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The influence of size on winery performance: Evidence from Italy

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Abstract

The aim of this paper is to analyse the influence of firm size on the economic performance of wineries. To achieve this, the paper employs both different traditional profitability and productivity measures and a non-parametric technique to estimate efficiency as indicators of performance. Further, several parametric and non-parametric tests are used to analyse the influence of firm size on these performance indicators. Overall, the results obtained with a sample of 723 Italian wineries (limited companies and cooperatives) in 2013 show that size has a positive influence on the economic performance of wineries. Managers should be aware of the importance of monitoring their own performance in order to guarantee the competitiveness of their wineries.

Keywords: Winery; Performance; Profitability; Productivity; Efficiency; Italy

1. Introduction

The globalisation of markets has increased the level of competition in most industries during recent decades. In the particular case of the wine sector, the growing competitiveness deriving from the appearance of New World wine-producing countries and the decline in the wine consumption in some western countries has given rise to an economic environment where it is becoming increasingly difficult for wineries to survive. Within this context, winery managers should be aware of the importance of monitoring and controlling their economic performance in order to guarantee survival in the long term, in addition to implementing all possible strategies to improve their position. In fact, assessment of performance is a critical component of the management process in any type of organisation (Sellers-Rubio, 2010). However, as Zhu (2000) states, a company's performance is a complex phenomenon requiring more than a single criterion to characterise it, which has led many authors to characterise economic performance as a multidimensional construct (Lewin and Minton, 1986; Venkatraman and Ramanujam, 1986; Flood et al., 1994; Morgan and Piercy, 1998; Raju and Lonial, 2001).

This paper analyses the influence that the size of the firm has on winery performance. The relationship between firm size and profitability is an issue often discussed in the industrial economy. Traditionally, it is considered that company size involves a number of characteristics that may influence the economic performance of the company (Baumol, 1967). Size can be a source of competitive advantage because bigger firms are presumed to be relatively more efficient than smaller ones, as well as benefitting from economies of scale to attain higher profitability. Further, economic theory argues that increasing firm size will bring incremental advantages because the size of the firm enables it to raise barriers to potential entrants. However, despite the numerous contributions made on this topic, the causal relationship between firm size and economic performance remains unclear, with ambiguous results. In general, although firm size is one element affecting performance, it is not possible to infer the extent of its importance in explaining the heterogeneity of company performance.

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More specifically, this paper estimates the economic performance of wineries using different approaches widely employed in management literature and analyses the influence that the size of the winery can have on these estimations. The methodology applied is based on traditional profitability and productivity measures and a non-parametric technique to estimate efficiency. The influence of size is assessed through different parametric and non-parametric tests. The empirical application is carried out on a sample of 722 Italian wineries in 2013. Given the availability of information, only limited companies and cooperatives have been considered.

Having defined the goal of the paper, the rest of the paper is structured as follows. The second section reviews the literature on the relationship between firm size and performance. The third describes the methodology and sample used. The fourth section presents the main results and the deriving managerial implications. Finally, the last section outlines the conclusions of the paper and its main limitations.

2. The influence of size on firm performance

The importance that profitability has for a firm has justified the existence of a broad strand of research that aims to provide empirical evidence about how and why firms attain profitability levels. Broadly speaking, previous articles on this topic can be classified in two categories (Capon et al., 1990). On the one hand are papers that attempt to analyse the influence of certain specific company characteristics on profitability. This resource-based view suggests that factors internal to each firm explain the existence of more or less profitable firms within the same industry, and firm size is one of them (Barney, 1991; Peteraf, 1993). On the other hand there are articles that also consider factors related to the structure of the industry within which the firms develop their activities. In this line of research certain scholars have indicated specific industry effects (e.g. concentration levels, industry growth), using the structure-conduct-performance model (SCP), as the most important factor explaining firm profitability (Scherer, 1980; Porter, 1981). However, the results do not show definitive conclusions, and it has not been possible to clearly confirm the effect that firm size has on profitability. While some articles indicate no relationship between size and profitability, in others a clear correlation is observed, although the sign thereof is discrepant.

