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Research article

What is driving the performance of Italian wine cooperatives?

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Abstract. Cooperatives have long been central to the European wine sector, yet comprehensive national-level analyses of their performance determinants remain scarce. This study investigates the financial and economic drivers of Italian wine cooperative performance using a fixed-effects panel framework on an unbalanced sample of 452 entities over the 2021-2023 period. The analysis tests the effects of cooperative size (total assets, turnover), internal financing capacity (cash flow), capital structure (financial autonomy, debt-to-equity ratio), and liquidity ratios (current, quick) on both earnings before interest, taxes, depreciation, and amortisation (EBITDA) and return on sales (ROS). The findings indicate that the cooperative size significantly influences performance. Estimates for cash flow and financial autonomy indicate that the internal financing capacity is a key driver of cooperative performance. The results underscore the relevance of governance and managerial structures in optimising resource allocation and liquidity management to harness cooperative principles without compromising competitiveness. Overall, this study provides actionable insights for policymakers and cooperative boards aiming to foster sustainable growth in the evolving wine market.

Keywords: wine cooperatives, economic performance, profitability, wine economics, fixed-effects.
JEL codes: C23, L25, Q13.

HIGHLIGHTS

- A fixed-effects model is applied to panel data from 452 Italian wine cooperatives to identify performance drivers.
- Cooperative size, cash flow, and financial autonomy significantly influence profitability.
- A structural trade-off emerges between mutualistic practices and short-term liquidity performance.
- Governance and management are key to balancing mutualistic principles with market-driven strategies.

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1. INTRODUCTION

The wine industry is increasingly influenced by globalisation, evolving consumption patterns, and shifts in lifestyles, leading to changes in the market environment. These shifts are driven by the ever-greater diversification of consumer preferences (Alpeza *et al*., 2024; Caracciolo *et al*., 2015), increased internationalisation (Behmiri *et al*., 2019; Festa *et al*., 2020), and rising demands for innovation and new sustainability standards (Fragoso, Vieira, 2024). Consequently, companies have been required to adopt more professionalised strategies through structural and organisational changes to remain competitive and support higher activity levels (Mozas-Moral *et al*., 2021).

Within this context, cooperatives have emerged as a distinct organisational means that links small and medium-sized wine and grape producers through strategic alliances and mutual commitment, enabling collective responses to market challenges (Frick, 2017). Key cooperative principles, including voluntary and open membership along with democratic member control, define them as people-centred organisations that prioritise social equity, local community development, and access to education and information (Marques, Teixeira, 2023).

In the wine industry, cooperatives have demonstrated the sustainable development of the sector (D'Amato *et al*., 2021; Pliakoura *et al*., 2021). They successfully integrate economic and social sustainability by encouraging sustainable farming practices (Troiano *et al*., 2023), while contributing to lowering transaction costs and improving economies of scale (Coelho, 2024). Specifically, cooperatives support grape and wine producers in managing downstream supply chain phases, protecting them from the bargaining power of buyers. Consequently, cooperatives provide protection against adverse market fluctuations and enhance sector cohesion (Pomarici *et al*., 2021). The coronavirus disease 2019 (COVID-19) pandemic underscored this adaptive capacity, with wine cooperatives strategically prioritising digitalisation efforts in communication, e-commerce, online sales, and advertising (Borsellino *et al*., 2024). Moreover, cooperatives have demonstrated competitiveness with private wineries regarding product quality and reputation (Schamel, 2014).

Cooperatives have a long-standing tradition in European wine-producing countries, such as France, Italy, Spain, and Portugal, accounting for more than half of total wine production by volume (Richter, Hanf, 2021). In Italy, wine cooperatives ensure economic sustainability for small farms by leveraging the entrepreneurial skills and experience of producers, fostering a sustainable and collaborative business model (Pomarici *et al*., 2021). The Italian wine sector includes 459 cooperatives with 136,498 members, generating €6.4 billion in turnover and employing 10,633 people (Licciardo, Fontanari, 2024). A mutual purpose prevails in the Italian wine cooperatives, with members contributing over half of total product acquisitions in terms of volume or value (Borsellino *et al*., 2020). Wine cooperatives generally operate under two organisational models. First-tier cooperatives, which bring together grape producers to process and market wine collectively, and second-tier cooperatives, which coordinate multiple simple cooperatives and may also manage wine estates, combining member-based production with vertically integrated activities. Although cooperatives account for over 55% of Italy's total wine production, approximately 25% of their output is bottled and marketed directly, while the remaining share is commercialised through investor-owned firms specialised in marketing and distribution (ISMEA, 2024; Malorgio *et al*., 2013; Pomarici *et al*., 2021).

Overall, the underlying governance structure of cooperatives – typically characterised by a strong producer orientation rooted in mutuality principles and heterogeneous membership – may constrain the adoption of market-driven strategies. As a result, wine cooperatives are challenged to establish a competitive industry position by shifting to managerial principles and performance-driven strategies to adapt to globalisation, maturing markets, and climate change (Ferrer *et al*., 2019; Schamel, 2018).

