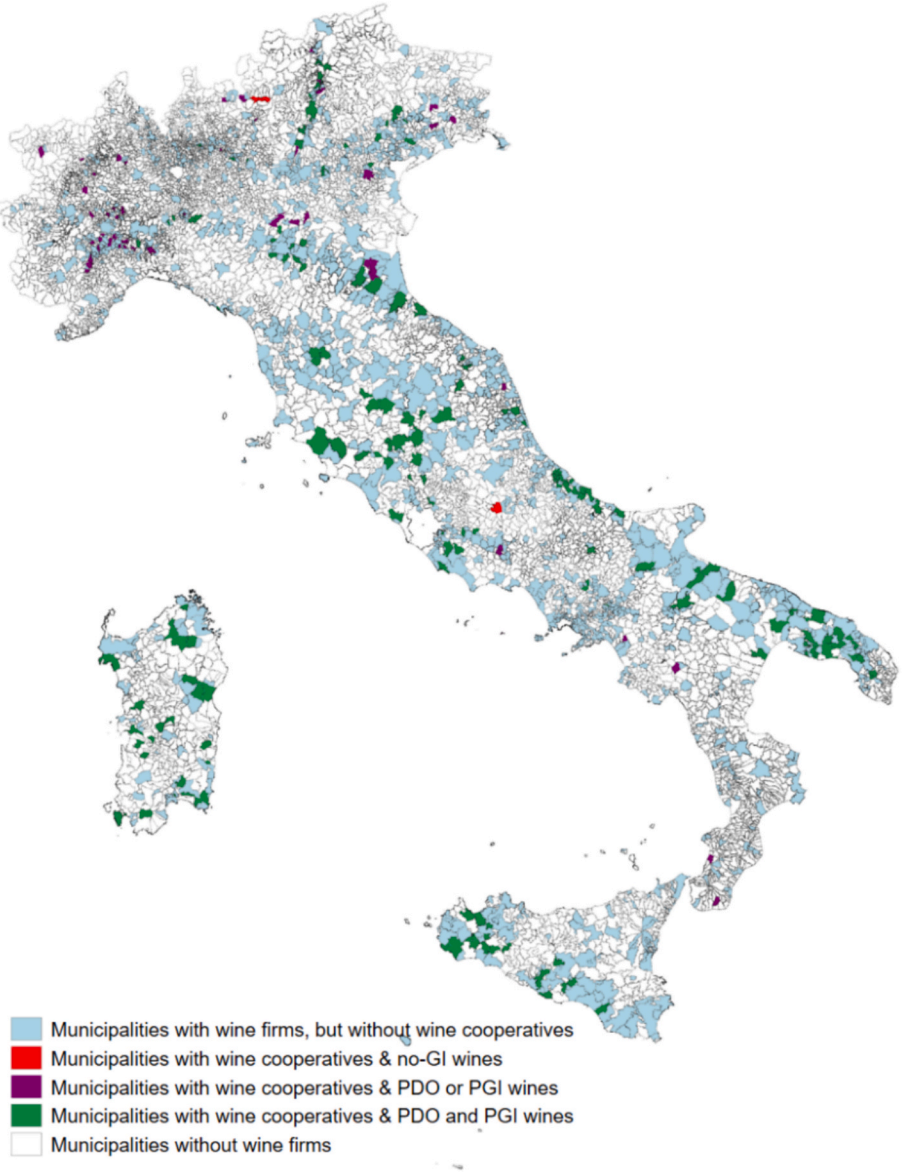

Fig. 1. Map of wine cooperatives and wine GI municipalities in Italy, 2022. . (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)
Source: Authors' processing of data collected from Orbis and Geographical Indication codes of practice (source*: eAmbrosia*). N.B.: Light blue: municipalities without cooperatives; red: municipalities with cooperatives but without GI schemes; purple: municipalities with cooperatives and only one GI scheme; green: municipalities with cooperatives and both GI schemes (PDO and PGI)

mainly located in the south (101), followed by islands (Sicily and Sardinia, 73) and north-east (72) Italy, and usually have a larger average number of employees (21 *vs* 11 of non-cooperatives).

3.2. The measures of performance

Given the multi-purpose nature of cooperatives (Martinez et al., 2024), we estimate the effect by focusing on a group of outcomes, including extended profitability ratios specific to cooperatives (Table A3 and Table A4 in the Appendix). Considering only standard profitability ratios, such as Earnings before Interest, Taxes, Depreciation, and Amortization (EBIDTA), Returns on Sales (ROS), return on investment (ROI), etc., would answer the wrong question and give an incomplete, if not biased, measure of performance for cooperatives (see, e.g., Soboh et al., 2009 and Martinez et al., 2024). Since cooperatives are user-owned and controlled, their members are both the owners and the major contributors to the firm, hence its dual purpose (Soboh et al., 2009). As noted in the introduction, therefore, the main economic aim of cooperatives is not to maximise profits *per se*, but to seek fair remuneration for members' provision of raw materials.

To consider this aspect, we build on existing literature (Borzaga and Fontanari, 2014; D'Amato et al., 2022) and calculate an extended measure of profitability gross of the cost of raw materials, i.e., the grapes acquired to make wine. In effect, as also explained in Melia-Marti et al. (2024), this enables the dual nature of cooperatives to be taken into account when using financial data, i.e., it is relatively easy to find and

Table 2
Municipalities featuring cooperatives and/or GIs, 2022.

	Municipalities not involved in a GI scheme	Municipalities involved in at least one of the GI schemes (PDO or PGI)	Municipalities involved in both GI schemes (PDO and PGI)
Number of cooperatives	2	310	41
Number of non-cooperatives	116	2215	472

N.B.: Authors' processing of data collected from Orbis.

use data at the firm level.[14] In this way, we take into account the fact that cooperatives may not maximise profits per se but rather, together with this aim, they try to provide fair remuneration for their members' grape supplies. Moreover, the sum of the profit created at the downstream level (either cooperative or IOF firms) plus the prices paid to grapes upstream is a proxy of the overall value created in the value chain. After all, no matter the form of ownership, an economically sustainable organisation seeks to efficiently process grapes into wine and market the wine in the best conditions to maximise the overall value in the chain. The difference in objective functions may lead to a different distribution of value between upstream and downstream actors. However, looking at the overall value created in the chain gives a common metric to measure the performance of both cooperatives and private firms, i.e., they become comparable.