The arguments to justify a direct and positive relationship between size and profitability focus on the competitive advantages associated with larger size. First, the theory of the firm or technology perspective, which views the firm as a production function, so that the production unit will be more efficient as its size approximates the optimum size where unit costs are minimised. Second, the focus of classic industrial organisation or industrial economics, according to which the behaviour of the company, and hence its performance, is determined by the structure of the sector. On this hypothesis there have been studies about the relationship between concentration and market share and profitability, assuming the thesis of the positive relationship between size and profitability via market share or concentration. Thus, the causal relationship can be explained by two hypotheses: 1) the traditional or market concentration theory (Demsetz, 1973), whereby high concentration facilitates collusion, so that market power is what underlies the positive relationship between concentration market and profitability. However, even under this hypothesis several authors found an inverse relationship between size and profitability (Shepherd, 1972), perhaps because in certain situations the fixed costs associated with larger size outweigh the benefits of increased market power or, as shown by Chen and Hambrick (1995), because companies with low market share can be as profitable as those with the largest share, but to do so require different competitive strategies based on flexibility rather than on economies of scale. Then 2), the efficiency hypothesis, according to which the differences in yield sizes are a sign of the greater economic efficiency of large companies, since the most efficient firms tend to grow more and achieve greater profitability (Demsetz, 1973; Scherer, 1979).

Third, the latest approach to building a Strategic Theory that considers size a source of competitive advantage. This theory holds that big firms have all the options of the small – though not vice versa – having competitive advantage in five areas (Hall and Weiss, 1967): economies of scale and experience curves, financial, human, marketing and technical resources. Thus, big firms can benefit from economies of scale and access to capital markets from which small firms are excluded, thus leading to higher profitability.

However, some studies consider that the firm size-profitability relationship tends to show non-significant results (Capon et al., 1990), or that it only influences certain specific industries (Marcus, 1969). Given the fact that profitability is determined by several factors (e.g. the production function, prices or costs) this relationship varies between industries and cannot be readily identified. Further, among the arguments justifying the absence of a relationship between size and profitability there is also the law of proportional effect, which states that corporate growth is a stochastic process that arises from the action of countless random and insignificant factors, regardless of size. One implication of this proposition is that there is no optimal size for companies and, consequently, there is a spurious association between profitability and size.

In this sense, the Industrial Economy Theory argues that the behaviour and performance of companies within an industry are conditioned by the structural characteristics of the industry. Thus, the distinctive features of each sector, such as the size of the market, the degree of concentration and competition or the existence of entry barriers, among other variables, can help to explain the disparity of companies' results (Scherer and Ross, 1990).

Finally, a negative relationship between size and profitability has been justified in the more capital-intensive sector operating through large companies, which means lower interest rates, as well as the separation of ownership and control that creates agency conflicts between managers and shareholders, which in turn could shift the objective from maximising

benefits for others towards management, such as survival or growth. Downs (1967) suggests that the managerial task is more difficult in larger firms, which can lead to organisational inefficiencies and lower profit rates. In fact, increased size tends to be associated with higher bureaucratisation, as suggested by Ahuja and Majumdar (1998). Along the same line, Whittington (1980) and Becker et al. (2010) show a negative correlation between firm size and profitability.

As has been shown, despite the potential benefits that size could have, it is difficult to make a clear final prediction of the overall effects of firm size on performance. Thus, the following hypothesis is stated:

H1. The size of the winery is positively associated with its performance.

On the basis of previous research, this association appears to differ depending on the industry under analysis. More specifically, this paper aims to estimate the trend of this relationship within the wine industry.