A knowledge gap remains due to the lack of comprehensive, national-level analyses that have systematically investigated the drivers of wine cooperative performance, a limitation largely attributable to the methodological complexity of this task. In cooperative accounting systems, profits are embedded within operating costs, and the allocation of member remuneration as operating cost biases conventional profitability ratios, underscoring that performance cannot be interpreted according to the same criteria used for investor-owned firms. This study develops a national-level analysis of financial and economic indicators of Italian wine cooperatives to identify the key performance determinants. There are two objectives: to examine cooperative behaviour within the evolving wine market context; and to provide actionable insights and recommendations for cooperative managers and policymakers to support economic sustainability and enhance organisational resilience.

2. BACKGROUND

The main distinction between cooperative and investor-owned firms lies in ownership rights and objective

functions. While investor-owned firms aim to maximise total profit, cooperatives are designed to maximise the value per unit of input pooled by their members. This objective is typically achieved through the maximisation of member returns, the distribution of patronage refunds, and the minimisation of costs (Royer, 2014). In cooperatives, decision-making is decentralised, control rights are shared, and there is no single residual claimant (Ben-Ner, 1987). A distinctive feature of cooperative enterprises is their institutional structure, in which members act as entrepreneurs, performing governance and strategic decision-making. Accordingly, members assume the business risk, as their remuneration varies with the cooperative's economic performance (Tessitore, 1990).

The neoclassical theory has traditionally regarded cooperatives as inefficient due to vaguely defined property rights and agency problems that limit the efficient allocation of productive resources (Frick, 2017). The interpretation of the economic role of cooperatives has been developed through advances in firm theory mainly driven by Coase's (1937) neo-institutionalist perspective on property rights. Alchian, Demsetz (1972) argued that organisational forms rooted in cooperation replace market mechanisms whenever it is not possible to distinguish individual efforts from the overall joint effort contributing to the realisation of a specific output. This leads to the problem of free-riding, which refers to situations where individuals may reduce their personal effort while benefiting from the efforts of the others. Free-riding problems have a greater impact on cooperative enterprises, where members are simultaneously owners and contributors, and property rights are not specified and, thus, cannot be traded (Green, Laffont, 1977). Unlike investor-owned firms, where both the volume and quality of output are contractually defined, cooperative members may allocate part of their production to alternative markets whenever external prices are more favourable than the internal price set by the cooperative.

The mechanisms for internal governance and incentive alignment help mitigate these challenges. In particular, while the members' direct participation in management mitigates free-riding problems in small and medium-sized cooperatives, difficulties persist in measuring each member's actual contribution and risks of free-riding in large cooperatives. Integrating elements of agency, property rights, and financial theories, Jensen, Meckling, (1976) shifted the focus on the separation of ownership and control. They analysed the relationship between a principal (e.g., the firm's owner), whose objective is to maximise a specific function, and an agent (e.g., the manager), who is supposed to act in the principal's interest. Agency problems emerge when there are information asymmetries and conflicting interests between the agent and the principal; they represent a significant governance challenge that might lead to increased monitoring costs (Jensen, Meckling, 1976). Although efficiency losses can potentially be minimised, they cannot be fully resolved (Prendergast, 1999). Under such conditions, market coordination becomes inefficient, and organisational control is required. Nonetheless, several governance mechanisms have been proposed to mitigate these inefficiencies. As Frick (2017) argued, managing entry and exit barriers to reduce adverse selection and moral hazard, combined with effective monitoring systems, can help to align the interests of heterogeneous members. Moreover, vertical integration through cooperatives enables farmers to internalise externalities, to access collective goods, and to reduce transaction costs associated with organising exchanges and mitigating opportunistic behaviour (Royer, 1999; Staatz, 1987). Notably, the effectiveness of cooperatives is closely linked to the extent to which members act in accordance with cooperative principles, including their propensity to invest equity capital, their active participation in governance, and the quality and quantity of the raw materials they supply (Fanasch, Frick, 2018).

Despite these theoretical issues, cooperatives have been shown to provide tangible benefits, especially for the agricultural sector. Cooperatives enable addressing the holdup problem and opportunistic behaviour related to asset specificity by strengthening farmers' market power and securing access to markets, particularly in fragmented or specialised market settings (Staatz, 1987). This is particularly relevant in the wine industry, where downstream firms (i.e., wineries purchasing grapes) may exert market power, leading to opportunistic behaviour (Albanese *et al*., 2015). The high level of risk in agriculture further exacerbates such issues, making cooperatives an effective tool for risk management (Koç, Cennet, 2024).

The predominant model characterising the agricultural domain – and, in particular, the wine sector – is the producer cooperative, which is owned and governed by producers who contribute production inputs, including capital assets, intermediate goods, and labour (Fanasch, Frick, 2018; Hansmann, 1999). Farmers combine their inputs and may jointly own equipment like harvesters or grape presses (Agbo *et al*., 2015). Members deliver their produce (e.g., grapes in the case of wine cooperatives) through a transaction at an internal transfer price, which is set according to the cooperative's annual economic result. This price is generally lower than the prevailing market price at the time of delivery, as the retained margin is used to generate a surplus that is subsequently redistributed to members.

