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Factors affecting bank profitability in Europe: An empirical investigation

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The aim of this paper was to explore the relationship between bank-specific characteristics and profitability in European banking sector in order to determine the impact of internal factors on achieving high profitability. A regression analysis was done on an unbalanced panel dataset related to 28 European banks over the period of 2006-2015. The largest bank for any single country of the European Union was selected. Regression results show that capital ratio and size have positive impacts on bank profitability in Europe,; while higher asset quality results in lower profitability levels. Findings also suggest that banks with higher deposit ratio tend to be more profitable. The study provides interesting insights into the characteristics and practices of profitable banks in Europe. Few econometric studies have empirically explored the determinants of profitability in Europe banking sector so far, even though similar studies have been conducted in several developed countries.

Key words: Bank profitability, determinants of bank performance, internal factors of bank profitability, European banking sector.

INTRODUCTION

It is generally agreed that the banking sector fulfills an important economic function in stoking up a sustainable economic development. In this regard, banks play an important role in economy and their stability is relevant and critical for the financial system. Consequently, if a financial system is efficient, then it should record profitability advances, growing the amount of funds rolling from savers to borrowers, and increasing better quality services for customers (De Bandt and Davis, 2000). In the literature, the performance of banking system has been widely debated and some prior studies contributed to explore the determinants of profitability for banking sector, inspecting - for example - the size of the bank and

how it is diversified, the bank's ownership characteristics, the attitude of the bank's owners and managers towards risk and the extent of competition a bank deals with (Goddard et al., 2001).

While there has been wide literature examining the profitability of financial institutions in developed countries, empirical studies on factors influencing the performance of banks in European economy are quite few. Especially with respect to the impact of internal factors on banks' profitability, a limited number of theoretical studies have been carried out for the European region, while several others have investigated the matter related to specific countries. Likewise, limited econometric studies have

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already inspected the determining factor of profitability for the European banking system. For example, prior studies on European banks were focused on other aspects of bank performance. For instance, Claeys and Vander Vennet (1998) examined the determinants of bank interest margins and they evaluated to what extent, the low bank margins can be accredited to limited efficiency and non-competitive market conditions of the macroeconomic environment in the Central and Eastern European Countries (CEEC).

The purpose of this study was to inspect bank profitability in the context of 28 European banks, by using cross-sectional time series data. An extensive literature that focused on specific determinants of bank profitability was followed. Thus, on the basis of the existing studies that highlighted the impact of internal factors on bank profitability, a cluster of internal variables in our regression model was included in order to capture their effects on European banks' performance.

This paper is organized as follows: The introduction is developed in Section 1. Section 2 provides a literature review on the determinants of bank profitability and describes the research hypotheses based on previous studies. Section 3 defines the research methodology and data sample. The econometric model applied and the variables used in the regression model are described in this Section. Empirical findings of the study are presented and investigated in Section 4. The final section underlines the results achieved by this research and offers some proposals for future empirical studies.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The importance of bank profitability at the micro and macro levels led researchers, academics, bank managers and bank regulatory authorities to grow wide interests on the determinants of banks' profitability (Athanasoglou et al., 2008). Some banks gain relatively high rates of return, while others earn lower ones. How much variation in these banks' profitability came from differences in external factors under the control of bank management? The earnings performance differs widely from one bank to another and a number of causes could be assumed to contribute to the variability of bank profits, such as differences in bank's size, structure and location, as well as variances in quality of bank management, asset portfolios and liabilities composition.

There have been several studies on the influence of firm characteristics on profitability and following early works by Short (1979) and Bourke (1989), more recent studies have attempted to recognize some of the main determinants of bank profitability in many countries. Some studies are country-specific (Garcia-Herrero et al., 2009; Saeed, 2014; Ghazouani and Moussa 2013; Gul et al., 2011; Ali et al., 2011; Tarus et al., 2012; Sufian

and Habibullah, 2009; Sufian and Chong, 2008; Dietrich and Wanzenried, 2009), while few of them consider panel of countries (Abreu and Mendes, 2002; Staikouras and Wood, 2004; Pasiouras and Kosmidou, 2007).

The empirical findings of the mentioned studies diverge significantly because of the differences in time periods, datasets and examined countries. Many factors affect bank profitability but it is possible to find some common elements that can be used to further categorize its determinants. Particularly, these factors are classified into two main categories: i.e, factors that are controlled by the management (managerial or internal factors) and those that are beyond the control of management (environmental or external factors). For this reason, the authors prefer to categorize the related literature according to internal and external determinants of bank profitability rather than according to investigation based on a specific country or on a set of countries. In the literature, bank profitability is usually expressed as a function of internal and external determinants, but especially the internal ones (also termed micro or bank-specific factors) have been shown to be the most important in influencing this profitability.

