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Board Members' Educational Background and Financial Performance: Evidence from Eurozone Banks

Abstract: This study examines the impact of the quality of board members' educational background on the financial performance of a group of Eurozone banks. Return on average assets (ROAA), Return on average equity (ROAE), and Tobin's Q are used as measures to assess bank financial performance. Three indices are used as proxies for board members' educational qualifications: Eduindex, for all academic qualifications in areas such as business or economics; Eduversal, for all qualifications from business schools ranked by Eduniversal; and EduFT, for all qualifications from business schools ranked by the Financial Times. Our study results offer relevant policy implications. Generally, there is a significant negative effect from Eduversal and EduFT qualifications on bank financial performance. This effect can be explained by the fact that some well-qualified board members use their expertise for their own interest, which, in most cases, is not favourable for bank financial performance. The implication is that the European Central Bank needs to implement more rigorous measures than those currently imposed to control bank board member behaviour and reduce agency problems.

Keywords: Bank financial performance; corporate governance; board of directors; educational background; Eurozone banking.

JEL Classification: C10, G20.

1. Introduction

In the last decade, banks have remained a focus of attention for international financial institutions, governments, and their national central banks. Many believe that corporate governance remains fundamental to maintaining the stability of the financial system. For instance, The Basel Committee on Banking Supervision (2015) has stated that effective corporate governance is essential to guarantee the normal functioning of the banking sector. In addition, the European Banking Authority and European Securities and Markets Authority (2017) has indicated that weaknesses in corporate governance have contributed to the excessive and imprudent risk-taking that has caused the failure of several institutions.

There are several real cases among the Eurozone banks that have had significant problems where one relevant cause is bad corporate governance practice. The following examples of banks with relevant problems in the Eurozone include: Banco Espírito Santo in Portugal (2014); Hypo Real Estate in Germany (2008); and Allied Irish Banks in Ireland (2009).

Notably, banks have their own particularities based on the opacity of many services and the complexity of some products they sell. However, as stated by Adams and Mehran (2012), many governance reforms have not taken into consideration the particularities in the banking sector, which can increase the level of risk. John, De Masi, and Paci (2016) argue that banks have special features that increase the probability of governance problems. These authors illustrate this situation by referring to the high leverage of banks; and, comparing this to the situation in nonfinancial companies, the main providers of capital to banks are depositors and other debt holders.

One relevant characteristic of bank boards is the financial expertise and professional experience of each bank board member. As posed by John et al. (2016), there are several questions that have been asked by scholars and regulators in terms of bank boards. For example, is the quality of training of the board members relevant? If a bank board member holds a specific degree (PhD or MBA), will that improve bank performance?

The literature has documented some previous research questions in this context. Hau and Thum (2010) discovered that the education of the board members of German banks did not have a significant correlation with bank losses. By contrast, Nguyen, Hagendorff, and Eshraghi (2015) found opposite results claiming that the education of the executives in the US banking sector created shareholder wealth. We propose a study that considers the impact of bank board members'

education on bank financial performance. The literature on this topic is scarce and other relevant literature on this issue has been applied only to mutual fund managers. For instance, Chevalier and Ellison (1999) found that fund managers who had MBAs did not present a significantly better performance compared with those who did not have MBAs.

Another stream of research has considered several board characteristics and their effects in terms of bank performance. In particular, the following variables have been emphasized: board size; percentage of directors who are independent; annual compensation of the board of directors; percentage of foreign directors; and director age. In general, the impact of these board characteristics on bank performance has been contradictory in several empirical studies, which we will discuss in the literature review.

Taking into consideration the state-of-the-art corporate governance policies of banks, we identify a gap in the literature on the effects of the quality of training of bank board members on bank financial performance in the context of the main banks operating in the Eurozone. There is no consensus in the literature that human capital resources can predict bank risk-taking or performance. This topic is the subject of a study by Minton, Taillard, and Williamson (2014) indicating that independent directors with financial expertise supported increased risk taking prior to the financial crisis. However, there are few studies that consider banks in their samples. Thus, our study aims to expand the extant literature on corporate governance of banks and contribute to a better understanding of the effects of the board members' quality of training on bank financial performance.

This study contributes to the literature in the following ways. First, the study represents a new perspective specifically applied to the banking sector. Second, our study presents a broader view of corporate governance by considering the main Eurozone banks. Third, compared with V. Pereira and Filipe (2016), we present a new perspective in terms of the quality of the training investigated by considering the Financial Times Business School Rankings. Our results have implications for the prudential supervision that needs to be developed by national central banks and the European Central Bank.

This study uses quantitative and qualitative perspectives. In terms of board member qualifications, the study considers the period between 2011 and 2013. Additionally, measures of operating performance (e.g. ROAA) and stock return performance are used as dependent variables. In terms of independent variables, we construct indices measuring the quantity and quality of the qualifications of the board members.

The study design includes several means to validate the results. First, as suggested by Boyd, Adams, and Gove (2017) we apply a power analysis to consider the small effect sizes found in governance studies. Second, research methods in corporate governance must control possible effects of endogeneity. Accordingly, we include a lagged design to protect against possible reverse causality effects.

The remainder of the paper proceeds as follows. Section 2 presents the literature review and the hypotheses development. Section 3 discusses our data and methodology. Section 4 presents the empirical results. Section 5 provides the robustness tests; and finally, Section 6 offers our conclusions.

2. Literature review and hypotheses development

2.1. Board member education level and bank financial performance

The literature on the corporate governance of banks includes a specific stream of research that studies the association between board member education and bank performance. However, when considering specific samples of banks, there are few empirical studies in this stream. The most relevant studies consider samples of mutual funds, as in the case of Golec (1996) who argued that investors could expect a better risk-adjusted performance from younger managers with MBA degrees. By contrast, a study made by Chevalier and Ellison (1999) on mutual funds claimed that managers with MBAs did not show a meaningfully better performance than those without them. Another study, by Graham and Harvey (2001) discovered that CEOs with MBAs had a higher probability of using the net present value, which can be considered a sign of more financial expertise. Bertrand and Schoar (2003) argued that CEOs with MBAs related to higher operating returns on assets.

