Determinants of Bank Performance in the Context of Crisis: A Panel Data Analysis for Portugal

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Abstract:

Purpose: This research aims to study the determinants of the performance of the Portuguese banking sector, in the period between 2005 and 2011, characterized by economic downturn and by the bailout of Portuguese economy.

Design/Methodology/Approach: Bank performance is measured through Return on Assets (ROA) and Return on Equity (ROE), following the studies that relies on financial statements. We test the impact of a set of internal factors such as the bank's capital, costs, liquidity, asset quality, size and diversification, and external factors such as GDP, inflation, unemployment and market concentration in the performance of Portuguese banks, using a panel data model with fixed effects for a representative sample of Portuguese banks.

Findings: The results showed that the variables with the highest explanatory power on the ROA, in terms of internal determinants were operational costs and liquidity and in terms of external determinants, were GDP and Inflation. For the ROE, the variables with greater significance were the capital, operating costs and liquidity. The variables GDP and Inflation suggested weak significance.

Practical Implications: Our results showed that macroeconomic variables such as product growth, inflation and unemployment rate influence the performance of banks, and therefore it is important to monitor these economic indicators in order to incorporate them in the decision-making process. The results obtained for the internal variables, under the control of bank managers, show that liquidity and operating costs are relevant for performance.

Originality/Value: The value of this article is that it provides empirical evidence on the determinants of bank performance in the Portuguese banking sector, thus adding to international evidence of country studies.

Keywords: Bank performance, internal variables, macroeconomics factors, panel data.

JEL Code: D01, D11, D21.

Paper Type: Research study.

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1. Introduction

The subprime crisis that emerged at the end of 2007 in the United States, conditioned the performance of Portuguese financial institutions which, despite having no relevant direct exposure to this market, were limited in the access of funding, aggravating the level of liquidity and solvency of these institutions. 2011 was marked by the request for international financial assistance and the beginning of the process of adjusting the macroeconomic imbalances previously accumulated by the Portuguese economy. This recessive context brought negative effects to banking activity in general, expanding the dimension of the risks assumed by the banks, with consequences in the increase of credit spreads, devaluation of the asset portfolios and increase in customer defaults.

It is important to understand which specific characteristics of banks and macroeconomic and sectorial conditions influenced the performance of the Portuguese banks in this economic recession environment, to draw lessons that may support appropriate strategic decisions. This knowledge contributes to the financial strength and sustainability of these financial institutions. There are several studies demonstrating the effect of the negative economic context on the profitability of banks. Kumbirai and Webb (2010) analyzed the performance of South African banks between 2005 and 2009. They observed a generalized drop in profitability, liquidity and a deterioration in credit quality, linked to the downturn of the economic cycle. Also, Trujillo-Ponce (2013), studying the Spanish case, concluded that the economic cycle affects the performance of banks.

Several studies have sought to identify the factors that explain banking performance. There is a generalized consensus in the classification of the explanatory factors of banking performance in internal and external determinants. The former are characterized by being directly controlled by managers, while the latter, related to macroeconomic factors, although predictable, are not subject to control by the institutions.

We study the determinants of performance in the Portuguese banking sector in the period 2005 to 2011, using as performance measures, the return on assets (ROA) and the return on capital (ROE), following the accounting based approach that relies essentially on financial statements to explain bank profitability. Our results are consistent with previous studies, allowing us to conclude that bank's specific variables related to operating costs and liquidity, as well as sectorial and economic growth variables, influence the performance of the banking sector, as assessed by ROA or ROE.

This study is structured as follows. In section one we do the introduction. In section two, we present the literature review. In section three, we describe the sample and the methodology, select the explanatory variables and discuss the theoretical

arguments for their expected signal. In section four, we analyze the results. Finally, in section five, we conclude and draw policy implications from the results.

2. Literature Review

There are several studies that analyze banking performance, which consider the return on assets (ROA) and the return on equity (ROE) as the key variables for measuring that performance. This literature typically classifies the explanatory variables of performance as internal determinants, which include the specific factors of banks related to their management such as, capital, liquidity, asset quality, diversification, operational costs and size, and external determinants, which are linked to a set of macroeconomic factors that affect the banks performance (Dermiguc Kunt and Huizinga, 1999; Thalassinos and Thalassinos, 2018; Abreu and Mendes, 2002; Goddard *et al.,* 2004; Ben Naceur and Goaeid, 2008; Kosmidou *et al.,* 2005; Athanasoglou *et al.,* 2008; Anbar and Alper, 2011; Rekik and Kalai, 2018; Hughes *et al.,* 2019; Rupeika-Apoga *et al.,* 2018;).

