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## Article

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MACROECONOMIC AND INDUSTRY-SPECIFIC DETERMINANTS OF GREEK  
BANK PROFITABILITY

ZAMPARA K., GIANNOPOULOS M., KOUFOPOULOS D.N

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## Macroeconomic and Industry-Specific Determinants of Greek Bank Profitability

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ARTICLE INFO	ABSTRACT
<b>Article History</b> Received 29 <sup>th</sup> November 2016; Accepted 4 <sup>th</sup> February 2017 <b>JEL Classifications</b> G01, G21, L2	<b>Purpose:</b> The purpose of this paper is to investigate the external factors that influence the profitability of a typical Greek systemic bank over the period 2001–2014. <b>Design/Methodology/Approach:</b> A conceptual framework incorporating two fundamental groups of constructs, namely, macroeconomic forces and industry related factors, was developed. Two constructs were examined in the former: GDP growth rate and unemployment rate, whilst two attributes were explored in the latter; the bank's market share, both in terms of deposits and in terms of assets, and the banking market growth, also both in terms of the market's total assets and total deposits. In order to isolate the effects of the ongoing financial crisis, the research was undertaken for two periods, firstly 2001 to 2014 and secondly, the period 2001–2011, which excluded the deep recession. Consequently, multiple regression analysis was conducted and linear models were specified by means of OLS. <b>Findings:</b> The empirical analysis revealed that both macroeconomic forces and industry-related factors affect bank profitability. As far as the macroeconomic factors are concerned, unemployment rate has a negative impact, whereas the GDP growth rate has a positive impact on bank profitability. The industry-related factors, rate of growth of the industry's deposits and bank's assets market share have a positive impact on the financial performance of the bank. Finally, the rate of growth of the industry's assets and the bank's deposits market share have a negative effect on bank profitability. <b>Originality/Value:</b> This study reveals the mechanism determining bank profitability over a recent period that includes the financial crisis. Moreover, understanding the impact of macroeconomic forces as well as industry related attributes on bank profitability may enable banks to focus on the most critical factors in their decision process.

### Keywords:

Greek banking, bank profitability, determinants of profitability, financial crisis, decision process

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### 1. Introduction

The banking sector is considered to be the driving force of the Greek economy. Undoubtedly, banks in Greece serve a crucial role as financial intermediaries by providing stability to the Greek economy, sustaining entrepreneurship and facilitating money flows between the factors of the economy. Over the last decades, a series of important developments resulted in the complete reformation of the Greek banking sector. Specifically, a series of mergers and acquisitions led to an entirely reorganized banking industry, characterized by a highly competitive environment. Moreover, the development of new products and services, the

reorganization of their internal structure, along with the modernization of their networks, and the benefits stemming from the common currency European market signaled that Greek banks entered a new era (Chatzoglou *et al.*, 2010; Pasiouras and Sifodaskalakis, 2010; Noulas, 2001). However, after those years of deregulation and financial innovation, the Greek banking sector almost collapsed, due to the financial crisis. Inevitably, the ongoing financial crisis has revived interest into the determinants of bank profitability. Whitten *et al.* (2002) consider profitability as one of the most substantial criteria used in order to evaluate bank financial performance. Furthermore, Athanasoglou *et al.* (2008) aptly argue that a healthy, sound and profitable

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banking sector is able to contribute to the overall stability and soundness of the economy. In the same spirit, Lee *et al.* (2015) regard bank profitability as a crucial factor in a bank's ability to survive a financial crisis. Moreover, for Dietrich and Wanzenried (2011), bank profitability is an indication of how efficiently and effectively a bank is managed. Therefore, the Greek experience of the financial crisis offers a remarkable case for identifying the determinants of bank profitability, under the given financial and macroeconomic environment.

Consequently, this paper aims to examine how the external environment affects bank profitability. Although many studies have explored bank profitability in developed countries, empirical works on factors influencing bank profitability in Greece are relatively scarce. Consequently, this paper will complement and extend the existing literature by exploring the main determinants of bank profitability in Greece, while considering the impact of the financial crisis. Specifically, a conceptual framework capable of capturing the effects of macroeconomic forces and industry-specific factors on bank profitability is developed. A novel feature of this paper is the period over which the conceptual framework is being tested. In contrast with other studies on Greek bank profitability, this paper utilizes data from the Greek banking sector over a relatively long period from 2001 to 2014. Moreover, the study's empirical results may prove to be useful to bank managers.