In the case of banks, we found a study by Kauko (2009) arguing that the impact of age on efficiency depended on education. Kaukoalso stated that a university degree was useful mainly in the case of the largest banks in the sample. Another study from Hau and Thum (2010) indicated that, on average, board member education did not have a significant correlation with bank losses. In their study, Berger, Kick, and Schaeck (2014), using a sample of German banks, discovered that the presence of executives with PhD degrees related to a decline in portfolio risk. Moreover, Nguyen et al. (2015) claimed that in the US banking sector, the education of executives generated shareholder wealth. Furthermore, V. M. M. Pereira and Filipe (2015) identified a significant effect of bank board member education on a bank`s ROAE. Additionally, King, Srivastav, and Williams (2016)

emphasized that CEO education mattered, both in terms of level and quality, for bank performance. Another study by Fernandes, Farinha, Martins, and Mateus (2017) did not identify a statistically significant effect of education on the banks' financial performance. Finally, Gande and Kalpathy (2017) discovered that banks with CEOs with MBAs from a top 20 schools registered improvements in terms of 'buy and hold' returns.

Notably, the majority of these studies that associate board member education and bank performance generally used US bank samples and considered only the CEO's education. John et al. (2016) stated that current literature on bank corporate governance was indecisive when considering the effects of financial expertise on bank performance.

Therefore, considering the aforementioned, we believe that board member education is important to guarantee that board members are able to do a good job in terms of their managing capability. Further, we believe that the resource dependence theory applies here to our first hypothesis, as we think bank board members use their resources (e.g. education) to make the best decisions to positively affect bank performance. Accordingly, our first hypothesis (H1) is formulated as follows: *H1: Degrees and/or executive development in the areas of economics/business of board members are positively related to bank financial performance*.

2.2. Board member education from prestigious business schools and bank financial performance

In terms of the relationship between board member education and bank financial performance, not only is it relevant to consider the number of degrees each board member has, but also the quality of the education. This relevant research topic captures the quality of the training of the board members.

Gottesman and Morey (2006) argued that mutual fund managers who had MBAs from schools ranked in the top 30 of the Business Week rankings of MBA programs revealed better performance. Moreover, King et al. (2016) showed that bank CEOs with a higher level of quality of management education usually influenced better firm performance. However, they considered only undergraduate study and PhDs did not seem to be significant.

Here, we investigate whether the quality of the education of bank board members is relevant to bank financial performance. However, in this study, we consider all board members, not only CEOs, in contrast to the study of King et al. (2016). In

our study, we consider a sample of Eurozone banks, offering a diverse perspective when compared with traditional US bank samples. We conjecture that bank board members who hold degrees from business schools considered in the Financial Times Business Rankings, or in the Eduniversal Ranking, may have better technical skills. This, then, must imply better management decisions, which ultimately will affect bank performance positively.

Hence, our second hypothesis (H2) is the following: *H2: Degrees and/or executive development from business schools considered in the Financial Times Business Ranking, or in the Eduniversal Ranking, of bank board members are positively related to bank financial performance*. Again, in this second hypothesis, we assume the resource dependence theory point of view, supposing that education will be used in a positive way by bank board members to improve the bank's financial performance.

3. Data and Methods

3.1. Timeline

The current study considers corporate governance data for the period between 2011 and 2013. We choose that period because it involved several measures and modifications in terms of banking systems in several Eurozone countries. This may be considered a natural experiment considering the corporate governance of banks.

To avoid possible endogeneity effects, we use a lagged design in the proposed econometric model. We consider corporate governance data from the period 2011-2013 and the effects in terms of bank financial performance in the period 2012-2014.

The visualization of data allows us to identify two general aspects. First, as referenced by Adams (2017), many corporate governance variables do not change considerably over time, for example, the variable of ownership. In this study, we identify the same situation in the particular case of board member education. Second, board members are typically nominated for a period of three years. As there is a high rotation of board members, we consider three years for the analysis.

For illustration, we assume that, in general, a bank board member is nominated for a period of three years and will not stay on that bank board after that period. Moreover, after being nominated as a board member, the possible impact of

his/her decisions in terms of bank performance will take at least a year to register. Thus, the aforementioned aspect is the main reason why we choose a lagged design.

3.2. Bank Sample

Initially, our sample included the major financial institutions of the various countries of the Eurozone. We decided on the Eurozone region for several different reasons. First, relevant corporate governance research is focused mainly on US samples; thus, we wanted to test previous empirical results in a different region. Second, the Eurozone banking system is supervised by the European Central Bank, which guarantees a higher level of comparison that is critical in a multi-country study. Third, the Eurozone banking system has imposed several constraints in the last decade, which allows us to consider this regional banking system as a natural experiment for the current research development.

However, ultimately, we opted only for countries where there was a significant market share of state-owned banks. The reason for this relates to the fact that we wanted to analyse whether there are relevant differences between government-controlled banks and non-government-controlled banks in terms of board member education. For that purpose, we needed a sample of banks from countries where there was a representative presence of government-controlled banks. We followed the study by Čihák, Demirgüç-Kunt, Pería, and Mohseni-Cheraghlou (2012) to define the cut-off percentage for selecting countries where supposedly government control of banks is relevant. We decided to use a cut-off percentage of 10% in terms of banking system's assets that are government controlled. Taking into consideration the most recent Bank Regulation and Supervision Survey (World Bank) from 2012, which covered the time period 2008-2010, we identified that in 2010, there were seven Eurozone countries that fulfilled the cut-off percentage of 10%: Austria, Germany, Greece, Ireland, Netherlands, Portugal, and Slovenia. However, considering that there are no data from the Boardex for the case of Slovenia, we excluded banks from this country.

We also obtained all available information on board members from the Boardex database, annual reports, interim reports, and press releases. Moreover, financial data were obtained from the Bankscope database (currently named Moody's Analytics BankFocus) and from annual reports.

