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Investment Behaviour and Firms' Financial Performance: A Comparative Analysis Using Firm-Level Data from the Wine Industry

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This paper assesses the role of financial performance in explaining firms' investment dynamics in the wine industry from the three European Union (EU) largest producers. The wine sector deserves special attention to investigate firms' investment behaviour given the high competition imposed by the latecomers. More precisely, we investigate how the capitalisation, liquidity and profitability influence the investment dynamics using firm-level data from the wine industry from France (331 firms), Italy (335) firms and Spain (442) firms. We use data from 2007 to 2014, drawing a comparison between these countries, and relying on difference- and system-GMM estimators. Specifically, the impact of profitability is positive and significant, while the capitalisation has a significant and negative impact on the investment dynamics only in France and Spain. The influence of the liquidity ratio is negative and significant only in the case of Spain. Therefore, we notice different investment strategies for wine companies located in the largest producer countries. It appears that these findings are in general robust to different specifications of liquidity and profitability ratios, and to the different estimators we use.

Keywords: firm investment, financial performance, wine industry, comparative analysis

Introduction

One of the key challenges the corporate finance literature has to cope with is the identification of determinants of firms' investment behaviour. Understanding the factors influencing firms' investment is important from the perspective of financial management optimisation and investors' wealth. For this purpose, prior literature investigates the role of a large set of external and internal determinants, and reports mixed empirical evidence. However, the interest for studding the investment behaviour of wine companies is scarce. This paper fills in this gap and adds to the menu of studies addressing the role of internal factors in supporting the firms' investment

behaviour, by focusing on the role of financial performance and using wine industry firm-level data from the largest wine producing countries, namely France, Italy and Spain. We posit that the investment behaviour of the wine companies located in these countries is not only influenced by the economic context and competition policies (Rizzo, 2019), but also by their financial performances.

The external determinants of firms' investment behaviour are related to business cycle (Gertler & Gilchrist, 1994; Jeon & Nishihara, 2014; Pérez-Orive, 2016), taxation (Hall & Jorgenson 1967; Morck, 2003; Jugurnath et al., 2008), monetary policy (Vithessonthi et al., 2017), quality of institutions (Ajide, 2017), and even to the behaviour of other firms from the same industry (Lyandres, 2006; Leary & Roberts, 2014; Park et al., 2017). Noteworthy studies (Abel, 1983; Bernanke, 1983; Hartman, 1972; Pindyck, 1988; Calcagnini & Iacobucci, 1997; Baum et al., 2008; Glover & Levine, 2015) investigate the controversial role of uncertainty in influencing firms' investment behaviour.[1]

Two main categories of internal factors explain firms' investment behaviour.[2] On the one hand, building upon Modigliani and Miller (1958), the literature underlines the role of financial constraints, leverage and cash flow (Fazzari et al., 1988; Gilchrist & Himmelberg, 1995; Lang et al., 1996; Chen et al., 2001; Suto, 2003; Aivazian et al., 2005; Ahn et al., 2006; Baum et al., 2010; Almeida et al., 2011; Maçãs Nunes et al., 2012; Colombo et al., 2013; Vermoesen et al., 2013; Ameer, 2014). On the other hand, agency costs, information asymmetry and ownership structure are put forward (Jensen & Meckling, 1976; Koo & Maeng, 2006; Danielson & Scott, 2007; Alex et al., 2013; Farla, 2014; Mavruk & Carlsson, 2015). Several papers (e.g. Shen & Wang, 2005) show that both financial constraints and ownership structure influence the investment decision, while other papers (e.g. Bokpin & Onumah, 2009) underline the role of firms' size in explaining the investment behaviour.

The financial constraints and firms' leverage have important implications on the investment behaviour (Suto, 2003; Ahn et al., 2006), at the same time influencing the structure of investment (Almeida et al., 2011). A series of studies shows that financial constraints have a negative impact on firm-level investment. In this line, Vermoesen et al. (2013) report that high leveraged Belgian firms experienced a larger investment contraction during crisis times, compared to less leveraged firms. Opposite findings are reported by Baum et al. (2010) for a set of manufacturing United States (US) firms, who show that leverage stimulates the investment under the effects of uncertainty. However, most of existing empirical works focus on the role of financial constraints in explaining the investment – cash flow sensitivities. The financial friction theory mentions that the impact of cash flow on

investment increases in the presence of credit constraints. While Aidogan (2003) shows that the sensitivity of firm's investment to its own cash flow increases for growing firms, Kim (2014) states that the investment – cash flow sensitivity is explained by the level of external financing. Using a Panel Smooth Transition Regression model for 519 Asian listed firms over the period 1991–2004, Ameer (2014) reports that investment – cash flow sensitivity varies across different categories of firms. Mulier et al. (2016) also point out that the highest investment – cash flow sensitivity characterises financially constrained firms. Another set of works (e.g. Gamba and Triantis 2008; Arslan-Ayaydin et al., 2014) underlines the role of financial flexibility in fostering firm-level investment. Using a sample of 1,068 Asian firms, Arslan-Ayaydin et al. (2014) report that financial flexibility achieved through conservative leverage policies has significant influence on investment, in particular in crisis periods.