Previous studies have examined different aspects of wine cooperative performance. Couderc, Marchini (2011) analysed the performance of 25 French and Italian wine cooperatives, measured as total sales per product unit, using both survey and financial data, with the aim of examining the relationship between governance structures and commercial strategies. Based on survey data, Ferrer *et al.* (2019) found that Spanish cooperatives neither underperform nor lack innovation capabilities compared with investor-owned firms, although their performance drivers differ due to distinct organisational objectives. Challita *et al.* (2019) investigated the relationship between branding and financial performance in 207 French firms, including wine cooperatives and investor-owned firms. Using both survey and financial data, they concluded that the cooperative ownership model was the primary determinant of financial performance stability, as measured by return on assets (ROA) and return on sales (ROS). Borsellino *et al.* (2020) demonstrated that, within Sicilian wine cooperatives, adopting hybrid organisational models and engaging in strategic alliances, such as vertical quasi-integration, can enhance market competitiveness, financial stability, and packaged wine sales. Finally, despite theoretical concerns about cooperative inefficiencies, D'Amato *et al.* (2021) showed that Italian wine cooperatives were as economically efficient as investor-owned firms, often outperforming them between 2009 and 2018 based on an adjusted earnings before interest, taxes, depreciation, and amortisation (EBITDA) measure.

3. MATERIALS AND METHODS

3.1. Data

The "*Analisi Informatizzata delle Aziende Italiane*" (AIDA) database (Bureau Van Dijk, 2025) was used to extract the main financial and economic indicators for Italian cooperatives involved in grape cultivation or wine production (Table 1). The analysis encompasses the years 2021, 2022, and 2023 to provide a recent post-COVID-19 pandemic overview of the wine cooperative sector in Italy. Wine cooperatives were selected via a two-channel strategy using the NACE Rev. 2 classification (Statistical Classification of Economic Activities in the European Community). The first search explicitly addressed grapes and wine producers by looking for the codes "0121 Growing of grapes" and "1102 Manufacture of wine from grape" and resulted in an initial sub-sample of 596 active wine cooperatives. The second search implicitly targeted the wine industry by first selecting the more heterogeneous code "016 Support activities to agriculture and post-harvest crop activities". Only those cooperatives that operated in the wine sector were selected by explicitly searching for the words "wine" and "cellar" in the name of the company and/or in the product services they claim to provide. This step yielded a second sub-sample of 36 active wine cooperatives. The two datasets were then merged, and duplicates were removed.

The sample revealed substantial heterogeneity, with first-tier cooperatives focused mainly on grape production and second-tier cooperatives displaying higher lev-

Table 1. Variables used to analyse the performance of Italian wine cooperatives.

Variable	Definition	Unit of measure
EBITDA	Earnings before interest, taxes, depreciation, and amortisation	Thousands of euros (000 €)
Return on sales (ROS)	EBIT/turnover	Percentage (%)
Return on investments (ROI)	EBIT/(financial debts + equity)	Percentage (%)
Assets	Total assets	Thousands of euros (000 €)
Turnover	Total sales	Thousands of euros (000 €)
Cash flow	Operating cash flow	Thousands of euros (000 €)
Employees	Number of employees	Number
Current ratio	Current assets/current debts	Ratio
Quick ratio	(Current assets – inventories)/current debts	Ratio
Autonomy	Total equity/total assets	Percentage (%)
Financial sustainability	Financial charges/total debts	Percentage (%)
ST debts	Current debts/total debts	Percentage (%)
Debt-to-equity ratio	Total debts/total equity	Ratio
Labour productivity	Added value/employees	Thousands of euros (000 €)
Labour-added value share	Personnel costs/added value	Percentage (%)
Age	Age of wine cooperatives	Number of years
Production value	Value of total production	Thousands of euros (000 €)

els of vertical integration. However, this distinction is not always clearly captured by NACE codes, as many cooperatives operate across multiple stages, generating overlaps that blur classification boundaries. Those wine cooperatives with turnover, product value, and number of employees equal to zero were also deleted from the sample to remove very unlikely and/or unreliable features. This procedure resulted in an unbalanced panel of 452 wine cooperatives ready for further statistical analyses; this represents about 99% of the total Italian wine cooperatives.

The interpretation of economic performance in cooperatives requires specific methodological caution, as traditional income statement analysis may not fully capture the effects of their mutualistic structure. In cooperative firms, standard profit and loss statements embed member remuneration within operating costs, including settlement prices, services provided to members, and the remuneration of member-financed loans. As a result, the reported margins do not reflect residual profitability, but rather the outcome of mutualistic policies aimed at maximising member benefit. Because the variables available in the database do not allow these elements to be disentangled, and given the large size of the sample and the heterogeneity of production values across different areas, the empirical analysis relied exclusively on observed financial statements, without introducing any assumptions regarding board decisions on settlement prices. Therefore, profitability indicators were interpreted as measures of operating performance after member remuneration and used exclusively to compare cooperatives of different sizes operating under the same institutional and accounting constraints.

3.2. Regression analysis

The analysis was based on a panel data framework to fully exploit the cross-sectional and temporal characteristics of the dataset. More specifically, a classical fixed-effects model was considered. Following the compact notation of Verbeek (2004), it is written as Equation (1):

$$y_{it} = \alpha_i + x_{it}^{'}\beta + \varepsilon_{it} \quad (1)$$

where y_{it} and x'_{it} are, respectively, the dependent variable and the (transposed) vector of independent variables referring to the i-th wine cooperative (i = 1,..., 452) and t-th years (t = 2021,..., 2023); β measures the partial effects of the independent variable and is constant with respect to i and t; and the intercept α_i captures all the effects relative to the i-th wine cooperative, which are constant over time. The "within estimator", available in Stata 17, was used to estimate the model. Within this estimation framework, the intercept α_i is the average of the individual effects of the wine cooperatives, while all βs are consistently estimated.