Notably, only major banks, in general, have the detailed information necessary for our study; this was one reason why these banks were the ones considered in

each country. In fact, usually only major banks had detailed corporate governance information in their annual reports. Another reason was the fact that this task of hand-collecting data is extraordinarily time consuming and thus, it is not feasible to include a larger number of banks.

Given that we found some errors in the databases, we manually checked data to prevent big differences in the final results. For that, we used other databases: Zoominfo and Bloomberg. Initially, board member data included 326 elements, but in the final phase we could use only 302 elements as in the other cases there was no available information.

3.3. Construct measurement

As previously stated, our study uses data from six Eurozone countries: Austria, Germany, Greece, Ireland, the Netherlands, and Portugal. As is common in corporate governance research, when the sample includes various countries, researchers need to be aware of possible problems with comparative situations. Consequently, taking this into consideration, we selected a group of countries in the Eurozone; this means that these banks respond, in general, to common legislation, procedures, and rules, allowing comparative evaluations. In fact, the Eurozone banking system is supervised by a common institution: the European Central Bank (ECB). However, each country has leeway to implement the European rules, which allows some differences among the countries in the Eurozone. To deal with the specificities of each country, we consider the inclusion of country fixed effects.

3.4. Main variables

3.4.1. Bank performance measures

In this study, we consider two types of measures of bank performance. First, we consider a market performance measure as the sample includes publicly traded banks. Therefore, we use a similar methodology to that of Adams and Mehran (2012), which considered a proxy for Tobin's Q. However, in this case, we use the Moody's Analytics BankFocus methodology directly considering the ratio market capitalization to total assets.

We also consider two accounting measures for bank performance, which are essential due to the inclusion of state-owned banks in the sample. First, we consid-

er the inclusion of the variable return on average assets (ROAA) using Moody's Analytics BankFocus methodology, which represents net income to average total assets. This variable was also applied by Adams and Mehran (2012).

In addition, we consider a variable for accounting performance, ROAE, which, in the case of Moody's Analytics BankFocus methodology, considers net income to average stockholders' equity.

3.4.2. Board members' education

Our study aims to test whether board members' education affects bank performance from two perspectives. First, we adopt a quantitative perspective to test our first hypothesis, namely, that a higher number of academic degrees affects the bank's performance positively. Second, we consider a qualitative perspective referred to in the second hypothesis, namely, that the education from prestigious business schools has a relevant effect on bank performance.

We use three indices to compile the information associated with the academic degrees of each bank board member. Eduindex aggregates the academic degrees of each board member in economics and business areas. Eduversal compiles the academic degrees of each board member considered in the Eduniversal Ranking of 2015. EduFT considers the academic degrees held by each board member referenced in the Financial Times Business School Rankings. The methodology used in the variable construction is quite similar to the one in Hau and Thum (2010). First, we assign the value of one to each degree held by each bank board member. Additionally, we sum all values for each board member of each specific bank. Finally, we divide the sum of the values of each bank by the number of board members of each bank.

We assume that the ranking in terms of the referenced business schools does not change significantly over the years. Therefore, with few exceptions, the best business schools remain with the same status throughout the years; as such, we believe that this aspect will not significantly affect the results.

3.4.3. Control variables

In terms of control variables, we consider the recommendations of Bernerth and Aguinis (2016). First, we presume that a strong correlation might exist between the chosen control variable and the independent variable we want to study. Second, we choose control variables that have been considered in previous relevant

research. Third, we acknowledge that previous research has found significant associations between the chosen control variables and the variables considered here. Fourth, we believe that the control variables are fundamental to validate the econometric model.

Considering corporate governance research, several empirical studies have included the natural log of total assets as a control variable to control firm size effects, for example, in the study by Garcia-Meca, Garcia-Sanchez, and Martinez-Ferrero (2015). We think the inclusion of a control effect for firm size is essential here due to the relevant differences in the size of the banks in our sample.

We also include a control variable to analyse the differences between government-controlled banks and non-government-controlled banks. It is worth remembering that the sample considers countries with representative government-controlled banks.

To analyse if there are relevant differences between publicly traded banks and non-publicly traded ones, we include a control variable to capture differences between those two types of banks. Accordingly, the sample includes those two types of banks, subject to particular specificities not only in terms of reporting but also in terms of other aspects that can affect performance.

We also consider a control variable for the level of equity in each bank. In this case, we need to follow the levels of equity as defined by the Basel Agreement, which can be represented by the Tier 1 ratio. Again, we deduce that the level of equity can affect bank performance and it is probably correlated with the independent variables we postulate.

We also know that when trying to explain bank performance, it is important to measure the level of risk. To handle this, we consider in particular the case of non-publicly traded banks, the variable 'RiskROAA', which consists of the standard deviation of ROAA. Additionally, when studying the case of publicly traded banks, we need to consider a market measure for risk; here, we decided to choose market beta.

We consider that bank performance in the period 2012-2014 has a high probability of being affected by previous bank performance. Thus, we consider the variable 'ROAE Crisis' in the period 2011-2013 as a control variable. Additionally, we include this control variable to capture previous impacts on bank performance. For the particular case of publicly traded banks, we include a control variable for Tobin's Q in the period 2011-2013, referred to as 'Tobin's Q Crisis'. All variables in the current research are shown in Table 1.