3. Methodology, sample and variables

3.1. Methodology

The methodology employed to achieve the aim of this paper is divided into the following stages. In the first stage, certain performance indexes are employed. To estimate profitability, traditional indexes such as ROA (returns on assets), ROE (returns on equity), and ROI (returns on investment) are used. Furthermore, two specific ratios are utilised to estimate labour productivity: sales per employee and added value per employee. Efficiency is estimated using the non-parametric method of Data Envelopment Analysis (DEA) (Charnes et al., 1978, 1981). Generally speaking, DEA is an extension of the traditional ratio analysis that estimates efficiency based on linear programming techniques. DEA identifies a firm as efficient when no other firm is capable of producing a higher output from the same input (output-oriented) or, alternatively, of producing the same output from less input (input-oriented). An input-oriented model is used because the firms involved are subject to market demand and the inputs are under the control of the firms. Although wineries try to maximise their revenues, the volume of wine sold in the Italian market has been decreasing over recent years, acting as an important constraint for the Italian wineries. Moreover, it should be stressed that both model orientations identify the same efficient wineries.

If we consider the existence of N homogenous decision-making units (DMU_j; $j=1,\ldots,N$) (i.e. different wineries analysed), they can be characterised by a vector of m inputs $X_j=(x_{1j},x_{2j},\ldots,x_{mj})$ and a vector of s outputs $Y_j=(y_{1j},y_{2j},\ldots,y_{sj})$. For each DMU, the following linear VRS (Variable Returns to Scale) programming model (Banker et al., 1984) must be solved:

$$\max \quad z_0=\theta+\epsilon\sum_{r=1}^{s}s_r^{+}+\epsilon\sum_{i=1}^{m}s_i^{-}$$

s.a.

$$\sum_{j=1}^{n}x_{ij}\lambda_j+s_i^{-}=x_{r0}\qquad \sum_{j=1}^{n}y_{rj}\lambda_j-s_r^{+}=\theta y_{i0}$$

$$\sum_{j=1}^{n}\lambda_j=1\qquad \lambda_j,s_r^{+},s_i^{-}\geq 0;\ j=1,\ldots,n$$

$$r=1,\ldots,s;\ i=1,\ldots,m \tag{1}$$

Where θ is the measure of efficiency obtained for the unit analysed. A DMU is considered efficient if $\theta^*=1$ and all the slacks are zero. $\varepsilon>0$ is a so-called non-Archimedean element, defined as being smaller than any positive real number. As the above model implicitly assumes variable returns to scale, the above problem must be solved eliminating the restriction of convexity $\sum_{j=1}^{n}\lambda_j=1$ to estimate the scale efficiency, with which we obtain the CRS (Constant Returns to Scale) model (Charnes et al., 1978). The efficiency measures obtained with the CRS model (θ^*_{CRS}) are always lower or equal to those from the VRS model (θ^*_{VRS}), so that the scale efficiency (SE) is residually defined as: $SE_i=\theta^*_{CRS}/\theta^*_{VRS}$. If $SE_i=1$, the DMU analysed operates with scale efficiency, whereas if $SE_i<1$, it indicates the presence of scale inefficiencies.

In the second stage of the methodology certain correlation indexes (Pearson) are computed to test the degree of agreement between the different approaches employed to evaluate performance in wineries.

Finally, in the third stage, several parametric and non-parametric tests are employed in order to test whether there is an association between firm size and its profitability, productivity and efficiency. More specifically, the parametric ANOVA test and the non-parametric Kruskal Wallis (KW) test were used to check the robustness of the results. While the ANOVA is a test of equality of means, the KW test can be seen as a comparison of the mean ranks. Thus, in the case of the KW test the wineries have been ranked in ascending order based on their profitability, productivity, and efficiency estimates. Further, to check the robustness of the results several regression models were estimated. The dependent variables are the different performance indicators, while the independent variables are the intercept and three dummy variables that take the value 1 if it is a small, medium or big winery respectively and 0 otherwise. Micro wineries are omitted. The regressions are estimated by OLS for the profitability and productivity performance indicators. Tobit models are estimated by maximum likelihood for the efficiency performance indicators.