The internal determinants of profitability are empirically well investigated and most of the previous studies stated that size (Berger et al., 1987; Bikker and Hu, 2002), capital ratio (Molyneux and Thornton, 1992), liquidity ratio (Bourke, 1989; Molyneux and Thornton, 1992), asset quality and operational efficiency of the banks are important factors in achieving high profitability. The mixed results reached in prior literature implicated uncertain findings on the relationship between internal factors and bank profitability and then a growing interest towards this subject.

Additionally, Abreu and Mendes (2002) investigated the causes of bank's profitability in some European countries in the previous decade. They found that well capitalized banks face lower estimated bankruptcy costs and this circumstance results in greater profitability. Beccalli (2007) inspected whether investments in information technology (IT) affect the performance of banks. Using a sample of European banks over the period 1995-2000, Vander (2002) analyzed the cost and profit efficiency of European banks.

Altunbas and Marques (2008) studied the effect of European Union banks' strategic similarities on post-merger performance and they discovered that, on average, mergers lead to much performance in banking sector. Thus, a specific more recent analysis of the determinants of bank profitability in Europe is substantially missing since only few authors (Molyneux and Thornton, 1992; Abreu and Mendes, 2002; Pasiouras and Kosmidou, 2007) focused on this specific subject.

Hence, the purpose of this study was to investigate the relationship between internal factors and profitability in top 28 European banks and to contribute to the development of the pertinent literature. Based on the

contents and the aim of studies cited in the literature review, a number of explanatory variables have been considered as internal determinants of bank profitability. In particular, the management controllable (internal) factors considered in this study are: deposit ratio, asset quality (loan loss provisions) ratio, size, capital ratio and loan ratio. Based on the prior literature, this study aims to verify the following hypotheses.

Deposit ratio

The more the deposits a bank collects, the more the loan opportunities it will be able to provide to customers and then it will be able to generate further profits. It could be expected that higher upward deposits would develop the business of the bank and consequently produce more profits. Lee and Hsieh (2013) underlined this matter by concluding that additional deposits can be advantageous to banks in generating more profits while low deposits may impact negatively on their profitability. It is generally supposed that customer deposits affect banking performance positively if there is a satisfactory demand for loans in the market. Increasing deposits (the ratio of total deposits to total assets) implies the growth of the funds available to different profitable uses (e.g. lending activities and investments), which should upsurge bank's return on assets when other factors are constant.

Therefore, customer deposits are positively related to bank profitability but more deposits may dampen earnings, since loan demand is little and not too profitable. Bank's incapacity in releasing money through loans may reduce its profitability level because of the interests paid to depositors. Hence, the impact on profitability that originates from a growth in deposits depends on several factors. First, this impact is influenced by bank's ability to transform deposit liabilities into income-earning assets, which reveals bank's operating efficiency as well. Hence, a positive impact of deposits on bank profitability relies on the credit quality of these assets. The effect of fund source on profitability is measured by deposits over total assets ratio and, according to prior literature, it can be hypothesized that:

H1: There is a positive relationship between deposit ratio (DEP) and bank profitability.

Asset quality ratio

The ratio of loan loss provisions over total loans (asset quality ratio) is now analyzed to measure the effect of a bank's asset quality on profitability. If banks operate in more risky and uncertain environment and they find difficulties controlling their lending operations, the loan loss provision ratio probably will be higher, indicating a reduced credit quality and thus a lower profitability. A negative impact of loan loss reserves on bank profitability

would suggest a reduced quality of loans that upsurges the provisioning costs and declines interest revenue. Hence, the loan loss provisions to total loans ratio is expected to have a negative relationship with bank profitability because bad loans are expected to decrease profits.

In this way, Miller and Noulas (1997) found a negative association between credit risk and profitability. They argued that such correlation indicates a greater risk of loans because the more the exposure of the banks to high risk loans increases, the more the growth of unpaid loans would be enlarged and profitability would decline.

However, according to the risk-return hypothesis, a high asset quality ratio together with a sound quality of loans could suggest a positive correlation between risk and profits. In this regard, Kosmidou et al. (2008), Athanasoglou et al. (2008) and Vong and Chan (2009) stated a positive relationship between the ratio of loan loss provisions over total loans (asset quality ratio) and profitability. However, according to Fu and Heffernan (2010), the estimated relationship of this ratio with profitability can be positive or negative due to the assessment of a possible loan loss in the future or a timely recognition of bad banks' loans. According to what was pointed out above, the results of the majority of the existing studies lead to the following hypothesis:

H2: There is a negative relationship between asset quality ratio (ASSQ) and bank profitability.