We therefore use the following measures of profitability. First, we define an extended version of "profit", i.e., EBITDA,[15] as follows:

$$\text{M\_EBIDTA} = \text{EBIDTA} + \text{Cost of Raw Materials} \quad (1)$$

where EBIDTA +Cost of Raw Materials is gross of the cost of raw materials, such as grapes. Then and consistently, we define an extended version of its associated profitability ratio, that is, the Return On Sales (ROS), using the M_EBIDTA as follows:

$$\text{M\_ROS} = \text{M\_EBIDTA}/\text{Sales}. \quad (2)$$

In addition to investigating M_EBIDTA (its growth rate) and M_ROS, we evaluate other more standard performance indicators, such as the growth rate in sales, in fixed assets, EBITDA and ROS as well as the average wage and added value per employee over the period 2012–2022.

In our sample, from the descriptive statistics, the growth in the average value of revenues and fixed assets is higher for non-cooperatives. However, while ROS and EBITDA growth rates are lower for cooperatives, the extended versions are higher, in line with the expectations.

3.3. Methodology

To match control and treated units, we use three groups of variables, which can potentially affect the relationship between the outcomes and treatments (Rosenbaum and Rubin, 1983). The first accounts for internal business factors at the firm level, the second includes variables related to socio-economic territorial characteristics, and the third refers to the GI phenomenon and other products certified in the same area (see Table A1 in the Appendix for definitions and sources, and Table A2 for descriptive statistics). To have a robust sample mean, otherwise sensitive to extreme values, we winsorised the data at 5 %, a standard procedure in the literature.[16]

As stated above, for the first research question, the treatment is the condition of being a wine cooperative during the period under analysis (binary variable). The treated units are cooperative firms, and controls are all the other firms. When we look at the joint effect, the treatment is the interaction between the cooperative status and location within a municipality with the co-presence of PDO and PGI wines (binary variable).[17] In the latter case, cooperatives in a municipality with PDO and PGI wines are treated, and all the other firms are in the control group.

The decision to consider the presence of both GI schemes as treatment is for the following reasons. First, looking only at PDOs would have allowed us to capture the historical value of GIs, given that before becoming a PDO, wines must have been PGI for around ten years, in addition to the fact that this territory is populated by actors who believe in the value of the wine. Becoming a PDO is not automatic; actors must carry out the same application procedure required initially to certify a common wine as a PGI. However, if we had looked only at PDOs, we would not have accounted for the current importance of the scheme in that area. In other words, a territory included only in a PDO means it has not recently requested any other certifications, a rather unusual phenomenon given the increasing trend of products certified. Therefore, if a territory is not interested in certifying new wines, it may mean that either the area is not populated by actors with a strong sense of cooperation or the area has obtained no benefits from the scheme and is not interested in obtaining new certifications.

Second, if we had considered only PGIs, we would have lost the historical value of the scheme and the exclusive linkage between wine and territories. In the case of PGIs, part of the production can be carried out outside the region of origin, and around 20 % of grapes can come from a different area. This is not allowed in PDOs whose vineyards must be located within the area and the entire production process carried out in that area.

Lastly, if we had only one GI scheme, regardless of which, we would model something like a baseline condition since, in Italy, there is a widespread distribution of GIs across all regions and municipalities. This condition does not allow us to present GIs as a case of local territorial cooperation. As a result, given that the GI scheme is considered here as a proxy of territorial cooperation and not a policy scheme per se, we decided to consider only those included in both PDO and PGI territories as GI territories. In our sample, 931 municipalities have this status.[18]

Along with standard PSM model assumptions, we assessed the quality and validity of the matching in terms of overlapping, balancing

[14] Melia-Marti et al. (2024) review different studies that compare cooperative and non-cooperative firms in the agricultural sector. As they report —- and use themselves in their analysis – other methodologies are available, in particular those based on frontier techniques, such as Data Envelopment Analysis and Stochastic Frontier Analysis. While very interesting, these methodologies are beyond the scope of the present paper and are left for future research.

[15] EBITDA is considered one of the indicators that best shows internal resource performance. Several papers adopt it to investigate the wine industry (see, e.g., Simon-Elorz et al., 2015 and Amadieu and Viviani, 2010) and other industries.

[16] 2.5% at the lower and 2.5% at the upper tail.

[17] Potential reverse causality arising from the non-random allocation of GIs (Resce and Vaquero-Piñeiro, 2024) potentially linked with the flourishing of local actors actively engaging in GI certification is ruled-out by the fact that this condition is the same for both cooperatives and non-cooperatives. We cannot attribute the formal recognition of GIs to the presence of cooperatives.

[18] Our sample includes 1,217 municipalities with PGIs, 1,097 municipalities with PDOs, 931 municipalities with both PDOs and PGIs and 452 municipalities with only one scheme (PDO or PGI).

and conditional mean independence (Cerulli, 2022).[19] For all the models, the sample balancing after PSM and the reduction bias confirm that no significant differences exist between treated and non-treated firms after matching.[20]

Despite its limitations, PSM is the only counterfactual approach suitable for this data setting. The advantage of PSM is to compare the economic dynamics of firms that are similar in terms of observable factors correlated with the treatment (Rosenbaum and Rubin, 1983). Indeed, PSM reduces possible sources of endogeneity and selection bias by matching treated and untreated units based on their propensity scores, which represent the likelihood of receiving the treatment (Cerulli, 2022; Crescenzi et al., 2022). On the other hand, PSM cannot fully control unobservable factors that influence both the treatment and firm performance.

A before-after would help us to control for time-invariant unobservable factors, but the data structure and the nature of the treatments, which do not change over time in the analysis period, make a time-varying setting unsuitable (e.g., both static and staggered, difference-in-differences, synthetic control or synthetic control difference-in-differences models). To address the issue of unobservables, we first included macro-regional area fixed effects to account for potential invariant unobserved confounders at the spatial level. Second, we performed the Rosenbaum sensitivity test, which evaluates whether the matching is robust to unobservable selection.