3.2. Sample and variables

The wine sector plays a major role in Italy. The total number of farms cultivating vines is incredibly high (388,881) and the total area planted is 664,296 ha (5.2% of the total national agricultural area) (ISTAT, 2010). The total wine production reached 44.7 million hectolitres (excluding must) in 2014 (OIV, 2015), with an estimated value higher than 11.9 billion euros for the same year (Mediobanca, 2015). The sector is showing great performance in exports (Mariani et al., 2012), which in 2014 reached 20.54 million hectolitres (while imports were only 2.54 million hectolitres) and 5078 million euros

Table 1
Descriptive statistics of the variables used.

Variable	Net Income (sales revenue) (thousands of euros)	Added Value (thousands of euros)	Earnings before interests and taxes (thousands of euros)	Assets (thousands of euros)	Total Debt (thousands of euros)	Equity (thousands of euros)	Investment (thousands of euros)	Employees (number)
Mean	7830.00	1176.00	153.00	10376.00	6352.00	3439.00	4119.00	14.00
SD	17701.10	3243.07	1983.16	22474.91	12698.28	10720.59	11666.50	23.77
Max	202339	31708	16634	335571	168481	141838	199723	322
Min	0	−36199	−38559	3	3	−30740	0	1

(OIV, 2015). In the same year Italy was the second most important wine producer after France and the second wine exporter after France in terms of value.

The sector shows a strong fragmentation and a marked duality. 55% of the total number of farms possess less than 3 ha, accounting for slightly more than 17% of the total vine area, while 4% of the total number of farms possess over 30 ha, accounting for more than 24% of the total vine area. This means that there are, on the one side, thousands of small farms that produce small amounts of grapes, mainly for self-consumption and, on the other, companies with high levels of professionalism and large wine production quantities. Therefore, the wine production system shows a clear differentiation among the farms in terms of production costs, level of vertical integration of the production process, relationship with the market, production philosophies and size. This leads to a frequent separation of the production process among different wine players, resulting in a reduction of the added value for the farmers. As evidence of this, in Italy there are numerous wine processing establishments/companies (about 65,000), to which the task of processing the grapes into wine is assigned (Malorgio et al., 2011), and bottlers (around 13,000), to support the small/medium farm wine cellars, for which the internal vertical integration of the process is often not economically convenient.

Since competition is getting increasingly tougher in terms of both supply quantity and price, the Italian wine companies must constantly monitor their performances and the market, considering also that the internal demand for wine is progressively decreasing (for 2014 its value reached 20.4 million of hectolitres, equal to 38.0 l per capita, against the 93.5 of 1977). Hence the need to analyse whether size can influence the performance of the companies in the sector, and to what extent.

Considering the aim of the study and the role they play in the internal and international market, only the companies that sell wine in the market are going to be taken into consideration. The sample used in the paper is taken from the Italian wineries included in the 1102 NACE-2009 code (Manufacture of wine), which is equivalent to the 2084 US SIC code (Wines, brandy and brandy spirits). The source used to obtain the variables employed is the AIDA database (which provides accounting information on Italian limited companies and cooperatives). More specifically, in the search strategy we have taken into consideration only wineries that had positive turnovers in 2013. The companies included in the database are those that grow their own grapes, possibly buying some on the market, and those that only process grapes bought on the market. The initial sample from the AIDA database is comprised of 1197 firms. In order to guarantee the homogeneity of the companies analysed, those that produce mainly brandy and spirits are excluded. The final sample is comprised of 723 wineries.

Table 2
Criteria employed to identify the size of the firms.
Source: European Commission (2003).

	Employees	Turnover (millions of euros)	Assets (millions of euros)
Micro	0–9	0–2	0–2
Small	10–49	3–10	3–10
Medium	50–249	11–50	11–43
Big	250-	51-	44-

With regard to the variables used to estimate profitability, the following are considered (Damodaran, 2002): ROA (total earnings of the winery before interest and taxes/total assets of the winery); ROE (net income/book value of common equity of the winery); ROI (total earnings of the winery before interest and taxes/investment (plants + equipment + stocks) of the winery). To estimate productivity, two traditional ratios were estimated: sales per employee ratio (total sales revenue of the winery/total number of full-time equivalent employees of the winery); and added value per employee (added value/total number of full-time equivalent employees of the winery).