Size

One of the main enquiries in the literature is whether bank size maximizes banks' profits. The relationship between size and profitability has been inspected in some prior studies and many empirical results proved the role of size as a determinant of bank profitability. Following the review of the existing literature concerning the relation between bank size and profitability, different results have been observed.

In previous studies by Alp et al. (2010), Bikker and Hu (2002) and Dogan (2013), a significant positive correlation between size and profitability was identified. Also Camilleri (2005), Athanasoglou et al. (2008), Pasiouras and Kosmidou (2007), Gul et al. (2011) and Saeed (2014) found that size positively influences the profitability of the banks they have investigated. Mainly, prior studies on the effect of size on bank profitability joined with the idea that large banks can benefit from economies of scale enable cost reduction (Molyneux and Thornton, 1992; Bikker and Hu, 2002; Goddard et al., 2004a). Based on this efficiency hypothesis, larger banks are more profitable than smaller ones because economies of scale lead to the increase of operational efficiency. Large banks might also benefit from scope economies (reduced risks and product diversification), by accessing markets in which small banks cannot enter.

However, the impact of such economies is not unequivocal because the findings do not reveal that an increase in size always amplifies the profitability level. Some studies have tested economies of scale for large banks (Altunbas et al., 2001) while others have found diseconomies for them or economies of scale for small ones. In particular, Vander (2002) observed economies of scale only for the smallest banks in Europe and diseconomies of scale for the largest ones. Some researchers suggested that banks could reduce costs by increasing their size but on the other hand, banks might incur in scale of inefficiencies (Berger and Humphrey, 1997); for this reason, smaller banks could be more profitable than larger ones. According to these studies, large banks' size might imply a negative relationship between size and profitability, caused by costs related to the management of extremely large firms, overheads of bureaucratic processes and agency costs (Stiroh and Rumble, 2006; Pasiouras and Kosmidou, 2007; Athanasoglou et al., 2008). Also, other researchers confirmed a negative relation between profits and bank size, suggesting that larger banks attain a lower level of profitability as compared to smaller ones. These results are suggested by Sufian and Chong (2008) in Asia, Miller and Noulas (1997) in the USA, Jiang et al. (2003) in Hong Kong and Bashir (2003) for Middle Eastern Islamic banks.

Hence, the mentioned existing findings produce a vague understanding of the effect of size on profitability in banking sector. As a result, size is encompassed in the regression model to catch the cost advantages associated with size (economies of scale) and the higher ability of larger bank in the differentiation of their products and services. As in the literature, bank size is considered an independent variable. Based on main literature review, bank size is measured by total assets and is stated to be positively associated with profitability:

H3: There is a positive relationship between size (SIZE) and bank profitability.

Capital ratio

Capital ratio is comprised in the regression model to inspect the relationship between profitability and bank capitalization. The equity to total assets ratio (capital ratio) is considered a basic measure of capital strength (Golin, 2001) and is widely used to analyze the status of a bank's financial power. The capital ratio is a valued tool for assessing capital adequacy as it represents the strength of capital structure to bear losses and to dismiss the risk of insolvency during crisis times.

Researchers extensively theorize that banks with higher capital are more protected from insolvency. For instance, some empirical evidences by Pasiouras and Kosmidou (2007), Garcia-Herrero et al. (2009), Kosmidou

(2008), Obamuyi (2013) and Dietrich and Wanzenrid (2009) demonstrated that the best performing banks are those who preserve a high level of equity relative to their assets. Such positive correlation has been confirmed also by Sufian and Chong (2008), Hassan and Bashir (2005) and Vong and Chan (2009). It is largely assumed that well capitalized banks challenge lower probable costs of financial distress and such circumstance will then be turned into high profitability (Abreu and Mendes, 2002). In particular, Abreu and Mendes (2002) found that in some European countries, well capitalized banks meet low predicted bankruptcy and low funding costs together with higher interest margins on profitable assets, thus demonstrating a positive relationship between capital and bank profitability. Then, higher volume of equity will reduce the cost of capital, causing a positive effect on profitability. Furthermore, it is estimated that banks with higher capital ratio are less dependent on external funding, with a positive impact on their profits. Therefore, well capitalized banks achieve greater profitability because lower risk raises bank's creditworthiness and reduces the cost of funding. On the contrary, lower capital ratio involves higher leverage risk, which implies higher borrowing costs. Some authors mentioned above considered banks with higher capital ratios less risky as compared to others with lower capital ratios. To this point, high capital ratio is considered a measure of low leverage and therefore of low risk.