There is theoretical as well as empirical justification for the appropriateness of the fixed-effects model. First, unlike the pooled framework, the fixed-effects model explicitly considers the heterogeneity of the individual wine cooperatives. For this reason, it is possible to assume that the pooled model is nested within the fixed-effects model, that is to say, the former is a restricted version of the latter. This justifies the use of an F-test to test whether the fixed-effects model is indeed a more complete and, therefore, appropriate framework for analysing the problem at hand (Gujarati, 2014). Second, the absence in this analysis of time-constant determinants of the performance of wine cooperatives together with the unbalancedness of the panel considered suggest that a fixed-effects model is preferable to a random-effects model (Wooldridge, 2016). This theoretical expectation is empirically corroborated by the Hausman test, which represents the gold standard to assess substantial differences between fixed effect models and random effect models addressing a certain research question. Last but not least, the presence of time fixed effects is tested using a classical F-test on the dummy year variables included in the model.

Two dependent variables – EBITDA (log-transformed) and ROS – were chosen to identify the determinants of the performance of Italian wine cooperatives. EBITDA provides a comprehensive description of a firm's operating profitability, which considers value losses from tangible and intangible assets, while ROS captures the operating margin per unit of sales. ROI was excluded from the regression analysis because many values were missing across the wine cooperatives in the sample, particularly among smaller ones. Therefore, it was retained solely for descriptive purposes.

4. RESULTS AND DISCUSSION

4.1. Descriptive statistics

Table 2 provides a summary of the descriptive statistics of the full sample for a comprehensive overview of the key financial and economic indicators of Italian wine cooperatives during the 2021-2023 period.

The Italian wine cooperatives have an average age of approximately 49 years since foundation, indicating a well-established sector characterised by substantial organisational maturity. On average, cooperatives employ 24 workers, each generating € 51,780 in gross value added. 71% of total value added is allocated to labour, under-

Table 2. Summary statistics of wine cooperatives (full sample).

Variable	Obs.	Mean	Std. dev.	Min	Max	Median	A
EBITDA	1291	510.66	1280.34	-2940.20	20635.39	137.43	79
ROI	959	2.27	5.43	-27.87	29.09	1.56	52
ROS	1243	1.35	7.67	-49.43	29.72	1.31	97
Assets	1291	14900.47	38075.38	9.61	466743.70	3982.73	0
Turnover	1291	10456.87	28499.92	3.63	311511.40	2158.39	0
Cash flow	1291	470.91	1292.15	-4015.59	20098.75	104.88	80
Employees	1201	24.44	84.01	1	1601	10	0
Current ratio	1288	1.88	3.55	0.01	80.67	1.31	0
Quick ratio	1288	1.11	2.17	0.00	40.01	0.73	0
Autonomy	1291	25.32	21.45	-113.50	95.34	23.24	29
Financial sustainability	1291	1.08	1.05	0	10.25	0.80	0
ST debts	1291	73.00	23.95	0.00	100.00	76.39	0
Debt-to-equity ratio	1291	16.73	197.54	-726.22	6703.46	2.72	29
Labour productivity	1201	51.78	108.81	-2364.37	473.35	49.16	21
Labour-added value share	1291	71.44	218.84	-2482.62	5108.33	63.96	26
Age	1291	48.82	28.43	1	131	55	0
Production value	1291	11328.56	30430.33	3.63	323255.60	2413.48	0

Note: The variables and their units are described in Table 1. The "A" column indicates the number of wine cooperatives with at least one negative value for a certain variable. Abbreviations: Obs., number of observations; Std. dev., standard deviation; Min, minimum; Max, maximum.

scoring a strong commitment to workforce remuneration. This is consistent with cooperative principles, as profits are not reported as a separate item and the portion of value added directed to members is embedded in the payments distributed to them.

Appropriate profitability evaluation pertaining to cooperatives should consider the diversity of the owner structure and the companies' objectives of maximising member results. This is particularly relevant when analysing ROI and ROS. Profitability indicators suggest adequate returns, while the autonomy ratio points to a moderate level of financial independence, with equity financing approximately one-quarter of total assets.

The average cash flow indicates a solid self-financing capacity across the sample in the period under analysis, although the high standard deviation reveals substantial heterogeneity, with 80 cooperatives reporting negative cash flow. The quick ratio points to limited short-term liquidity when inventories are excluded, consistent with a business model where a significant share of current assets is tied up in wine inventories. In contrast, the current ratio suggests a conservative approach to liquidity and a general ability to meet immediate obligations, a finding reinforced by the low standard deviation, indicating consistent liquidity management practices across the sample.