4. Results

Table 3 presents the results for the first research question, i.e., for the performance of cooperative *vs* non-cooperative ownership, by estimating the Average Treatment Effect on the Treated (ATT). Findings reveal that cooperative ownership positively affects the M_ROS, which is 0.16 percent higher (*Column 4*). From a methodological perspective, these results highlight the relevance of using economic indicators that account for the dual nature of cooperatives. By the standard ROS, cooperatives perform worse than other firms (*Column 3*), but significantly better according to the extended modified version (*Column 4*).

Examining dynamic outcomes, particularly growth rates, it appears however that cooperatives underperform compared to non-cooperative firms in terms of economic outcomes (*Columns 1, 5, and 6*) and investments (*Column 2*). The key reason for the disparity between average levels and average growth rates could be that cooperatives focus more on member welfare, such as ensuring fair remuneration, rather than prioritising profits (Soboh et al., 2009; Martinez et al., 2024). In this context, the negative differences in asset growth might be attributed to the lower tendency of cooperatives to make capital investments. In other words, compared to other types of firms, cooperatives may prefer to distribute value to members rather than to the cooperative itself. On a similar note, given that cooperatives may tend to serve their members, and to the extent that members may not grow in number or by cultivated acreage, cooperatives do not necessarily grow.

Opposed to this strategic (or distributional) reason, however, cooperatives may suffer from some structural limitations. In the literature some authors[21] argue that cooperatives have such limitations due to the inadequate incentive structure provided to members/owners, restricting investments. From our data we cannot ascertain whether the lower growth rates of cooperatives is a choice or limitation, but future research may address this question.[22]

To counter potential bias resulting from territorial heterogeneity, we move to the model accounting for firms within a cooperative territory (interaction treatment). Results are shown in Table 4. The effect of the cooperative form on performance (as measured by M_ROS) is now slightly higher when we estimate the impact of cooperative ownership in a cooperative territory. For example, being a cooperative within a well-established GI system (in areas with PDO and PGI wines) increased the extended return on sales to 0.20 percentage points (*vs* 0.16 percentage points for the simple cooperative treatment).

The positive impact of cooperative territories on cooperative firms seems to confirm the key role of social networks in enabling the pursuit of socio-economic aims beyond the strict profit maximisation of downstream firms (Capello, 2018; Dagnino, 2009). Overall, from a socio-economic development perspective, these findings support the relevance of cooperative ownership as a channel to enhance local development through a fairer remuneration of commodities and income redistribution among actors (Pomarici et al., 2021). The coexistence of formal certifications and informal linkages, here proxied by the GIs, creates a fertile socio-economic condition (Vaquero-Piñeiro et al., 2025; Crescenzi et al., 2022) that seems also to enhance the economic sustainability of cooperatives, and, with them, all the small and medium-sized firms involved. The positive collective reputation generates a competitive advantage because the territory of origin cannot be imitated by competitors, and promotion and transaction costs are lower (Moschini et al., 2008). As recently stated by Stranieri et al. (2023), in GIs territories, economic activities are based on coordinated forms of transactions, reducing uncertainties and strategic costs. As a result, their product reputation, economic value and the demand for them increase (Menapace et al., 2011). Moreover, from a sectorial perspective, through the specific product specifications, the GI converts established informal production routines and territorial gastronomy habits into a formal regulation for producers organised in *Consortia* and competing cooperatively.

To summarise, using the correct measure of cooperative economic performance, the findings show that (Fig. 2): (i) cooperatives perform better than other types of firms (RQ1); (ii) the effects do not depend on strong territorial cooperation (GI areas) but are enhanced by synergies. (RQ2).

4.1. Robustness check: The treatment level effect

The simultaneous recognition of more than one GI wine is common in Italy. However, the presence of a high number of GI labels is not a guarantee of better economic performance or of a higher level of territorial cooperation between actors. The increasing number of GI labels may be more the result of a marketing differentiation strategy or the effort of local politicians (Resce and Vaquero-Piñeiro, 2024). To support the claim that the positive effects driven by GI as we found (Table 3) capture territorial cooperation and not simply marketing strategies, we check to what extent the effects of GIs are related to the intensity of the treatment. In this case, the treatment is continuous, and what matters is the number of GI wines produced in the same area, rather than merely the presence of a GI and, therefore, we move to a Generalised Propensity Score setting (Tübbicke, 2020; Bia and Mattei, 2008; Hirano et al., 2004). The controls and the outcome variables are the same as used for the PSM analysis described above. However, among the outcomes

[19] The validity of the Conditional Mean Independence assumption was confirmed by the Rosenbaum sensitivity test performed based on the Wilcoxon sign rank test (DiPrete and Gangl, 2004), which evaluates whether the matching is robust to unobservable selection.

[20] Balancing graphs and tables for bias reduction after matching are available on request.

[21] For instance, as mentioned earlier, Cook (1995) illustrates different issues for agricultural cooperatives, Iliopoulos and Cook (2023) different organisational costs, and Frick and Fanasch (2018) provide a detailed discussion of issues specific to wine cooperatives.

[22] One way to distinguish between the alternative explanations could be to use data on cooperatives that are member-controlled *vs*. management-controlled (according to Hendrikse and Feng, 2013). In the latter there should less emphasis on distribution and more on investments to strengthen the cooperative.

Table 3
Estimated ATT for cooperative ownership.

	Cooperative ownership					
	(1)	(2)	(3)	(4)	(5)	(6)
	Revenues growth rate	Fixed assets growth rate	ROS	M_ROS	EBITDA growth rate	M_EBITDA growth rate
Cooperative	−0.49***	−1.28**	−0.018**	0.16***	−0.43**	−0.50***
	(0.17)	(0.55)	(0.01)	(0.01)	(0.20)	(0.15)
Constant	0.76***	1.95***	0.084***	0.64***	0.53***	0.71***
	(0.15)	(0.50)	(0.01)	(0.01)	(0.18)	(0.14)
No. Obs.	888	890	900	900	890	889
Treated firms	272	272	274	274	272	272
Untreated firms	616	618	626	626	618	617

Note: ***p < 0.01, **p < 0.05, *p < 0.1. Clustered standard errors at the firm level in parentheses. Growth rates, ROS, and M_ROS are expressed as percentage points. The added value per employee is expressed in thousands (EUR). The average wage per year per employee is expressed in thousands (EUR).