To estimate efficiency, three inputs and one output are considered. As this paper is concerned with the economic aspect of the wineries' performance, monetary variables are employed. Specifically, as output we consider the sales revenue of each winery. The justification for this choice is that wineries work with an assortment of wines, which hinders the collection of disintegrated information on outputs produced. With regard to inputs, three controllable productive factors are used: i) the number of employees, a representative input of the labour factor; ii) the equity level of the winery (capital plus reserves); and iii) the level of debt (short and long-term debt). These two latter variables are used instead of a single capital variable because access to financing and its costs is a fundamental dimension of international competition in the wine industry (Viviani, 2008).

Table 1 shows the main descriptive statistics of the variables used.

Table 3
Profitability, productivity and efficiency estimates: main results.

	Profitability			Productivity		Efficiency		
	ROA (%)	ROE (%)	ROI (%)	Sales per employee (1000 euros)	Added Value per employee (1000 euros)	Econ. Effic.	Tech. Effic.	Scale Effic.
Mean	0.34	13.91	10.45	479.902	74.896	0.315	0.506	0.710
SD	11.03	25.88	23.77	504.072	69.552	0.216	0.297	0.323
Max	47.25	99.25	99.37	2909.430	497.770	1.000	1.000	1.000
Min	−79.55	−91.69	−95.06	0.000	−46.060	0.000	0.062	0.000

Table 4
Pearson correlation coefficients of profitability, productivity and estimate averages.

	ROA	ROE	ROI	Sales per employee	Added value per employee	Econ. Effic.	Tech. Effic.	Scale Effic.
ROA	1							
ROE	0.224**	1						
ROI	0.461**	0.316**	1					
Sales per employee	0.220**	0.212**	0.242**	1				
Added Value per employee	0.389**	0.275**	0.311**	0.521**	1			
EE	0.268**	0.280**	0.348**	0.562**	0.387**	1		
TE	−0.181**	0.179**	0.037	0.275**	0.131**	0.422**	1	
SE	0.386**	0.147**	0.283**	0.278**	0.260**	0.508**	−0.469**	1

** = Prob. < 0.01.

In order to classify the firms according to their size, the European Commission (2003) recommendation is employed. This recommendation is used to identify Small and Medium Enterprises (SMEs), defining micro, small and medium-sized enterprises using the following variables: the number of employees and either turnover or balance sheet total assets (see Table 2). Big firms are identified residually. According to the European Commission (2003) recommendation, the established size classification aims to improve the consistency and effectiveness of policies targeting SMEs and would, therefore, limit the risk of distortion of competition, avoiding and limiting the proliferation of definitions of small and medium-sized enterprises in use at Community level. Thus, this recommendation is applied to any enterprise, engaged in economic activities, regardless of its legal form, including in particular entities engaged in a craft activity and other activities on an individual or family basis, partnerships or associations regularly engaged in economic activities. In this sense, this classification can be applied to any sector, including the wine sector.

4. Results

In this section, profitability and productivity indexes as well as efficiency estimates are computed. The main results are shown in Table 3.

As can be seen, for the sample analysed the mean profitability ratios are: ROA = 0.34%, ROE = 13.91%, and ROI = 10.45%. Regarding the productivity indexes, the results show that the average amount sold per employee in thousands of euros is 479.9 and the average added value per employee is 74.896 thousand of euros.

Table 3 also shows the mean efficiency estimates of the firms analysed. The mean economic efficiency is 0.315, revealing substantial productive inefficiency in the Italian wine industry. On average, wineries included in the analysis could have used 68.5% fewer inputs to obtain the same level of output. The average technical and scale efficiencies are 0.506 and 0.710. This result suggests that most of the deviation from the efficiency frontier is due to poor use of inputs and, to a lesser extent, to companies not operating at optimum size.