Bank profitability is an indication of how well a bank is managed (Dietrich and Wanzenried, 2011), whereas it also indicates the financial status of the bank, providing at the same time an insight into future prospects. Besides, understanding the way that the macroeconomic environment, as well as how the structure of the banking industry may affect is undeniably essential for every bank's decision process in terms of strategy formulation and implementation. As such, being aware of the impact a change in a macroeconomic variable may have on bank profitability means that bank management should take the necessary actions in order to tackle any negative effect or even take advantage of a positive effect. Additionally, when an unforeseen change occurs in the external environment the management should be able to design a strategy to overcome the shock with a minimal negative effect on profitability.

The remainder of the paper is structured as follows: *Section 2* gives an overview of the relevant literature on bank profitability, focusing on the selected variables. *Section 3* outlines the model and the variables selected. *Section 4* describes the data sample and the methodology of the study, whereas *Section 5* presents the findings of the empirical analysis. Finally, *Section 6* concludes.

## 1. Review of the literature

The first remarkable studies on bank profitability were conducted by Short (1979), Bourke (1989) and Molyneux and Thornton (1992). Following them, a large and growing body of literature focused on the determinants of bank profitability, taking also into consideration its importance to bank solvency and the overall banking sector stability (Dietrich and Wanzenried, 2011; Lee and

Kim, 2013; Growe *et al.*, 2014; Athanasoglou *et al.*, 2008). Although, a part of the literature on bank profitability determinants examines groups of international banks (Dietrich and Wanzenried, 2014 and Mizraei *et al.*, 2013), the majority of the studies survey bank profitability in specific areas, such as Lee *et al.* (2015), Growe *et al.* (2014) and Kanas *et al.* (2012) for US banks and Pasiouras and Kosmidou (2007), Staikouras and Wood (2003), Molyneux and Thornton (1992), Goddard *et al.* (2004) and Athanasoglou *et al.* (2006) for European banks. Moreover, some studies have explored the determinants of bank profitability in specific countries, such as Kosmidou *et al.* (2004) in UK, Trujillo-Ponce (2013) in Spain, Tan and Floros (2012) in China.

As far as Greece is concerned, bank profitability has only been investigated in a small number of studies. Recently, Kosmidou (2008) examined the determinants of Greek bank profitability from 1990 to 2002, a period encompassing European Union financial integration, whereas, Athanasoglou *et al.* (2008) examined the impact of internal and external factors on Greek bank profitability from 1985 to 2001. Finally, Alexiou and Voyazas (2009) explored the influence of bank-specific as well as macroeconomic determinants on the profitability of Greek banks over the period 2000 to 2007.

Research on bank profitability has mainly focused on two groups of factors as explanatory variables, namely internal and external determinants. Lee *et al.* (2015), Athanasoglou *et al.* (2008) and Staikouras and Wood (2003) define as bank specific determinants of bank profitability those factors that are influenced by the bank's management, whereas Kosmidou (2008) and Staikouras and Wood (2003) define as external environment determinants of bank profitability those external to the bank factors which cannot be influenced by its management. The latter are additionally divided into industry-specific and macroeconomic determinants of bank profitability. In particular, Growe *et al.* (2014), Kosmidou (2008) and Staikouras and Wood (2003) regard as industry-specific determinants of bank profitability these factors related to the external environment of banking institutions which demonstrate industry conditions. In addition, Growe *et al.* (2014) define as macroeconomic determinants of bank profitability, the variables which entail aspects of the overall economic conditions in the country where the bank operates.

A considerable number of studies explore the explanatory power of macroeconomic forces on bank profitability (Athanasoglou *et al.*, 2008; Kosmidou, 2008; Lee and Kim, 2013; Bolt *et al.*, 2012; Tan and Floros, 2012; Pasiouras and Kosmidou, 2007; Alexiou and Voyazas, 2009; Jureviciene and Doftartaite, 2013) whereas a large body of literature investigates how industry-specific factors affect bank performance (Bourke, 1989; Mizraei *et al.*, 2013; Athanasoglou *et al.*, 2006; Goddard *et al.*, 2004; Belkhaoui *et al.*, 2014; Pillof and Rhoades, 2002). Finally, the impact of the recent financial crisis on the determinants of bank profitability has been scarcely examined (Dietrich and Wanzenried, 2011; Lee *et al.*, 2015). The next section describes both the dependent and independent variables considered in this paper.