Table 4
Estimated ATT for cooperative ownership in cooperative territories.

	Cooperative ownership in cooperative territories					
	(1)	(2)	(3)	(4)	(5)	(6)
	Revenue growth rate	Fixed asses growth rate	ROS	M_ROS	EBITDA growth rate	M_EBITDA growth rate
Cooperative in GI municipalities	−0.95***	−1.99***	−0.01*	0.20***	−0.48*	−0.43***
	(0.24)	(0.65)	(0.01)	(0.02)	(0.26)	(0.14)
Constant	1.23***	2.66***	0.083***	0.65***	0.54**	0.64***
	(0.22)	(0.60)	(0.01)	(0.017)	(0.24)	(0.13)
No. Obs.	888	890	900	900	890	889
Treated firms	208	208	210	210	208	208
Untreated firms	680	682	690	690	682	681

Note: ***p < 0.01, **p < 0.05, *p < 0.1. Clustered standard errors at the firm level in parentheses. Growth rates, ROS, and M_ROS are expressed as percentage points. The added value per employee is expressed in thousands (euros). The average wage per year per employee is expressed in thousands (euros).

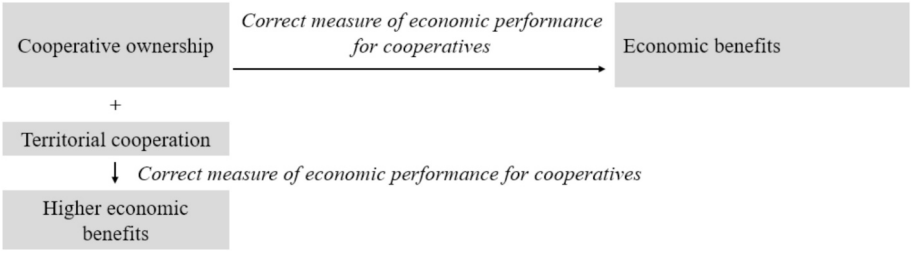

Fig. 2. Summary of the results. Source: Authors' processing of data.

considered, we report solely those relevant for cooperatives based on their economic aims, but which nonetheless can be compared with other firms, i.e., M_EBIDTA growth and M_ROS, together with average wages.[23]

Fig. 3 shows the changing causal effect of the treatment on co-operatives according to intensity, i.e., the number of GI wines. On the left, the dose–response function shows the relationship between treatment and outcome, and on the right, the treatment effect function shows how the outcome changes due to an increase equal to 1 in the treatment variable for different levels of treatment.

Specifically, we standardised the treatment distribution (GI wines) so that each interval on the horizontal axis corresponds to a discrete treatment increment. Standardisation was carried out by dividing each treatment level by the maximum treatment level within the distribution (13 GI wines). As a result, in the horizontal axes of Figs. 3, 1 unit of treatment corresponds to 1/13 (0.07), but for graphic purposes each interval of the horizontal axis corresponds to an increment of the treatment equal to 3.

Findings confirm our previous results and the enhancing effect of GIs on the economic performance of cooperatives. However, the dose–response functions indicate that economic outcomes remain mainly constant with a higher number of GI wines: more GI wines does not radically change the economic performance of cooperatives. The treatment effect function, showing the change in outcomes due to treatment increases, indicates a clear relationship, whose marginal effect is, however, overall, around 0, thus suggesting quite a small economic impact from the increased number of GIs. In addition, there is no clear optimal maximum level of the treatment.

4.2. Other robustness checks

We conduct some empirical extensions to test the robustness of our results. First, we replicate the analysis by conducting a sample split rather than by using the interaction term to account for the co-presence of cooperative ownership and cooperating territories. Table A5 in the Appendix confirms the main results shown in Table 3.

Second, we run a test to make sure that the results are not driven by the value and/or specific GI production but by the territory with a better social dimension. Although there is a high number of GI wines in Italy,

[23] Results for the other outcomes are available on request.