To examine the degree of agreement of these estimates, Pearson correlation coefficients are calculated. The results (see Table 4) show a high degree of correlation between the profitability indexes, between the productivity indexes, and between the efficiency estimates. As can be seen, almost all the correlations are positive and significant at a level of 1%. The only exceptions are the correlation between technical efficiency (Tech. Eff.) and ROA (which is significant but negative), the correlation between TE and ROI (which is not significant), and the correlation between technical efficiency and scale efficiency (which is negative and significant). Generally speaking, these results highlight the importance of considering alternative estimates of performance, since relying on only one of these estimates could lead to confounding results.

To identify the influence that firm size has on profitability and test the central hypothesis of the paper, the sample of wineries was divided into different groups by number of employees, total turnover and volume of assets, according to the European Commission recommendation criteria. Tables 5.1, 5.2 and 5.3

Table 5.1
Profitability, productivity and efficiency estimate averages by firm size according to number of employees.

	ROA	ROE	ROI	Sales per employee	Added value per employee	Econ. Effic.	Tech. Effic.	Scale Effic.
Micro ($n=451$)								
Mean	−0.011	0.128	0.069	424.141	64.197	0.281	0.550	0.595
SD	0.127	0.289	0.248	514.060	75.406	0.222	0.312	0.348
Small ($n=229$)								
Mean	0.024	0.120	0.135	537.943	79.908	0.363	0.402	0.932
SD	0.073	0.167	0.254	499.586	56.345	0.195	0.236	0.109
Medium ($n=42$)								
Mean	0.042	0.133	0.140	620.484	106.616	0.409	0.588	0.742
SD	0.040	0.156	0.149	323.984	57.120	0.171	0.286	0.131
Big ($n=1$)								
Mean	0.012	0.029	0.021	673.590	98.470	0.358	1.000	0.358
SD	–	–	–	–	–	–	–	–
F ([a])	7.043	0.120	4.289	3.986	6.506	10.739	15.574	72.472
(Sig.)	0.000	0.949	0.005	0.008	0.000	0.000	0.000	0.000
K-W ([a])	28.414	3.450	27.621	32.439	30.914	37.452	242.749	222.349
(Sig.)	0.000	0.178	0.000	0.000	0.000	0.000	0.000	0.000

[a]To estimate the F-test and the K-W test large firms have been excluded from the analyses.

Table 5.2
Profitability, productivity and efficiency estimate averages by firm size according to total turnover.

	ROA	ROE	ROI	Sales per employee	Added value per employee	Econ. Effic.	Tech. Effic.	Scale Effic.
Micro ($n=348$)								
Mean	−0.027	0.095	0.039	233.471	45.472	0.200	0.537	0.488
SD	0.139	0.289	0.249	263.159	57.845	0.162	0.333	0.322
Small ($n=243$)								
Mean	0.025	0.152	0.124	604.686	81.941	0.389	0.424	0.947
SD	0.069	0.222	0.233	549.436	64.769	0.210	0.250	0.110
Medium ($n=110$)								
Mean	0.043	0.157	0.180	822.766	117.350	0.465	0.526	0.899
SD	0.046	0.152	0.240	556.065	75.169	0.179	0.212	0.103
Big ($n=22$)								
Mean	0.049	0.171	0.191	1023.612	144.714	0.555	0.836	0.668
SD	0.043	0.196	0.217	618.176	70.890	0.180	0.204	0.137
F	19.276	3.532	13.022	76.496	50.568	96.706	17.806	206.285
(Sig.)	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000
K-W	89.203	30.017	75.537	268.226	212.426	260.061	45.340	400.281
(Sig.)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0. 000

show the main results. Generally speaking, results indicate a positive relationship between the size indicators and the different performance estimates. Except for ROE, all parametric and non-parametric tests show that the variation of the performance estimates among the four groups of firms is significant. Further, several regression models were estimated in order to check the robustness of the results (see Appendix), confirming that wineries have higher profitability as their size increases. Specifically, except for ROE and technical efficiency, most of the estimated parameters are positive and significant, showing that as size increases the winery improves its performance. Thus, the results confirm hypothesis 1 supporting a positive relationship between size and performance.