### 1.1 Bank performance measurement

Profitability is a way to identify how efficiently a bank is managed (Kilic, 2011; Dietrich and Wanzenried, 2011). With the purpose of measuring bank profitability various financial indicators have been utilized in the relevant literature on bank performance. In particular, bank profitability is mostly measured by the return on assets and return on equity ratios expressed as functions of various determinants (Bourke, 1989; Staikouras and Wood, 2003; Goddard *et al.*, 2004; Kosmidou *et al.*, 2004; Athanasoglou *et al.*, 2008; Alexiou and Voyazas, 2009; Dietrich and Wanzenried, 2011; Kanas *et al.*, 2012; Lee and Kim, 2013; Mizraei *et al.*, 2013; Dietrich and Wanzenried, 2014). Those indicators are used because of their obvious advantages; return on equity (ROE) is the ratio of net income for the full fiscal year after taxes to average total equity and reflects how efficiently the bank's equity has been used, while return on assets (ROA) is the ratio of annual net income after taxes to average total assets, and indicates how efficiently the assets have been used to produce the profit achieved by the bank. According to Kosmidou (2008), average total assets and average total equity are used in order to avoid any discrepancies due to variations in the volume of assets and equity, respectively, within the period under examination. Nonetheless, there are only a few studies such as Bolt *et al.* (2012) and Dietrich and Wanzenried (2014) that complementarily use alternative measures of bank performance such as net interest margin.

### 1.2 Determinants of bank profitability

The external determinants of bank profitability as presented in the extant literature include various macroeconomic factors as well as variables representing market characteristics.

#### 1.2.1 Macroeconomic effects

Indisputably, the macroeconomic environment entails a number of forces which can create either opportunities or critical threats for banks. First of all, the rate of growth of gross domestic product (GDP) is highly considered to positively affect bank profitability. According to Staikouras and Wood (2003), Alexiou and Voyazas (2009), Growe *et al.* (2014) and Dietrich and Wanzenried (2011) a higher GDP growth rate results in higher demand for bank services, on the one hand, and lower loan default probability on the other, whereas banks can also impose higher fees and interest for their services, resulting in higher profitability. Moreover, Karimzadeh *et al.* (2013) and Said and Tumin (2011) argue that GDP growth has a positive effect on the expectations of both the bank and the customers, implying hence that during economic booms not only customers' demand for new loans and financial services rises, but simultaneously banks are also more eager to increase loan supply. On the contrary, in the case of economic depressions the quality of loan portfolio deteriorates, resulting therefore in credit losses, and consequently in lower bank profitability (Albertazzi and Gambacorta, 2009; Lee and Kim, 2013; Apergis, 2009). The literature also provides evidence that the rate of unemployment has a negative effect on bank profitability. The unemployment rate, which directly affects average income, is considered to influence both

the ability of consumers to repay undertaken loans and their ability to deposit. Moreover, the overall demand for financial services, including new loans, is negatively affected by unemployment (Bolt *et al.*, 2012; Louzis *et al.*, 2010). Therefore, banks face augmented losses due to increased loan defaults. In their study on the determinants of non-performing loans Messai and Jouini (2013) highlighted that unemployment negatively affects the profitability of banking institutions due to the negative impact it has on the quality of loan portfolios. In the same vein, Jureviciene and Doftartaite (2013) have also revealed a negative impact of unemployment rate on bank profitability.

#### 1.2.2 Industry related effects

The structure of the banking industry is also a significant determinant of a bank's potential profitability. A number of studies have revealed a positive statistical relationship between variables of industry structure, such as either concentration ratios or market share and profitability (Molyneux and Thornton, 1992; Berger, 1995; Dietrich and Wanzenried, 2011; Dietrich and Wanzenried, 2014). Staikouras and Wood (2003) in their study, however, uncovered a statistically-insignificant negative impact of market structure measures on bank profitability.