The average debt-to-equity ratio, characterised by high variability across the sample, reflects diverse capital structures and varying degrees of leverage risk. Wine cooperatives are quite reliant on debt financing, with 73% of total debt being short term. This result highlights a substantial divergence from Italian investor-owned wine companies, which operate with an average debt ratio of less than 40% (Mediobanca, 2022). This reliance is further explained by the financial sustainability indicator (1%), which underscores both the low cost of debt and its widespread use within cooperatives. When the ROI exceeds the financial sustainability ratio (i.e., the cost of total debts), the cooperative operates under a favourable financial condition, with potential for value creation through efficient capital allocation (Magni, 2021). Caution is warranted, however, as total debts comprise both onerous and non-onerous liabilities, with the latter accounting for 73% of the total. In such contexts, debt financing can enhance returns to members when operations are profitable (Pokharel *et al.*, 2019). For investor-owned wine firms, the average ROI is approximately 5% (Mediobanca, 2022), a value that is markedly higher than that recorded for the cooperatives in the sample, which present a satisfactory average of around 2.3%. This difference does not imply lower efficiency of cooperatives; instead, it should be interpreted as a consequence of the mutualistic principles adopted in determining raw material procurement costs. Such treatment does not prevent cooperatives from pursuing the maximisation of operating results.

The average production value is €11.3 million, with a standard deviation of €30.4 million, indicating a highly

Table 3. Summary statistics of small Italian wine cooperatives (turnover ≤ the median of €2.158 million) in the sample.

Variable	Obs.	Mean	Std. dev.	Min	Max	Median	A
EBITDA	646	44.80	87.59	-815.77	485.99	29.30	72
ROI	359	3.04	7.60	-27.87	29.09	2.26	36
ROS	602	1.19	10.50	-49.43	29.72	1.89	78
Assets	646	1408.98	1736.98	9.61	17601.62	914.32	0
Turnover	646	638.94	665.86	3.63	3870.09	383.77	0
Cash flow	646	29.53	135.95	-2851.16	485.54	20.72	76
Employees	564	6.67	12.68	1	267	5	0
Current ratio	643	2.29	4.94	0.01	80.67	1.37	0
Quick ratio	643	1.41	2.99	0	40.01	0.78	0
Autonomy	646	21.48	25.14	-113.50	95.34	19.35	29
Financial sustainability	646	1.15	1.27	0.00	10.25	0.77	0
ST debts	646	70.46	28.74	0	100	76.57	0
Debt-to-equity ratio	646	23.19	269.78	-726.22	6703.46	3.00	29
Labour productivity	564	32060.50	37.90	-233.18	360.95	24.90	19
Labour-added value share	646	83.93	308.44	-2482.62	5108.33	73.12	24
Age	646	35.15	27.19	1	118	26	0
Production value	646	714.78	691.64	3.63	2413.48	446.76	0

Note: The variables and their units are described in Table 1. The "A" column indicates the number of wine cooperatives with at least one negative value for a certain variable. Abbreviations: Obs., number of observations; Std. dev., standard deviation; Min, minimum; Max, maximum.

heterogeneous size structure that includes both small and large cooperatives. This variability is further confirmed by the average assets (€14.9 million) and turnover (€10.5 million), with corresponding medians of €3.98 million and €2.16 million, respectively. Moreover, the average asset-to-turnover ratio of approximately 1.4 further indicates the capital requirements of wine production.

Given this heterogeneity, the sample was divided into two groups based on whether turnover was above or below the median, classifying cooperatives as small (Table 3) and large (Table 4), respectively.

It is worth noting that the average turnover of cooperatives during the 2021-2023 period appears to have been affected by the effects of the post-COVID-19 period. Large cooperatives are older, suggesting more established governance structures, with on average 40 and 7 employees, respectively.

The higher average ROI among smaller cooperatives (3.04%) can be explained by their leaner asset base and greater operational flexibility. With mean total assets of €1.4 million, compared with €28.4 million for larger cooperatives, even modest earnings translate into a relatively high ROI. However, the higher ROI for small cooperatives reflects the small scale of operations rather than superior profitability or efficiency.

ROS is affected by operating income and the value of goods sold. Based on the values, there is a lower sales profit for smaller cooperatives than larger ones, indicating that the latter produce higher-value products or benefit from economies of scale, achieving higher margins per unit sold (Gezahegn *et al.*, 2019; Ortmann, King, 2007). The low EBITDA observed among small cooperatives further illustrates these structural constraints. Operating at a smaller scale limits their ability to benefit from economies of scale, while their focus on member value often translates into reduced margins.

With reference to the composition of liabilities, small cooperatives also exhibit higher debt ratios, with 29 of them reporting negative equity and an average cash flow of €29,530. These results reflect a mutualistic model that prioritises the redistribution of earnings to members over reinvestment, as shown by Rebelo, Caldas (2015), who highlighted that agricultural cooperatives with a more mutualistic orientation tend to distribute earnings rather than accumulate equity. The low absolute value of cash flow, despite a relatively high ROI, is another consequence of the small asset base and modest operating scale. In comparison, larger cooperatives, with relatively lower leverage and substantially higher cash flows, are less financially stressed and better positioned to retain and reinvest resources (Pokharel *et al.*, 2019). This enhances their competitiveness and resilience by enabling strategic investments, improving their capacity to respond to market fluctuations, and supporting innovation. Notably, the weight of short-term debt is consistently high across cooperatives, largely due to the amounts owed to members for grape contributions, typically recorded under current liabilities. This debt, often

Table 4. Summary statistics of large Italian wine cooperatives (turnover > the median of €2.158 million) in the sample.

