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Firms' Performance and Exports: The Case of Romanian Winemakers

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Abstract

This paper examines the impact of exports and its main determinants on the financial performance of the Romanian wine industry. We draw on a dataset consisting of mixed firm-level (i.e., 207 companies) data, web data and mezzo-economic variables, and cover the period from 2009 to 2017. We show that Romanian wine exports, at firm level, are strongly affected by regional wine productivity (especially in the case of red wine varieties), temperature and vineyard size, as well as by firm agglomeration. We also find a close positive correlation between financial performance and exports.

JEL Classifications: F61, L66, C23

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1. Introduction

This paper aims at indentifying the determinants of the Romanian wine companies' exports and at analyzing the link between exports and financial performance[1] in the Romanian wine industry. We choose to perform this in-depth analysis of the wine industry in Romania for several reasons.

First, little attention has been paid in the literature to the analysis of the wine industry in Romania although its wine sector is one of the largest in the European Union (EU). OIV (2018) shows that in 2017 Romania was ranked 13th in wine production and 14th in wine consumption in the world, and 6th and 7th, respectively, in the EU. However, Romanian wine consumption rose by only 8.5% between 2016 and 2017, while Romania's wine production saw an increase of 61% in 2016 and 31% in 2017. Thus, wine consumption appears to increase more slowly than wine production. Moreover, Romania does not seem to profit from its openness; according to the RNIS (2018), in 2017, Romania was the 37th largest wine exporter and 43th largest wine importer in the world. Hence, a gap can be seen between production and exports rankings, indicating unexploited potential in the Romanian wine industry. In this context, it is compelling to identify key determinants of Romanian wine exports.

Second, a main feature of the Romanian wine industry is the high degree of fragmentation (Eurostat, 2017). For example, in 2015, Romania accounted for only 5,7% of the vineyard area in the EU, far below Spain, Italy and France where more than 75% are concentrated. At the same time, Romania is ranked first in terms of number of vineyard holdings, accounting for a third of the EU total, well ahead of Spain, Italy, or Portugal. This suggests that the average area under vines per holding in Romania is very small[2].

Third, the sector is characterized by other unique aspects such as low yields (Noev, 2007) and its focus on bulk production. In 2015, in all EU countries with vineyards, except Romania, grapes for quality wine represent the largest share of the total area under vines (Eurostat, 2017)[3]. Wine quality and product differentiation are directly related to the wine market prices (Noev, 2007). These factors (e.g. product differentiation, prices) can have an impact on the financial performance of Romanian winemakers. This financial performance is also linked to the demand side, to the volumes sold on the domestic and foreign markets. In this context, again, the export activities and their drivers can play a crucial role. Theoretically, firm exports could enhance a company's financial performance since operations on foreign markets may induce economies of scale. This reduces production costs and increases returns, subsequently improving financial performance.

Following this, our paper analyzes the impact of exports on the financial performance of Romanian wine producers. For this purpose, we use a panel data approach with a sample that includes 207 active companies over the period 2009-2017. Our results suggest that exports are positively linked to the financial performance of the firms and that trade is impacted by several

[1] The financial dimension of performance is assessed according to the "narrow definition" of companies' performance, in the spirit of Berman et al. (1999) and Hofer's (1980). This concept of companies' performance is based on "the use of simple outcome-based financial indicators that are assumed to reflect the fulfilment of the economic goals of the firm" (Venkatraman and Ramanujam, 1986).

[2] In fact, with 0.21 ha/holding, it was the smallest in Europe in 2015.

[3] The share of quality wine/total area in Romania is 28%, which is well below the EU average (78%) (Eurostat, 2017).

regional[4] variables (e.g., wine production per hectare, cultivated vineyard area, agglomeration effects, and external temperature). Moreover, exports seem to be higher in regions that specialize in the production of red wine.

The contribution of this paper to the literature is the following. To the best of our knowledge, our paper is one of the first econometric studies to analyze the Romanian wine industry[5]; in particular, it investigates the link between Romanian exports and companies' profitability, and identifies crucial export determinants (i.e., company characteristics, economic context, and climate conditions), using an original data set composed of micro-economic data, web data, and mezzo-economic data.

The rest of our paper is organized as follows. Section 2 presents the literature. Section 3 describes the methodology and data, while Section 4 analyzes the empirical results. Section 5 sums up the robustness checks. Finally, Section 6 concludes.

2. Literature Review

The literature on exports and economic performance at the micro-level goes back to Bernard and Jensen (1995). By drawing on longitudinal data provided by the Census Bureau's Annual Survey of Manufactures (ASM) for U.S. companies they compare exporters and non-exporters. Exporters generally perform better than non-exporters in the short term, which is due to factors such as firm size, productivity, and capitalization power. Melitz (2003) explores the probability of exporting, under different sunk costs and productivity levels, in a dynamic industry model with heterogeneous firms. He finds that the more productive companies can penetrate the export market, while the less productive ones continue to operate at the domestic level. Moreover, he shows that, among companies with low productivity, the ones with the lowest productivity are eventually forced to leave the market. Crozet et al. (2012) provide further support to Melitz's (2003) analysis as they develop an empirical analysis that uses data on products' quality in a study that investigates the French wine industry. They conclude that a higher quality of wine increases exports to more markets, as well as driving higher prices and more sales in each market. Similar results are obtained by Manova (2012), who suggests that companies will perform poorly in the international market if they face more financial restrictions.

A series of studies have followed these papers. They consider either productivity or profitability to capture the firms' performance in relation to exports. However, only a few analyses are devoted to the financial dimension; the literature that investigates the impact of exports on financial performance seems to be scarce.

Within this framework, two strands of literature can be identified. The first strand shows a positive impact of exports on profitability, while the second one finds mixed results (either a negative or a non-linear effect, or no connection between exports and financial performances).