The relevant literature suggests that there are two different theoretical approaches that explain such a relationship (Berger, 1995; Goldberg and Rai, 1996; Yildirim and Phlipatos, 2007; Yildirim and Mohanty, 2010). The first viewpoint which is the structure-conduct-performance hypothesis, suggests that banks operating in highly concentrated markets can impose prices and fees less favorable to consumers, as a result of imperfectly competitive markets. More particularly, in a concentrated banking sector, a bank can earn a favorable interest margin that results in monopolistic profits from higher lending interest rates and lower deposit interest rates (Mizraei *et al.*, 2013; Athanasoglou *et al.*, 2006). Therefore, according to the structure-conduct-performance hypothesis, banks in more concentrated markets will earn higher profits than those operating in less concentrated ones, regardless of their efficiency. A more specific approach of the structure-conduct-performance hypothesis is the relative-market-power hypothesis, which states that banks that include well-differentiated products and services in their portfolio can increase their market share and consequently exercise their market power by setting higher prices, resulting in abnormal profits (Berger, 1995; Athanasoglou *et al.*, 2008; Mizraei *et al.*, 2013). The second viewpoint concerns the efficient-structure hypothesis, according to which efficient banks grow in terms of size and market share because of their ability to generate higher profits (Staikouras and Wood, 2003; Athanasoglou *et al.*, 2006). The market share variable is mostly used to capture the influence of market structure on bank profitability. Karimzadeh *et al.* (2013) and Growe *et al.* (2014) have revealed a positive effect of market share in terms of assets on bank profitability. On the contrary, Growe *et al.* (2014) argue that a high market share in terms of deposits is an indication that the bank funds its assets with more expensive capital sources; therefore, negatively affecting bank profitability. Besides,

Belkhaoui *et al.* (2014) argue that deposit market share has a positive impact on bank profitability suggesting that banks with large market share have the possibility to achieve high profits. They argue that these banking institutions can offer a portfolio of better-differentiated products that can be sold to customers at high prices. Finally, another explanation is given by Kuzma and Shanklin (1992), who argue that customers are usually attracted by companies which possess larger market shares, insinuating additionally that profitability and market share are positively associated.

Another industry-related determinant of bank profitability is the growth of the market. A positive relationship between market growth and bank profitability has been revealed by Mizraei *et al.* (2013), who argue that a fast-growing market tends to promote an environment which enhances higher earnings. Dietrich and Wanzenried (2014), on the contrary, argue that a fast-growing market may possibly attract new probable entrants, meaning that the profitability of the existent market participants could be negatively affected.

In line with the above, Bourke (1989) argued that an expanding market improves the capability of generating higher profits, especially if associated with entry barriers. In line with this, market growth has a positive effect on bank profitability, as long as, the consequential increased demand for bank services and product is not accompanied by a simultaneous and equivalent increase in supply (Pillof and Rhoades, 2002). High asset growth rates in the banking industry, are however often related to granting loans to customers with lower credit quality (Dietrich and Wanzenried, 2014; Apergis, 2009), which implies an indirect negative effect on bank profitability. In addition, Dietrich and Wanzenried (2011) argue that the growth rate of deposits negatively influences bank profitability, especially during a crisis, because the banks do not have the ability to convert the increasing amount of deposit liabilities into higher revenue-yielding assets.

Nevertheless, Table 1 summarizes the variables that will be further used in the empirical analysis of the study.

Table 1: The variables of the model

		Variable	Notation	Expected Effect	Related Literature	
Dependent variables		Return on assets	ROA		(Bourke, 1989; Staikouras and Wood, 2003; Goddard et al., 2004; Kosmidou et al., 2004; Athanasoglou et al., 2008; Alexiou and Voyazas, 2009; Dietrich and Wanzenried, 2011; Kanas et al., 2012; Lee and Kim, 2013; Mizraei et al., 2013; Dietrich and Wanzenried, 2014)	
		Return on equity	ROE			
Independent variables	macroeconomic variables	Percent growth of gross domestic product	GDP	positive	(Grove et al., 2014; Alexiou and Voyazas, 2009; Staikouras and Wood, 2003; Dietrich and Wanzenried, 2011; Said and Tumin, 2011; Albertazzi and Gambacorta, 2009; Lee and Kim, 2013; Karimzadeh et al., 2013)	
		Unemployment Rate	UNR	negative	(Bolt et al., 2012; Messai and Jouini, 2013; Louzis et al., 2010; Jureviciene and Dofartaite, 2013)	
	industry structure related variables	market growth	Growth rate of total assets in the Greek banking industry	AGR	negative	(Mizraei et al., 2013; Dietrich and Wanzenried, 2014; Bourke, 1989; Pillof and Rhoades, 2002; Apergis, 2009; Dietrich and Wanzenried, 2011)
			Growth rate of total deposits in the Greek banking industry	DGR	positive	
		Bank's market share	Bank's Assets market share	AMS	positive	(Mizraei et al., 2013; Molyneux and Thornton, 1992; Berger, 1995; Dietrich and Wanzenried, 2011; Dietrich and Wanzenried, 2014; Staikouras and Wood, 2003; Goldberg and Rai, 1996; Yildirim and Philippatos, 2007; Yildirim and Mohanty, 2010; Athanasoglou et al., 2006; Athanasoglou et al., 2008; Belkhaoui et al., 2014; Karimzadeh et al., 2013; Grove et al., 2014; Kuzma and Shanklin, 1992)
			Bank's Deposits market share	DMS	negative	