Berger (1995) studied the impact of capital on the performance of American banks, from 1983 to 1989, and concluded that banks with high capital levels have lower ROE, as the risk on equity and the expected return by investors is smaller. However, Bourke (1989), Dermiguc Kunt and Huizinga (1999), Abreu and Mendes (2002), Athanasoglou *et al.* (2008), Kosmidou *et al.* (2005), Pasiourias and Kosmidou (2007) and Dietrich and Wanzenried (2010) showed, on the contrary, a positive relationship between capital level and performance, arguing that banks with high capital ratios have lower bankruptcy risks, as well as lower financing costs and, consequently, higher levels of profitability (Thalassinos and Pociovalisteanu 2007). More recently, Trujillo-Ponce (2013) concluded that the best-capitalized banks show a higher ROA. Analyzing liquidity risk, these authors argued that, although a high liquidity ratio has a positive effect on bank performance, the illiquid assets promote greater performance, due to their higher remuneration.

Athanasoglou *et al.* (2006; 2008) and Vong and Chan (2009) concluded that there is a negative relationship between performance and credit risk, arguing that greater exposure to credit risk tends to reduce profits. Furthermore, the extent of the losses depends on the risk of bankruptcy, the level of exposure at default (EAD) and loss given default (LGD). In the same line of reasoning, Sufian (2010), analyzing the case of Korean banking between 1994 and 2008, noted that banks with lower credit risk tend to perform better.

Vong and Chan (2009) addressed the diversification issue, and showed that the most diversified banks obtain important gains through the collection of commissions, reducing their dependence on regular activity (interest received) which is easily affected by adverse macroeconomic environments.

Bourke (1989), Molyneux and Thornton (1992), Athanasoglou *et al.* (2006; 2008), Kosmidou *et al.* (2005) and Pasiourias and Kosmidou (2007) recognized that a low level of costs helps to improve efficiency and increases profitability of financial institutions, implying a negative relationship between operating expenses and performance. However, Ben Naceur and Goaeid (2008) and Sufian and Habibullah (2009) contradicted these conclusions, observing that an increase in operating costs does not always negatively influence performance, as banks that invest in hiring and qualifying workers increase their performance.

A large bank can benefit from economies of scale, become more efficient and provide services at a lower cost, thus establishing a positive relationship between size and performance (Athanasoglou *et al.,* 2006; Pasiourias and Kosmidou, 2007). Some years later Anbar and Alper (2011) also confirmed these results, concluding that the size of the balance sheet has a positive effect on the banks' profitability.

Economic growth is associated with higher volumes of banking business, in particular, to more credit. According to Athanasoglou *et al.* (2006; 2008), in periods of economic downturn banks are more exposed to higher levels of default and, consequently, to lower results. Bad loans have a depraving effect on the quality of the loan portfolio, creating problems of liquidity and confidence in the financial system (Albertazzi and Gambacorta, 2009). These authors noted that GDP growth has a positive and statistically significant impact on banks' performance. Trujillo-Ponce (2013) showed the importance of the economic cycle in the performance of banks. Contrarily, Dermiguc Kunt and Huizinga (1999), Pasiourias and Kosmidou (2007), Sufian and Habibullah (2009) and Vong and Chan (2009), did not observe any statistically significant relationship between economic growth and banks' profitability.

The relationship between inflation and banking performance was studied by Perry (1992), who concluded that the influence of this variable depends on the anticipation of future inflation rates by banks. If the rise in inflation has been correctly anticipated, the bank will be able to adjust interest rates in order to increase revenues and improve performance. The empirical results obtained by Bourke (1989), Molyneux and Thornton (1992), Kosmidou *et al.* (2005), Vong and Chan (2009), Pasiourias and Kosmidou (2007) and Athanasoglou *et al.* (2008), point out a positive relationship between inflation and bank performance. However, this relation is not consensual, as we can see in other studies (Abreu and Mendes, 2002; Sufian and Habibullah, 2009; Sufian, 2010) that inflation and banks' performance tend to be negatively correlated, especially when the capital ratio is high, as costs tend to increasing faster than revenues in inflationary environments.