One of the first papers underlying a positive influence of exports on financial performances is the one by Fryges and Wagner (2010). Their analysis is focused on Germany's manufacturing sector during the years 1999–2004. The authors note that exports generate higher profits because

[4] Officially, Romania is divided administratively into 41 departments (*judete*) or regions, including Bucharest, the capital. These regions are considered at the NUTS 2 level. NUTS refers to territorial units for statistics set at the European level. It is a geographical system, used to divide the territory of the European Union into hierarchical levels (European Commission, 2014). The four hierarchical levels are NUTS 0, NUTS 1, NUTS 2, and NUTS 3. Throughout this study, **all the regional variables will be considered at the NUTS 2 level**; this is the most detailed regional level with available data for Romania.

[5] The financial data, provided by Bureau van Dijk (2018), is directly collected from the companies' financial reports.

the enhanced productivity is not absorbed by sunk costs. Several other papers find the same positive impact of exports on profitability (i.e., Liargovas and Skandalis (2010) or Esmeray and Esmeray (2016)).

A negative connection between exports and profitability is put forward by Esen et al. (2016). They use data from the Istanbul Stock Exchange, from 2009 to 2014, considering 107 manufacturing companies, and explain that the fall of profitability is the result of additional production and marketing costs generated by the export activity. Vogel and Wagner (2010) find a non-linear link between exports and financial performances in the case of business services firms in Germany. They show the existence of a negative and significant profitability differential of exporters compared to non-exporters. Wagner (2012) also studies the relation between exports and profitability in the case of German manufacturing firms. He shows empirically that any additional productivity unit generated by exports is "consumed" by the extra selling costs related to foreign markets. Wagner (2012) subsequently claims that there is no significant relation between exports and profitability in the manufacturing sector. Similar results are found by Grazzi (2012).

The link "exports - financial performances" is generally explained by three main theoretical transmission channels, as Mutascu and Murgea (2018) note: cost channel, risk channel, and knowledge channel. The cost channel is strongly connected to the market policy. The extension of foreign market shares or the penetration on new markets generate economies of scale. By exporting more, companies improve their productivity, reduce costs, and increase returns. The resulting positive financial performance will be incentive for further exports. The risk channel is related to company's risk exposure because of international trade openness. In this case, higher openness will spread the business risks across existing markets, avoiding losses. At the same time, this openness can also expose the company to market disturbances, which negatively affect financial performance by increasing protection costs. The knowledge channel captures the international free flow of ideas and knowledge in general. The additional knowledge and experience gained from export activities stimulate the know-how and innovation, improving financial performance by reducing costs.

Regarding the topic of wine, few papers are strictly devoted to this issue, with many of them focusing on France. For example, by analyzing the French wine industry, Viviani (2009) finds that exports positively influence financial performance, but through the intangible expenses directly connected with companies' profit and risk. Similar results are put forward by Amadieu et al. (2013), also for France. They show that exports improve financial performance but the intensity of the effect depends on whether the wine producer is a corporation or a cooperative. Unlike the aforementioned authors, Cardebat and Figuet (2019) test the influence of exchange rate as the main determinant for French wine exports. An Armington panel model, covering 2000 to 2011, represents the empirical support. The finding shows that French wines lose in term of competition during the 2000s: this is explained by the rise of domestic wine prices compared to foreign competitors and the appreciation of the Euro in respect to both USD and GBP.

The Romanian wine industry has not been analyzed closely. Only a few papers are available in the literature; they assess the competitiveness of wine or the trade performances of the sector. A brief presentation of the existing studies follows.

In order to analyze the drivers and barriers to wine export innovation, Nakata and Antalis (2013) conduct a survey of seven experts and structural managers in the Romanian wine industry. The main outcomes show that the factors driving exports are related to sales decline and the new foreign producers' entry into the industry. The external barriers to wine exports are related to the negative image of the country and to an underdeveloped internal wine market.

Ladaru et al. (2014) statistically analyze the evolution of the wine sector up to 2013, trying to identify the channels through which an improvement in competitiveness in the Romanian wine sector can be reached. Various broad measures that can be applied to increase the national and global attractiveness of Romanian wines are identified. Beciu et al. (2017) underline, in a survey, that low export prices characterize Romanian wine on international markets. The authors suggest that it is crucial to gain access to extra-European markets, where prices can be higher and allow for better marginal profits. Noev (2007) statistically analyzes the dynamics of the Romanian wine sector, since the 1990s, through the transition period till the Romania's EU accession. He shows how reforms affected the performance of wine industry and how they have caused changes in the vineyards ownership structure, wine consumption, production and trade.

Within this framework, a gap can be identified in the literature related to the analysis of the Romanian wine sector. This gap is associated to a lack of in-depth economic and econometric studies on the Romanian wine sector, using firm-level, and financial data. Our paper aims to fill this gap by investigating how exports interact with the financial performance of Romanian companies in the wine industry, using an original database and different econometric tools.

3. Data and Methodology

A. Methodology

We analyse the influence of wine exports on financial performance in the Romanian wine industry with a panel model approach and run several regressions from 2009 to 2017, using an original data set and mixing firm-level data, web data, and mezzo-economic data for 207 active winemakers.

Our empirical strategy consists of two steps: *(a)* step one explores the main determinants of wine exports, while *(b)* step two focuses on the impact of wine exports on financial performance for the considered companies. Several robustness checks are performed for both steps.

