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How accounting information and macroeconomic environment determine credit risk? Evidence from Greece

Vasiliki Makri¹, Konstantinos Papadatos²

Abstract

In this paper, we study the determinants of credit risk in the Greek banking sector. Credit risk is related to bank asset quality and considered responsible for bank failures. In this context, we investigate how loan quality can be explained by accounting and macroeconomic factors. Aggregate loans loss provisions (LLP) are used as a proxy for measuring credit risk. Using quarterly aggregate data that span from 2001Q1 to 2012Q4, we examine a period that covers the recent financial crisis in Greece. The results of Generalized Method of Moments (GMM) estimations indicate that LLP is positively affected by unemployment, public debt, loans loss provisions of previous quarter and negatively by capital adequacy ratio. Therefore, our findings support the hypotheses that both macroeconomic environment and accounting information exert significant influence on the credit risk of Greek banking system.

Keywords: Credit risk, loan loss provisions, Greek banking system, accounting information and macroeconomic environment, GMM

JEL Classification: E44, G20, G21

1. Introduction

It is widely accepted that financial institutions play a vital role to the economy by allocating credit from surplus economic units to deficit economic units in various economic sectors, i.e. mobilising savings and allocating resources to productive economic activities (Fukuda and Dahalan, 2012). A sound banking system is prerequisite for economic growth (Rajaraman and Vasishta, 2002) and welfare (Kristo, 2013). Moreover, Bairamli and Kostoglou (2010) highlight that economic growth ensures macroeconomic stability, develops strong financial institutions in order to transform savings into investments. However, banks have to confront credit risk. According to Saunders and Cornet (2008), credit risk can be defined as the risk that the promised cash flows from loans and securities,

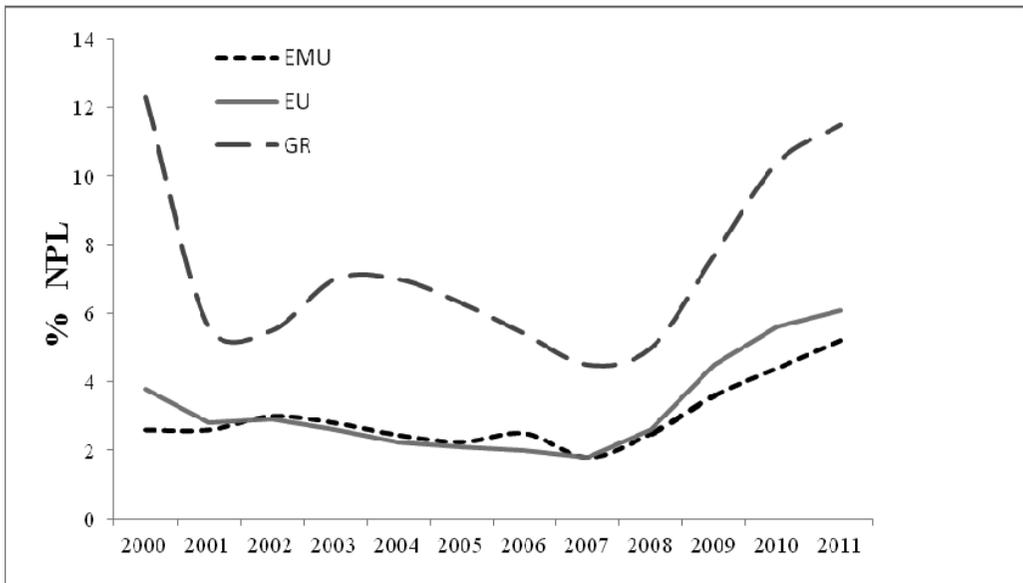
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held by financial institutions, may not be paid in full. Consequently, credit risk is linked to bank asset quality and considered responsible for bank failures (eg. Gup and Kolari,2005, Samad, 2012). Since 1990s, the issue of bank asset quality has gained much attention revealing important insights about the financial fragility of banking institutions. Banks' loans portfolio quality is measured through various indicators drawn from their balance sheet. The most commonly used indicators are the Non Performing Loans to Total Loans (NPL) and Loan Loss Provision to total loans (LLP).