The second strand of literature investigates the role of agency costs, information asymmetry and ownership structure in influencing the investment behaviour. In their pioneering paper, Jensen and Meckling (1976) show that agency conflicts might distort firms' investment decision in the presence of multiple owners. Performing an empirical investigation for a panel of 115 listed firms in Taiwan for the period 1991–1997, Shen and Wang (2005) highlight that investment behaviour is financially constrained in a cross-ownership system. At the same time, Koo and Maeng (2006) find that the presence of foreign ownership in Korean firms decreases the investment – cash flow sensitivity. More recently, Farla (2014) discovers that firms' investment behaviour has little dependency on a country's macroeconomic setting, while foreign-owned firms have lower investment dynamics.

Only few papers, however, focus on the role of profitability and liquidity on the investment behaviour (Perić & Đurkin, 2015; Yu et al., 2017). While some studies (Stickney & McGee, 1982; Gilchrist & Himmelberg, 1995; Black et al. 2000) use financial performance indicators as control variables in their empirical specifications, several papers put accent on the role of liquidity in influencing the investment behaviour. As Baum et al. (2008) show, the impact of liquidity on investment is not straightforward. While in crisis periods characterised by credit contractions and financial frictions it is expected that liquidity positively influence the investment decision, an opposite effect appears if investment projects are delayed. On the one side, Acharya et al. (2007) state that the liquidity level sustains firms' future investment and offers protection against market risks. On the other side, Hirth and Viswanatha (2011) find that in the case of financially constrained firms, the relationship between liquidity and investment is U-shaped.

We extend the existing literature by examining not only the role of liquidity, but also the impact of capitalisation and profitability on investment

behaviour. All these variables characterise the firms' financial performance, offering at the same time information about risk protection and incentive to develop the business. The level of cash holdings and thus the level of liquidity is considered the cheapest cost of investment. Therefore, for a specific period, if firms decide to increase their liquidity for risk protection reasons (i.e. during crisis periods), a trade-off is expected between liquidity and investment. The increase of capitalisation level might also be done in the detriment of investment. It is surprising that previous literature does not debate the role of capitalisation in the investment behaviour. However, the level of capitalisation provides, on the one hand, information about the debt level and, on the other hand, information about the way shareholders interact with managers in the investment decision. When investment becomes risky, shareholders might prefer to increase capitalisation. At the same time, shareholders' equity represents an investment resource. In this context, during a fiscal year, it is expected that an increase in capitalisation negatively influence the investment dynamics. Finally, the level of profitability positively affects the investment behaviour. First, profitability increases the level of internal funds available for investment and has a negative influence on leverage (Datta & Agarwal, 2014). Second, high profits provide information about market dynamics and recommend future investments.

Another contribution of this paper to the bulk of literature investigating the determinants of firm-level investment consists of the empirical approach we use. Investment dynamics affects the firms' financial performance in its turn (Gatchev et al., 2009). Therefore, in line with other studies, we address the endogeneity issues resorting to a Generalised Method of Moments (GMM) panel approach. Nevertheless, different form previous works, we address different econometric issues as residual autocorrelation or instruments' over-identification, which may introduce a bias in the reported results, if the models are not correctly specified. Comparing a difference-GMM (Arellano & Bond, 1991) and a system-GMM estimator (Blundell & Bond, 1998), we show that the results are sensitive to different econometric specifications, although they are robust to alternative measures of liquidity and profitability.

Finally, we investigate the role of financial performance on the investment behaviour using wine industry firm-level data from France, Italy and Spain, the largest European Union (EU) and worldwide producers. As far as we know, the study by Outreville and Hanni (2013) is the only one addressing the determinants of investment in the wine industry. However, the authors focus on the foreign investment, investigating the case of the largest multinational enterprises, and underline the role of location for the inward investment. Different from this work, we analyse the case of domestic and foreign firms acting in the wine industry from the largest producing coun-

tries. France and Italy dominated the international wine market before the 1980s (Morrison & Rabellotti, 2017). Spain recorded a considerable development of the wine industry since then. Therefore, even after the increasing importance of newcomers in the industry (i.e. US, Chile, South Africa or Australia), the three EU countries continued to dominate the wine industry at global level.[3] Has the financial performance of firms located in these countries a similar impact on their investment behaviour in the context of an increased competition on the wine market? We try to respond to this question analysing firm-level data for 331 firms located in France, 335 firms located in Italy and 442 firms from Spain, over the period 2007 to 2014.

The rest of the paper is structured as follows. The second section presents some general statistics about the wine industry, with a focus on the EU. The third section describes the data and the methodology. The fourth section highlights the empirical results and presents the robustness checks. In the fifth section we present the summary of results and discuss in a comparative manner the role of financial performance on firms' investment behaviour in the three analysed countries, generating policy recommendations. The last section concludes.