Table 1: Definition of variables

Variables	Measures
	Panel A: Dependent variables
ROAA	Net income/average total assets (Moody's Analytics BankFocus) (years 2012-2014)
ROAE	Net income/average stockholders' equity (Moody's Analytics BankFocus) (years 2012-2014)
Tobin's Q	Market capitalisation/Total assets (Moody's Analytics BankFocus and Bloomberg) (years 2012-2014)
	Panel B: Board members qualifications
Eduindex	Index that aggregates the academic degrees of board members in the areas of economics/business (years 2011-2013)
Eduversal	Index that compiles the academic degrees of each board member considered in the Eduniversal Ranking (years 2011-2013)
EduFT	Index that considers the academic degrees held by each board member referred to in the Financial Times Business School Rankings (years 2011-2013)
	Panel C: Other control variables
Banksize	Natural log of total assets (Moody's Analytics BankFocus) (years 2012-2014)
Government	Dummy variable equal to 1 if a bank is government-controlled (government owned 50% or more equity)
PublicTraded	Dummy variable equal to 1 if a bank is publicly traded
Tier 1 ratio	Tier 1 ratio (Moody's Analytics BankFocus) (years 2012-2014) – Tier One Capital/ Risk Weighted Assets
RiskROAA	Standard deviation of ROAA
Beta	Historical market beta (Adjusted Beta Overridable) (Bloomberg)
ROAE Crisis	Net income/average stockholders' equity (Moody's Analytics BankFocus) (years 2009-2011)
ROAA Crisis	Net income/average total assets (Moody's Analytics BankFocus) (years 2009-2011)
Tobin's Q Crisis	Market capitalisation/Total assets (Moody's Analytics BankFocus) (years 2009-2011)

3.5. Endogeneity

Corporate governance research needs to consider the phenomenon of endogeneity, which can affect research results. To deal with the endogeneity problem, Boyd et al. (2017) recommended the use of several different methods such as a lagged design and instrumental variable approaches.

Here, we consider a lagged design with board members' data for the period 2011-2013 and bank financial performance for the period 2012-2014. We assume that

board member decisions take time to be implemented and, as a result, bank financial performance will be affected in the future. Additionally, we think that by using a lagged design our study will be protected against reverse causality effects.

Finally, we test the covariance between the main independent variables (Eduindex, Eduversal, and EduFT) and the error term derived from OLS regressions. The results confirm that the main independent variables are exogenous.

3.6. Empirical methodology

To study the effects of board members' quality of education when considering bank financial performance, we consider the following general model:

ROAA or ROAE or Tobin's Q = β0 + β1Eduindex + β2Eduversal + β3EduFT + β4Banksize + β5Government + β6PublicTraded + β7Tier1ratio + β8RiskROAA + β9Beta + β10ROAECrisis + β11ROAACrisis + β11Tobin'sCrisis.

The variables in this generic model are defined in Table 1.

4. Robustness Checks

We apply several robustness tests to validate the model results. First, we evaluate the normality of data by using the Shapiro-Wilk W-test and the Shapiro-Francia W'-test. Second, we express how to deal with missing data and outliers in this model. Third, we include quadratic effect terms to evaluate the existence of the negative effects of Eduindex, Eduversal, and EduFT on bank financial performance after some specific stages.

4.1. Normality of data

We perform the Shapiro-Wilk W test for normal data by using the main variables of the proposed model: ROAA, ROAE, Tobin's Q, Eduindex, Eduversal, and EduFT. For all variables considered, we reject the hypothesis for normal distribution apart from Eduindex. Subsequently, we apply the Shapiro-Francia W' test for normal distribution and only in the cases of Eduindex and EduFT is the hypothesis for normal distribution not rejected. Finally, we consider the skewness/kurtosis test for normality; in the case of Eduindex, we do not reject the hypothesis for normal distribution.

Moreover, we regress Eduindex, Eduversal, and EduFT on ROAA, and save the regression errors to verify if they follow a normal distribution. The Shapiro-Wilk W and the Shapiro-Francia W' tests also allow us to verify that the errors are not normally distributed. After regressing Eduindex, Eduversal, and EduFT on ROAE, we find that the regression errors do not follow a normal distribution. Additionally, we regress Eduindex, Eduversal, and EduFT on Tobin's Q and verify that the regression errors do not follow a normal distribution. Consequently, the statistical inference in the linear regression analysis needs to be complemented by generalized linear models, non-parametric methods, or the transformation of variables using logs.

4.2. Data imperfections (outliers/missing data)

As referenced by Williams (2016), when extreme data values are present they can produce spurious regression coefficients. Consequently, we adopt some strategies to deal with outliers for a more consistent econometric model.

First, we use descriptive statistics to detect any situations of uncommon values. We find a particularly high value in the ROAE variable with a standard deviation of 43.26251, which can be attributed to: Alpha Bank ROAE of -106.628 in 2012; Eurobank Ergasias ROAE of 322.87 in 2012; and the National Bank of Greece ROAE of 200.288 in 2012. We also detect a particularly significant value for the variable ROAEcrisis with a standard deviation of 93.05915, which can be attributed to: Hypo Real Estate Group ROAECrisis of -144.212 in 2012; Hypo Group Alpe Adria ROAECrisis of -123.406 in 2012; Allied Irish Banks ROAECrisis of -129.584 in 2013; Bank of Piraeus ROAECrisis of -992.293 in 2014; Eurobank Ergasias ROAECrisis of -157.727 in 2014; and the National Bank of Greece ROAECrisis of -231.404 in 2014.

Second, we perform Cook's distance on the ROAE dependent variable to try to find values higher than one. We find a Cook's distance higher than one in one situation: Eurobank Ergasias. We also consider another perspective in the use of Cook's distance, which is to detect possible outlier problems considering $Di > 4/n$, with 'n' representing the number of observations. By using this criterion, we detect some outliers: Alpha Bank; Eurobank Ergasias; and the National Bank of Greece.

We also evaluate if the presence of missing values is high, as this circumstance can affect results. Accordingly, we use Stata software called 'mdesc', which considers the number of missing values and shows its percentage. The results demon-

strate a high percentage of missing values in the following variables: ROAA with 30.43%; ROAE with 30.43%; Banksize with 34.78%; and Tier1ratio with 44.93%.

Second, we use the function 'rmiss2' to verify the distribution of missing values across observations. We detect that around 65% of the observations have at least one missing value. We conclude that missing data need to be carefully considered so as not to affect our research results.

4.3. Quadratic effect terms

We now introduce quadratic effect terms to analyse whether the main independent variables have an inverted U-shaped impact on bank financial performance. Accordingly, using the Hausman-Taylor estimation, we regress ROAA, ROAE, and Tobin's Q on the squared versions of Eduindex, Eduversal, and EduFT. We do not detect any significant effects of these regressions on these independent variables. In addition, for squared Eduversal, we find that the coefficient for ROAE is negative. Therefore, it is possible that after a certain level of qualification considered in the variable Eduversal, the impact on bank financial performance might turn negative.