(a) The study developed in the first step analyzes the "determinants of wine exports". It uses classical panel Ordinary Least Squares (OLS) regressions by considering exogenous determinants, such as wine productivity, vine-cultivated area, an agglomeration index, export price, and climate conditions (i.e., temperature and precipitations). This approach explores the exports at the firm level by exclusively focusing on regional determinants. We nevertheless take into account the firm dimension (without explicitly focusing on it) through the basic panel OLS (and also Generalized Least Squares (GLS)) model with "regional-company" as a group cross-section. The model is written as follows:

$$Exports_{ijt} = \alpha + \sum \beta_k X_{k,ijt} + \varepsilon_{it} \quad (1)$$

where $Exports_{ijt}$ translates the wine exports of the company i from region j at moment t. α is the intercept, while β_k are the slopes of independent variables X_k (i.e., regional wine productivity, vine cultivated surface, agglomeration effect, and climate conditions), with $k = 1 .. n$. The error term is ε_{it} varying over both companies and time. In order to avoid endogeneity issues, the lag of wine productivity is alternatively used in the estimations. Moreover, we introduce among the explanatory variables the wine varieties, either as simple dummy variables or as interacted "dummy with wine productivity" variables, respectively. The unobserved heterogeneity is modeled via random-effects. We expect these models to be more appropriate than fixed-effects ones as T<N in our case and heterogeneity can be considered constant over time. The final selection of the random effects is made based on a Hausman test. Both OLS and GLS estimators are considered further in the random effects estimations.

(b) We explore, in a second step, the link between "exports and financial performances". This analysis follows a dynamic approach employing a GMM (Generalized Method of Moments) estimator. The GMM approach tackles the endogeneity issue generated by the reverse causality between exports and financial performances, but also caused by omitted variables or measurement errors. Additionally, such estimators allow controlling for heteroscedasticity. Roodman (2009) underlines several advantages of the GMM estimators. They can be used in the case of "1) 'small T, large N' panels, meaning few time periods and many individuals; 2) a linear functional relationship; 3) one left-hand-side (LHS) variable that is dynamic, depending on its own past realizations; 4) independent variables that are not strictly exogenous, meaning that they are correlated with past and possibly current realizations of the error; 5) fixed individual effects; 6) heteroskedasticity and autocorrelation within individuals but not across them" (Roodman, 2009, p. 86).

In our analysis we acknowledge that the current financial performance of winemakers might depend on their past financial performance and on current economic variables. Hence, the Arellano–Bond (1991) GMM estimator (GMM-dynamic) can be used to capture this. However, a weak instrument problem can occur in the Arellano-Bond approach. To take account of the fact that in this modelling strategy, the lagged levels of regressors might be poor instruments for the first-differenced ones, we finally choose to employ the Blundell and Bond (1998) approach. This offers an improved version of the GMM-dynamic estimator, the so-called GMM-system estimator, which also considers the level of variables, as showed in Equation (1). A system with two equations represents the core of the GMM-system estimator: one differenced and another one in level. Hansen's J-test is used to check the validity of instruments, its alternative - the Sargan test - being inconsistent under robust GMM. As Mileva (2007) suggests, the Arellano–Bond test for autocorrelation allows for detection of the autocorrelation in residuals by following the AR(2) test in first difference. Given its superior valence in term of consistency compared to the GMM-dynamic models, the GMM-system estimator is used in all related estimations for this paper.

Our model can be written as follows:

$$\Delta FinPerf_{it} = \varphi \Delta FinPerf_{it-1} + \beta_1 \Delta Exports_{it} + \psi \Delta X'_{it} + \Delta \nu_i + \Delta \varepsilon_{it} \quad (2)$$

where φ denotes the coefficient of the lagged dependent variable *FinPerf*, which in turn captures the financial performances of company *i* at time *t*. *Exports* represents the variable of interest (i.e., firms' exports), while ψ is the coefficient of the vector of control variables X'. The standard random variable with zero mean is captured by ν_i. The error term is ε_{it} which varies over both country and time.

B. Data

One of the main challenges in the analysis of the Romanian wine exports is the lack of data. Our study overcomes this problem by using firm-level data, web data, and mezzo-economic data. Our empirical approach is constructed on an extended unbalanced panel, covering the period 2009-2017. The panel includes 207 firms representing the Romanian active companies from the wine industry.

The main panel is divided into two sub-panels: the first one is used for the *"determinants of exports"* study *(a)*, while the second one serves in the *"exports and financial performances"* analysis *(b)*.

(a) In the analysis of the "determinants of exports," we include the following variables: wine exports at firm level, wine average productivity at regional level, vine cultivated areas at regional level, agglomeration index, national export price, temperature, and precipitations. As each region produces different varieties of wine given its geo-climatic regional characteristics, three dummies variables are also considered to discriminate between red, white, and mixed wine varieties produced at regional level.

The dependent variable is *wine exports*, being expressed in Euros. Due to the lack of data at firm level, this variable is a constructed one: it is obtained, at time t, by multiplying the operational revenues (Euros) of a company i, from region r, by the "wine web data" regional indicator (transformed in percentage), as follows:

$$Wine\ exports_{irt} = Operational\ revenues_{irt} \times "Wine\ web\ data"\ indicator_{rt} \quad (3)$$

The intensity of exports at regional level, captured through the "wine web data" indicator, is used to proxy the exports at the level of companies. We suppose that this exports intensity at regional level can be applied to the operational revenues of a company active in that region to proxy the firm's exports (i.e., the wine exports in operational revenues increase as the intensity of exports at regional level rises as well).

The "wine web data" variable is obtained based on the Google Trends Index, stemming from the search engine Google. It measures the frequency of searches for the English word "wine" in Romania, at the regional level. We follow the approach of Askitas and Zimmermann (2015), in which different variables in the social sciences can be approximated using internet resources. We assume that wine exports are positively and strongly correlated with the frequency of Google searches for "wine" (i.e., the more searches for "wine," the higher the wine exports in the area should be). Google Trends Index search results generate values between 0 and 100, where 0 (or 0% ≈ 0) is the minimum level, while 100 (or 100% ≈ 1) is the maximum one. Thus, exports of wine are higher if the indicator is close to 100 ≈ 1. We compute the correlation coefficient of our index of exports with the Romanian national wine exports data (mil. euros)[6], over the period 2009-2017. The results show that both the "wine web data" index and the country wine exports have the same trend with one exception: over a recent period (2015–2017), the two appear disconnected. Nevertheless, over 2009-2017, the correlation coefficient between the two variables equals 0.918, which suggests that the "wine web data" index can be a proxy for wine exports. Constructing this proxy has several advantages. It is a rather simple process, has low costs, and allows for collecting data under various forms in terms of period, frequency, regions, companies, etc.[7]