General Statistics about the Wine Industry in the Selected EU Countries

During the last decades, in the context of new EU regulations, wine-producing regions of Europe struggled to adapt to changing market conditions and to fight against the competition of newcomers in this industry (Outreville & Hanni, 2013). Table 1 indicates that France, Italy and Spain together represented more than 55% from the total wine production, and more than 25% of total wine exports during the 1960s. However, the total production of these countries dropped to 45% out of the world production during the 2010s, while the total exports represent nowadays more than 50%. These figures show that world-level production and consumption increased with the newcomers on the wine market, but the consecrated producers became more and more competitive. This happened in the context of an intensive process of international acquisitions, driven by competitive prices and the opportunity to acquire key brands (Anderson et al., 2003). Given that wine is considered a typical cultural commodity, these producers readapted their market strategy, underlining the intangible characteristics of their product (e.g. the notion of 'terroir' in France). Nevertheless, while Italy and Spain continued to increase their quotas in the world exports, France encountered a severe contraction during the last decade.

As compared to other EU countries, France, Italy and Spain are considered by far the largest producers, representing according to the Eurostat statistics, more than 80% of the total wine production in the EU. Table 2

Table 1 Wine Production and Exports

		1961	1970	1980	1990	2000	2007	2008	2009	2010	2011	2012	2013
(a)	FR	22.59	24.97	19.79	22.98	20.32	17.80	15.69	17.47	16.77	18.69	16.17	14.67
	IT	24.42	22.81	24.57	19.24	19.10	15.47	16.15	16.22	16.54	14.87	14.70	15.39
	SP	9.39	8.48	12.03	13.92	14.54	13.30	13.73	12.14	13.36	12.33	11.95	15.75
(b)	FR	14.72	11.26	19.58	28.19	22.07	16.34	15.17	13.66	14.12	14.30	14.87	14.52
	IT	6.87	15.25	33.49	29.55	23.20	21.12	20.91	22.79	23.26	23.70	21.08	20.31
	SP	5.48	9.03	12.22	10.80	12.01	16.32	17.66	16.98	18.37	21.81	20.31	17.96

Notes Rpw headings are as follows: (a) wine production, (b) wine exports. Percentages of world total volumes. Based on data from Faostat database (http://www.fao.org/faostat/en/#home).

Table 2 Opening Stocks by Vintage Year in the EU Countries

	2007–8	2008–9	2009–10	2010–1	2011–2	2012–3	2013–4	2014–5	2015–6	2016–7
FR	57,062	57,459	53,901	54,061	54,518	59,958	53,238	47,830	50,318	51,514
IT	41,120	41,719	44,746	41,360	41,502	40,632	36,500	45,250	41,276	42,692
SP	33,817	34,168	36,962	36,446	34,169	28,677	29,311	36,619	33,730	30,701
EU	165,624	167,871	174,182	170,454	164,921	160,483	150,868	164,249	162,908	163,586

Notes 1,000 Hl. Based on data from Eurostat database (http://www.fao.org/faostat/en/#home).

presents the dynamics of the wine industry in terms of opening stocks in the selected EU countries.

Data and Methodology

Data

We use firm-level annual data from AMADEUS database to investigate the impact of firms' financial performance on the investment dynamics over the period 2007 to 2014. To avoid the broken panel bias, we have included in our analysis only firms without missing values for a specific indicator. Further, we have dropped from our sample the companies where data indicate a capitalisation ratio (capital to total assets) over 100%. Finally, our sample includes 331 firms out of 367 firms registered in France (90%), 335 firms out of 410 recorded in Italy (82%), and 442 firms out of 531 registered in Spain (83%). The focus on firms with complete data may only introduce a sample bias, because firms with specific characteristics are more likely to enter in our sample. However, in our case, this bias is marginal given the high percentage of retained companies from each country. Moreover, as Andrén and Jankensgård (2015) state, balancing the panel has an important benefit as it allows the possibility to perform different robustness checks.

The investment dynamics (*inv*) is calculated as the growth rate of fixed assets. The liquidity ratios (general liquidity ratio – *lr* and current ratio – *cr*), as well as the profitability ratios (Return on Equity – *roe* and Return on Assets – *roa*) are extracted from AMADEUS database, while the capitalisation ratio (*cap*) is equivalent with the capital to total assets ratio.

Table 3 presents the results of panel unit root tests for all variables

Table 3 Panel Unit Root Tests

Country	Variable	(1)	(2)	(3)	(4)
France	*inv*	–178.48‡	–26.687‡	1283.5‡	1832.4‡
	cap	–59.872‡	–4.8567‡	826.21‡	1139.2‡
	lr	–29.625‡	–4.2284‡	938.34‡	1266.6‡
	cr	–136.49‡	–8.8148‡	875.02‡	1255.3‡
	roe	–95.209‡	–13.785‡	1162.3‡	1672.9‡
	roa	–93.703‡	–14.462‡	1112.0‡	1577.2‡
Italy	*inv*	–10523‡	–3696.9‡	1830.4‡	1708.2‡
	cap	–633.61‡	–40.561‡	860.73‡	1455.6‡
	lr	–34.530‡	–3.5804‡	871.94‡	1191.2‡
	cr	–25.908‡	–2.1644†	872.10‡	1042.6‡
	roe	–55.071‡	–11.468‡	1051.9‡	1635.9‡
	roa	–43.487‡	–8.1827‡	971.91‡	1396.2‡
Spain	*inv*	504.00	–33.357‡	1882.1‡	2807.2‡
	cap	0.2664	–11.625‡	1053.3‡	1270.6‡
	lr	–38.522‡	–3.9996‡	1179.6‡	1581.3‡
	cr	–33.441‡	–3.9028‡	1226.2‡	1498.1‡
	roe	–254.89‡	–19.882‡	1409.3‡	2367.1‡
	roa	–214.84‡	–14.507‡	1327.7‡	2044.8‡