## 2. Data and methodology

The next section shortly describes the methodology followed in this study and presents information with regards to the data selection process. Moreover, the

econometric model that was utilized in order to investigate the effects of the various macroeconomic and industry related factors on bank profitability is presented in this section.

## 2.1 Methodology

In attempting to investigate the external determinants of bank profitability in Greece, a number of issues need to be considered and confronted. The Greek banking sector qualifies as a very interesting context with regards to exploring determinants of bank profitability, however, over the past few years it has experienced severe and significant changes. Following a series of mergers and acquisitions the sector is merely comprised of four systemic banks. The deficiency of an adequate number of bank level observations in order to perform a sound panel data analysis (Ahn and Schmidt, 1995; Kiviet, 1995; Judson and Owen, 1999; Blundell and Bond, 1998; Hedeker *et al.*, 1999) was surpassed by moving beyond the methodology developed in previous studies of bank profitability. First of all, the time dimension of the dataset which was utilized has been long enough to capture the effects of macroeconomic and banking industry related variables on bank profitability. Secondly, following Yin (2012) and Seawright and Gerring (2013), a case study was chosen as the more appropriate research method. For that reason, one of the Greek systemic banks has been selected as the typical representative case and has served as the unit of analysis. Considering the fact that all four Greek systemic banks are essentially similar (Dietrich and Wanzenried, 2011) as they operate under the same regulatory standards, accounting rules and economic environment, within the same country, across the period under investigation, it is reasonable to assume that the one which has been selected qualifies as a unit of analysis.

## 2.2 Data selection

The study utilized data from the Greek banking sector over a relative long period, from 2001 to 2014. In particular, quarterly accounting data have been obtained through the representative bank's annual, semi-annual, first quarter and third quarter financial results reports, balance sheets and income statements. The particular time period was chosen because it offers recent time-series data, and also includes the financial crisis. Moreover, quarterly data regarding the macroeconomic and industry-related variables have been gathered from databases such as the Organization for Economic Co-operation and Development ([OECD](#)), International Monetary Fund ([IMF](#)), [Bank of Greece](#), and Hellenic Bank Association ([HBA](#)).

## 2.3 Model formulation

This section describes an econometric model which examines the explanatory power of macroeconomic features and banking industry related attributes on bank profitability. Towards this direction, a multiple regression model is developed. Short (1979), Bourke (1989), Molyneux and Thornton (1992) and Goddard *et al.* (2004) in their studies conclude that linear models are as good as models of other functional forms. Therefore, a linear function of the following form is considered:

$$y = a_{0t} + b_{it} \sum_i^N X_{it} + c_{jt} \sum_j^M Z_{jt} \quad (1),$$

where,  $a_0$  is a constant,  $y$  is the dependent variable,  $X_i$  the explanatory variables regarding the macroeconomic environment,  $Z_j$  the explanatory variables regarding the banking industry structure and  $b_i$  and  $c_j$  their effects respectively on the dependent variable over time  $t$ . The model is specified with the means of ordinary least squares. Two approaches for the measurement of profitability are being followed. The first one regards ROA as the dependent variable (eq. 2), and the second one regards ROE as the dependent variable (eq. 3).

$$ROA_t = a_0 + a_1 GDP_t + a_2 UNR_t + a_3 AGR_t + a_4 DGR_t + a_5 AMS_t + a_6 DMS_t + u_t \quad (\text{eq. 2})$$

$$ROE_t = b_0 + b_1 GDP_t + b_2 UNR_t + b_3 AGR_t + b_4 DGR_t + b_5 AMS_t + b_6 DMS_t + e_t \quad (\text{eq. 3})$$

The models are tested for the existence of heteroscedasticity, autocorrelation and multicollinearity, so that the estimation of reliable - unbiased, efficient and consistent - coefficients can be reassured.