The first three independent variables are *average productivity in the wine industry at the regional level*, the *vine cultivated area in each region*, as well as an *agglomeration index*. The first two are specific determinants for wine exports, according to the Romanian Wine Exporters and Producers Association (WEPA) (2016). The third is a constructed index for each NUTS 2

[6] Source of data on Romanian national wine exports: Romanian National Institute of Statistics (RNIS, 2018)

[7] Vögele (2017, pp. 17–18), however, highlights several limits, emphasizing that "the index is self-referential and relative to itself, … the number of topics available is limited, … different countries may vary in their degrees of Internet penetration and Google's market share, … the data collection process of Google Trends gives rise to the risk of selection bias, … the data cannot be validated as direct surveys."

region, taking into account the number of firms. The average wine productivity at regional level is expressed in liters per hectare, while the regional vine cultivated area is measured in hectares. We compute the agglomeration index as the number of active winemakers per NUTS 2 region. This index is meant to capture the concentration of wine companies in a specific region. All three variables available at the regional level are linked to the firm-level data since, for each company, we have information on its geographical position. We can, subsequently, identify for each of the firms in our sample, the region in which it is located. We expect the regional average wine productivity to be positively linked with wine exports. The expected impact of regional vine cultivated areas on wine exports is mixed. Brunow et al. (2019) show that agglomeration triggers economies of scale that stimulate the exports through increased productivity. We can expect a positive sign of the agglomeration index in relation to exports.

The *export price* variable captures the economic conditions at the national level. Export price is the average national price per exported litter in Euros. A negative correlation between export price and exports can be expected, as Tamas (2017) notes, referring to the case of Romania.

Finally, two climate variables are also considered as export determinants: *temperature* and *precipitations*. Temperature is expressed in Celsius, while precipitation is expressed in millimeters per year. Both variables are registered at regional level while being extended at company level based on geographical coordinates of the latter. According to Cahill et al. (2007), climate conditions influence not only the volume of wine production, but also the quality of wine. In this context, specific climate conditions can stimulate exports as they impact the volume and quality of the wine production. However, overall, the sign of these environment variables is uncertain due to specific characteristics of the grape.

We include three *wine variety dummies*, **one for each,** red wine, white wine, and mixed wine. Each dummy is introduced separately into the considered models and takes the value 1 if a region is predominantly producing red/white/mixed wine and 0 otherwise. For each of the 41 NUTS 2 regions, we compute the specialization index in terms of dominant grape varieties; this is shown in Table A1 in the Appendix.

The operational revenues used to estimate the exports are taken from the Orbis platform database of Bureau van Dijk (2018), while the variables available at the regional level (average productivity of the wine industry, vine cultivated surface, temperature, and precipitations) are available on the website for the Romanian National Institute of Statistics (2018). The *agglomeration index* captures the concentration of companies, being computed based on information provided by Orbis platform database of Bureau van Dijk (2018). The index translates the number of active firms at the level of each region.[8] The regional agglomeration index increases as the number of companies rises within a region. The export price is available at national level and is provided by the Romanian National Institute of Statistics.

(b) In the study of "exports financial performances nexus", we employ the following variables: return on assets (ROA), wine exports, collection period, credit period, interest ratio, number of employees, and total assets.

The dependent variable is *ROA*, reflecting the company's profitability as net income over total assets as a percentage. Lu and Beamish (2004) show that *ROA* is the best way to measure the company's financial performances. The available literature does offer a set of alternatives to ROA, as outlined by Boaventura et al. (2012, p. 234): return on equity (ROE), sales growth, return on sales (ROS), operating margin, and Tobin's Q. Unfortunately, due to the lack of data

[8] Based on the Orbis information, we are able to identify the geographic coordinates of each firm. With that information, we are able to know the NUTS 2 region each firm is located in.

for the Romanian wine industry, only ROA is considered in our estimations, this indicator being consistently available in our sample.

The variable of interest is the *wine exports* as it is constructed in the previous sub-panel. As noted in the literature review section, we can expect a positive link between exports and ROA.

A set of control variables is also used. The *collection period* and *credit period* capture the quality of payment management regarding the commercial relations with customers and providers, respectively. The collection period shows the number of payment days in the commercial relationship with the customers, while the credit period reflects the number of payment days in the commercial relationship with the providers. Tang (2014) claims that one can expect a positive or negative relation between the collection period and financial performance of a firm. A higher collection period compresses the operational costs, increases sales, and secures customer loyalty, but, at the same time, it can seriously affect the balance of payment. The credit period is positively connected with financial performances because of lower operational costs. Both variables are expressed in number of payment days.

An *interacted collection-credit period* variable is constructed as the ratio between the collection period and the credit period. This is done in order to check for the quality of the management payment period. Given the above assumptions for collection and credit periods, we expect a mixed impact on the financial performance for this interacted variable.

The debt status of a company is measured by the *interest paid* in Euros. Its impact on financial performances is controversial. Modigliani and Miller (1958) show a positive influence of debt on profitability, while Smith and Warner (1979) show a negative one.

Two other variables are alternatively used to test the impact of company size on financial performances: the *number of employees* and the *total assets*. The number of employees captures the number of persons employed in each firm, while total assets is expressed in Euros. On the one hand, we can expect a positive correlation between the firm size and the profitability as a result of economies of scale. On the other hand, Mehran (1995) suggests a negative link can be also identified as small companies can be more flexible and find better business opportunities.

Finally, a *time dummy* variable is used to control for 2015 to 2017, where some disconnections between the "wine web data" index and real country wine exports are observed. The period dummy takes the value 1 for 2009 to 2015 and 0 for the remaining years.