Notes Column headings are as follows: (1) Levin-Lin-Chu t^*, (2) Im-Pesaran-Shin W-stat, (3) ADF-Fisher Chi-square, (4) PP-Fisher Chi-square. *, †, and ‡ mean stationarity significant at 10%, 5%, and 1%. For all the tests, the null hypothesis is that the panel contains a unit root. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution, while the other tests assume asymptotic normality.

and countries. With a small exception (the t^* test indicates the absence of stationarity for investment and capitalisation in the case of Italy), all variables are stationary and GMM models may be tested.

Methodology

Classical panel data analyses investigating the role of firms' financial performance on their investment behaviour usually use fixed effects models to avoid the omitted variables bias. Therefore, along with previous studies, we draw first on a panel fixed effects model (Equation 1).

$$Y_{i,t} = \alpha_0 + \alpha_1 X_{i,t} + \beta_i + \varepsilon_{i,t}, \quad (1)$$

where Y_{it} is the dependent variable (*inv*), α_0 is the intercept, β_i represents all the stable characteristics of firms from each country, X_{it} represents the vector of independent financial performance variables, α are the coefficients, and $\varepsilon_{i,t}$ is the error term.

Given the fact that our sample has a $N > T$ structure (the number of companies is much higher than the number of periods), we also test a random model (Equation 2), which controls for all stable covariates (Allison & Waterman, 2002). To select between these two static models, a Hausman test is performed.

$$Y_{i,t} = \alpha_0 + \alpha_1 X_{i,t} + \beta_i + \mu_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where μ represents between-entity errors and $\varepsilon_{i,t}$ are the within-entity errors.

The results of the classic static models might be affected by an endogeneity bias. While the firms' financial performance influences the investment behaviour in the wine industry, we can also expect that an increase in investment will have a negative impact on liquidity and profitability in the short-run, and an opposite effect in the long run. Further, static models do not account for dynamics, where changes in explicative variables influence the dependent variables after a time adjustment, that is, in the long run. Therefore, we address the endogeneity issue applying a GMM approach. We first resort to the dynamic-GMM estimator of Arellano and Bond (1991):

$$\Delta investment_{i,t} = \sum_{j=t-p}^{t-1} \vartheta_j \Delta investment + \alpha_1 \Delta capitalisation_{i,t} + \alpha_2 \Delta liquidity_{i,t} + \alpha_3 \Delta profitability_{i,t} + \Delta\mu_{i,t} + \Delta\nu_{i,t}, \quad (3)$$

where ϑ is the first lag of investment dynamics, $\mu_{i,t}$ and $\nu_{i,t}$ are the error terms which vary over both firms and time, α are the coefficients of the explanatory variables.

However, for large *N* and small *T* samples, the system-GMM might have better properties (Blundell & Bond, 1998), since in the case of difference-GMM estimator, lagged levels of regressors are considered poor instruments and $\Delta investment_{i,t}$ might be still correlated with $\Delta\nu_{i,t}$. The system-GMM estimator implies a system of two simultaneous equations, one in level and one in first difference. In this case, both lagged first differences and lagged levels of variables act as instruments.

Both GMM estimators might suffer from the proliferation of instruments and a Sargan test is used for over-identifying restrictions related to instruments. However, the Sargan test is not powerful enough in the presence of too many instruments. Therefore, a Hansen test statistic should be used if nonsphericity is suspected in the errors, which requires robust error correction (Roodman, 2009).

In conclusion, the two GMM estimators we use (difference- and system-GMM) serve as different tools for testing the robustness of our findings. In addition, we also check the robustness by using a two-step estimator instead of the default one-step. The two-step estimator requires robust errors and, in this case, the standard covariance matrix is robust to panel-specific autocorrelation and heteroscedasticity. Further, in the two-step approach the number of parameters does not grow with the number of estimated regressors in the nonlinear GMM step. The autocorrelation issue is checked with the Arellano-Bond tests (AR(1) and AR(2)) for autocorrelation, applied to differenced residuals. While the AR(1) process usually rejects the null hy-

Table 4 GMM Results for France (One-Step Results, GMM Errors)

	Difference-GMM				System-GMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
c	20.31†	20.49†	21.49†	21.73†	14.26†	14.24†	16.16†	16.05†
lag(1)	0.000*	0.000	0.000*	0.000	0.001*	0.000	0.001*	0.000
cap	–2.462†	–2.268†	–2.447†	–2.254†	–1.846†	–1.692†	–1.884†	–1.731†
lr	–0.533	–0.364			–0.138	–0.284		
cr			–0.725	–0.659			–0.687	–0.730
roe	0.666†		0.671†		1.174†		1.196†	
roa		0.539		0.556		2.205†		2.261†
Observations		1,986				2,317		
Groups		331				331		
Instruments		94				59		
Sargan over-identification	721.4 [0.00]	724.3 [0.00]	719.8 [0.00]	722.5 [0.00]	885.4 [0.00]	896.9 [0.00]	886.4 [0.00]	898.5 [0.00]

Notes *lag*(1) is the first lag of the dependent variable; capitalisation is considered strictly exogenous while liquidity and profitability are endogenous variables; *, †, and ‡ means significance at 10%, 5% and 1%; *inv* – investment dynamics, *cap* – capitalisation ratio, *lr* – liquidity ratio, *cr* – current ratio, *roe* – return on equity, *roa* – return on assets.

pothesis of no autocorrelation, the AR(2) test is more important as it helps detecting the autocorrelation in levels.