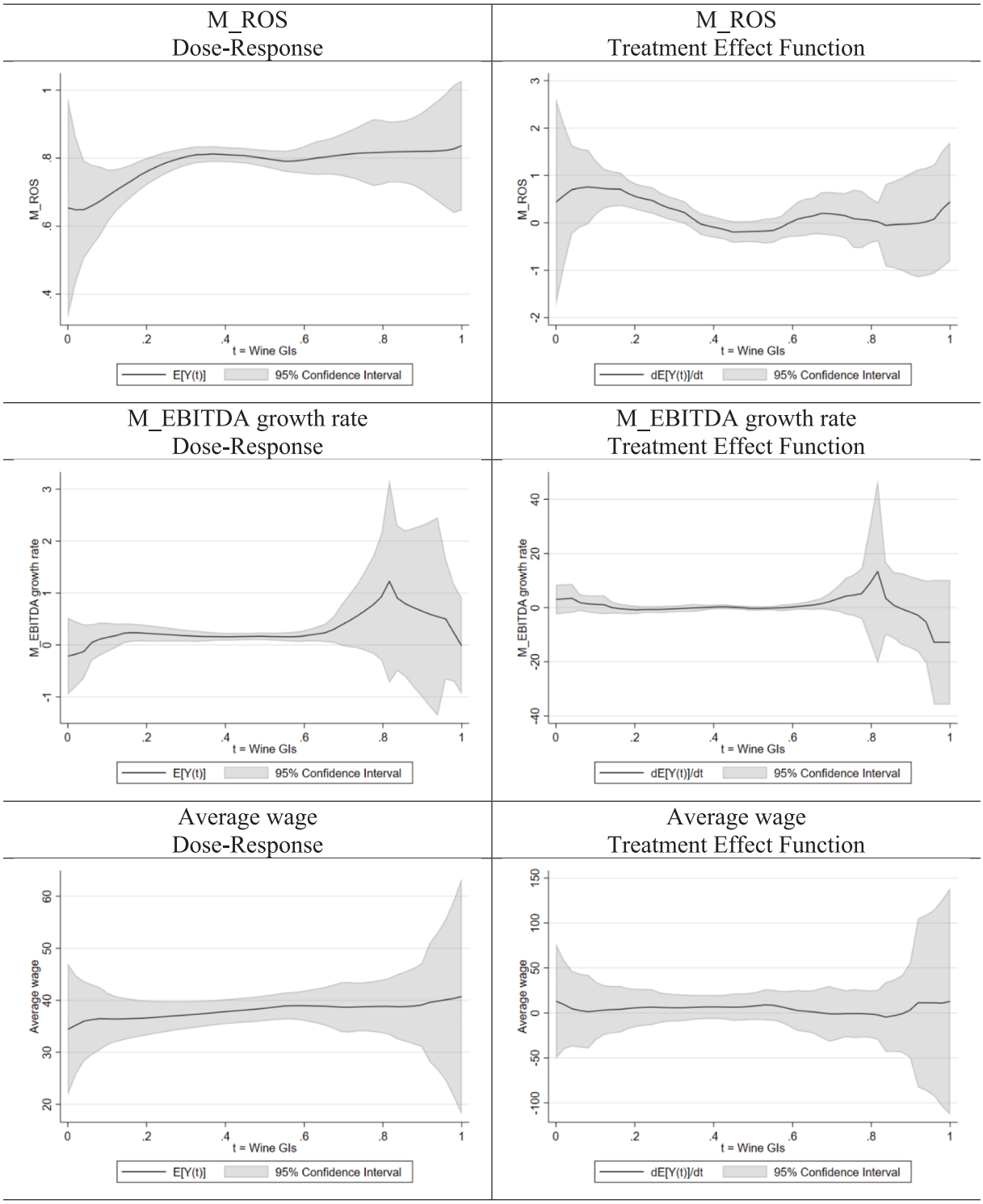

Fig. 3. The impact of Geographical Indication endowment on cooperatives. N.B.: The left-side panel of the figures shows the dose–response function, providing graphic representations of the relationship between the number of GIs and economic outcomes; the right-side panel displays the treatment effect function, that is, the first derivative of the respective dose–response function. The GPS approach uses entropy balancing for continuous treatments to estimate the dose–response function and the treatment effect function. The middle line refers to the function, while the top and bottom lines represent 95% confidence intervals. The model has been estimated with 50 bootstraps.(We have also replicated the analysis with boot-reps equal to 100 with results that are coherent. However, in choosing the number of boot-reps, we followed Bia and Mattei (2008) and show the results with boot-reps equal to 50. The results for 100 boot-reps are available on request.) The treatment has been standardised by dividing each treatment level by the maximum treatment level within the distribution (13). A unit of treatment therefore corresponds to 1/13 (0.07). In the graph each interval of the horizontal axis corresponds to an increase in the treatment of 3 (0.2).

not all have the same significance in terms of volume and value. Obtaining formal recognition as a GI per se does not catalyse economic benefits and fertile socio-economic networks. In Italy, for example, of all the 527 GI wines (409 PDO and 118 PGI), only three have a production of over 1,000 thousand hl, and only eight have a production value above 100 million euros (ISMEA, 2023).[24] Hence, we investigate the effects of being a cooperative in a municipality included within the region of origin recognised as one of the most performative GIs in Italy. To do this, we rely on ISMEA data and replicate the analysis to capture the difference in ownership form in these areas.[25] Table A6 shows the results, more or less in line those set out in Table 3, with no differences in the sign and significance of the effects of being a cooperative. In particular, the positive impact on M_ROS is confirmed for both, suggesting that what matters is the location in a GI area rather than the value and volume of the GIs in that area.

Third, shifting the focus to the institutional dimension of GIs, we test the validity of our analysis by adding the Institutional Quality Index (IQI) estimated by Nifo and Vecchione (2014) to our set of PSM observables.[26] This index allows us to control for the quality of formal institutions, which may affect socio-economic outcomes (Rodríguez-Pose, 2020), and isolate the effect of cooperative networks and informal cooperation among local actors, here shown as the significance of the GI treatment (Table 2). Even after controlling for the quality of formal institutions, the territorial effect on cooperative ownership is confirmed as positive in terms of average wage and M_ROS (see Table A7 in the Appendix). We also tested our results considering the MAQI Index recently published by Cerqua et al. (2024), a composite index designed to measure the quality of administrations at the municipality level in Italy. Again, results remain consistent, showing that cooperative territories have an effect beyond and distinct from the positive effect of local institutions.[27]

Lastly, we re-estimate the models by eliminating data for 2012, the year characterised by the highest number of missing data. The findings align with the results obtained for the whole period sample.

5. Policy implications

We find that with appropriate performance measures cooperatives seem to outperform non-cooperative firms in terms of profitability, even though they have a lower assets growth rate. The positive performances are reinforced in places where GIs are functioning. This evidence can have implications for policymakers in multiple areas, including cooperative governance, GI certification policies, and local economic development strategies.

First, our study suggests that, to strengthen the resilience of the sector, policies should aim to "*increase the attractiveness of Producer Organisations (POs) and cooperative models by treating cooperatives and POs in the wine sector as SMEs*" (p.5), in line with the 2024 Policy Recommendation for the Future of the EU wine sector and the CAP objectives (Strategic Objectives No. 3).[28]

The wine cooperatives investigated have greater profitability and probably contribute to a distribution of the value created in the wine value chain more in favour of the upstream agricultural sector, i.e., their members (grape growers).

The findings that cooperative firms have a lower growth rate can be seen at least from two possible points of view. They could grow less because more of the value created is distributed to members, a strategic choice, but it could also be related to the intrinsic limitations discussed in the literature, i.e., structural limitations. However, cooperatives also tend to have a higher turnover-to-fixed-assets ratio and a lower turnover-to-inventory ratio. These results led Soboh et al. (2012) to suggest that "*cooperatives demonstrate better operational efficiency compared with IOFs*" (Melia-Marti, 2024: p. 4). If cooperatives are indeed more efficient in using their resources, one could then suppose that they need to grow and invest less compared to less efficient firms. Understanding the reasons for their lower growth is beyond the scope of the present study, but it deserves further investigation.