All firm-level variables are taken from Orbis platform database of Bureau van Dijk (2018), with the exception of wine exports. In order to use the same scale of measurement, all variables used in this paper are normalized between 0 and 1 (0 being low intensity and 1 being high intensity).

Detailed information about the raw variables, for both scenarios, is presented in Tables A2–A3 in the Appendix. The stationarity property of the normalized variables is tested via the Maddala and Wu (1999) test, but only in the second scenario; the variables in the first scenario are generally scalars. We exclusively follow the first generation of panel unit-root test by assuming cross-sectional independence, the sub-panel being unbalanced (i.e., the second generation of panel unit-root tests assumes cross-sectional dependence and requires balanced panel). Although the panel has a small T compared to the N, the unit root test is employed to simply eliminate any bias doubt which can influence the quality of estimations.

Table A4, in the Appendix, shows the main results of the unit root test, with constant and with constant and trend, respectively. Finally, a VIF (Variance Inflation Factors) test for normalized variables is performed for each scenario in order to detect any multicollinearity issue, as illustrated in Tables A5–A6 in the Appendix.

4. Results and Interpretation

The results are presented by following our two-model scenarios: one scenario related to the "determinants of exports" *(a)* and another referring to the "exports and financial performance" *(b)* at the firm level.

(a) The results of the *"determinants of exports" analysis* are presented in Table A7 in the Appendix. They are obtained using OLS panel models (1)-(5).

The VIF test of multicollinearity is illustrated in Table A5. As the average value does not exceed Ringle et al.'s (2015) recommended level of 5 or Hair et al.'s (1995) rule of 10, no evidence of multicollinearity bias is found in the constructed panel models.

Model (1) in Table A7 shows that the average regional productivity and the vine cultivated area are key determinants of wine exports in Romania, both of them being statistically significant. Productivity is positively correlated with exports, while the cultivated surface has the opposite impact. Unlike productivity, the vine-cultivated surface does not confirm our expectations showing that extended surfaces compress exports.

Further, by introducing in Model (2) variables capturing specific economic conditions (i.e., agglomeration index and export price), the productivity and surface determinants remain robust. The agglomeration index is significant and positively linked with exports; however, the export price is not significant. The results show that wine producers export more as the concentration of wine companies in an area increases, reinforcing the results of Brunow et al. (2019).

Model (3) replaces the economic conditions with weather conditions by considering temperature and precipitations. However, only the temperature variable is significant, showing a positive impact on exports. In other words, the level of exports increases with higher temperatures. This estimation partially confirms the findings of Cahill et al. (2007).

Finally, Model (4) includes all determinants mentioned above, which, with the exception of export price and precipitations, are all significant. Exports are stimulated by higher productivity in the wine industry, smaller cultivated surfaces, agglomeration economies, and higher temperature (i.e., considered as a key element for the wine quality). The endogeneity issue is avoided in Model (5) by using the lag of regional wine productivity. The lagged endogenous variable is statistically significant, having a positive sign similar to like Model (4). All other variables remain as significant and show the same signs as in Model (4).

We go a step further in the analysis and investigate the impact of specific wine varieties on exports. Table A8, in the Appendix, presents the full Models (4) and (5) extended with the wine variety dummies and lagged interacted "variety of wine dummy-productivity," respectively. The estimations are run using OLS in a panel framework, as shown in Models (6)–(11). The results underline that only the regional specialization in red wine varieties is positively correlated with wine exports, while white varieties and mixed ones are negatively linked to exports. Moreover, models (9)–(11) show that the lagged interacted "red wine dummy-productivity" remains positively correlated with wine exports, while the lagged interacted "mixed wine dummy - productivity" has a negative sign.

The unobserved heterogeneity is modelled by using GLS estimators, as shown in Table A9 in the Appendix. The Hausman tests suggest in all scenarios that random-effects are more appropriate than fixed-effects. Models (12)–(15) show that the vine cultivated area, the agglomeration index and the temperature are still significant in all estimations, maintaining their previous signs. However, we find lagged wine productivity (in Model 12) or lagged interacted "variety of wine dummy-productivity" (in Models (13)–(15) respectively)) to be statistically insignificant, suggesting that wine exports are randomly sensitive to regional conditions.

(b) The outcomes of *"exports and financial performances" analysis* are illustrated in Table A10, in the Appendix, as panel GMM-system Models (16)–(19). The results of Maddala and Wu's (1999) test for panel unit root, presented in Table A4, suggest that all normalized variables used in this step are stationary in level. Table A6 does not show any multicolliniarity issue in the estimated models, as the average value of VIF test is lower than the critical level.

The GMM-system estimations deal with the endogeneity generated by the reverse causality of "financial performance - exports" (Melitz, 2003; Manova, 2012). The main instruments used to fix the issue are two proxies of "wine exports" (i.e., the wine productivity and wine cultivated surface) and the "wine exports" lagged values.

Model (16) shows that exports are strongly significant, having a positive impact on ROA. Both credit and collection period variables are significant but negatively correlated with ROA, while the paid interest is not significant. Controlling for company size via the number of employees, we find that there is a significant and negative correlation between the number of workers and ROA. The negative sign seems to be explained by a lower productivity, seen as a consequence of lower employee engagement in the Romanian wine sector (Harter et al., 2002); this can be linked to the fact that most of the workers in this sector have seasonal jobs with fixed-term contracts.

Model (17) also controls for the company size but through the total assets. This variable, however, is not significant. Here the exports and collection period maintain their significance and signs as in the previous model, while the credit period and paid interest lose their significance.

Models (18) and (19) alternatively use the number of employees and the total assets, removing the effect of the paid interest. The exports, collection period, and number of employees are significant, having the sign put forward in the previous estimations, while the credit period and total assets are not significant.