4.4. Link between management competence and bank financial performance

We know that it is difficult to link management competence to bank financial performance. One possible means to do that is to use a moderator variable, but even with this strategy it is difficult to determine the reliability of the chosen variable. Therefore, closely related relevant research, such as Chevalier and Ellison (1999) did not consider a moderator effect. However, here, we consider it reasonable to establish a direct link between education and bank financial performance.

5. Empirical results

5.1. Summary descriptive statistics

Summary statistics for all the variables are presented in Table 2. We can verify a strong standard deviation for ROAE with a value of 43.26251. Additionally, we can verify as well as a relevant standard deviation for the variable ROAECrisis with a value of 93.05915.

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROAA	96	-.1784167	2.381599	-20.62	4.429
ROAE	96	6.769333	43.26251	-106.628	322.87
Tobin's Q	79	.311281	.4188497	.005	1.0661
Eduindex	135	1.180928	.4180613	.3333333	2
Eduversal	138	.9873188	.2046579	.75	1.375
Eduft	129	.3790567	.3716312	0	1.25
Banksize	90	10.96948	1.619581	7.180831	14.5148
Government	135	.4	.4917225	0	1
PublicTraded	135	.637037	.4826452	0	1
Tier 1 ratio	76	13.40368	3.535967	8.5	28
Riskroaa	138	1.049077	1.393172	.0431292	6.828177
Beta	69	.9816116	3.254256	-12.8759	7.2953
ROAE Crisis	132	-13.31189	93.05915	-992.293	18.204
ROAA Crisis	135	-.2218741	1.840748	-12.367	1.714
Tobin's Q Crisis	48	.6457833	.4709016	.005	1.0861

Table 3 shows the Pearson correlation coefficients between independent variables and control variables. We identify one case where there is a possible problem of multicollinearity: there is a value greater than 0.8 in the correlation between the variables ROAACrisis and ROAECrisis.

Table 3: Correlation Matrix

	Eduindex	Eduversal	EduFT	Banksize	Government	Publictraded	Tier1ratio	RiskROAA	Beta	ROAECrisis	ROAACrisis	Tobin's Q Crisis
Eduindex	1.0000											
Eduversal	0.4140	1.0000										
EduFT	0.5111	0.2014	1.0000									
Banksize	0.1011	-0.1726	-0.1299	1.0000								
Government	0.1192	-0.0540	-0.1400	0.4714	1.0000							
Publictraded	0.2909	0.4751	0.2008	-0.0693	-0.4214	1.0000						
Tier1ratio	0.1063	0.1196	0.0009	-0.2354	-0.1859	0.0222	1.0000					
RiskROAA	0.4465	0.2796	0.1109	0.0558	0.3703	0.0303	-0.2005	1.0000				
Beta	-0.1440	-0.1364	0.1202	0.0045	0.1104	-0.2565	-0.0843	-0.1331	1.0000			
ROAECrisis	-0.0483	-0.1541	0.0573	-0.0619	-0.2205	-0.0318	0.0367	-0.2550	-0.0105	1.0000		
ROAACrisis	-0.0821	-0.1594	0.0868	-0.1436	-0.2936	0.0105	0.0106	-0.3005	-0.0720	0.8202	1.0000	
Tobin's Q Crisis	-0.2368	-0.4447	-0.1973	0.1036	-0.1404	-0.1360	0.0729	-0.0723	-0.2275	0.2486	0.3217	1.0000

Notably, the Pearson correlation coefficients are more appropriate for variables that follow a normal distribution (Clark (2013)). In this study, three variables assume a normal distribution using the Shapiro-Wilk Normality test: Eduindex, Government, and Publictraded. Consequently, the Pearson's correlation should not be used with the other variables; as a viable alternative the Spearman's Rank Correlation can be used.

We detect some relevant relations in terms of the following variables using Spearman's correlation: EduFT vs. Eduindex with a value of 0.7233; ROAECrisis vs. RiskROAA with a value of -0.8505; ROAACrisis vs. RiskROAA with a value of -0.8143; and ROAACrisis vs. ROAECrisis with a value of 0.9591.

We also intend to verify if a monotonic relationship exists between variables that do not follow a normal distribution by using a two-way graph. In fact, we only detect one possible monotonic relationship between the variables ROAECrisis and ROAACrisis. Similarly, as referenced in V. M. Pereira and Filipe (2018), for non-monotonic relationships, it may be a good idea to implement Hoeffding's D measure. However, we cannot implement this in the Stata program.

5.2. Empirical results

To test the effects of board members' characteristics on bank financial performance we first consider a traditional ordinary least squares (OLS) regression with different control variables (see Table 4). Moreover, we identify a significant negative effect of Eduversal on Banks' ROAA, namely, an increase in the number of board members with degrees from business schools ranked at Eduniversal might have a negative effect on banks' ROAA. This result is counter to our expectations, meaning that the methodology we used might not have been the best option for the current situation. Moreover, the other variables Eduindex and EduFT did not have significant effects on ROAA, ROAE, or Tobin's Q.