Consequently, this work investigates in a single equation framework the effect of external forces on bank profitability. Figure 1 summarizes the econometric models into a conceptual framework.

## 3. Empirical results

This section presents the findings of the empirical analysis. A sequence of regressions was performed for each model separately, in order to extrapolate the statistically insignificant explanatory variables, and conclude to the final specification of the models. Moreover, following the pattern of Dietrich and Wanzenried (2011) whose study examined Swiss bank profitability before and during the financial crisis and Lee *et al.* (2015) who examined how the determinants of U.S. bank profitability were influenced by the financial crisis, this research, aiming to isolate the effects of the financial crisis, was also conducted for two periods. The first period was from the 1<sup>st</sup> quarter of 2001 to the 3<sup>rd</sup> quarter of 2014 and the second period was from the 1<sup>st</sup> quarter of 2001 to the 1<sup>st</sup> quarter of 2011, excluding hence the deep recession period. Table 2, consequently, presents the results for the whole period; column 1 for the case of ROA while column 2 for the case of ROE as dependent variable, whereas Table 3 reports the results for the period before the crisis; column 3 for the case of ROA while column 4 for the case of ROE as dependent variable, respectively. Although there are not any major differences observed between the models in respect to the factors affecting profitability, the explanatory power of the models is significantly improved when excluding the observations of the period during the financial crisis. Tests controlling for the existence of autocorrelation, multicollinearity and heteroscedasticity have also been performed and are reported respectively in Table 2 and

Table 3. Furthermore, the collinearity test controls the degree of correlation between the explanatory variables which were utilized in the multiple regression analysis. The results indicate that the independent variables are not correlated to such a degree that the regression analysis could be distorted. Moreover, White's test for heteroscedasticity indicates that the null hypothesis of

heteroscedasticity is rejected, whereas Durbin-Watson test indicates that there is no evidence of autocorrelation. It is reasonable, therefore, to assume that the method of ordinary least squares has generated unbiased, consistent and efficient estimators.