Even though capitalization has been tested to play an overall and essential role in improving the performance of financial institutions, some empirical findings demonstrated that this direct relation is not always assured. In line with these findings, it should be expected that banks with lower capital ratio should have higher profits as compared to well capitalized ones (Saona, 2011; Ali et al., 2011; Staikouras and Wood, 2004). Therefore, this risk-return assumption would entail a negative relationship between capital ratio and bank profitability.

Anyway following to the previous considerations and regarding most of the prior studies cited, capital ratio is estimated to show a positive relationship with profitability because well capitalized banks are assessed to be more profitable. The findings of majority of the prior literature led to the following hypothesis:

H4: There is a positive relationship between capital ratio (CAP) and bank profitability.

Loan ratio

A lot of academics assign a prominent role to asset and liability composition ratios in influencing bank performance. In this regard, the volume of loans and deposits detained are used to measure the efficiency of asset and liability portfolio management, respectively.

Consistent with prior literature, total loans to total assets ratio (loan ratio) is considered an indicator of liquidity and liquidity is very important in explaining bank profitability and loans are the main source of income and are estimated to have a positive impact on bank performance. Much literature found a positive relationship between liquidity and profitability (Abreu and Mendes, 2002; Bashir, 2003; Sufian and Abibullah, 2009) as a bank which holds a reasonably high quantity of liquid assets will probable obtain high profits.

Even though bank loans are the main source of returns and are anticipated to impact profits positively, evidences from many existing studies revealed a negative correlation between bank loans and profits. For these reasons, empirical results of studies concerning the relationship between liquidity and profitability in banks are diversified. When banks increase their loans portfolio, it could be assumed that they have to pay upper costs for their funding provisions.

In this case, a very elevated loan ratio could imply that banks have rapidly grown their loans portfolio paying a higher cost for their funding necessities and this circumstance could cause a negative effect on profitability.

From a theoretical perspective, the influence of loans on bank performance is quite challenging to predict. For example, a bank with a higher growth rate of its loan volume, apparently, would be more profitable in consequence of the added business created. However, a high growth of the loan volume might also result in a drop of credit quality and consequently in a reduced profitability. A big credit portfolio could lead to reduced bank profits if it largely includes high-risk loans which could cause lower returns and financial losses.

Furthermore, if the bank increases loan volume along with lower margins, it could be presumed a negative effect on profitability (Hassan and Bashir, 2005; Staikouras and Wood, 2004).

In this regard, Duca and McLaughlin (1990), among others, concluded that differences in bank profitability largely depend on changes in credit risk and also Miller and Noulas (1997) stated a negative relationship between credit risk and profitability as variations in credit risk produce changes in the credit quality of a loan portfolio (Cooper et al., 2003).

Since the impact of loan ratio on profitability could be positive or negative, the effect on bank profitability cannot be predicted theoretically. In fact, the profits of a bank depend on either the amount and the composition of its credit portfolio.

Hence, it is possible to conclude that the size of a bank's credit portfolio affects its profitability either positively or negatively, depending on its credit quality. However, in line with the majority of the mentioned studies, the following hypothesis is suggested:

H4: There is a positive relationship between loan ratio (LOAN) and bank profitability.

Data source and research design

In this paper, the cross-sectional and time series data downloaded from Bank scope have been examined applying a panel data multiple regression. The sample is an unbalanced panel dataset of 28 large European commercial banks, based on 280 observations over a 10-year period from 2006 to 2015. To account for profit persistence and potential endogeneity problems, the system GMM estimator was applied for our panel of European banks. The authors applied the GMM up-to-date econometric technique to address the issue of endogeneity of regressors which can lead to inconsistent estimates in this type of study.

Regarding the time period, the panel data are collected from 2006 to 2015 in order to study the period before and after the beginning of the financial crisis. The investigation of banks' profitability is particularly interesting in this period as the financial system and banks have been exposed to several financial shocks and challenges in many countries.

As this study is related to commercial banks in Europe, non-banking credit institutions, securities houses, investment banks and the European Central Bank (ECB) were excluded. Within the sample selection, the 28 European banks (Appendix 1) have been selected for data collection as each of them is scheduled the "largest bank" in each country of the European Union by Bankscope according to the amount of total assets. Overall, the banks in this sample are focused on commercial banking activities, with a median of approximately 80% of their income produced in the traditional field of interest income.

Banks had to meet a series of conditions in order to be included in the sample. First, they had to be European owned commercial banks among the financial institutions operating within the European Union banking sector, in line with the nationality analysis of the European Central Bank (ECB) updated at 31st December 2015. Second, data of the annual balance sheets and income statements had to be available for all the years between 2006 and 2015 (collected from the Bankscope database).