Variable	Obs.	Mean	Std. dev.	Min	Max	Median	A
EBITDA	645	977.24	1685.29	-2940.20	20635.39	470.26	8
ROI	600	1.81	3.48	-22.91	23.82	1.37	17
ROS	641	1.49	3.27	-44.14	23.11	1.10	19
Assets	645	28412.88	50353.71	1235.71	466743.70	13273.67	0
Turnover	645	20290.02	37855.47	604.51	311511.40	8743.31	0
Cash flow	645	912.99	1713.13	-4015.59	20098.75	395.39	5
Employees	637	40.17	112.46	1	1601	18	0
Current ratio	645	1.47	0.80	0.48	10.01	1.28	0
Quick ratio	645	0.83	0.56	0.08	5.40	0.70	0
Autonomy	645	29.17	16.08	0.076	94.17	26.68	0
Financial sustainability	645	1.01	.77	0	3.84	0.81	0
ST debts	645	75.54	17.58	7.76	100.00	76.39	0
Debt-to-equity ratio	645	10.26	72.00	0.05	1300.39	2.55	0
Labour productivity	637	69238.48	142.88	-2364.37	473.35	74.65	3
Labour-added value share	645	58.94	18.27	-97.14	271.72	60.05	3
Age	645	62.51	22.43	3	131	63	0
Production value	645	21958.79	40351.30	2461.57	323255.60	9667.53	0

Note: The variables and their units are described in Table 1. The "A" column indicates the number of wine cooperatives with at least one negative value for a certain variable. Abbreviations: Obs., number of observations; Std. dev., standard deviation; Min, minimum; Max, maximum.

linked to the cooperative nature of operations rather than traditional bank loans, structurally increases overall indebtedness, thereby progressively reducing the financial autonomy of cooperatives, especially among smaller entities.

4.2. Panel regression analysis results

The model in Equation 1 was estimated twice using two different dependent variables, namely log(EBITDA) for Model 1 and ROS for Model 2. For the sake of comparability, both the models employ the same set of independent variables, specifically log(assets), log(turnover), log(cash flow), log(employees), the current ratio, the quick ratio, autonomy, financial sustainability, ST debts, the debt-to-equity ratio, labour productivity, and labour-added value share. The use of log-log relationships such as those in Model 1 helps convey economic information in the form of elasticities, thereby linking percentage changes in the independent variables to the corresponding percentage changes in the dependent variable (Hill *et al.*, 2018). Year dummies are also added among the independent variables to control for time fixed effects. More specifically, the year 2021 is used as the base year and is omitted to avoid a dummy variable trap. This setting provides a comprehensive yet consistent framework of determinants of the performances of the wine cooperatives. The results of the panel regression analysis are outlined in Table 5.

Despite the slightly different information conveyed by the dependent variables EBITDA and ROS, the model results reveal the determinants that help outline the main drivers underlying the performance of wine cooperatives. Model 1 is characterised by a relatively high R^2 (within) of 0.8541, so it explains a high percentage of the variance.

The size of the cooperatives, measured by total assets and turnover, emerges as a key determinant of performance in both the models, with a positive and significant effect ($P < 0.01$) on EBITDA and ROS. These variables, which capture the organisational scale of cooperatives, play a strategic role in processes such as mergers and acquisitions (Arcas *et al.*, 2011; Liang *et al.*, 2023). Indeed, larger cooperatives can more easily access larger markets and financial resources, thereby enhancing economies of scale and operational efficiency (Sala-Ríos, 2024). However, expanding firm size, which is a common strategic objective across business models, requires additional effort for cooperatives. Specifically, cooperatives must find a balance between configuring the business as a projection of their members' activities and achieving autonomous economies capable of competing in the market and generating self-financing flows to sustain growth.

Dimensional expansion may occur either through internal growth, enabled by the capabilities and resources available within the organisation, or through external growth via the acquisition or merger of existing coopera-

Table 5. Fixed-effects estimation results.

	Model 1	Model 2
Dependent variable	log(EBITDA)	ROS
Independent variables		
log(Assets)	0.2523246***	3.158571***
	(0.0602453)	(0.9313465)
log(Turnover)	0.2519245***	2.297392***
	(0.0341156)	(0.5348394)
log(Cash flow)	0.4290764***	1.16292***
	(0.0161348)	(0.2377854)
log(Employees)	0.0220244	0.2986411
	(0.0256627)	(0.3972093)
Current ratio	0.0300256**	0.0464374
	(0.0130235)	(0.2057876)
Quick ratio	-0.0588755**	-0.1001972
	(0.0237573)	(0.3767668)
Autonomy	0.0047038**	0.1127394***
	(0.0019465)	(0.0303431)
ST debts	-0.0013445	0.0140284
	(0.0008499)	(0.0131282)
Debt-to-equity ratio	-0.0002373	0.0008687
	(0.0002331)	(0.0035992)
Labour productivity	-0.0002304	-0.0036405
	(0.0003073)	(0.0047464)
Labour-added value share	-0.0192555***	-0.13334***
	(0.0011246)	(0.0153323)
Year 2022	-0.0060094	-0.5900901***
	(0.0128251)	(0.1987951)
Year 2023	0.0446733***	-0.2917924
	(0.0137565)	(0.2127952)
Intercept	0.080926	-43.66395***
	(0.5624411)	(8.628822)
Number of observations	1083	1075
Number of wine cooperatives	421	417
R^2 (within)	0.8541	0.3798

Note: The variables are described in Table 1. * P < 0.1, ** P < 0.05, and *** P < 0.01.

tive entities. The latter represents the primary and most recurrent strategy of external growth, as it is both cost-effective and institutionally rational, although its implementation is often constrained by local interests and cultural resistance.