Figure 1: The conceptual framework

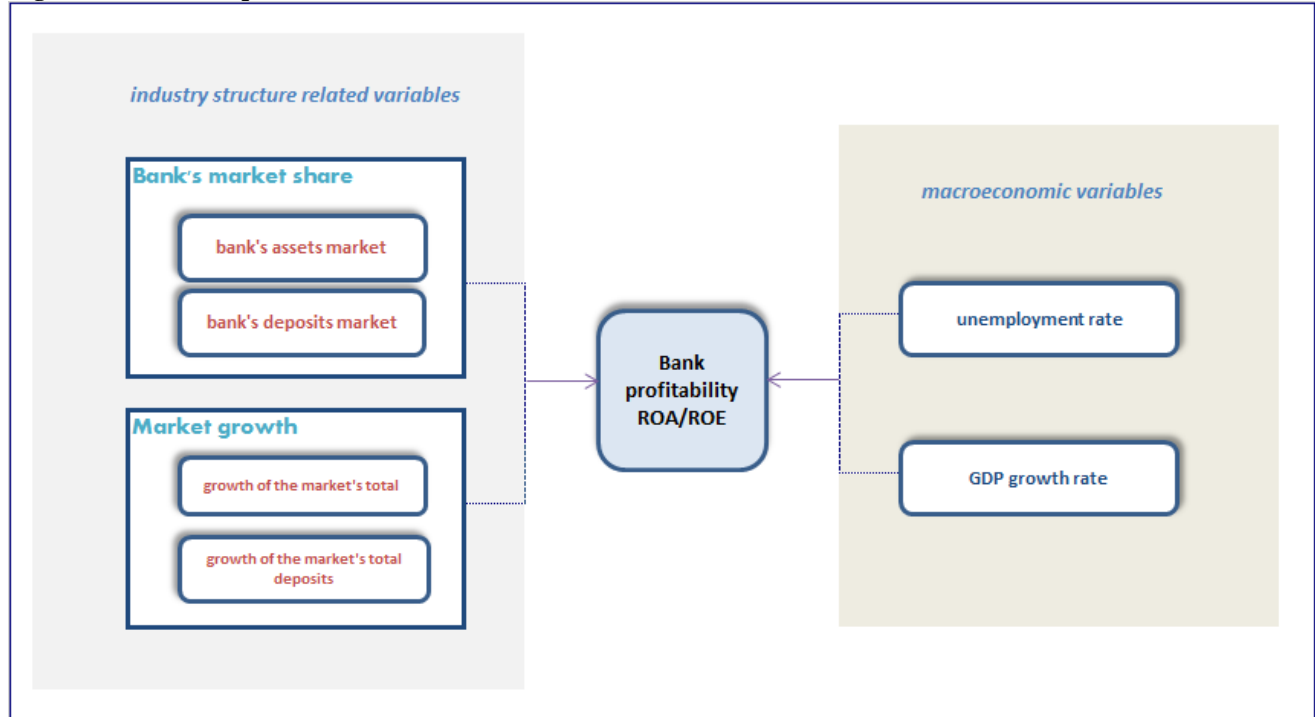


Table 2: Empirical results for the period 2001Q1 – 2014Q3

2001 Q1 - 2014 Q3						
Independent variable	1			2		
	ROA			ROE		
	coefficient	p-value	collinearity - test	coefficient	p-value	collinearity - test
constant	-0.000711	0.9327		0.004955	0.9692	
GDP	0.122334***	0.0781	0.582****	1.858295***	0.0794	0.582****
UNR	-0.201613**	0.0250	0.199****	-3.290836**	0.0169	0.199****
AGR	-0.215405***	0.0772	0.446****	-3.088237***	0.0963	0.446****
DGR	0.227475**	0.0449	0.487****	3.498161**	0.0433	0.487****
AMS	0.304658*	0.0047	0.268****	4.609364*	0.0051	0.268****
Included observations	55			55		
R-squared	0.329592			0.345134		
Durbin-Watson stat	1.735602*****			1.909989*****		
S.E. of regression	0.019420			0.296314		
Sum squared resid	0.018479			4.302292		
F-statistic	4.817960			5.164888		
Prob(F-statistic)	0.001163			0.000696		
White Heteroskedasticity Test						
F-statistic	1.397886			1.467258		
Prob(F-statistic)	0.213011*****			0.184128*****		

\*Statistically significant at 1%

\*\* Statistically significant at 5%

\*\*\* Statistically significant at 10%

\*\*\*\* Reject multicollinearity for tolerance above 0.1

\*\*\*\*\* Reject Ho for autocorrelation

\*\*\*\*\* Reject Ho for heteroskedasticity

**Table 3: Empirical results for the period 2001Q1 – 2011Q1**

2001 Q1 - 2011 Q1						
Independent variable	3			4		
	ROA			ROE		
	coefficient	p-value	collinearity - test	coefficient	p-value	collinearity - test
constant	0.018450	0.1486		0.267580	0.2406	
GDP	0.049720***	0.0943	0.249****	0.719186	0.1744	0.249****
UNR	-0.120491***	0.0910	0.339****	-2.000741	0.1168	0.339****
DGR	0.060398**	0.0350	0.801****	1.001610***	0.0503	0.801****
AMS	0.182067*	0.0054	0.242****	3.225712*	0.0060	0.242****
DMS	-0.185655**	0.0294	0.234****	-3.012424**	0.0476	0.234****
Included observations	41			41		
R-squared	0.596986			0.541423		
Durbin-Watson stat	1.827426*****			1.550128*****		
S.E. of regression	0.004170			0.074824		
Sum squared resid	0.000609			0.195954		
F-statistic	10.36911			8.264617		
Prob(F-statistic)	0.000004			0.000031		
White Heteroskedasticity Test						
F-statistic	0.926922			0.867225		
Prob(F-statistic)	0.522797*****			0.572181*****		

\*Statistically significant at 1%

\*\* Statistically significant at 5%

\*\*\* Statistically significant at 10%

\*\*\*\* Reject multicollinearity for tolerance above 0.1

\*\*\*\*\* Reject Ho for autocorrelation

\*\*\*\*\* Reject Ho for heteroskedasticity

Turning to the industry-specific determinants, the empirical results provide evidence that they also affect bank profitability. The effect of the bank's market share, on its profitability depends on which independent variable is considered. Firstly, the bank's market share, in terms of assets, has a positive and statistically-significant effect on bank profitability. This result is in line with Mizraei *et al.* (2013), who contend that a higher asset market share implies that the bank can impose higher prices for its products and services, whereas it can also be related to the fact that customers are likely to be more attracted by banks which possess larger market share (Kuzma and Shanklin, 1992). On the contrary, the bank's market share in terms of deposits negatively affects bank profitability. Actually, this outcome is statistically significant merely from the first quarter of 2011 to the first one of 2011, but insignificant (although still negative) for the whole period from the first quarter of 2001 to the third quarter of 2014. Deposits are a costlier way of funding assets in comparison to other forms of funding, such as inter-bank borrowing, borrowing from the European Central Bank or direct funding from sources such as the international monetary and capital markets. However, during the past few years Greek banks, due to Greece's financial situation, were excluded from the financial markets and had to rely more on customer deposits. Therefore, the profitability of a bank which heavily relies on deposits in order to fund its assets is negatively affected by the deposits market share (Lekkos *et al.*, 2010; Growe *et al.*, 2014).