Empirical findings

This section presents the results obtained for each country retained into analysis. The findings of static estimators are presented in Tables 6, 9, and 12 and serve as reference for potential comparisons with similar researches. According to the fixed and random effects models, there is no significant influence of firms' financial performance on their investment behaviour in the case of France and Italy. However, the capitalisation and liquidity negatively affect the investment dynamics in Spain, while the profitability level has an opposite effect.

In what follows, we focus on the dynamic estimators' results, and we present the empirical findings for each country. For each estimator, four different models are tested (Models 1–4), resulting from an alternative use of liquidity ratios (*lr* and *cr*) and profitability ratios (*roe* and *roa*). While liquidity and profitability are considered endogenous variables, the capitalisation ratio is included in estimations strictly as exogenous variable. There is no theoretical intuition that shows a direct increase or decrease in the level of capitalisation, following an increase in the level of investment.

Results for France

In the case of France, the first set of estimations (one-step results) shows generally robust findings between difference- and system-GMM estimators (Table 4). As expected, in all the cases the capitalisation level negatively in-

Table 5 GMM Results for France (Two-Step Results, Robust Errors)

	Difference-GMM				System-GMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
c	12.48	11.55	13.52*	12.56	3.621	1.520	7.926	6.261
lag(1)	0.000†	0.000†	0.000†	0.000†	0.073	0.073	0.031	0.037
cap	–2.123	–1.747	–2.113	–1.729	–0.015	–0.002	–0.026	–0.021
lr	–0.397	–0.203			–2.430	–1.722		
cr			–0.550	–0.453			–1.593	–1.564
roe	0.654		0.668		0.237		–0.007	
roa		0.536		0.603		0.880		0.456
Observations	1,986				2,317			
Groups	331				331			
Instruments	94				32			
Arellano-Bond test AR(1)	–1.339 [0.18]	–1.325 [0.18]	–1.340 [0.18]	–1.326 [0.18]	–1.320 [0.18]	–1.360 [0.17]	–1.330 [0.18]	–1.350 [0.17]
Arellano-Bond test AR(2)	–0.447 [0.65]	–0.143 [0.88]	–0.474 [0.63]	–0.169 [0.86]	0.310 [0.75]	0.460 [0.64]	–0.020 [0.98]	0.080 [0.93]
Sargan over-identification					7.170 [1.00]	10.29 [0.99]	19.70 [0.84]	18.40 [0.89]
Hansen over-identification					27.62 [0.43]	24.52 [0.60]	22.66 [0.70]	21.74 [0.75]

Notes *lag*(1) is the first lag of the dependent variable; capitalisation is considered strictly exogenous while liquidity and profitability are endogenous variables; *, †, and ‡ means significance at 10%, 5% and 1%; *inv* – investment dynamics, *cap* – capitalisation ratio, *lr* – liquidity ratio, *cr* – current ratio, *roe* – return on equity, *roa* – return on assets.

Table 6 Results of Fixed and Random Effect Estimators for France

Variables	Model 1		Model 2		Model 3		Model 4	
	F	R	F	R	F	R	F	R
c	109.0 (106)	107.4 (68.73)	92.32 (108)	82.41 (69.39)	107.6 (108)	118.8 (71.34)	90.37 (111)	93.06 (72.18)
cap	–2.158 (13.49)	–0.579 (4.287)	–4.123 (13.45)	–0.338 (4.290)	–2.173 (13.49)	–0.535 (4.277)	–4.155 (13.44)	–0.298 (4.281)
lr	–1.639 (37.71)	–10.06 (26.49)	–3.861 (37.77)	–9.031 (26.52)				
cr					–0.315 (20.69)	–9.197 (15.33)	–1.157 (20.71)	–8.406 (15.34)
roe	–7.237 (4.716)	–6.188* (3.473)			–7.242 (4.714)	–6.220* (3.473)		
roa			1.431 (16.96)	–1.416 (10.89)			1.374 (16.95)	–1.520 (72.18)
Hausman test (recommended)	Prob > χ^2 = 0.97 (random)		Prob > χ^2 = 0.98 (random)		Prob > χ^2 = 0.91 (random)		Prob > χ^2 = 0.93 (random)	

Notes F – fixed, R – random. *, †, ‡ means significance at 10%, 5% and 1%. Standard errors are reported in brackets.

fluences the investment dynamics. This result states that an increase of the capitalisation ratio might be made in the detriment of an increase in investments. While the liquidity is not important for the investment dynamics, the profitability has a positive influence, as expected. However, this last result

Table 7 GMM Results for Italy (One-Step Result, GMM Errors)