In this section, both the dependent and independent variables that we selected for our analysis are also defined. Even if the definition of profitability differs in banking literature, this study postulates return on equity (ROE) as the measure of profitability (dependent variable), in line with previous literature. ROE indicates the returns to shareholders on the book value of their investments (equity) and then it measures a firm's efficiency to generate profits from every unit of shareholders' equity. In other words, ROE shows how successfully a company invests funds to grow earnings. In line with prior studies on bank profitability, ROE is defined as the ratio of net profits to total equity.

Five bank-specific independent variables are investigated in the study as internal determinants of European banks' profitability. Precisely, the internal factors used in the regression model are: total deposits to total assets (DEP), asset quality expressed as the ratio of loan loss provisions over total loans (ASSQ), total assets of a bank representing bank's size (SIZE), ratio of equity to total assets indicating capital strength (CAP) and loans to total assets (LOAN).

The ratio of deposits to total assets (DEP) is estimated to have a positive effect on banks' profits even though the effect on profitability originating from a growth in deposits is influenced by several factors. For example, it depends on a bank's operating efficiency (the bank's ability to transform deposit liabilities into income-earning assets) and on the credit quality of interest-earning assets.

The ratio of loan loss provisions over total gross loans is used as a measure of a bank's asset quality (ASSQ) and it is combined as an independent variable in the regression analysis. The ratio of loan loss provisions to total loans is also an indicator of credit risk. A higher ratio shows lower credit quality and, thus, a lower

Table 1. Explanation of variables used in the regression model.

Variable	Description	Measure	Expected effect on profitability
Dependent variables			
ROE	Return on equity	Net income/average total equity (%)	NA
Independent variables			
DEP	Deposit ratio	Total deposits/total assets	+
ASSQ	Asset quality ratio	Loan loss provisions/total gross loans	-
SIZE	Bank size	Total assets (mil EUR)	+
CAP	Capital ratio	Equity/total assets	+
LOAN	Loan ratio	Net loans/total assets	+

profitability. Hence ASSQ is estimated to have a negative relationship with profitability.

In this study, the size of the bank (SIZE) is included in the regression model and it is measured by total assets. Usually, the effect of increasing size on profitability has been verified to be positive to a certain extent but the impact of size could be negative especially due to bureaucratic reasons for those banks that are excessively large.

Capital ratio is measured by equity over total assets (CAP). It represents bank capitalization and identifies the ability of a bank to manage losses and risk exposures. A higher capital level raises profitability since a bank can certainly be compliant with regulatory capital standards by having more capital and consequently by using the excess capital as loans. Capital ratio is predictable to have a positive relationship with profitability because well capitalized banks are less risky and more profitable.

The ratio of net loans to total assets (LOAN) is estimated to have a positive association with bank profitability. Other conditions being constant, the more the deposits are converted into loans, the higher the level of profitability is. Nevertheless, it could be possible that banks that are fast growing their loans have to meet higher costs for their funding supplies and this circumstance could impact negatively on profitability.

The explanations of dependent and independent variables investigated in our study are presented in Table 1. Which lists all the variables used in the regression model, including their description, measure and expected effects on profitability.

To test the hypotheses of the study, a linear regression model was constructed using the cross-sectional time series data of European banks in the period 2006-2015. As a result, a multivariate analysis was carried out applying a OLS-regression model and panel regression techniques. As the data set proves that European banks reply to cyclical movements similarly, the authors applied pooled least squares (OLS) method. OLS-regression model is the most consistent regression method because of its general attitude in minimizing biases and variance (Koutsoyiannis, 2003; Greene, 2004). Panel data (or cross-sectional time series data) were selected because they can measure respectively individual variability and dynamic change of the cross-sectional units over time. To examine the determinants of European banks' profitability, a linear regression model is estimated as follows:

$$Y_{it} = \delta_0 + \alpha_1 DEP_{it} + \alpha_2 ASSQ_{it} + \alpha_3 SIZE_{it} + \alpha_4 CAP_{it} + \alpha_5 LOAN_{it} + \varepsilon_{it}$$

where Y_{it} is the profitability of bank i at time t ; i refers to an individual bank; t refers to year; δ_0 constitutes the fixed effect, DEP, ASSQ, SIZE, CAP and LOAN represent the internal factors (determinants) of a bank's profitability; ε_{it} is a normally distributed random variable

disturbance term (error term).

The model is estimated using a fixed effects regression analysis, using the least square method to a fixed effects model. The firm-level heterogeneity was eliminated through the use of mean deviation data. White's (1980) transformation was applied to verify cross-sectional heteroscedasticity of the variables and the standard errors tested for all coefficients were based on White's adjustment.