Overall, the results show that the wine exports variable has a positive impact on ROA in all the constructed scenarios, in line with the findings of Fryges and Wagner (2010), Liargovas and Skandalis (2010), and Esmeray and Esmeray (2016). It is also noteworthy that the collection period and the number of employees are robust, both having a negative impact on ROA. These outputs are in line with the results of Tang (2014) in terms of collection period and the findings of Mehran (1995) regarding the company size. The paid interest, credit period, and total assets are not significant in the analyzed scenarios. Moreover, it seems that firm exports are enhanced in regions specializing in red wine.

5. Robustness Check

Robustness checks are run at two levels. First, we introduce more variables in the model that explains the relation between financial performances and exports. We include a time period variable to account for changes over the considered period and an interaction between the collection and the credit variables. Second, two alternative variables will be used to capture the wine exports: these variables are the estimated wine exports, obtained using two econometric strategies that will be described further on in this section.

A first robustness check is run for the model that links financial performances and regional-firm-level wine exports (obtained using a web data approach). We aim at taking account of the impact that the time dimension of our study can have on the results (in this respect a time period dummy is used) and of possible interactions between key variables presented in the initial Equation 2. The results are presented in Table A11 in the Appendix. Model (20) introduces a new variable capturing the interaction between the collection period and the credit variable in order to check for the quality of the payment management period, using the number of employees as a control for the company size. The variables exports and number of employees are significant, maintaining their previous signs, while the interacted variable is not significant. Finally, Model (22) analyzes the same relation while controlling for the period with a lower correlation between "wine web data" index and the real country wine exports ("a disconnected period"). The dummy period is not significant, indicating that the observed "disconnection" does not generate a bias in estimations. Moreover, wine exports, collection period, and number of employees remain significant, keeping the signs they had in previous estimations.

In a second robustness check, we measure the "wine exports" index using *estimated* wine exports. To do so, we use a two-step approach. First, we run the full Model (12) in step (a) *"determinants of exports"* and obtain estimated wine exports drawing on both significant and non-significant variables in the regression. We call this variable *wine exports (all)*. We then employ the same approach but only include the significant regressors and call this variable *wine exports (only significant)*. We follow this approach in order to avoid any potential bias generated by the "omitted variable" issue. In a second step, we run Equation (2), which links financial performances and exports, alternatively, with the two estimated wine export variables. The results are presented in Table A12 in the Appendix.

These models are run, first, by introducing the *time dummy* mentioned in Section 3, and second, by dropping it from the regressions. As the results do not change (in the presence or in the absence of the time dummy), we present the outcomes obtained in the presence of this variable. They show that both estimated wine export alternatives significantly impact the ROA. The collection period and number of employees are also significant and have the expected signs.

6. Conclusion

In the wine industry, exports can play a crucial role in explaining the financial performance of firms. In this context, it is interesting to investigate whether Romanian wine firms could improve their financial performance via exports. Furthermore, we explore the potential drivers of wine exports.

The main results of this study suggest that more exports are associated with a better financial performance while controlling for collection payment period and firm size. In other words, profitability is positively impacted by exports and negatively affected by the collection payment period rise and by additional hired workers. Our results point to higher exports generating more revenue by being able to absorb the associated costs. A reduction of the collection period, without diminishing sales, can then lead to additional cash flows that can further support those operations. The addition of a new employee seems to be related to decreased profitability*;* this might be explained by a lower engagement in the work: employees in this sector generally have seasonal jobs with fixed-term contracts. Here the related costs can be compensated for by higher productivity generated by exports, which is one way for companies to achieve economies of scale.

At the same time, the financial performance of Romanian wine producers does not seem influenced by management of the credit payment period or by concomitant adjustment of both "collection" and "credit" payment periods. Finally, we show that Romanian wine exports, at firm level, are positively associated with higher regional wine productivity (especially in the case of red wine varieties), temperature, and vineyard size, as well as with stronger firm agglomeration.

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Appendix

Table A1
Wine Varieties at NUTS 2 Regional Level (Only in the Case of Regions with Wine Production)

Variety	NUTS 2 Regions
Red wine	Arad, Arges, Bucuresti, Buzau, Dolj, Ialomita, Ilfov, Mehedinti, Olt, Prahova, Timis, Valcea.
White wine	Alba, Bistrita-Nasaud, Brasov, Cluj, Iasi, Maramures, Mures, Salaj, Satu Mare, Sibiu.
Mixed wine	Bacau, Braila, Constanta, Galati, Neamt, Tulcea, Vaslui, Vrancea.

Table A2

Description of Variables - "Determinants of Exports"

Variable	Description	Source of data	Unit	Expected sign
Wine exports	The indicator is the value of total exports in absolute value at firm level.	Romanian National Institute of Statistics	Euros	
Regional wine productivity	The indicator shows the volume of total production of wine per hectare at regional level.	Romanian National Institute of Statistics	Litters/ha	+
Wine cultivated surface	The indicator denotes the vine cultivated surface at regional level.	Romanian National Institute of Statistics	ha	+
Agglomeration index	The index shows the number of vineyard producers at regional level.	Constructed based on Orbis platform database of Bureau van Dijk	Numbers of companies	+
Export price	The indicator captures the export price as average at regional level.	Romanian National Institute of Statistics	Euros	+
Temperature	The indicator shows the average air temperature at regional level.	Romanian National Institute of Statistics	Celsius degree	+/-
Precipitations	The indicator denotes the average precipitations at regional level.	Romanian National Institute of Statistics	mm/ year	+/-
Red wine dummy	The variable takes the value 1 if the region mainly produces red wine, and 0 otherwise.	Constructed	1 or 0	+/-
White wine dummy	The variable takes the value 1 if the region mainly produces white wine, and 0 otherwise.	Constructed	1 or 0	+/-
Mixed wine dummy	The variable takes the value 1 if the region mainly produces red and white wine, and 0 otherwise.	Constructed	1 or 0	+/-