Cash flow, representing the main internal source of financing, is also recognised as a key driver of cooperative performance. Its impact is positive and significant (P < 0.01) for both EBITDA and ROS. In particular, a 1% increase in the cash flow generates a rough 0.43% increase in EBITDA. Positive cash flow enables cooperatives to extend trade credit, which operates as a strategic investment tool, particularly for smaller cooperatives. By strengthening commercial relationships and supporting sales growth, this mechanism contributes to improved operating performance (Martínez-Victoria, Maté-Sanchez-Val, 2021).

Two solvency indicators are considered in this analysis, namely the debt-to-equity-ratio and financial autonomy, whose impact on performance should be interpreted considering the descriptive results provided in Tables 2-4. Two peculiar yet relevant factors emerge. First, the non-significance of the debt-to-equity ratio highlights that although the Italian wine cooperatives have a relatively high level of indebtedness, it does not impact their economic performance. Second, the effect of autonomy on performance is positive and significant with respect to both EBITDA (P < 0.05) and ROS (P < 0.01). A stronger reliance on member equity reflects a governance orientation towards internal resource mobilisation and long-term mutualistic stability, thereby enhancing economic performance. According to Sala-Ríos (2024), this behaviour stems from the tendency of agricultural cooperatives to be highly indebted and, as such, less able to raise funds from banks. Consequently, their economic performance becomes highly dependent on internal rather than external funds.

Liquidity reflects a firm's ability to minimise risk and financing costs by meeting short-term liabilities (Neves *et al.*, 2022). While maintaining adequate liquidity is essential for supporting profitability, both excess and shortage entail significant risks. Excessive liquidity may result in idle resources and missed investment opportunities, whereas insufficient liquidity can compromise solvency and limit production capacity (Ehiedu, 2014; Sala-Ríos, 2024). Liquidity indicators, namely the current ratio and the quick ratio, appear to have a significant effect on performance only for EBITDA. Specifically, the positive and significant (P < 0.05) effect of the current ratio on EBITDA in wine cooperatives reflects the fact that a balanced liquidity structure, including inventory, is a determinant of economic performance. Despite its significance (P < 0.05), the quick ratio has a negative effect on EBITDA, thus underscoring two relevant aspects: first, inventories play a fundamental role in sustaining overall liquidity for wine cooperatives. Second, performance improvements tend to reduce internal liquidity due to short-term obligations and immediate value redistribution to members. These findings are consistent with a previous study that emphasised the role of inventory liquidity to explain profitability in agricultural cooperatives (Yen *et al.*, 2025). Moreover, the results highlight the distinctive financial structure of cooperatives, characterised by lower capitalisation levels, higher indebtedness, non-distributable mandatory social funds, and a variable share capital (Sala-Ríos, 2024). Cooperatives prioritise mutualistic transfers, typically through

higher payment for delivered products or member refunds, thus generating a structural trade-off between redistribution of operating return and short- and long-term financial solvency.

The non-significance of the current ratio and the quick ratio on ROS, in contrast, can be ascribed to the relatively limited role liquidity plays in explaining operating margins. In fact, ROS is influenced more by pricing strategies, cost control, and value-added processes than by short-term liquidity dynamics. A final analysis of the labour variable highlights three fundamental aspects. First, the variable employees is not a significant determinant of performance. Similar considerations also hold for labour productivity, whose effect is also not statistically significant. This result reflects the positive role of technological investments, as evidenced by the significance of assets, which contribute to production processes by replacing labour input. Conversely, as expected, the labour-added value share has a negative and significant effect on both EBITDA and ROS ($P < 0.01$). Specifically, a 1% increase in the labour-added value share is associated with a 1.93% decrease in EBITDA, and a 1.33% reduction in ROS.

The results of some additional tests are provided to empirically validate the choice of the econometric setting employed throughout this study. The results of the F-tests regarding the null hypothesis of no presence of time fixed effects for both Model 1 and Model 2 are reported in Table 6. The hypothesis is rejected in both cases, thus emphasising the importance of including dummy year variables to control for time fixed effects.

F-tests are again used to test the null hypothesis that there are no individual fixed effects for both Model 1 and Model 2. This hypothesis is rejected for both models, which suggests that the fixed-effects model is superior to the pooled one, thus substantiating the use of the former.

Finally, Table 8 shows the results of the Hausman test to empirically test whether a fixed-effects or a random-effects framework is appropriate. The estimates of the fixed-effects and random-effects models seem to substantially differ from each other for both Model 1 and Model 2, thus suggesting that the former might be more appropriate than the latter for the problem at hand.

Table 6. Testing the presence of time fixed-effects.

H_0: No presence of time fixed effects		
	Model 1	Model 2
F-test	F(2, 649) = 8.31***	F(2, 645) = 4.42**

Note: ** $P < 0.05$ and *** $P < 0.01$.
Source: authors' calculations.

Table 7. Testing the presence of fixed-effects.