Table 4: OLS Performance Regressions with Control Variables

	ROAA	ROAA	ROAA	ROAE	ROAE	ROAE	Tobin's Q	Tobin's Q	Tobin's Q
Intercept	-1.21152	0.1504581	-1.231024	-16.79549	-29.61411	-18.70641	2.196371***	1.683326***	1.702485**
	(-0.93)	(0.10)	(-0.95)	(-0.24)	(-0.36)	(-0.27)	(3.62)	(3.08)	(2.56)
Eduindex	0.0041983			4.109641			0.2663637		
	(0.01)			(0.26)			(1.49)		
Eduversal		-1.43639*			12.00381			-0.0514536	
		(-1.75)			(0.27)			(-0.14)	
EduFT			-0.0832908			-10.45995			0.0239104
			(-0.28)			(-0.67)			(0.11)
Banksize	0.0489528	0.0155418	0.0508281	-1.215473	-0.6487595	-0.8318646	-0.1165273***	-0.0796184**	-0.0825795*
	(0.51)	(0.17)	(0.55)	(-0.24)	(-0.13)	(-0.17)	(-2.89)	(-2.40)	(-1.95)
Government	-0.5069273	-0.5476709*	-0.4885564	17.87601	18.37295	20.58774	-0.1025894	-0.0124605	-0.0259126
	(-1.63)	(-1.80)	(-1.54)	(1.08)	(1.11)	(1.22)	(-0.78)	(-0.09)	(-0.19)
Publictraded	-0.4039202	-0.2825176	-0.3652354	7.833344	8.424181	13.48235	-0.4872532	-0.2482142	-0.2735959
	(-1.16)	(-0.86)	(-1.04)	(0.42)	(0.47)	(0.71)	(-1.55)	(-0.84)	(-0.86)
Tier 1 ratio	0.0820953**	0.0987473***	0.0823408**	0.8839899	0.8465778	0.9966214	-0.049112***	-0.0327345**	-0.0341621**
	(2.56)	(3.08)	(2.63)	(0.52)	(0.49)	(0.61)	(-2.89)	(-2.09)	(-2.33)
RiskROAA	0.1614337	0.3436486**	0.1559466	13.47323*	12.3719	13.08321*			
	(1.20)	(2.08)	(1.17)	(1.95)	(1.41)	(1.92)			
ROAACrisis	0.1240823**	0.1313866**	0.1248142**						
	(2.22)	(2.40)	(2.24)						
ROAECrisis				0.117292**	0.1169728**	0.1196951**			
				(2.26)	(2.25)	(2.32)			
Beta							0.0033203	0.003219	0.0031664
							(0.19)	(0.17)	(0.17)
Tobins' Q Crisis							0.2628858**	0.1807662	0.1918562*
							(2.50)	(1.59)	(1.92)
Obs.	76	76	76	73	73	73	33	33	33
Adj-R2	0.1127	0.1510	0.1137	0.0628	0.0629	0.0682	0.2472	0.1813	0.1811

The regressions controls are bank size measured by the natural logarithm of total assets, Tier 1 ratio. The table reports the regression coefficients, t-statistics (in parentheses), number of observations (N) and adjusted R2.

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

Second, we consider a different methodology that uses heteroskedastic linear regressions (see Table 5). We find a significant negative effect of EduFT on ROAA. Moreover, we are not able to perform the regressions that use ROAE and Tobin's Q as dependent variables as the convergence cannot be achieved in the Stata software.

Table 5: Heteroskedastic Linear Regression

	ROAA#	ROAA#	ROAA#	ROAE&	ROAE&	ROAE&	Tobin's Q&	Tobin's Q&	Tobin's Q&
Intercept	0.8094535	0.6751355	0.442707						
	(1.43)	(0.89)	(1.05)						
Eduindex	0.0107243								
	(0.08)								
Eduversal		-0.2150003							
		(-0.40)							
EduFT			-0.1921018*						
			(-1.90)						
Banksize	-0.0484286	-0.0371524	-0.0254039						
	(-1.37)	(-1.02)	(-1.04)						
Government	-0.1910882*	-0.152043	-0.1264587						
	(-1.77)	(-1.03)	(-1.04)						
Publictraded	-0.1865278**	-0.1449578	-0.0890837						
	(-2.00)	(-0.93)	(-0.84)						
Tier 1 ratio	0.009908	0.0222431	0.0159954						
	(0.59)	(1.13)	(1.18)						
RiskROAA	-0.1584233	-0.1922381	-0.1624031						
	(-0.45)	(-0.62)	(-0.72)						
ROAACrisis	0.147791	0.1360004	0.1480051						
	(1.16)	(1.25)	(1.62)						
ROAECrisis									
Beta									
Tobins' Q Crisis									
Obs.	76	76	76						
Wald chi2(8)	24.52	21.30	32.32						
Prob > chi2	0.0009	0.0033	0.0000						

The regressions controls are bank size measured by the natural logarithm of total assets, Tier 1 ratio. The table reports the regression coefficients, z-statistics (in parentheses), number of observations (N).

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

In this case, the likelihood-ratio test reported at the bottom of the table shows that the model of the variance fits the data better than a model in which the variance is constant.
& In this case, the convergence is not achieved.

Third, we include a linear regression with panel-corrected standard errors (PCSE) in the empirical analysis, which can consider disturbances that are not assumed to be independent and identically distributed. First, we detect a significant negative effect of Eduversal and EduFT on bank ROAA. Second, we see a significant

negative effect of EduFT on ROAE. Third, we see a significant negative effect of Eduversal on Tobin's Q as well.

Table 6: Linear Regression with Panel-Corrected Standard Errors (PCSE)