It is clear that organisational performance is a multidimensional construct and managers should take into account these different dimensions when analysing their own performance. In fact, the results obtained are even more important when comparing the performance estimates of a single winery. Depending on the index employed, the results can vary greatly, indicating significant differences, which winery managers should take into account. This result reveals, for example, that firm size can be related to ROA but not to ROE.

Table 5.3
Profitability, productivity and efficiency estimate averages by firm size according to volume of assets.

	ROA	ROE	ROI	Sales per employee	Added value per employee	Econ. Effic.	Tech. Effic.	Scale Effic.
Micro ($n=238$)								
Mean	−0.034	0.118	0.053	262.662	39.983	0.257	0.624	0.480
SD	0.163	0.316	0.289	352.696	53.232	0.212	0.315	0.321
Small ($n=307$)								
Mean	0.015	0.130	0.101	465.894	74.258	0.307	0.429	0.789
SD	0.068	0.239	0.233	481.365	68.776	0.211	0.272	0.300
Medium ($n=149$)								
Mean	0.032	0.132	0.134	745.116	105.371	0.403	0.458	0.911
SD	0.058	0.147	0.200	564.167	72.145	0.205	0.252	0.119
Big ($n=29$)								
Mean	0.041	0.116	0.144	849.836	131.543	0.414	0.613	0.729
SD	0.040	0.158	0.204	595.621	61.404	0.166	0.290	0.158
F	15.278	0.151	3.960	39.119	41.149	17.360	23.979	89.869
(Sig.)	0.000	0.929	0.008	0.000	0.000	0.000	0.000	0.000
K-W	42.425	6.449	27.596	169.018	185.802	70.643	64.944	187.869
(Sig.)	0.000	0.092	0.000	0.000	0.000	0.000	0.000	0.000

5. Conclusions

Several approaches can be found in literature for measuring economic performance. This paper simultaneously applies traditional profitability and productivity measures and a non-parametric technique to estimate efficiency; it then compares the results obtained among different groups of wineries depending on their size. The empirical application is carried out on a sample of wineries (limited companies and cooperatives) operating in the Italian market.

Results show a positive and statistically significant relation between firm size and profitability. Big firms have at their disposal greater technical and commercial opportunities, allowing them to benefit from real and financial economies of scale. They also have more bargaining power with customers, suppliers and financial institutions, as well as easier access to international markets (Baumol, 1967; Demsetz, 1973). Further, economic theory holds that increasing firm size makes it possible to raise barriers to potential entrants. The higher the barrier to entry, the lower the threat of potential competition, and the higher the profits that existing firms can earn without inducing entry (Chrystal and Lipsey, 1997). The results also highlight the need to understand why wineries are different, which is one of the main objectives in the field of strategic management. Although bigger wineries outperform small wineries, managers need to identify those factors which create diversity in terms of performance and resources among competing wineries. In this sense, we have only shown that diversity exists among the firms considered. A necessary step for future research will be to analyse which specific winery resources constitute a source of competitive advantage. Finally, this paper has an interesting policy-making implication. While micro wineries are the most common type in the Italian wine sector, future regulation should try to encourage actions directed at increasing the average size of the wineries as a way to improve the competitiveness of the entire sector.

This paper is not without limitations. First, the analysis of wineries' performance considers only the companies' turnover and not the differences in the unit value of the wine typologies produced, an element that could influence their profitability. Secondly, only Italian wineries have been analysed. The generalisation of the conclusions of the study to other countries should be made with caution. Thirdly, this paper has considered only the wineries' economic performance and the findings are not substitutes for other subjective measures directed at the assessment of aspects such as the quality of the wines produced (Delorda et al., 2015). Finally, and given the availability of information, only limited companies and cooperatives have been considered, and the generalisation of the conclusions of the study to other winery types should be made with caution.

In the final analysis, future lines of research should be directed towards considering the variables and factors that determine performance and identifying the types of management practice currently being implemented in Italian wineries that have a positive impact on productivity, profitability and efficiency. As Alvarez and Arias (2004) state, unconditional results on the relationship between size and efficiency strongly depend on the existence of the correlation between the size and other control variables that are not included in this analysis. With increasing global competition and excess quantities of grapes worldwide, wineries need to focus on methods to streamline operations and sustain productivity in the long term (Thach et al., 2005).