Molyneaux and Forbes (1995) stated that banks that operate in markets that are more concentrated would obtain greater profits, resulting from collusion practices, than those that operate in less concentrated ones. Dermiguc Kunt and Huizinga (1999) also concluded that there is a positive impact of market concentration on

performance. They argued that a more concentrated banking sector would be more likely to obtain greater benefits, exploiting its market power. In addition, Goddard *et al.* (2004), Bikker and Bos (2005) Athanasoglou *et al.* (2006), Kosmidou *et al.* (2005), Pasiourias and Kosmidou (2007) and Trujillo-Ponce (2013) concluded that there is a positive relationship between market concentration and performance. Bikker and Bos (2005) demonstrated that markets that are more concentrated, banks are more able to charge higher rates on loans and pay lower rates on deposits, resulting in greater efficiency gains.

More recent studies analyze other factors that impact in the bank's performance (King *et al.,* 2016; Fernandes *et al.,* 2017; Pereira and Filipe, 2018). For instance, Pereira and Filipe (2018) analysed the impact of quality of board members on performance, measured by return on asset and return on equity, for Portugal and conclude that education level influence positively the ROA and ROE ratios. Also, KuKaj *et al.* (2020) analize the impact of profitability on return on assets, using annual bank reports and conclude that ROE and profit margins are important variables to explain performance.

3. Data and Methodology

Our sample is composed of 18 banks. Although the sample represents only 17% of the number of entities operating in 2011, in terms of the volume of consolidated assets, it represents 93% of the national banking activity, assuring an adequate representation of the Portuguese banking system. The data used in the present study was obtained from the consolidated financial statements of the banks, made available by the Portuguese Banking Association (APB). We obtained macroeconomic data (GDP, inflation rate and unemployment rate) from the Eurostat and European Central Bank databases. Market structure information, measured by the Hirschman-Herfindahl index, was extracted from a database of the Banco de Portugal. The period considered is seven years, 2005 to 2011, resulting in a panel data of 126 observations.

To measure performance in the Portuguese banking sector, we consider: (i) return on assets (ROA), which assesses how banks are generating revenue from their assets, and is measured as the ratio of net profit before tax over total assets; and (ii) return on equity (ROE), which assesses the banks' ability to grow and add value, and is measured by the net profit before taxes over equity ratio.

3.1 Internal Determinants

In terms of internal determinants of bank performance, we selected the following explanatory variables: capital, operating costs, liquidity, credit risk, diversification and size. For each of these variables, we discuss the expected signals for the estimated parameters based on the results of previous studies, as discussed in the literature review section.

Capital is defined by the ratio of equity over total assets (EQUI). A high ratio means that the institution is solid and prudent in taking risks. This variable is expected to be positively related with banking performance when measured by ROA, and negatively when measured by ROE.

Costs is analyzed by two variables; the cost-to-income ratio, measured by the ratio of operating costs over banking product (COST), and the ratio of operating costs over asset costs (NIE), both of which provide information on the efficiency of the bank's management. When these ratios are high, this suggests that management is less efficient. Therefore, a negative relationship between costs and performance is expected.

Financial institutions are exposed to liquidity risks, when they are unable to meet their short-term liabilities, and may incur a risk of loss resulting from the difficulty of selling assets or renewing funding. To analyze liquidity, we use the ratio of net current assets over short-term liabilities (LIQUI), which indicates the extent to which there are liquid assets that allow the institution to support an unexpected withdrawal of short-term funds. The higher the ratio, the more liquid the portfolio and the higher the bank's liquidity. As liquid assets typically have lower returns, this ratio is expected to be negatively related to performance. Additionally, we use the ratio of loans granted over total assets (LIQ). A high value in this ratio means a lower level of liquidity. As remuneration will be higher, this ratio is expected to be positively related with bank performance.