Table A3

Description of Variables - "Exports and Financial Performances" Analysis

Variable	Description	Source of data	Unit	Expected sign
ROA	The rate is calculated by dividing the net income by total assets at firm level.	Orbis platform database of Bureau van Dijk	%	
Wine exports	The indicator translates the volume of total exports in absolute value at firm level.	Constructed based on Orbis platform database of Bureau van Dijk and using a web collecting data approach	Euros	+
Collection period	The indicator denotes the number of payment days in the commercial relationships with the customers for each firm.	Orbis platform database of Bureau van Dijk	Days	+/-
Credit period	The indicator shows the number of payment days in the commercial relationships with the providers for each firm.	Orbis platform database of Bureau van Dijk	Days	+
Paid interest	The indicator captures the total interest paid in absolute value by each firm.	Orbis platform database of Bureau van Dijk	Euros	+/-
Number of employees	The indicator shows the effective number of workers per firm.	Orbis platform database of Bureau van Dijk	Persons	+/-
Total assets	The indicator is calculated as the total assets in absolute value at firm level.	Orbis platform database of Bureau van Dijk	Euros	+/-
Time dummy	The variable takes the value 1 for the period 2009-2015, and 0 otherwise.	Constructed	1 or 0	+/-

Table A4

Panel Unit Root Tests - "Exports and Financial Performances" Analysis

Tested variable	Maddala and Wu (1999) test (level, normalized values)	
	Constant	Constant and trend
ROA	1238.1***	1072.9***
Wine exports	841.1***	674.1***
Collection period	1287.5***	970.1***
Credit period	113.9***	46.536***
Interacted collection - credit period	40.13***	2.416
Paid Interest	523.4***	591.3***
Number of employees	320.3***	606.1***
Total assets	1176.6***	1291.2***

(a) *, **and *** shows stationarity significance at 10, 5 and 1%, respectively;
(b) The null hypothesis assumes there is a common unit root.

Table A5

VIF Test - "Determinants of Exports" Analysis

Variable	VIF	1/VIF
Vine cultivated surface	5.09	0.196382
Agglomeration index	4.12	0.242548
Regional wine productivity	1.94	0.515799
Precipitations	1.41	0.711535
Temperature	1.20	0.830212
Export price	1.09	0.919114
Mean VIF	2.48	

Table A6

VIF Test - "Exports and Financial Performances" Analysis

Variable	VIF	1/VIF
Number of employees	1.43	0.701553
Paid Interest	1.40	0.716238
Total assets	1.34	0.748421
Collection period	1.23	0.812685
Credit period	1.22	0.821480
Wine exports	1.20	0.832033
Mean VIF	1.30	

Table A7

Empirical Results - “Determinants of Exports” Analysis

Dependent variable: wine exports at firm level (wine exports obtained using web data)						
Variable	Model					Expected sign
	(1)	(2)	(3)	(4)	(5)	
Regional wine productivity	0.028* (0.015)	0.036 ** (0.015)	0.044*** (0.015)	0 .048*** (0.016)		+
Lagged regional wine productivity					0 .030* (0.016)	+
Wine cultivated area	-0.033*** (0.006)	-0.070*** (0.011)	-0.036*** (0.006)	-0.068*** (0.011)	-0.068*** (0.011)	+
Agglomeration Index		0.036*** (0.009)		0.033*** (0.009)	0.037*** (0.009)	+
Export price		0.006 (0.005)		0.004 (0.005)	0.006 (0.007)	-
Temperature			0.038*** (0.011)	0.033*** (0.011)	0.031** (0.012)	+/-
Precipitations			0.010 (0.010)	0.009 (0.010)	0.006 (0.011)	+/-
Constant	0.015** (0.007)	0.009 (0.008)	-0.013 (0.010)	-0.014 (0.011)	-0.006 (0.011)	
Type of panel estimation	Panel OLS	Panel OLS	Panel OLS	Panel OLS	Panel OLS	
R-squared	0.022	0.035	0.033	0.043	0.042	
Obs.	1,177	1,177	1,177	1,177	1,053	
Groups	207	207	207	207	207	

Note:
(a) (…) denotes the standard error;
(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively;

Table A8

Empirical Results - "Determinants of Exports" Analysis Considering the Wine Varieties

Dependent variable: wine exports at firm level (wine exports obtained using web data)							
Variable	Model						Expected sign
	(6)	(7)	(8)	(9)	(10)	(11)	
Regional wine productivity	0 .056*** (0.016)	0 .046*** (0.016)	0 .057*** (0.016)				
Wine cultivated area	-0.056*** (0.011)	-0.069*** (0.011)	-0.056*** (0.012)	-0.049*** (0.011)	-0.060*** (0.011)	-0.051*** (0.012)	+
Agglomeration Index	0.030*** (0.009)	0.031*** (0.009)	0.032*** (0.009)	0.037*** (0.009)	0.036*** (0.009)	0.038*** (0.009)	+
Export price	0.006 (0.006)	0.004 (0.006)	0.005 (0.006)	0.005 (0.007)	0.005 (0.007)	0.004 (0.007)	-
Temperature	0.018 (0.012)	0.014 (0.015)	0.039*** (0.011)	0.017 (0.012)	0.020 (0.014)	0.030 (0.012)	+/-
Precipitations	0.005 (0.010)	0.016 (0.011)	-0.001 (0.011)	0.001 (0.011)	0.007 (0.011)	-0.001 (0.011)	+/-
Constant	-0.023** (0.011)	-0.003 (0.012)	-0.016 (0.011)	0.004 (0.007)	0.014 (0.008)	0.011 (0.007)	
Red wine dummy	0.019*** (0.005)						+/-
White wine dummy		-0.016** (0.008)					+/-
Mixed wine dummy			-0.016*** (0.006)				+/-
Lagged interacted 'Red wine dummy-productivity'				0.036*** (0.010)			+/-
Lagged interacted 'White wine dummy-productivity'					-0.017 (0.015)		+/-
Lagged interacted 'Mixed wine dummy-productivity'						-0.015 (0.009)	+/-
Type of panel estimation	Panel OLS	Panel OLS	Panel OLS	Panel OLS	Panel OLS	Panel OLS	
R-squared	0.058	0.051	0.054	0.051	0.040	0.042	
Obs.	1,177	1,177	1,177	1,053	1,053	1,053	
Groups	207	207	207	207	207	207	