The option of a fixed effects model rather than a random effects one has been verified with Hausman test (Baltagi, 2001). The Breusch-Pagan test was also used to check for residual heteroscedasticity. Given the dynamic nature of this model, least squares estimation methods generate biased and inconsistent evaluations. Therefore, techniques for dynamic panel estimation that are able to deal with the biases of our estimates were used. Another challenge concerning the estimation of bank profitability refers to the endogeneity problem which is addressed in this study by employing the generalized method of moments, also known as system GMM estimator.

REGRESSION RESULTS AND DISCUSSION

Based on panel data, all the variables are observed for each cross-section and time period. Descriptive statistics, correlation matrix and multivariate regression results are presented in Tables 2, 3 and 4, respectively. Table 2 shows summary statistics of the dependent and independent variables used in the regression model. The table reports the results of descriptive statistics for all the variables included in the sample data set. A wide variety of profitability information is found. Particularly, the value of ROE has significant dispersion in the scores, as revealed by the minimum, maximum and standard deviation values. On average, European banks show a ROE of 0.405073 over the entire period of 2006 to 2015. The amount of ROE ranges from -94.5790 to 20.8770 and the highest standard deviation is 16.5710. The difference between mean and standard deviation reveals the existence of great differences among the profitability of banks.

A large variation is also marked with regard to some of the independent variables as signified by their minimum and maximum values. Especially, there is a large

Table 2. Summary statistics.

Variables	Mean	Median	Minimum	Maximum	Std. deviation	5%	95%
Dependent variables							
ROE	0.405073	4.25300	-94.5790	20.8770	16.5710	-9.3508	15.2754
Independent variables							
DEP	2.56763	2.48703	0.220000	8.65300	1.64302	0.536700	5.63161
ASSQ	0.543716	0.560350	0.00000	0.856000	0.131395	0.433800	0.907620
SIZE	709513.	581808.	16689.0	2.41562e+005	545162.	45207.4	1.75401e+005
CAP	4.97803	4.38020	-0.0690000	16.7950	2.75968	1.50320	11.4948
LOAN	45.7238	47.2790	8.89600	76.7042	15.7267	18.9161	72.5516

Table 3. Correlation matrix.

Variables	ROE	DEP	ASSQ	SIZE	CAP	LOAN
ROE	1.0000	0.1294	-0.2730	0.0199	0.3427	0.0976
DEP		1.0000	-0.0784	-0.0123	0.0478	0.0327
ASSQ			1.0000	-0.0310	0.0642	0.0365
SIZE				1.0000	-0.1691	-0.1284
CAP					1.0000	0.2574
LOAN						1.0000

Table 4. Regression analysis.

	Coefficient	Std. Error	t-ratio	p-value
Model 1 - Dependent variable: ROE				
Const	-23.7040	6.81397	-3.3989	0.00084***
DEP	2.03139	0.92625	-2.4782	0.01486**
ASSQ	-24.9967	10.4186	2.4110	0.01802**
SIZE	5.96725e-04	2.37309e-04	2.5089	0.01406**
CAP	1.94366	0.473487	4.3267	0.00005***
LOAN	0.0426859	0.0934593	0.3675	0.72537
R-squared	0.243516	Log-likelihood	-707.7532	
F-statistic	5.176401	Schwarz criterion	1582.255	
S.E. of regression	15.20784	Akaike criterion	1523.696	
Adjusted R-squared	0.776023	Hannan-Quinn	1565.481	
P-value(F)	2.69e-04	Durbin-Watson	1.897152	

***, ** and * indicate significance at the level of 0.01, 0.05 and 0.10, respectively.

variation within the data set of SIZE. Some of the banks have large size and higher capital because they are well established for a long period, while the others have small size and thus less capital. The standard deviation for SIZE amounts is 545162, while all the other independent variables display lower standard deviation values which indicate much more consistency of the data set. For example, the value of capital ratio (CAP) varies among banks (as well as the other internal determinants) but the

standard deviation is quite low (2.75968), showing a small variation in the values. In this sample, the best capitalized bank show a capital ratio of 16.7950, whereas it amounts to -0.0690000 for the least capitalized bank.

To carry out the regression analysis, the existence of an econometric problem of data set is checked by using the correlation matrix. The authors tested the independence of variables to verify the absence of multicollinearity problems that may compromise the

results. The relationships among the research variables used in the model can be found in Table 3.

Table 3 presents correlation coefficients for the variables involved in the regression model. The matrix shows that the correlation between the bank specific variables is not strong, suggesting that multicollinearity problems are not severe and confirming that the model employed is soundness and reliable (Kennedy, 2008). In this regard, the correlation between each of the variables is not high and the maximum degree of correlation found is very satisfactory. As a result, the coefficients show that a multivariate analysis can be implemented by inspecting individual correlations between independent and dependent variables. The regression results are shown in Table 4. The full regression results, which include both time and bank-specific fixed effects are not reported in this paper.