	ROAA	ROAA	ROAA	ROAE	ROAE	ROAE	Tobin's Q	Tobin's Q	Tobin's Q
Intercept	-1.975003***	-0.6456164	-2.120044***	-50.17831***	-63.12878***	-50.78874***	1.87371***	1.631757***	1.465164***
	(-2.63)	(-0.98)	(-2.86)	(-3.57)	(-3.24)	(-4.20)	(5.00)	(11.41)	(8.68)
Eduindex	-0.0890973			2.953715			0.1423056		
	(-0.46)			(0.53)			(1.05)		
Eduversal		-1.617571*			15.52272			-0.1669045**	
		(-1.92)			(0.99)			(-1.83)	
EduFT			-0.1171203***			-11.70007***			-0.0503578
			(-6.00)			(-4.03)			(-0.76)
Banksize	0.0824805	0.0490949*	0.0843555*	-0.5941634	-0.0587525	-0.2962687	-0.0927282***	-0.0708331***	-0.0650567***
	(1.56)	(1.70)	(1.94)	(-0.60)	(-0.15)	(-0.45)	(-3.68)	(-11.95)	(-5.98)
Government	-0.4408951	-0.4743156	-0.4083278	26.09568***	25.87066***	29.00413***	-0.0702166	-0.0020793	-0.0172941
	(-1.20)	(-1.07)	(-1.01)	(7.57)	(5.30)	(6.33)	(-1.22)	(-0.07)	(-0.77)
Publictraded	-0.3487226**	-0.232551	-0.3316216	15.29796***	14.467***	21.08117***	-0.3878063***	-0.2344489***	-0.2454787***
	(-2.34)	(-1.40)	(-1.36)	(4.92)	(3.58)	(3.42)	(-3.23)	(-25.14)	(-6.37)
Tier 1 ratio	0.1130725***	0.1376985***	0.1171523***	2.37104***	2.123985***	2.402081***	-0.0403658***	-0.0264037***	-0.0293495***
	(5.35)	(6.96)	(6.54)	(3.27)	(3.01)	(3.82)	(-3.98)	(-4.80)	(-5.96)
RiskROAA	0.1795493	0.3695339	0.1650782	13.41147***	11.85109***	12.66567***			
	(0.94)	(1.28)	(0.89)	(3.17)	(3.34)	(3.03)			
ROAACrisis	0.1699699***	0.1882***	0.1772759***						
	(10.13)	(-0.98)	(10.48)						
ROAECrisis				0.1158364***	0.1157811***	0.1166948***			
				(9.37)	(8.77)	(9.02)			
Beta							0.00208	0.0000978	0.0010725
							(0.35)	(0.03)	(0.38)
Tobins' Q Crisis							0.1882069***	0.1003522***	0.1191189***
							(2.92)	(3.74)	(4.37)
Obs.	76	76	76	73	73	73	33	33	33
R-squared	0.2359	0.2751	0.2443	0.1204	0.1232	0.1232	0.3715	0.3470	0.3428
Wald chi2(3)	38.25	304.21	94.71	391.59	11.60	316.96	94.26	867.96	309.62
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0089	0.0000	0.0000	0.0000	0.0000
rho	0.2704816	0.3554793	0.3130976	0.4751402	0.4348918	0.4720382	0.3084633	0.5643973	0.5226201

The regressions controls are bank size measured by the natural logarithm of total assets, Tier 1 ratio. The table reports the regression coefficients, z-statistics (in parentheses), number of observations (N).

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

Fourth, a random-effects model is included in the analysis as it is common in corporate governance research. Moreover, as referenced by Torres-Reyna (2017), fixed effects should not be used with slow-changing variables over time. Accord-

ingly, we consider a random-effects model as the best methodology for the econometric model, as board member education is considered as having little time variation. Furthermore, we use the Breusch-Pagan Lagrange multiplier (LM) to define whether it is worth considering a random-effects regression or a simple OLS regression.

The analysis shows a negative and significant effect of Eduversal on banks' ROAA. Finally, according to data, in most cases, the random-effects model is not a better option than the OLS regression (Table 7).

Table 7: Random Effects Regression (Breusch and Pagan Lagrangian Multiplier Test)

	ROAA	ROAA	ROAA	ROAE	ROAE	ROAE	Tobin's Q	Tobin's Q#	Tobin's Q#
Intercept	-1.530739	0.035579	-1.536203	-16.79549	-29.61411	-18.70641	0.9866033***	1.298684***	0.9305407***
	(-0.97)	(0.02)	(-1.00)	(-0.56)	(-0.94)	(-0.61)	(3.74)	(2.92)	(4.24)
Eduindex	-0.0277765			4.109641			-0.1498241		
	(-0.10)			(0.43)			(-0.79)		
Eduversal		-1.479588**			12.00381			-0.4064646	
		(-1.99)			(0.49)			(-1.23)	
EduFT			-0.0834019			-10.45995			-0.1521954
			(-0.46)			(-1.59)			(-0.67)
Banksize	0.0634272	0.0208295	0.0629278	-1.215473	-0.6487595	-0.8318646	-0.0491005***	-0.0534382***	-0.0490802***
	(0.64)	(0.24)	(0.68)	(-0.62)	(-0.31)	(-0.41)	(-2.62)	(-2.95)	(-2.79)
Government	-0.5071127*	-0.5487601*	-0.4895604	17.87601	18.37295	20.58774	0.0400683	0.0414293	0.0209419
	(-1.67)	(-1.74)	(-1.59)	(1.09)	(1.16)	(1.28)	(0.66)	(0.67)	(0.32)
Publictraded	-0.3945561	-0.2783464	-0.3692399	7.833344	8.424181	13.48235	-0.1643931	-0.1971408*	-0.2304383*
	(-1.39)	(-1.07)	(-1.28)	(0.54)	(0.62)	(0.97)	(-0.86)	(-1.83)	(-1.74)
Tier 1 ratio	0.0948365*	0.1051687**	0.0942841*	0.8839899	0.8465778	0.9966214	0.0002947	0.0003304	0.0002972
	(1.93)	(2.31)	(1.96)	(0.75)	(0.69)	(0.96)	(0.15)	(0.17)	(0.15)
RiskROAA	0.1799483	0.3551963*	0.1710246	13.47323**	12.3719**	13.08321**			
	(0.95)	(1.69)	(0.94)	(2.24)	(2.47)	(2.08)			
ROAACrisis	0.1281839	0.1330274	0.128426						
	(1.44)	(1.52)	(1.45)						
ROAECrisis				0.117292**	0.1169728**	0.1196951**			
				(2.43)	(2.46)	(2.42)			
Beta							-0.0002428	-0.0002078	-0.0002404
							(-1.03)	(-0.92)	(-1.04)
Tobins' Q Crisis							0.0000155	-0.0000149	0.00000762
							(0.00)	(-0.00)	(0.00)
Obs.	76	76	76	73	73	73	33	33	33
R-squared (overall)	0.1945	0.23	0.1955	0.1539	0.154	0.1588	0.1433	0.2113	0.1369

The regressions controls are bank size measured by the natural logarithm of total assets, Tier 1 ratio. The table reports the regression coefficients, z-statistics (in parentheses), number of observations (N) and adjusted R2.

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

In this case, the random effects model fits better than OLS.