Our analysis can also help to understand which production models may be most suitable to strengthen the position of the Italian wine supply (Di Ciolla et al., 2021). Although we do not have data on the type of wines produced by the cooperatives under analysis, their location in GI areas makes it reasonable to assume the production of at least one GI label. From the formal perspective, this quality upgrading and its certification by official schemes seem to increase the economic performance of cooperatives, suggesting it is a good strategy to support their resilience in the medium and long term. In 2024, in fact, in Italy there was more balance between cooperatives (three, with one at the top of the ranking) and private companies (five) with turnovers above 200 million euros, prompting thoughts about the future of cooperatives (Pomarici & Sarnari, 2024). Differentiation based on quality may, therefore, be considered a strategic approach to support the competitiveness of cooperatives and to enhance the reputation of this type of business rather than relying on quantity as in the past. Stringent regulation, especially for PDOs, not only tend to guarantee higher stability in terms of prices and production (Pomarici & Sarnari, 2024) but also lead cooperatives to integrate the production process into more added value economic activities. This improves their position in the wine value chain, especially for farmers, in line with Strategic Objective 3 in the 2023–2027 CAP (Di Ciolla et al., 2021).

Looking at the informal nature of GI, and its role as a proxy of territorial cooperation, the results provide evidence of the benefits generated by this context and the networks of actors at the local level. This is the basis for optimism regarding territorial cooperation complementing the the type of ownership under analysis and suggests the importance of localised cooperative business forms in areas characterised by fertile cooperatives. It suggests that policymakers should still promote the spread of GI certification in areas as yet with none, while supporting existing GIs, including the less well-known. Such policies would enhance the economic performance of vine growers and wine makers, and, consequently, the socio-economic development of territories. This is particularly relevant in terms of policy projections given that the majority of GIs are in rural areas whose economic renaissance is an EU policy objective. In terms of concrete actions, the simplified registration processes introduced by the new GI law (Reg. (EU) 1143/2024) may also strengthen cooperative performance. Equally, the new role of producers

[24] The GIs accounting for the highest quantity of production are Prosecco PDO (4.844 k hl), Delle Venezie PDO (1.722 thousand hl), and Puglia PGI (1.460 thousand hl). The GIs accounting for the highest value of bulk wine is Prosecco PDO (1.145 million euros), Conegliano Valdobbiadene Prosecco PDO (239 million euros), Delle Venezie PDO (188 million euros), Asti PDO (133 million euros), Amarone della Valpolicella PDO (130 million euros) Valpolicella Ripasso PDO (114 million euros), Chianti PDO (102 million euros).

[25] To split the sample, we used the quantile distribution of the average of quantity and economic value of bulk wine at the farm gate over the 2017–2020 period. The analysis has been conducted considering the firms belonging to the highest quantile.

[26] The IQI is a multi-dimensional index based on five indicators with equal weighting: regulatory quality, government effectiveness, rule of law, corruption, voice and accountability. The index is available only at the NUTS3 level; hence we used the quantile distribution to split the sample.

[27] Although the municipality disaggregation corresponds with the level of our other territorial controls, the MAQI Index imposes a sample reduction, given that some municipalities are excluded from the Index due to lack of data.

[28] High-Level Group on Wine Policy, *Policy Recommendations for the Future of the EU Wine Sector,* December 2024. Consolidated text: Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products and repealing Council Regulations (EEC) No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007.

in the scheme as regulators of each GI may encourage the active involvement of cooperatives in GI governance, improving coordination and market positioning and reinforcing the economic benefits of territorial cooperation. The new role of producers established by the recent GI law is in line with EU efforts in favour of the Producer Organisations (Reg. (EU) No. 1308/2013; Zappalaglio, 2023).

The positive link between territorial cooperation and cooperative performance suggests that policymakers should promote cooperative-led rural development programmes that strengthen local supply chains and ensure more resilient local economies. This requires fostering cluster-based development strategies where small and medium-sized firms collaborate in specific regions (EC, 2025).[29] As declared in the EU Strategic dialogue, "*development paths […] can be organized in a cooperative manner. Policies should facilitate and encourage institutionalized regional and local cooperation between communities, agri-food stakeholders including agri-cooperatives* […] (EC, 2024: p 35).

The policy intervention areas and lines of intervention suggested by the paper are summarised in the following Table 5.

Another important lesson to be learnt from this analysis is that a sole strategy is likely to be insufficient; different strategies may be optimal, and they may differ according to firm and territorial characteristics. Policymakers should tailor policy interventions to local and firm-specific characteristics recognizing that one-size-fits-all sectorial strategies may not be appropriate.

Greater precision in diagnosing the obstacles to individual and territorial cooperation might lead to the adoption of more efficient policies (Gartzou-Katsouyanni, 2024).

To ensure that policies are effective and respond to the real needs of the territory, policymakers should target:

- the collection of accurate and up-to-date data not only on nationwide, but also on regional and sub-regional specificities
- the use of the correct policy indicators and economic variables to capture firm performance in different economic and social realities (i.e., extended indicators for cooperatives).

6. Conclusions

The literature finds positive effects of cooperation among local actors as a potential vehicle for economic development, both at the firm and territorial level (see, e.g., Belso-Martinez et al., 2024). Our paper provides evidence in support of this hypothesis, showing that for impactful economic outcomes one should consider not only the form of ownership but territorial cooperation as well.

Although the wine sector is one of a kind in terms of the role of cooperatives, some takeaways on the role of cooperatives could be extended to other agri-food sectors. The sources of uncertainty for the wine sector (e.g., consumption patterns, climate change) are, in fact, the same as for other products (e.g., olive oil, fruit) and require a new culture of cooperation, at both individual and territorial level (EC, 2024), as suggested by the Strategic Dialogue, and more recently as worded in the 2025 Vision, "*farmers' position in the value chain must be strengthened by encouraging them to join cooperatives and/or associations to reduce costs, increase efficiency and improve prices for the market*" (EC, 2025: p. 7).[30]

Moreover, through "*the lens of the firms*" (Ganau and Rodríguez-Pose, 2023, p.530), this paper contributes to confirming the relevance of preserving territorial cooperation for economic development, as highlighted in the existing literature (see, among others, Cutrini, 2023; Charron et al., 2014), providing evidence on how cooperating networks transform local peculiarities into economic prosperity.