The empirical analysis shows some relevant differences with respect to both the significance and the size of the estimation findings. In particular, the R-square indicates how internal factors are related to bank profitability and the adjusted R-squared refers to the reliability of additional predictor variables with statistical shrinkage. The difference between R-square and adjusted R-squared (shrinkage level) is low, showing an acceptable level of correlation between dependent and independent variables. The value of F-statistic is significant confirming the validity and the stability of the model employed in our study. The explanatory power of the models is reasonably high since the value of the R-squared adjusted (0.776023) evidences that about 77% of the variation of the dependent variable ROE is explained by the independent variables included in the analysis.

The deposit ratio - amount of deposits to total assets (DEP) - has a positive and significant influence (at the level of 5%) on ROE. This result supports similar studies concerning banks' profitability such as Al-Jarrah et al. (2010), Gul et al. (2011) and Saeed (2014). The results concerning the variable DEP sustain the view that banks depending on deposits for funds can realize high return on assets. More deposits improve the lending capacity and determine higher profits. After the crisis period, top banks in Europe were able to collect additional saving deposits and to transform the growing amount of deposit liabilities into greater income earnings. As the demand for lending increased, even profitability enlarged because banks had been able to find attractive investment opportunities lending their additional deposits.

Literature shows that wide exposure to credit risk is generally related to low firm profitability and, hence, the authors assumed a negative relationship between the ratio of loan loss provisions to total gross loans ratio (ASSQ) and profitability. In this analysis, ASSQ is established to have a significant negative impact on banks' profitability. As expected, the regression coefficient is negative and significant for ROE (at the level of 0.05), suggesting that European banks with

higher credit risk have a lower profitability. The sign of this ratio is in line with the results of other studies performed in the most developed countries as mentioned in the literature review.

The findings advise that European banks would expand profitability by screening and monitoring more efficiently credit risk and thus by improving the estimation of future risks. In this regard, European banks should dedicate more on credit risk management which would support financial institutions in assessing well credit risk. Nevertheless, the relationship between asset quality ratio and ROE depends on the reliability of the financial system over the cycle as higher risk assets could imply higher returns during an economic upturn.

Turning to another explanatory variable, SIZE has a significant positive impact on profitability, showing that larger banks better succeed than smaller ones in achieving a higher ROE. This result is consistent with prior evidence (Pasiouras and Kosmidou, 2007; Staikouras, et al., 2008; Goddard et al., 2004a; Gul et al., 2011). Since a bank expands its operations, there are more opportunities of a growth in profitability. The first explanation for the positive relationship between size and profitability is linked to economies of scale (Hauner, 2005; Pasiouras and Kosmidou, 2007; Staikouras et al., 2008). In this regard, a potential cause is related market power because banks having huge amounts of assets generally control a larger portion of the market, improving profits through the allocation of fixed costs over a larger volume of services (Hauner, 2005). This position should enable such banks to pay less for their inputs and to acquire less expensive capital. It also reveals that larger banks are able to take advantage of higher production and loan diversification opportunities (Bikker and Hu, 2002). For these reasons, since the unit costs of large scale banks are likely to be lower than those of smaller banks, their profitability ratios will be higher.

For hypotheses testing, results document that capital ratio (CAP) is positively related with profitability because well capitalized banks experience higher returns by reducing their cost of funding and by facing lower risks of going bankrupt. On the contrary, lower capital ratios imply greater leverage and risk, and then higher borrowing costs. If an increase in the amount of equity may allow banks to reduce their level of debt, lower funding costs are expected. Therefore, it is logical that the profitability level should be higher for the better capitalized banks. In fact, the regression coefficients of the capital ratio are positive and statistically significant (at the level of 0.01), reflecting the positive impact of capital strength on profitability in European banking sector (the value of the coefficient is 1.94366). These empirical results are consistent with previous studies of Kosmidou et al. (2006), Berger (1995a, b), Dermiguc-Kunt and Huizinga (1999), Staikouras and Wood (2004), Goddard et al. (2004a), Pasiouras and Kosmidou (2007), Sufian and Chong (2008) and Saeed (2014). It can be concluded that banks with low leverage ratios (banks financed by

high amounts of equity) are able to be more profitable. A robust capital structure is crucial for financial institutions in pursuing successfully business opportunities and in withstanding unexpected losses, thus achieving more profitability.

Regarding loan ratio (LOAN), this study hypothesis is not supported by the findings as the analysis suggests that LOAN has a positive but insignificant influence on the level of ROE. The results show that more loans increase the chances of achieving higher profitability but the effect is not certain. Regression findings invalidate a correlation between this independent variable and the mentioned measure of profitability used as dependent variables, in contrast with the hypothesis 5 which states that loan ratio is positively related to profitability. Moreover, the results do not confirm those obtained from other similar studies (Kosmidou, 2008) which have found that the ratio of net loans to total assets of European banks has a negative influence on profitability.