Credit risk reflects the risk of loss in case of default by counterparties. For the analysis of credit risk we use the ratio of provisions over loans granted (LLP). We suggest that the greater the exposure to risk, that is, the higher the ratio, the lower the performance of the bank, thus expecting a negative relationship between the LLP ratio and performance. To measure the diversification of banking activity, we use the ratio of other operating income over total assets (OOI). This variable indicates the importance of income from commissions and other revenues, that is, the income not resulting from the traditional banking activity of granting credit. Anbar and Alper (2011) concluded that non-interest income had a positive impact in bank's performance. The most diversified banks have a higher ratio, and a positive relationship between diversification and performance is expected.

Finally, we consider the size of the bank, which should capture the positive impact of economies of scale. This effect is analyzed by the total assets of the bank (DIM). The size of the bank is expected to be positively related with performance.

3.2 Sectorial and External Determinants

The external and sectorial independent variables considered in our study are the following.

For the degree of market concentration, we used the Herfindahl-Hirschman index (CONC). In more concentrated markets, there is greater market power, which can be used to obtain benefits. Therefore, a positive relationship between the degree of market concentration and performance is expected.

As discussed in the literature review section, if the rise in inflation is anticipated, the banks will be able to adjust interest rates in order to increase revenues. Therefore, a positive relationship between the inflation rate (INF) and performance is expected.

Economic growth is measured by GDP. This variable is expected to have a positive effect on banks' profitability, as in an environment of economic growth, banks tend to increase lending and practice higher margins. A high unemployment rate (UNEMP) means that customers will have less disposable income, lower savings levels, higher indebtedness levels and, consequently, banks have a higher exposure to default, which will ultimately result in a reduction in performance. Therefore, we expect a negative relationship between the unemployment rate and the banks' performance.

3.3 Descriptive Statistics

This study focuses on the period from 2005 to 2011. Considering the negative impact of the 2008 financial crisis on banking activity, we present the descriptive statistics for two sub periods, 2005 to 2007 and 2008 to 2011.

Table 1. *Descriptive Statistics*

	Period 1 (2005 -2007)					Period 2 (2008-2011)				
	Mean	**Median**	**Min**	**Max**	**St. dev.**	**Mean**	**Median**	**Min**	**Max**	**St. dev.**
ROA	0.811	0.890	-0.410	3.000	0.722	0.412	0.305	-5.050	9.340	1.437
ROE	14.935	13.997	-9.521	47.697	11.283	9.406	5.281	-101.531	261.293	39.784
EQUI	7.667	5.792	0.304	28.821	6.156	6.932	5.561	-0.392	31.501	5.112
COST	63.975	60.866	33.470	107.226	18.155	60.157	61.440	-55.329	115.024	21.324
NIE	1,743	1,681	0.482	4.239	0.803	1.657	1.513	0.681	4.521	0.671
LIQ	53.731	64.160	2.383	88.193	26.806	56.325	58.888	3.848	92.198	22.065
LIQUI	132.917	123.244	82.037	221.209	34.160	212.446	134.341	55.633	5,101.693	586.857
LLP	1.797	1.496	0.000	5.846	1.268	2.619	2.118	0.000	13.990	2.498
OOI	0.192	0.108	-0.208	3.101	0.427	0.218	0.088	-0.177	0.618	0.184
DIM	15.708	15.685	12.322	18.456	1.746	15.913	16.097	11.722	18.542	1.815
CONC	1,129	1,134	1,098	1,154	23	1,065	1,064	1,050	1,083	12
GDP	1.533	1.400	0.800	2.400	0.666	-0.800	-0.850	-2.900	1.400	1.647
INF	2.500	2.400	2.100	3.000	0.378	1.700	2.050	-0.900	3.600	1.705
UNEMP	7.767	7.700	7.600	8.000	0.172	11.000	10.150	7.600	12.700	1.874

Source: Own study.

From Table 1 we find that, the banks considered in the sample registered a ROA of 0.81% between 2005 and 2007. The ROE averaged 14.9% in the same period, confirming the good performance of the Portuguese banking system. However, in the following period, between 2008 and 2011, there was a significant drop in both performance measures, registering 0.41% (ROA) and 9.4% (ROE). This fall in profitability was motivated by the outbreak of the mortgage market crisis that started in 2007, which had already negatively affected the results of the Portuguese banks in the last months of that year.