With regards to the market growth of the banking industry, its impact on bank profitability also depends on the feature that is examined. As far as the growth rate of

the market's total assets is concerned, the study has revealed a negative and statistically significant impact on bank profitability, when the period under examination was from the first quarter of 2001 to the third one of 2014. The effect was still negative but insignificant when the period of the deep financial distress, from the second quarter of 2011 onwards, was not included. Following Apergis (2009) this result is explained considering that a rapidly growing market might initiate hazardous lending, which means that the quality of assets itself is not able to result into the expected profitability that their increase should otherwise entail. Furthermore, a fast-growing market can inflict increasing labor and building costs and advertising expenses on the individual banks, which consecutively negatively affect bank profitability. Nevertheless, this regression result deviates from the findings of Mizraei *et al.* (2013). Finally, the study has revealed that the growth rate of the market's total deposits positively and significantly influences Greek bank profitability. These results are in accordance with those of Pillof and Rhoades (2002). This can possibly be explained by the bank taking advantage of the growing market, despite the fact that deposits are a more expensive source of funding (Lekkos *et al.*, 2010) due to the Greek banks' restricted access to other forms of funding, it manages to convert deposits into profit-yielding assets (Dietrich and Wanzenried, 2011).

## 1. Conclusions and further research

This paper specified an empirical framework which investigates how various macroeconomic forces and banking industry-related attributes influence the ability of Greek banks to produce profits. In order to explore the explanatory power of the selected factors on Greek bank profitability over the period 2001 – 2014, one out of the four systemic banks was chosen. With the means of the ordinary least squares method, linear multiple regression models were developed. Firstly, in order to explore the impact of the macroeconomic environment on the profitability of a Greek bank, two fundamental constructs, namely growth rate of gross domestic product and unemployment rate were investigated. Secondly, in order to study the effect of the industry structure on the profitability of a Greek bank four factors, namely the deposits market share, the assets market share, the growth rate of the industry's total deposits and the growth rate of the industry's total assets, were examined. Moreover, to account for the recent financial crisis, two time periods were examined separately; from the first quarter of 2001 to the third quarter of 2014, and from the first quarter of 2001 to the first quarter of 2011.

Overall the empirical results provide evidence regarding the mechanism that determines profitability in the Greek banking sector. The study revealed that Greek bank profitability is shaped by both macroeconomic and industry-specific factors. As far as the macroeconomic factors are concerned, the study provided evidence that unemployment rate has a negative effect on bank profitability, while GDP growth has a positive impact on that profitability. Moving to the industry structure-related factors, on the one hand, the rate of growth of the industry's deposits and the bank's asset market share positively affect bank profitability. On the other hand, the rate of growth of the industry's assets and the bank's deposit market share negatively influence bank profitability.

The conclusions could prove to be useful in the Greek banks decision process regarding strategy formulation and implementation. In addition, the findings of the current study are also of considerable relevance to policymakers. The influence of various external environment factors on bank profitability has been examined over a long period including the recent financial crisis, whereas, the empirical findings confirm the results from previous studies on bank profitability. Understanding how bank profitability is shaped by macroeconomic and industry related variables enables bank managers, bank regulators and monetary authorities to design, develop and impose the necessary buffer instruments towards the stability of the whole financial sector.

Finally, the study has been conducted under certain limitations which could be ground for further future research. A first limitation regards the small sample size, due to the particular peculiarities of the Greek banking sector. Future research can overcome this limitation by utilizing a larger sample which will include more banks from various Eurozone or Balkan countries. Furthermore, this paper has studied how macroeconomic and industry related features determine bank profitability. The inclusion in future studies of bank-specific factors and attributes such as the effect of certain political decisions or interventions, on the one hand, and the impact of mergers and acquisitions or even information regarding the banks' upper management and board members, on the other hand, may result in new paths of bank profitability.

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