Conclusion

This study examines the impact of bank-specific characteristics (internal factors) on European banks' profitability. In this scope, factors affecting bank profitability have been analyzed in a multiple regression model by using a sample of banks operating in Europe in the period 2006-2015. Panel data estimation has been applied to 28 large European banks, analyzing the cross-sectional and time series data for the mentioned period. Regression results suggest that there are differences in profitability among the banks included in the sample and a significant extent of this variation can be explained by the analyzed independent variables. SIZE- represented by total assets, is the main determinant of European banks' profits, demonstrating that large banks take advantage of the economies of scale and the differentiation of their products and services. Empirical results also demonstrate that asset quality ratio (ASSQ) is another internal determinant of bank profitability in Europe but its impact is negative. On the contrary, the effect of deposit ratio (DEP) on ROE is positive and significant. The findings also show that capital strength, measured by equity to total assets (CAP), is a significant determinant of bank profitability. Well capitalized banks reduce costs of external financing and such an advantage can be turned into higher profitability. On the other hand, regression analysis shows that the ratio of net loans to total assets (LOAN) does not explain the variability of profitability measured by ROE.

The findings provide interesting insights into the characteristics and practices of commercial European banks. In this regard, some suggestions may be beneficial for banks' management, policy maker, shareholders and bank regulatory authorities (i.e. the central banks, banker associations, governments) in order to intensify and sustain soundness and stability of

the banking sector. This study has considerable policy implications since the ability to maximize risk-adjusted returns on investment and to sustain stable and competitive advantages is a crucial factor in order to safeguard the competitiveness of the European banking sector. It would be useful to identify the profitability determinants of successful banks in order to define policies for intensifying and maintaining the strength and the stability of the banking sector in Europe.

The results of this study have other important implications. First, the results offer comprehensive new insights into the factors determining the profitability of commercial banks in Europe. Single bank's characteristics explain a portion of the within-country variation in European bank profitability, suggesting that much more attention should be dedicated on bank's specifics to increase the profitability. Secondly, the study could be a support for investors in their decision making process and particularly could be useful for the global institutional investors looking for profitable investment opportunities in European banking sector.

Finally, the study extends prior literature in several ways. To date, very few econometric studies have empirically explored the determinants of profitability of the European banking sector (Goddard et al., 2004b; Athanasoglou et al., 2006), even though similar studies have been conducted in some developed countries. Therefore, the present paper tries to bridge the gap in the existing literature improving the insights of bank profitability in Europe. Based on this study, many others could be carried on by investigating any internal and/or external variables that could affect the bank profitability. Furthermore, future research may be conducted by including further European banks in the sample or by increasing the number of variables to improve the consistency of the study. For example, future research could consider further variables such as taxation, exchange rates and indicators of the quality of the offered services or other information on employees, management and board members (e.g. number, education, skill level and experience). Another potential improvement could be the inspection of differences in the determinants of profitability between small and large banks as well as between high and low profitable banks.

Conflict of interest

The authors have not declared any conflict of interest

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Appendix 1. European banks included in the sample.

Bank name	City
Latvijas Banka-Bank of Latvia	Riga
AB SEB Bankas	Vilnius
Bank of Valletta Plc	Valletta
Swedbank As	Tallinn
NLB dd-Nova Ljubljanska Banka d.d.	Ljubljana
Bulgarian National Bank	Sofia
Zagrebacka Banka dd	Zagreb
Narodna Banka Slovenska-National Bank of Slovakia	Bratislava
ABH Financial Limited	Nicosia
National Bank of Hungary-Magyar Nemzeti Bank	Budapest
Ceskoslovenska Obchodni Banka A.S.- CSOB	Prague
National Bank of Romania-Banca Nationala a Romaniei	Bucharest
Narodowy Bank Polski-National Bank of Poland	Warsaw
Bank of Greece	Athens
Caixa Geral de Depositos	Lisbon Codex
Erste Group Bank AG	Vienna
Nordea Bank Finland Plc	Nordea - Helsinki
Dexia	Brussels
Merrill Lynch International Bank Limited	Dublin
Danske Bank A/S	Copenhagen
Nordea Bank AB (publ)	Stockholm
European Stability Mechanism-ESM	Luxembourg
UniCredit SpA	Milan
ING Groep NV	Amsterdam
Banco Santander SA	Madrid
Crédit Agricole-Crédit Agricole Group	Paris
HSBC Holdings Plc	London
Deutscher Sparkassen-und Giroverband eV	Berlin