However, our results raise some questions regarding the future of cooperatives. While they seem to achieve good performances, they suffer from a relatively lower growth rate than other firms, leaving one wondering whether this is the flipside of their better performance, i.e. of higher operational efficiency, or whether their relative importance in the economy is doomed to decrease in the future. Unfortunately, the sample under analysis is not representative of the entire wine sector due to data construction and collection, and caution is needed before extending our results. Therefore, this is a question left for future endeavour, together with extending and investigating the linkages explored in this study to other sectors and European countries.

Table 5
Summary of policy implications.

Policy intervention areas	Lines of intervention
Cooperative governance	Increase the attractiveness of the cooperative model
	Support cooperatives as vehicles for fairer value redistribution along the wine value chain
GI certification policies	Reinforce existing GIs, even the less well-known, and expand GI certifications, especially in under-recognised areas
	Encourage the active participation of cooperatives in GI governance
Local economic development	Consider territorial cooperation, e.g., GI networks, as a tool for enhancing cooperative success and to stimulate rural economic development
	Support cooperative-led local development programmes and cluster-based strategies
	Encourage institutionalised local cooperation between communities, cooperatives, and agri-food stakeholders

CRediT authorship contribution statement

Cristina Vaquero-Piñeiro: Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Luca Salvatici:** Writing – review & editing, Supervision. **Angelo Zago:** Writing – review & editing, Supervision, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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[29] Draghi's report on *The Future of European Competitiveness:* https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en.

[30] The replicability of our study for other agri-food sectors depends heavily on data availability. We will investigate the feasibility of similar studies for other sectors at a later date.

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Appendix

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Table A1
Explanatory Variables for Propensity Score Matching.

Variable	Definition	Source
Number of employees	Number of workers employed in firms	Orbis
Average wage	Total value of labour costs/Number of employees	Our calculation based on Orbis data
Added value per employee	Total value added / Number of employees	Our calculation based on Orbis data
Agricultural land diffusion	Utilized Agricultural Area/Municipality area	National Agricultural Census, ISTAT
Small farms	Share of farms with UAA between 1–10 ha	Authors' processing of data from the National Agricultural Census, ISTAT
Big farms	Share of farms with UAA more than 100 ha	Authors' processing of data from the National Agricultural Census, ISTAT
Winegrowing specialisation	The ratio between winegrowing farms and the total number of farms	Authors' processing of data from National Agricultural Census, ISTAT
Population density	Number of residents per km2	National Census, ISTAT
Employment rate	The ratio of employed resident population to total resident population aged 15 and over	National Census, ISTAT
Agricultural employment rate	Share of the economically active population working in agriculture, forestry and fishing sectors	National Census, ISTAT
Elderly population	Share of over 75 residential population	National Census, ISTAT
Tertiary education	The percentage ration between the residents of 25–64 years with a high school diploma or university degree and the resident population of 25–64 years	National Census, ISTAT
Remoteness	Distance from the major city of the region (meters)	Authors' processing of data – Geographical Information System
Altitude	Categorical variable classifying municipalities according to altitude – 5 levels	National Census, ISTAT
Rurality	Dummy = 1 for rural municipalities	National Census, ISTAT
GI food	Dummy = 1 for municipalities with food GIs	Authors' processing of product specification data
GI seniority	Number of years from the establishment of GI Consortium	Authors' processing of MASAF data
Regional macro area	Categorical variable classifying municipalities according to five macro geographical areas: Northeast, Northwest, Centre, South and Islands	National Census, ISTAT

Table A2
Explanatory Variables for Propensity Score Matching – Descriptive Statistics.

Variable	Mean	Sd	Min	Max
Number of employees	17.18	38.28	1	832
Average wage	36.82	22.59	0.11	772.38
Added value per employee	81.51	104.42	−1797.73	2683.02
Agricultural land diffusion	47.73	24.20	0	192.86
Small farms	461.10	679.67	0	5318
Big farms	29.65	54.46	0	329
Winegrowing specialisation	0.21	0.24	0	0.97
Population density	557.61	927.59	6.6	11088.6
Employment rate	44.61	7.75	24.2	69.3
Agricultural employment rate	9.47	8.70	0.5	68
Elderly population	10.83	2.95	3	34
Tertiary education	161.47	59.11	45	445.4
Remoteness	86168.87	56318.43	0	334647.3
Altitude				
Level 1	0.98	0.29	0	1
Level 2	0.01	0.10	0	1
Level 3	0.35	0.47	0	1
Level 4	0.18	0.38	0	1
Level 5	0.35	0.47	0	1
Rurality				
Non-rural areas	0.19	0.39	0	1
Rural areas	0.80	0.39	0	1
GI food				
Municipalities without food GIs	0.002	0.48	0	1
Municipalities with food GIs	0.99	0.48	0	1

(continued on next page)

Table A2 (*continued*)

Variable	Mean	Sd	Min	Max
GI seniority	29.31	14.95	1	49
Regional macro area				
Northeast	0.24	0.42	0	1
Northwest	0.16	0.36	0	1
Centre	0.15	0.35	0	1
South	0.31	0.46	0	1
Islands	0.14	0.35	0	1

Table A3
Outcome variables.