Regarding the explanatory variables, we highlight the variable liquidity (LIQUI), whose average was 132.9% in the period from 2005 to 2007 and increased to 212% in the following period. This strong increase in liquidity is related to the deleveraging process registered in this period.

It is also worth mentioning the variable related to the credit risk (LLP), which registered 1.80% in the period between 2005 and 2007 and in the following period, it increased to 2.62%, which can be interpreted as a decrease in the quality of the credit portfolio.

With regard to macroeconomic and sectoral variables, major changes are noted, reflecting the economic recession experienced in Portugal and in other European Union countries. GDP recorded an average growth of 1.53% in the first period. However, in the following period, a deep recession occurred, with a negative annual growth rate of 0.80%. The unemployment rate (UNEMP) showed an increasing trend, from 7.7% in the first period to 11% in the second period, because of the worsening of the country's socio-economic conditions. Inflation (INF) decreased from 2.5% in the first period, to 1.7% in the second period, reflecting the contraction of the economic activity. Regarding the concentration of the market, there was a reduction of the Hirschman-Herfindahl index from 1,129 in the first sub period 1, to 1,065 in period 2, because of restructuring carried out in the banking sector.

3.4 Methodology

Our methodology is based on the studies of Molyneux and Thornton (1992), Bourke (1989) and Athanasoglou et al (2008), with a special focus on the latter. Since we are using panel data, the Hausman test was performed to assess which model is the most appropriate to estimate, fixed effects model or random effects model.

To test the empirical relevance of internal and external determinants for the performance of Portuguese banks, we estimate the following specification:

$$\pi_{it} = c + \sum_{j=1}^{J} \beta_j X_{it}^{j} + \sum_{l=1}^{L} \beta_l X_{it}^{l} + \sum_{m=1}^{M} \beta_m X_{it}^{m} + \varepsilon_{it}, \qquad \varepsilon_{it} = v_{it} + v_{it}$$

where π_{it} represents the dependent variable (ROA or ROE) of bank i in period t; c is the constant term of the regression. The set of explanatory variables includes X_{it}^j (capital, operating costs, liquidity, credit risk, diversification and size), X_{it}^l (concentration) and X_{it}^m (GDP, inflation rate and unemployment rate). β_j, β_l and β_m are the coefficients of the respective explanatory variables X_{it}^j, X_{it}^l and; ε_{it} corresponds to the regression error.

4. Results

The Hausman test allowed us to conclude that the fixed effects model is the one that best fits data. Thus, to analyze the determinants of bank performance, we estimated a model with balanced panel data with fixed effects (EGLS), cross-sectional weights and using white period standard errors and covariance. We estimated Model 1 with ROA as the dependent variable, and Model 2 with ROE. Table 2 below shows the results.

Table 2. *Results*

	Model 1 (dependent variable ROA)			Model 2 (dependent variable ROE)		
	Coefficient	**St. dev.**	**Significance**	**Coefficient**	**St. dev.**	**Significance**
C	-1,6721	1,1270		-35,1316	40,6970	
EQUI	0,0321	0,0174		-1,4323	0,4393	***
COST	-0,0113	0,0030	***	-0,2021	0,0787	**
NIE	0,4425	0,0697	***	5,9526	1,4376	***
LIQ	-0,0053	0,0017	***	-0,2155	0,0809	***
LIQUI	0,0001	0,0000	***	0,0025	0,0003	***
LLP	-0,0901	0,0220	***	-0,0429	0,3938	
OOI	-0,2332	0,1387	*	2,9841	3,7660	
DIM	-0,0109	0,0236		0,0759	0,7105	
CONC	0,0026	0,0006	***	0,0712	0,0403	*
GDP	0,0348	0,0087	***	0,7355	0,3840	*
INF	-0,0261	0,0122	**	-0,7098	0,8349	
UNEMP	0,0011	0,0217		-0,9416	0,5612	*
Observations	126			126		
F-statistic	16,746			8,454		
Prob (F)	0,000			0,000		
R²	0,640			0,473		
Adjusted R²	0,602			0,417		

Note: *(***), (**) and (*) indicate the statistically significant coefficients at the level of 1%, 5% and 10% respectively.*
Source: *Own study.*