The paper contributes to the literature by exploring the determinants of the aggregate bank loan quality in Greece, using loan loss provisions to total loans (LLP) as indicator of credit quality. We consider Greece to be in the core of our investigation due to several reasons. Firstly, Greece is in the middle of a severe, still ongoing, sovereign debt crisis. Consequently, this economic instability might have jeopardized the fragility of the Greek banking system. Additionally, during last decade (2000 – 2011) the levels of NPLs in Greece (GR) are constantly above the average of European Monetary Union (EMU) and European Union (EU). More precisely, since 2008, the year of the beginning of the global financial crisis, the levels of NPL have increased 108% and 135% for EMU and EU respectively, although in Greece the NPL growth reached 130% (see Graph 1).

Graph 1: Non Performing Loans Ratio, World Bank



During last three decades, the Greek banking industry has faced important structural reforms. Numerous mergers and acquisitions have taken place, state owned banks were privatized and Greek banks expanded their activities to Balkan countries¹. Regarding their

¹ For more details about the evolution of Greek banking industry see, Athanasoglou et al. 2009, Dimitropoulos et al. 2010, etc.

performance, Greek banks were quite profitable, since 2007, ROE reached at 15%. However, the recent financial crisis has influenced significantly the Greek banking profitability, as ROE, was ranged from -8% to -34%, in 2010 and 2011 respectively (Financial Soundness Indicators, IMF) after Greek Private Sector Involvement (PSI), on 2012, Greek banks must face and accept a new reality by focusing on their recapitalization and restructuring procedures².

In our study, we focus on aggregate LLP for the period 2001-2012. More precisely, we examined the impact of both accounting specific and macroeconomic factors to aggregate bank loan quality. The examination of aggregate banking data is widely used in credit quality literature (e.g. Brookes, Dicks and Pradhan, 1994, Ghosh, 2005, Chase, Greenidge, Moore and Worrell, 2005, Rinaldi and Sanchis-Arellano, 2006, Marcucci and Quagliariello, 2008, Boudriga et al. 2009, Pederzoli, Torricelli and Castellani, 2010, Nkusu, 2011, Fainstein and Novikov, 2011b, Bofondi and Ropele, 2011, Vogiazas and Nikolaidou, 2011, Jakubik and Reininger, 2013). According to Boudriga et al. (2009), aggregate data (for the aggregate banking system), in contrast to individual data for each bank, are considered preferable as the risk of non-representativeness of the sample is reduced. Also, Rinaldi and Sanchis-Arellano (2006) argued that aggregate data seem to be appropriate, where individual data unavailability exists. In this context, our study, based on aggregate accounting data extracted from Bank of Greece, takes into consideration not only the major listed commercial banks but the total of monetary financial institutions operating in Greece (cooperative banks, small commercial banks etc).

Several studies examined the determinants of loan portfolio quality in many countries around the world (e.g. Arpa et al. 2001, Boudriga et al. 2009, Espinoza and Prasad, 2010, Chase, Greenidge, Moore and Worrell, 2005, Nikolaidou and Vogiazas 2013). However, the examination of the Greek banking system is at a very early stage, as only the study of Louzis et al. (2010) focused on the determinants of loan portfolio quality. Our research extends the existing literature and differentiates from the analysis of Louzis et al. (2010) in many ways. Firstly, Balás (2009) argue that although NPL can reflect trends in changes in portfolio quality, shows weaker correlation with loan losses. Therefore, in order to investigate the loan portfolio quality, we used LLP instead of NPL. Secondly, we processed aggregate instead of individual banking data, hence our empirical results based on the total of monetary financial institutions operating in Greece. Moreover, given that since 2009 Greece is in a very deep crisis, we decided to include in our sample data covering this period. Thus, contrary to Louzis et al. (2010), so as to include the impact of prolonged recession in our results, we analyzed data from 2001 to 2012. Finally, taking into account the Greek fiscal problems, we decided to differentiate by examining public debt as possible macroeconomic determinant of loan losses. In general, our findings record that both accounting specific and macroeconomic variables seem to exert a powerful influence on LLP.