	Difference-GMM				System-GMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
c	24.24†	27.19†	16.26†	23.48†	7.021	9.288	–1.830	1.887
lag(1)	–0.000	–0.000	–0.000	–0.000	–0.000	–0.001	–0.000	–0.001
cap	–0.127	–0.177	0.075	–0.034	–0.076	–0.126	0.087	0.005
lr	–3.858	–5.958			12.71†	10.25†		
cr			1.709	–1.953	–0.044		12.23†	9.779†
roe	–0.006		0.013				–0.031	
roa		–0.617		–0.399		0.655		1.149
Observations		2,010				2,345		
Groups		335				335		
Instruments		94				59		
Sargan over-identification	615.7 [0.00]	635.3 [0.00]	489.0 [0.00]	546.9 [0.00]	741.1 [0.00]	777.7 [0.00]	601.7 [0.00]	671.5 [0.00]

Notes *lag*(1) is the first lag of the dependent variable; capitalisation is considered strictly exogenous while liquidity and profitability are endogenous variables; *, †, and ‡ means significance at 10%, 5% and 1%; *inv* – investment dynamics, *cap* – capitalisation ratio, *lr* – liquidity ratio, *cr* – current ratio, *roe* – return on equity, *roa* – return on assets.

is influenced by the way the profitability is measured, a significant influence being reported only in the case of *roe*.

The Sargan test shows, nevertheless, that these findings might be affected by the proliferation of instruments. Therefore, in the second part we have performed two-step estimation, where the number of maximum lags for the dependent variable is set at one and for the explanatory variable at two. In this case, the results do not indicate a significant influence of financial performances on the investment dynamics (Table 5). The findings are similar for both estimators and for all the models, and in agreement with the static analysis (Table 6). Moreover, in this case, the Arellano-Bond tests show no autocorrelation problem, while the Sargan and Hansen tests indicate that the instruments are well identified.

We thus conclude that in the case of France, the capitalisation negatively impacts the investment dynamics, while the profitability has a positive impact. The liquidity has no significant influence on investment. However, these findings might be influenced by the over-identification of instruments and are not confirmed by the two-step estimation, which puts into question their robustness.

Results for Italy

In the case of the Italian wine industry, the default one-step estimation shows no significant influence of financial performance on investment dynamics, except for the liquidity ratios for the system-GMM approach. Table 7 shows no significant impact of capitalisation and profitability, while the Sargan over-identification test indicates a proliferation of instruments is-

Table 8 GMM Results for Italy (Two-Step Results, Robust Errors)

	Difference-GMM				System-GMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
c	13.29†	15.69†	6.902	13.04†	12.98†	13.70†	12.89†	13.60
lag(1)	–0.000	–0.000	–0.000	–0.000	0.016	0.003	0.033*	0.007
cap	–0.099	–0.111	0.083	–0.027	–0.086	–0.105	–0.089	–0.081
lr	–3.952	–6.044†			–1.548	–1.127		
cr			1.675	–1.969			–0.956	–0.738
roe	–0.006		0.008		0.026		0.057	
roa		–0.745		–0.491		–0.199		–0.115
Observations		2,010				2,345		
Groups		335				335		
Instruments		94				59		
Arellano-Bond test AR(1)	–1.716 [0.08]	–1.715 [0.08]	–1.717 [0.08]	–1.716 [0.08]	–1.750 [0.08]	–1.720 [0.08]	–1.750 [0.08]	–1.720 [0.08]
Arellano-Bond test AR(2)	0.321 [0.74]	0.161 [0.87]	0.686 [0.49]	0.454 [0.64]	0.850 [0.39]	0.610 [0.54]	1.150 [0.25]	0.730 [0.46]
Sargan over-identification					3.260 [1.00]	4.280 [1.00]	2.580 [1.00]	3.690 [1.00]
Hansen over-identification					30.99 [0.27]	27.55 [0.43]	31.32 [0.25]	29.78 [0.32]

Notes *lag*(1) is the first lag of the dependent variable; capitalisation is considered strictly exogenous while liquidity and profitability are endogenous variables; *, †, and ‡ means significance at 10%, 5% and 1%; *inv* – investment dynamics, *cap* – capitalisation ratio, *lr* – liquidity ratio, *cr* – current ratio, *roe* – return on equity, *roa* – return on assets.

Table 9 Results of Fixed and Random Effect Estimators for Italy

Variables	Model 1		Model 2		Model 3		Model 4	
	F	R	F	R	F	R	F	R
c	71.71 (45.56)	45.86 (35.54)	73.77 (46.70)	47.18 (35.85)	73.94 (52.33)	49.99 (38.61)	75.99 (53.30)	50.82 (38.83)
cap	–0.388 (3.452)	–0.829 (2.458)	–0.364 (3.454)	–0.839 (2.458)	–0.387 (3.453)	–0.867 (2.463)	–0.363 (3.455)	–0.873 (2.463)
lr	–21.44 (27.28)	6.393 (12.51)	–21.40 (27.28)	7.107 (12.74)				
cr					–14.15 (22.06)	1.522 (11.21)	–14.12 (22.06)	1.885 (11.34)
roe	0.000 (1.043)	0.036 (0.734)			0.009 (1.043)	0.042 (0.734)		
roa			–2.483 (12.28)	–2.221 (7.782)			–2.491 (12.28)	–1.583 (7.730)
Hausman test (recommended)	Prob > χ^2 = 0.71 (random)		Prob > χ^2 = 0.69 (random)		Prob > χ^2 = 0.86 (random)		Prob > χ^2 = 0.85 (random)	

Notes F – fixed, R – random. *, †, ‡ means significance at 10%, 5% and 1%. Standard errors are reported in brackets.

sue. These findings are this time confirmed by the two-step estimations with robust errors and we notice once again the lack of a significant influence of firms' financial performance on their investment dynamics in Italy (Table 8). As in the case of France, the two-step estimations for Italy do not present autocorrelation or over-identification problems.