In Model 1 (ROA), we found that variables related to operating costs (COST and NIE), liquidity (LIQ and LIQUI), credit risk (LLP), concentration (CONC) and GDP, were statistically significant at the 1% significance level. The variable Inflation (INF) was found to be statistically significant at a significance level of 5% and the variables, dimension (DIM) and unemployment rate (UNEMP) did not have any explanatory power. For Model 2 (ROE), the variables with the greatest explanatory power, at a 1% significance level, are capital (EQUI), operating costs (NIE), and liquidity (LIQ and LIQUI) and at a 5% statistical significance level, the variable operating costs (COST). Concentration (CONC), GDP and the unemployment rate (UNEMP) are significant only at the 10% level. The variables credit risk (LLP), diversification (OOI), dimension (DIM) and inflation (INF), were not statistically significant.

In a more detailed analysis, the capital variable (EQUI) presents the expected negative sign in Model 2, confirming the result of Berger (1995) that banks with high capital have lower profitability of equity since the risk on equity and the return expected by investors are lower.

Regarding the variable COST, it presents, as expected, a negative sign in both models. This result is consistent with the studies of Athanasoglou et al (2008) and Kosmidou et al (2005), confirming that a good management of costs is reflected in increased profitability. In model 2, the variable NIE, registered a sign contrary to the expected. This can be interpreted as in Ben Naceur and Goaeid (2008) and Sufian and Habibullah (2009) studies, who claim that an increase in operational costs resulting from hiring more qualified workers, can have a positive impact on performance due to the increase in productivity.

In both models, the coefficient of the variable LIQUI has the expected positive sign. However, contrary the expectation, the coefficient of LIQ is negative. This can be explained by the fact that the period under analysis coincides with the international financial crisis, with default levels of loans increasing significantly. The credit risk variable (LLP) is significant only in Model 1 and presents the expected negative sign, confirming the results of Athanasoglou *et al.* (2006; 2008), and Vong and Chan (2009), that the greater the exposure to credit risk, the lower is the profitability of banks.

The diversification variable (OOI), which assesses the impact that commissions have on total assets, is not statistically significant, in any of the models. Therefore, our results did not confirm that the diversification of the banking activity increases performance. In addition, the size of the banks (DIM) is also not statistically significant, indicating that there were no scale economies to be explored. The level of market concentration (CONC) is only significant in model 2, with a positive sign, as expected, consistently with the findings of Molyneux and Forbes (1995).

Regarding the macroeconomic variables, inflation (INF) has a significant positive sign and in model 1 (ROA), as expected. This result, consistent with Perry (1992), is suggestive that banks are able to forecast and adjust interest rates on their products in advance of the effects of inflation, with a positive effect on profitability. Economic growth (GDP) shows a positive and statistically significant effect on ROA (model 1), confirming the previous results of Athanasoglou *et al.* (2006; 2008), and Dermiguc Kunt and Huizinga (1999).

5. Conclusions

In our study, we analyzed the determinants of performance in the Portuguese banking sector, between 2005 and 2011, using the return on assets (ROA) and return on capital (ROE) as measures of performance.

Our results showed that macroeconomic variables such as product growth, inflation and unemployment rate influence the performance of banks, and therefore it is important to monitor these economic indicators in order to incorporate them in the decision-making process, namely in the credit grant decision. In addition, the level of market concentration, which translates into more or less competitive market structures, revealed what was expected. That is, a greater concentration of the market allows the exploitation of the inherent market power, through collusion practices that may result from greater intermediation margins and the collection of higher commissions. In a competitive sector, this finding opens space for the regulator to intervene, in order to prevent anti-competitive practices.

The results obtained for the internal variables, under the control of bank managers, show that liquidity and operating costs are relevant for performance. Based on these results, we suggest that banks may adopt the following measures, with the purpose of improving their management and business models, namely: i) the need to ensure core capital levels generating liquidity and compliance with capital ratios; ii) orienting the business model to the customer, focusing on customer loyalty and the effectiveness of the commercial approach, in order to maximize the potential of revenue from commissions; iii) optimization of operational efficiency, with a focus on cost reduction, namely reorganization of the commercial structure and betting on effective solutions for the management of non-compliance; iv) implementation of a corporate governance model and internal control systems ensuring adequate risk management.

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