The structure of the paper is as follows. Section 2 reviews the relevant empirical literature. Section 3 provides the data and the methodology framework. Section 4 presents

² Bank of Greece (2012). Report on the recapitalisation and restructuring of the Greek banking sector.

the empirical findings followed by their discussion on section 5. Finally, section 6 demonstrates a brief summary and our concluding remarks.

2. Literature Review

During the 90's, many banking crises were linked to problems loans. Additionally, the availability of published data regarding banking sector was increased significantly. These facts gave the opportunity to many researchers to focus on loan portfolio quality (NPL, LLP and loans losses). In this context, several studies considered NPL as "financial pollution" with harmful effects for both economic development and social welfare (e.g. Zeng 2011, Gonzales-Hermosillo, 1999, Barseghyan, 2010).

One of the first studies that focused on the determinants of asset quality was the investigation of Keeton and Morris (1987), which examined a sample of 2,470 insured commercial banks in the United States (US) for the period 1978-1985. More precisely, they used NPL as indicator of loan quality and found that local economic conditions and low performance of various economic sectors are responsible for the differences in loan losses across banks. Moving to the same direction, Sinsky and Greenawlat (1991) were focused on loan losses in US commercial banks for the period 1984-1987. They also confirmed that both internal and external factors play a decisive impact on loan quality. Moreover, McGovern (1993) found that banks (in US) suffer from loan losses due to lax credit standards, unsecured loans and borrowers' attitudes. Berger and De Young (1997) studied the relationship between loan quality, capital adequacy and efficiency through Granger causality techniques to US commercial banks during 1985-1994. By formulating four hypothesis, regarding bank efficiency and capital adequacy (namely 'bad luck', 'bad management', 'skimping' and 'moral hazard'), they concluded that a decreased cost efficiency is associated with increased bad loans.

The analysis of Lis, Pages and Saurina (2000) examined Spanish commercial and savings banks and investigated the bank specific and macroeconomic factors that define their loan losses from 1985 to 1997. Specifically, via the implementation of dynamic estimations, they found that the level of problem loans is influenced by GDP growth rate and bank size negatively. On the contrary, loan growth, collateral loans, net interest margin and market power were found to deteriorate bank asset quality. Arpa, Giuliani, Ittner and Pauer (2001) examined the impact of various macroeconomic variables on loans loss provisions and revenues in Austria. For their analysis, they used quarterly data from Austrian banks for the period 1990-1999. Their results recorded that banks make higher provisions when GDP falls. Furthermore, Arpa et al. (2001) found a positive relationship between LLP and banks' earnings. Finally, they concluded that when banks implement good management practices, unfavorable macroeconomic conditions should not cause important financial problems. Similarly, Laeven and Majnoni (2003) collected data from 45 countries and 1419 banks, during 1988-1999. Based on cross-country comparisons, they provide evidence that LLP is related to loan growth, earnings and GDP growth. According to the authors, the positive relationship between LLP and earnings indicates that banks follow income-smoothing practices.

Quagliariello (2007) described the influence of both micro and macroeconomic factors on LLP and new bad debts. His analysis based on data extracted from 207 Italian banks for 1985-2002. The econometric findings revealed that LLP and new bad debts are moving cyclically with GDP. Moreover, he concluded that various bank specific (capital ratio, credit growth, interest income, etc.) and macro factors (loan-deposit rates spread, stock market indices) seem to be associated with LLP. Das and Ghosh (2007) studied the (micro and macro) factors affecting the level of problem loans in Indian public banks, for the period 1994-2005. They concluded that GDP growth, loan growth and bank size determine problem loans. The empirical analysis of Fonseca and Gonzalez (2008) examined a panel dataset for 40 countries from 1995-2002. In particular, they pointed out that loans loss provisions are used for income smoothing. Furthermore, they recorded significant relationships between LLP and various variables like GDP growth, the reserves for loan losses to total assets, capital ratios, etc.