Table 10 GMM Results for Spain (One-Step Results, GMM Errors)

	Difference-GMM				System-GMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
c	14.02†	12.51†	14.79†	13.26†	16.10†	15.35†	16.69†	15.91†
lag(1)	0.052†	0.054†	0.050†	0.052†	0.023	0.020	0.023	0.020
cap	–0.236†	–0.193*	–0.217†	–0.174*	–0.336†	–0.320†	–0.319†	–0.303†
lr	–1.580†	–1.565†			–0.940†	–0.912†		
cr			–1.137†	–1.128†			–0.770†	–0.752†
roe	0.067*		0.067*		0.075†		0.075†	
roa		0.325		0.326		0.400*		0.411*
Observations		2,652				3,094		
Groups		442				442		
Instruments		94				59		
Sargan over-identification	215.7 [0.00]	202.0 [0.00]	211.2 [0.00]	199.8 [0.00]	190.0 [0.00]	228.2 [0.00]	185.8 [0.00]	222.9 [0.00]

Notes *lag*(1) is the first lag of the dependent variable; capitalisation is considered strictly exogenous while liquidity and profitability are endogenous variables; *, †, and ‡ means significance at 10%, 5% and 1%; *inv* – investment dynamics, *cap* – capitalisation ratio, *lr* – liquidity ratio, *cr* – current ratio, *roe* – return on equity, *roa* – return on assets.

Results for Spain

The first set of results recorded for Spain (Table 10) shows that, in the case of a one-step classical estimation, the capitalisation ratio has a significant and negative impact on investment for all tested models, while the profitability has a positive impact, regardless the way profitability is computed. For firms acting in Spain, we notice that liquidity negatively influences the investment behaviour. Namely, firms that decide to increase their liquidity accept a reduction in the investment growth rate and conversely, the increase of investment is made in the detriment of the liquidity level. This result can be explained by the fact that Spanish wine companies might use their own funds with predilection, to finance the investment opportunities.

The two-step estimation partially confirms the one-step findings, although the significance of results decreases (Table 11). For the difference-GMM estimator, for all the models, we notice a negative impact of capitalisation and liquidity, and a positive influence of profitability on the investment dynamics. However, for the system-GMM estimator, the significance of liquidity and profitability's coefficients is no longer recorded.

If in the case of the one-step estimators the Sargan test indicates an instrument over-identification problem, in the case of the two-step estimators, the Sargan and Hansen tests show that instruments are well identified, and the autocorrelation test shows no autocorrelation bias, especially for the system-GMM specification.

Summary of Results, Comparisons and Policy Implications

This section presents a short overview of the empirical findings in a comparative manner and discusses different financial management strategies

Table 11 GMM Results for Spain (Two-Step Results, Robust Errors)

	Difference-GMM				System-GMM			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
c	6.610†	7.872†	8.229†	8.831†	5.624†	4.469†	5.614†	4.182†
lag(1)	0.065†	0.065†	0.062†	0.062†	0.019	–0.095	0.009	–0.068
cap	–0.103	–0.149*	–0.119*	–0.140*	–0.079†	–0.038	–0.077†	–0.030
lr	–1.499*	–1.528*			–0.174	–0.167		
cr			–1.036†	–1.062†			–0.053	–0.105
roe	0.062†		0.057		–0.009		0.023	
roa		0.437*		0.361		0.699		0.820
Observations		2,652				3,094		
Groups		442				442		
Instruments		94				32		
Arellano-Bond test AR(1)	–3.171 [0.00]	–3.179 [0.00]	–3.153 [0.00]	–3.165 [0.00]	–2.080 [0.03]	–2.100 [0.03]	–2.250 [0.02]	–2.440 [0.01]
Arellano-Bond test AR(2)	1.687 [0.09]	1.628 [0.10]	1.550 [0.12]	1.515 [0.12]	0.210 [0.83]	–0.059 [0.55]	0.170 [0.86]	–0.470 [0.64]
Sargan over-identification					55.01 [0.00]	59.66 [0.00]	46.77 [0.02]	52.48 [0.00]
Hansen over-identification					19.92 [0.83]	26.70 [0.48]	21.57 [0.75]	28.62 [0.38]

Notes *lag*(1) is the first lag of the dependent variable; capitalisation is considered strictly exogenous while liquidity and profitability are endogenous variables; *, †, and ‡ means significance at 10%, 5% and 1%; *inv* – investment dynamics, *cap* – capitalisation ratio, *lr* – liquidity ratio, *cr* – current ratio, *roe* – return on equity, *roa* – return on assets.