H_0: No presence of individual fixed effects		
	Model 1	Model 2
F-test	F(420, 649) =5.90***	F(416, 645) = 5.23***

Note: *** $P < 0.01$.
Source: authors' calculations.

Table 8. The Hausman test.

H_0: No difference in the estimates of the fixed and random effects.		
	Model 1	Model 2
χ^2 test	$\chi^2(13) = 113.13$***	$\chi^2(13) = 113.00$***

Note: *** $P < 0.01$.
Source: authors' calculations.

5. CONCLUSIONS

Cooperatives have historically played a central role in shaping traditional European wine markets, with the Italian case standing out as particularly significant. Their organisational model is characterised by the coexistence of mutualistic objectives and heterogeneity in terms of size, vertical integration, governance structure, and market strategy, making them a distinctive form within conventional corporate governance frameworks. Cooperation constitutes a key channel for enhancing the value of Italian wine production, accounting for over half of the national output. Notably, almost all the raw materials processed by wine cooperatives are supplied by their members. This confirms the mutualistic nature of Italian wine cooperatives and reflects their strong embeddedness in the local territory. As a result, cooperatives exercise effective supply chain control over production and embody a natural mission to protect and promote the origin of their products.

The present study addresses a gap in the existing literature by identifying and examining the determinants of performance in Italian wine cooperatives during the 2021-2023 period. The comparison between smaller and larger cooperatives reveals that cooperative size is associated with stronger operating performance, with larger cooperatives showing higher values in key efficiency and profitability indicators. This structural pattern is confirmed by the panel regression analysis results, which indicate that organisational size supports operating performance. There is an exception for ROI, which appears higher in

smaller cooperatives. This outcome can be attributed to the organisational simplicity and capital efficiency typical of such entities, characterised by lower investment levels, reduced technological requirements, and greater flexibility in the timing and level of remuneration for delivered products, enabled by the closer relationship between members and governance structures. When excluding capital profitability, the efficiency ratio, expressed as revenue per labour unit, is higher for larger cooperatives. This result suggests that the cooperative model does not entail structural inefficiency when appropriate managerial practices are adopted. In cooperatives, the criterion for determining consumption costs is guided by the objective of serving members, rooted in the principles of mutuality and a non-profit orientation. However, this does not prevent the cooperative under analysis from optimising its behaviour both internally and on the market to enhance operating performance. This suggests that the interests of cooperative management and members are not necessarily divergent – they can, in fact, be aligned.

Larger cooperatives are also better positioned to establish stable relationships with large-scale retailers, to enhance their investment capacity, and to diversify production. These features enhance access to wider distribution channels and contribute to improved market alignment. The consolidation process experienced by Italian wine cooperatives in the last decades, primarily through mergers and acquisitions, has led to a larger production scale and a more effective response to demand trends, including from international markets, where administrative and financial constraints are more pronounced. However, the expansion in size may lead to a weakening of mutualistic aims. There may be a shift from member-focused objectives to market-oriented strategies, with the risk of reducing the role of members from co-owners to simple suppliers.

Moreover, financial and competitive pressures require cooperatives to achieve a certain degree of autonomy from the individual economic structures of members to support internal capital accumulation and to sustain growth. Therefore, there must be balanced management of the economic and financial dimensions. The interdependence between these aspects becomes particularly relevant over the long term, as it allows for the retention of resources needed to finance development activities and to maintain adequate service provision to members. Continued participation in the cooperative is likely to depend on the extent to which members perceive that their expectations are being met. Overall, the results confirm the importance of operational scale, balanced liquidity, and financial autonomy as key determinants of the economic performance of Italian wine cooperatives. This mutualistic structure entails specific managerial features, including the significant role of equity, the frequent reliance on short-term debt owed to members, and a prevailing orientation towards profit redistribution rather than capital accumulation.

Effective governance and management are essential to harness the benefits of size and diversification without compromising cooperative principles. Board composition, transparency, and accountability mechanisms become key factors in aligning strategic choices with member expectations. Therefore, enhancing managerial capacity and governance structures can contribute to a sustainable development path, ensuring that cooperatives remain competitive and resilient in a rapidly evolving industry. In this regard, managerial interventions should focus on improving strategic planning capacities and developing marketing and branding competencies, which are traditionally weaker in producer cooperatives. From a policy perspective, support measures aimed at facilitating cooperative mergers, enhancing access to patient capital, and promoting targeted training in cooperative governance and digital market positioning could significantly improve the ability of wine cooperatives to compete in increasingly global and quality-driven markets.

This study is limited to financial data and does not capture qualitative aspects such as member satisfaction, governance dynamics, or innovation strategies. Nevertheless, the results provide a foundation for further research to examine the micro-fundamentals of cooperatives. Future studies that integrate qualitative methods (e.g., either with interviews or surveys) could improve the knowledge about the economic and organisational processes characterising this business model.

AUTHOR CONTRIBUTIONS

Pacifico A.M.: Conceptualization, Methodology, Data curation, Writing- Original draft preparation, Visualization, Investigation. Writing- Reviewing and Editing.

Calvia M.: Conceptualization, Methodology, Software, Data curation, Writing- Original draft preparation, Investigation, Validation, Writing- Reviewing and Editing.

Malorgio G.: Conceptualization, Methodology, Data curation, Writing- Original draft preparation, Supervision, Validation, Writing- Reviewing and Editing.

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