Remembering that most of our research variables are not normally distributed, it is worth considering a nonparametric regression that is not subject to misspecification errors. Therefore, we perform nonparametric regressions using dependent variables (ROAA, ROAE, and Tobin's Q) and independent variables (Eduindex, Eduversal, and EduFT). Consequently, we include control variables in the nonparametric regression, but the bootstrap does not work due to insufficient observations. Therefore, our results suggest that EduFT affects the banks' Tobin's Q significantly and negatively. Finally, we recognize that these results have limitations.

Table 8: Nonparametric Regression

	ROAA	ROAA	ROAA	ROAE	ROAE	ROAE	Tobin's Q	Tobin's Q	Tobin's Q
Dependent variable mean	-0.1784167	-0.1784167	-0.1430705	6.769333*	8.21051	6.769333*	0.3253504***	0.3395149***	0.2694477***
	(-0.79)	(-0.76)	(-0.61)	(1.77)	(1.54)	(1.65)	(8.30)	(6.99)	(7.56)
Eduindex	-0.9216678			11.17186			0.0139132		
	(-1.00)			(1.16)			(0.11)		
Eduversal		0.8002118			48.3279			-0.3821559	
		(0.81)			(1.31)			(-1.64)	
EduFT			-0.8897961			-5.274097			-0.3174367***
			(-0.92)			(-1.34)			(-3.47)
Obs.	96	96	96	96	96	96	79	79	76
R-squared	0.0292	0.0042	0.0538	0.0130	0.0628	0.0022	0.2132	0.1087	0.0927

The regressions controls are bank size measured by the natural logarithm of total assets, Tier 1 ratio. The table reports the regression coefficients, z-statistics (in parentheses), number of observations (N).

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

Furthermore, we include a Hausman-Taylor regression in the analysis. As referred to by V. M. Pereira and Filipe (2018) this regression considers that covariates can correlate with unobserved individual-level random effects. The results in Table 9 do not reveal any significant effect of Eduindex, Eduversal, and EduFT on bank performance measured by ROAA, ROAE, and Tobin's Q.

Table 9: Hausman-Taylor Regression

	ROAA	ROAA	ROAA	ROAE	ROAE	ROAE	Tobin's Q	Tobin's Q	Tobin's Q
Intercept	-26.51289	-32.69192	-44.11273*	-36.87272	-32.52721	242.8973	1.25877***	1.810014**	0.9682293***
	(-1.59)	(-1.40)	(-1.78)	(-0.26)	(-0.23)	(0.24)	(3.31)	(2.48)	(3.98)
Eduindex	-13.04344			11.44542			-0.6545753		
	(-1.32)			(0.10)			(-1.12)		
Eduversal		8.093455			-8.485038			-0.8967529	
		(0.74)			(-0.04)			(-1.34)	
EduFT			-5.981572			321.7828			-0.5048545
			(-0.52)			(0.24)			(-0.83)
Banksize	2.875366*	1.994994	3.576365*	-0.6118763	0.2113671	-25.93309	-0.0536761***	-0.0578434***	-0.0517745***
	(1.65)	(1.53)	(1.75)	(-0.04)	(0.05)	(-0.29)	(-2.70)	(-3.24)	(-2.95)
Government	-1.489051	-1.523575	-1.860457	18.15053	18.44339	-38.38957	0.2147593	0.0842383	0.1124147
	(-0.66)	(-0.95)	(-0.61)	(0.94)	(1.13)	(-0.13)	(0.96)	(0.82)	(0.59)
Publictraded	6.712925	-0.1509423	4.308044	8.964789	14.32175	-130.9359	0.1666176	-0.1805864	-0.1444085
	(1.27)	(-0.08)	(0.71)	(0.17)	(0.56)	(-0.22)	(0.31)	(-1.00)	(-0.44)
Tier 1 ratio	0.2427759**	0.236251**	0.2404936**	1.163332	1.33893	1.279547	0.0004491	0.0004314	0.0003884
	(2.18)	(2.05)	(2.26)	(0.26)	(0.34)	(0.30)	(0.23)	(0.22)	(0.20)
RiskROAA	1.473178	-0.2814041	0.4031144	12.8609**	14.72085	36.95322			
	(1.21)	(-0.23)	(0.35)	(2.11)	(0.75)	(0.32)			
ROAACrisis	0.1994084*	0.1892482*	0.2051048**						
	(1.95)	(1.90)	(1.97)						
ROAECrisis				0.1203349***	0.121297**	0.1177335***			
				(2.65)	(2.56)	(2.75)			
Beta							-0.0002035	-0.0001694	-0.000217
							(-0.78)	(-0.71)	(-0.89)
Tobins' Q Crisis							-0.0002734	-0.0001829	-0.0001671
							(-0.04)	(-0.03)	(-0.03)
Obs.	76	76	76	73	73	73	33	33	33
rho	0.99441201	0.98688975	0.99972494	0.72108312	0.68481828	0.99347977	0.99967857	0.99965609	0.9996318

The regressions controls are bank size measured by the natural logarithm of total assets, Tier 1 ratio. The table reports the regression coefficients, z-statistics (in parentheses), number of observations (N).

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

6. Conclusions

As indicated by V. M. Pereira and Filipe (2018), the influence of the educational attainment of board members on bank financial performance is scarce in the literature. Therefore, there is a need to expand the existing research to multiple countries and consider other business school rankings, such as the Financial Times Ranking. Our study responds to these gaps in the literature.

Our results reveal that, in most cases, there is a significant and negative effect of Eduversal and EduFT on bank financial performance. These results differ from our expectations from a resource dependence perspective. We believe that these results might be explained by the fact that some well-qualified board members use their expertise for their own interest, which, in most cases, is not favourable for the banks' financial performance.

We believe our research findings are particularly relevant. As such, we recommend that the European Central Bank implement more rigorous measures to control bank board member behaviour and to reduce agency problems issues.

We suggest that future research consider whether the current mechanisms of controlling agency problems in banks are truly efficient and, if not, what can be done to improve such mechanisms.

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