Table 12 Results of Fixed and Random Effect Estimators for Spain

Variables	Model 1		Model 2		Model 3		Model 4	
	F	R	F	R	F	R	F	R
c	14.50† (2.338)	9.399† (35.54)	13.82† (2.364)	8.747† (1.116)	15.17† (2.367)	9.845† (1.103)	14.49† (2.392)	9.176† (38.83)
cap	–0.241† (0.770)	–0.092† (0.025)	–0.225† (0.077)	–0.075† (0.026)	–0.231† (0.077)	–0.086† (0.025)	–0.214† (0.077)	–0.068† (0.026)
lr	–0.629† (0.270)	–0.095 (0.189)	–0.631† (0.270)	–0.123 (0.189)				
cr					–0.597† (0.206)	–0.234 (0.144)	–0.599† (0.206)	–0.253* (0.144)
roe	0.052* (0.029)	0.044* (0.026)			0.052* 0.029)	0.045* (0.026)		
roa			0.286 (0.180)	0.352† (0.139)			0.291 (0.179)	0.355† (0.139)
Hausman test (recommended)	Prob > χ^2 = 0.00 (fixed)		Prob > χ^2 = 0.01 (fixed)		Prob > χ^2 = 0.01 (fixed)		Prob > χ^2 = 0.01 (fixed)	

Notes F – fixed, R – random. *, †, ‡ means significance at 10%, 5% and 1%. Standard errors are reported in brackets.

that seem to be implemented by the firms acting in the wine industry from the largest worldwide producers. Table 13 shows that our empirical findings are in general robust to different estimators and models we have used but are sensitive to the way we address the proliferation of instrument issue.

Table 13 Results' Centralization

Country	Invest. dynamics	Difference-GMM		System-GMM	
		One-step	Two-step	One-step	Two-step
France	Capitalisation	N	–	N	–
	Liquidity	–	–	–	–
	Profitability	P	–	P	–
Italy	Capitalisation	–	–	–	–
	Liquidity	–	–	P	–
	Profitability	–	–	–	–
Spain	Capitalisation	N	N	N	N
	Liquidity	N	N	N	–
	Profitability	P	P	P	–

Notes P – means positive infuence, N – negative significant influence, – indicates no significant influence.

We can notice that, in the case of Italy, the financial performance of wine industry companies does not influence their investment behaviour. That is, the investment decision is based on other factors (e.g. market conditions), and we may suppose these companies extend their production capacity by accessing external funds, in the detriment of internal sources. This result might also indicate a lack of inertia regarding the investment dynamics in the aftermath of the recent global financial crisis. For the French wine companies, the degree of capitalisation and the level of profitability represent reliable factors that influence their investment dynamics. In general, the profitability favours the investment decision, while a trade-off is recorded between investment and capitalisation. It appears that internal funds play their role in the investment behaviour, although the results in case of France are not very robust. In the case of Spanish wine companies, we notice an important role of financial performance in influencing their investment behaviour. On the one hand, the capitalisation and liquidity ratios have a negative influence on the investment dynamics. On the other hand, a higher profitability represents a prerequisite for increasing the investment level. These findings are quite robust and show that Spanish managers from the wine industry prefer the internal funds to extend their business. The results reported for Spain indicate the existence of a trade-off between capitalisation and liquidity on the one hand, and investment dynamics on the other hand. Moreover, these results confirm the potential trade-off between liquidity and profitability underlined by previous researches.

Conclusions

The purpose of this paper was to investigate how firms' investment behaviour is influenced by their financial performance. With a focus on the

wine industry from the largest EU producers, namely France, Italy and Spain, we use firm-level data for a large set of companies to perform this investigation. Our panel data analysis covers the post-crisis period (2007 to 2014) and relies on dynamic model specifications.

The findings show different investment strategies for firms located in these countries. It appears that the investment behaviour of Italian firms is not influenced by their financial performance. In addition, in the case of French companies, only the capitalisation and the profitability ratio are important for the investment decision, while the influence of liquidity is insignificant. However, these results are partially robust and might be affected by the over-identification of the instruments used in the analysis. Finally, interesting and robust results are reported for Spanish firms. We show that the financial performance of wine companies is very important for their investment behaviour. If a negative impact is recorded in the case of capitalisation and liquidity, a positive influence is noticed for the profitability level. This means that the profits are usually re-invested by Spanish companies, and that internal funds are preferred by managers to sustain their investment decision. These findings support the growing importance of the Spanish wine industry at global level and have noteworthy policy implications for financial managers acting in these companies, as well as for the national authorities interested in the development and increased performance of the wine sector.

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Notes

1. Uncertainty is in general associated with the lack of forecast accuracy (Albulescu et al., 2017). A recent paper by Chen et al. (2017) shows that the quality of analysts' forecasts significantly increases the efficiency of firms' investment.
2. A distinct category of internal factors explaining firms' investment behaviour might be related to the technological capabilities (for a discussion, please see the recent paper by Kang et al., 2017).
3. The EU countries do not only represent the largest wine exporters. For example, the United Kingdom is considered to be one of the largest wine importers (Anderson & Wittwer, 2017).

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