Appendix A. Effect on winery size on firm performance (standard deviation in brackets).

	ROA	ROE	ROI	Sales per employee	Added value per employee	Econ. Effic.	Tech. Effic.	Scale Effic.
	Beta (SD)	Beta (SD)	Beta (SD)	Beta (SD)	Beta (SD)	Beta (SD)	Beta (SD)	Beta (SD)
Size by Employees								
Intercept	−0.011 b	0.128 c	0.069 c	424.141 c	64.197 c	0.281 c	0.550 c	0.595 c
	(0.005)	(0.012)	(0.012)	(23.569)	(3.246)	(0.010)	(0.014)	(0.013)
Small	0.035 c	−0.008	0.067 c	113.802 c	15.712 c	0.083 c	−0.148 c	0.338 c
	(0.009)	(0.020)	(0.020)	(40.614)	(5.593)	(0.017)	(0.023)	(0.023)
Medium	0.053 c	0.005	0.072 a	196.343 b	42.419 c	0.128 c	0.038	0.148 c
	(0.018)	(0.040)	(0.040)	(80.748)	(11.121)	(0.034)	(0.047)	(0.046)
Big	0.023	−0.099	−0.048	249.449	34.273	0.077	0.450	−0.237
	(0.109)	(0.250)	(0.246)	(501.076)	(69.008)	(0.212)	(0.289)	(0.284)
F/LnL	7.043 c	0.120	4.289 c	3.986 c	6.506 c	10.739	15.574	72.472
Size by Turnover								
Intercept	−0.027 c	0.095 c	0.039 c	233.471 c	45.472 c	0.200 c	0.537 c	0.488 c
	(0.006)	(0.013)	(0.013)	(23.554)	(3.403)	(0.010)	(0.015)	(0.013)
Small	0.052 c	0.057 c	0.085 c	371.215 c	36.469 c	0.189 c	−0.113 c	0.459 c
	(0.009)	(0.021)	(0.020)	(36.733)	(5.307)	(0.015)	(0.024)	(0.020)
Medium	0.070 c	0.062 b	0.140 c	589.295 c	71.879 c	0.265 c	−0.011	0.411 c
	(0.012)	(0.027)	(0.026)	(48.062)	(6.944)	(0.020)	(0.031)	(0.026)
Big	0.076 c	0.076	0.152 c	790.141 c	99.242 c	0.355 c	0.299 c	0.180 c
	(0.023)	(0.055)	(0.053)	(96.595)	(13.956)	(0.040)	(0.063)	(0.052)
F / LnL	19.276 c	3.532 b	13.022 c	76.496 c	50.568 c	96.706	17.806	206.285
Size by Assets								
Intercept	−0.034 c	0.118 c	0.053 c	262.662 c	39.983 c	0.257 c	0.624 c	0.480 c
	(0.007)	(0.016)	(0.016)	(30.331)	(4.183)	(0.014)	(0.018)	(0.018)
Small	0.048 c	0.012	0.048 b	203.232 c	34.274 c	0.049 c	−0.195 c	0.309 c
	(0.009)	(0.022)	(0.021)	(40.412)	(5.574)	(0.018)	(0.025)	(0.024)
Medium	0.065 c	0.014	0.080 c	482.454 c	65.388 c	0.146 c	−0.166 c	0.431 c
	(0.011)	(0.026)	(0.026)	(48.882)	(6.742)	(0.022)	(0.030)	(0.029)
Big	0.075 c	−0.002	0.091 a	587.174 c	91.560 c	0.157 c	−0.010	0.249 c
	(0.021)	(0.049)	(0.048)	(92.032)	(12.694)	(0.041)	(0.056)	(0.054)
F / LnL	15.278 c	0.151	3.960 c	39.119 c	41.149 c	17.360	23.979	89.869

a: $p < 0.1$; b: $p < 0.05$; c: $p < 0.01$.

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