Note: (a) (…) denotes the standard error;
(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively;

Table A9

Empirical Results - "Determinants of Exports" Analysis with Random Effects

Dependent variable: wine exports at firm level (wine exports obtained using web data)					
Variable	Model				Expected sign
	(12)	(13)	(14)	(15)	
Lagged regional wine productivity	0.001 (0.012)				+
Lagged interacted 'Red wine dummy-productivity'		0.018 (0.014)			+/
Lagged interacted 'White wine dummy-productivity'			-0.006 (0.023)		+/
Lagged interacted 'Mixed wine dummy-productivity'				-0.009 (0.012)	+/
Wine cultivated area	-0.050*** (0.019)	-0.044** (0.019)	-0.006*** (0.018)	-0.043** (0.020)	+
Agglomeration Index	0.028* (0.017)	0.028* (0.017)	0.027 (0.017)	0.028* (0.017)	+
Export price	0.005 (0.004)	0.005 (0.004)	0.005 (0.004)	0.004 (0.004)	-
Temperature	0.034** (0.016)	0.033** (0.016)	0.032* (0.018)	0.035** (0.016)	+/-
Precipitations	-0.004 (0.013)	-0.003 (0.013)	-0.003 (0.014)	-0.005 (0.013)	+/-
Constant	0.006 (0.010)	0.001 (0.009)	0.008 (0.009)	0.007 (0.080)	
Type of panel estimation	Panel GLS	Panel GLS	Panel GLS	Panel GLS	
R-squared	0.044	0.052	0.044	0.046	
Hausman test for random-effects	Prob. = 0.452	Prob. = 0.228	Prob. = 0.465	Prob. = 0.666	
Obs.	1,053	1,053	1,053	1,053	
Groups	185	185	185	185	

Note:
(a) (…) denotes the standard error;
(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively;

Table A10

Empirical Results - "Exports and Financial Performances" Analysis (Firm-Level Wine Exports Obtained Using Web Data)

Dependent variable: ROA					
Variable	Model				Expected sign
	(16)	(17)	(18)	(19)	
Wine exports	0.056*** (0.014)	0.067*** (0.026)	0.064*** (0.013)	0.071** (0.028)	+
Collection period	-0.150** (0.061)	-0.162*** (0.061)	-0.161** (0.072)	-0.179** (0.071)	+/-
Credit period	-0.043* (0.025)	-0.038 (0. 028)	-0.030 (0.019)	-0.025 (0.022)	+/-
Paid interest	0.008 (0.023)	-0.015 (0.014)			+/-
Number of employees	-1.384* (0.725)		-1.256** (0.584)		+/-
Total assets		-0.041 (0.082)		-0.037 (0.081)	+/-
Constant	0.555*** (0.024)	0.541 (0.023)	0.550*** (0.018)	0.536*** (0.019)	
Type of panel estimation	GMM-system	GMM-system	GMM-system	GMM-system	
Number of instruments	41	41	40	40	
Arellano-Bond p-vales test for AR(2)	[0.076]	[0.147]	[0.068]	[0.141]	
Hansen test [p-value]	6.32 [1.000]	9.39 [1.000]	10.63 [1.000]	8.57 [1.000]	
Obs.	1,177	1,177	1,177	1,177	
Groups	207	207	207	207	

Note:
(a) (…) denotes the standard error;
(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively.

Table A11

Empirical Results - "Exports and Financial Performances" Analysis (Web Data Wine Exports) - Robustness Check

Dependent variable: ROA			
Variable	Model (20)	Model (21)	Expected sign
Wine exports	0.063*** (0.016)	0.056*** (0.015)	+
Collection period		-0.150** (0.066)	+/-
Credit period		-0.043* (0.023)	+/-
Interacted collection – credit period	-0.0001 (0.001)		+
Paid interest	-0.015 (0.020)	0.008 (0.024)	+/-
Number of employees	-1.432* (0.777)	-1.386** (0.707)	+/-
Period dummy		-0.0002 (0.011)	+/-
Constant	0.530*** (0.019)	0.556*** (0.021)	
Type of panel estimation	GMM-system	GMM-system	
Number of instruments	40	42	
Arellano-Bond p-vales test for AR(2)	[0.135]	[0.083]	
Hansen test [p-value]	9.46 [1.000]	4.36 [1.000]	
Obs.	1,177	1,177	
Groups	207	207	

Note:
(a) (…) denotes the standard error;
(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively.

Table A12

Empirical Results - “Exports and Financial Performances” Analysis (Estimated Wine Exports) - Robustness Check

Dependent variable: ROA			
Variable	Model		Expected sign
	(22)	(23)	
Estimate wine exports (all)	0. 838* (0.459)		+
Estimated wine exports (only significant)		0.840* (0.464)	+
Collection period	-0.111* (0.058)	-0.105** (0.056)	+/-
Credit period	-0.040 (0.028)	-0.046 (0.030)	+/-
Paid interest	0.011 (0.021)	0.021 (0.026)	+/-
Number of employees	-1.236* (0.701)	-1.465* (0.802)	+/-
Period dummy	-0.001 (0.011)	0.001 (0.012)	+/-
Constant	0.543*** (0.021)	0.552*** (0.020)	
Type of panel estimation	GMM-system	GMM-system	
Number of instruments	30	32	
Arellano-Bond p-vales test for AR(2)	[0.083]	[0.087]	
Hansen test [p-value]	5.76 [1.000]	5.68 [1.000]	
Obs.	1,177	1,177	

Note:
(a) (…) denotes the standard error;
(b) ***, **, and * show significance at 1, 5 and 10 % level of significance, respectively.