Variable	Definition	Source
Revenues growth rate	Growth rate over the period of the absolute value of firm revenues: (Revenues 2022 – Revenues 2012)/ Revenues 2012	Our calculation based on Orbis data
Fixed assets growth rate	Growth rate over the period of the absolute value of fixed assets: (Fixed assets 2022 – Fixed assets 2012)/ Fixed assets 2012	Our calculation based on Orbis data
ROS	Operating Profit/Revenues. The operating profit is defining as (EBIT − Earnings before interest and taxes)	Our calculation based on Orbis data
M_ROS	Operating Profit + Cost for row materials/RevenuesThe operating profit is defining as (EBIT − Earnings before interest and taxes)	Our calculation based on Orbis data
EBITDA growth rate	Growth rate over the period of the absolute value of firms' earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA): (EBITDA 2022 – EBITDA 2012)/ EBITDA 2012	Our calculation based on Orbis data
M_EBITDA growth rate	Growth rate over the period of the absolute value of firms' Earnings Before Interest, Taxes, Depreciation, and Amortization plus Cost for row materials (M_EBITDA): (M_EBITDA 2022 – M_EBITDA 2012)/ M_EBITDA 2012	Our calculation based on Orbis data

Table A4
Outcome variables – Descriptive Statistics.

Variable	Cooperatives				Non-cooperatives			
	Mean	Sd	Min	Max	Mean	Sd	Min	Max
Revenue growth rate	0.27	1.30	−0.61	15.35	1.27	3.27	−0.61	15.35
Fixed asset growth rate	0.55	3.21	−0.66	42.28	2.92	8.65	−0.66	42.28
ROS	0.07	0.06	−0.18	0.39	0.10	0.11	−0.18	0.39
M_ROS	0.80	0.17	0.20	1.25	0.70	0.21	0.20	1.24
EBITDA growth rate	0.09	1.83	−7.28	12.14	0.72	3.33	−7.29	12.15
M_EBITDA growth rate	0.20	0.84	−0.87	9.39	0.83	2.07	−0.87	9.39

Note: Descriptive statistics are calculated on the winsorised sample.

Table A5
Estimated ATT for cooperative ownership in cooperative territories – sample split.

	GI municipalities (Panel a)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Revenues growth rate	Fixed assets growth rate	ROS	M_ROS	EBITDA growth rate	M_EBITDA growth rate
Cooperative	−0.775***	−1.068	−0.00816	0.139***	−0.601*	−0.313***
	(0.236)	(15.12)	(0.00755)	(0.0191)	(0.330)	(0.118)
Constant	1.062***	16.10***	0.0771***	0.665***	0.665**	0.526***
	(0.220)	(5.409)	(0.00689)	(0.0166)	(0.316)	(0.104)
No. Obs.	685	687	694	694	687	686
Treated firms	477	479	210	484	479	478
Untreated firms	208	208	484	210	208	208
	Non-GI municipalities (Panel b)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Revenue growth rate	Fixed asset growth rate	ROS	M_ROS	EBITDA growth rate	M_EBITDA growth rate
Cooperative	−0.203	−12.31	−0.0229	0.142***	−0.187	−0.185
	(0.168)	(11.09)	(0.0190)	(0.0276)	(0.416)	(0.158)
Constant	0.412***	13.36	0.0825***	0.635***	0.361	0.382***
	(0.157)	(11.07)	(0.0178)	(0.0204)	(0.359)	(0.140)
No. Obs.	196	196	199	199	196	196
Treated firms	64	64	64	64	64	64
Untreated firms	132	132	135	135	132	132

Note: ***p < 0.01, **p < 0.05, *p < 0.1. Clustered standard errors at the firm level in parentheses. Growth rates, ROS, and M_ROS are expressed as percentage points. The added value per employee is expressed in thousands (euros). The average wage per year per employee is expressed in thousands (euros).

Table A6
Estimated ATT for cooperatives in high-production and high-value GI territories.

	High-production GI territories (Panel a)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Revenues growth rate	Fixed assets growth rate	ROS	M_ROS	EBITDA growth rate	M_EBITDA growth rate
Cooperative	−0.914***	−2.246***	−0.00757	0.177***	−0.345	−0.626***
	(0.259)	(0.768)	(0.00702)	(0.0151)	(0.266)	(0.160)
Constant	1.170***	2.960***	0.0739***	0.628***	0.449*	0.819***
	(0.249)	(0.733)	(0.00649)	(0.0126)	(0.251)	(0.153)
No. Obs.	807	809	817	817	809	808
Treated firms	255	255	257	257	255	255
Untreated firms	552	554	560	560	554	553
	High-value GI territories (Panel b)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Revenues growth rate	Fixed assets growth rate	ROS	M_ROS	EBITDA growth rate	M_EBITDA growth rate
Cooperative	−0.926***	−2.844***	−0.00779	0.167***	−0.487	−0.637***
	(0.223)	(0.939)	(0.00700)	(0.0167)	(0.336)	(0.169)
Constant	1.190***	3.549***	0.0746***	0.637***	0.575*	0.840***
	(0.212)	(0.911)	(0.00647)	(0.0143)	(0.326)	(0.162)
No. Obs.	800	800	800	810	802	801
Treated firms	254	254	256	256	254	254
Untreated firms	546	548	554	554	548	547

Note: ***p < 0.01, **p < 0.05, *p < 0.1. Clustered standard errors at the firm level in parentheses. Growth rates, ROS, and M_ROS are expressed as percentage points. The added value per employee is expressed in thousands (EUR). The average wage per year per employee is expressed in thousands (EUR).

Table A7
Estimated ATT for cooperative ownership in cooperating territories – IQI Index.

	GI municipalities					
	(1)	(2)	(5)	(6)	(7)	(8)
	Revenues growth rate	Fixed assets growth rate	ROS	M_ROS	EBITDA growth rate	M_EBITDA growth rate
Cooperative	−0.490***	−2.206***	−0.0139**	0.158***	−0.670***	−0.434***
	(0.166)	(0.756)	(0.00690)	(0.0154)	(0.204)	(0.136)
Constant	0.758***	2.872***	0.0807***	0.640***	0.762***	0.644***
	(0.153)	(0.725)	(0.00628)	(0.0128)	(0.184)	(0.128)
No. Obs.	888	890	900	900	890	889
Treated firms	272	272	274	626	618	317
Untreated firms	616	618	626	274	272	272

Note: ***p < 0.01, **p < 0.05, *p < 0.1. Clustered standard errors at the firm level in parentheses. Growth rates, ROS, and M_ROS are expressed as percentage points. The added value per employee is expressed in thousands (EUR). The average wage per year per employee is expressed in thousands (EUR).

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