Boudriga et al. (2009), using aggregate banking, financial, institutional and legal environment data of 59 countries for the period 2002-2006, explored the determinants of NPL. They showed that NPL is affected mainly by bank-specific factors, such as capital adequacy, provisions, and bank ownership, while credit exposure is reduced in countries where legal and institutional conditions are improved. The main research objective of Festić, Kavkler and Repina (2011) was to examine the interaction between NPL and various banking and macroeconomic indices in five new members of the EU (Estonia, Latvia, Lithuania, Bulgaria and Romania). Credit growth, FDI and loans to total assets are positively related to NPL. On the contrary, loans to deposits, exports, gross capital fixed formation, net foreign assets to net assets ratio, compensation of employees relative to domestic demand of households and the compliance with Basel principles seem to improve loan quality. The empirical analysis of Nkusu (2011) was focused on 26 advanced economies from 1998 to 2009. Her findings unveiled that poor macroeconomic performance (e.g. slower GDP growth, higher unemployment, decreasing asset prices etc) is related to increased non-performing loans. The Eurozone's banking fragility was under investigation by Makri, Tsagkanos and Bellas (2011). They investigated bank specific and macroeconomic determinants, on aggregate level, in 13 countries for 2000-2008. Their findings revealed that loans to deposits rate, capital adequacy ratio, NPL of the previous year, unemployment and public debt influence bank asset quality.

Nikolaidou and Vogiazas (2013) analyzed possible factors influencing Romanian bank asset quality, as well as the contagion effect of the Greek crisis. In this context, they collected and processed monthly data spanning from December 2001 to November 2010. Their findings suggest that unemployment, money supply, loan growth and the Greek loan loss provisions influence loan portfolio quality significantly. Finally, Louzis, Vouldis and Metaxas (2010) explored the Greek banking industry. They presented results for the pre-crisis period 2003Q1-2009Q3 and extracted data from nine commercial banks. They discovered that the GDP growth rate, unemployment and lending rates have a strong negative impact on NPL. Additionally, they found that ROE and ROA are negatively related NPL, indicating poor bank management practices.

Based on the aforementioned studies, macroeconomic and accounting specific factors seem to define bank asset quality. However, it is obvious that there is a large gap in the literature, regarding the determinants of loan quality in Greece, which our empirical investigation hopes to fill in. Specifically, the present study extends the existing literature by recording results, which cover the period of the prolonged recession in Greece, using LLP as indicator of loan quality (instead of NPL). In addition, it is examined the financial fragility of aggregate Greek banking system and not a specific category of banks (e.g. commercial or cooperative banks). Finally, in order to capture the impact of Greek fiscal problems on loan quality, we include public debt to our research as possible determinant of LLPs.

3. Data & Methodology

3.1 Data

As mentioned above, the aim of our study is to investigate the possible factors that influence aggregate loan quality of the Greek banking industry. For the completion of our empirical research, we chose to collect aggregate data. According to Boudriga et al. (2009), aggregate data (for the aggregate banking system), in contrast to individual data for each bank, are considered preferable as the risk of non-representativeness of the sample is reduced. In addition, as Rinaldi and Sanchis-Arellano (2006), we used aggregate data in order to tackle possible problems of disaggregate data unavailability. Considering this, aggregate accounting data were extracted from Bank of Greece and macroeconomic data were drawn from the Hellenic Statistical Authority (ELSTAT) and Eurostat databases, both in quarterly basis. Our final sample consisted of 48 quarterly observations extended from 2001Q1 to 2012Q4.

3.2 Methodology

Taking into consideration the studies that investigated bank asset quality, we examined a set of explanatory variables that are commonly used in similar investigations. Although Louzis et al. (2010) examined NPL with individual banking data, we also implemented a dynamic regression method for our analysis. More precisely, we implemented the Generalised Method of the Moments (GMM) estimation instead of OLS techniques. We investigated the effect of accounting and macroeconomic factors on LLPs for two separate periods, t and $t-1$ ³. Our first econometric estimation is expressed as follows:

$$LLP_t = a_0 + a_1 ACC_t + a_2 MAC_t + \varepsilon_t \quad (1)$$

³ We used first and second period lagged variables as instruments for the explanatory variables of GMM estimations for period t and $t-1$, respectively. The validity of the instruments is in line with the results of Sargan test).

Where LLP is the aggregate Loans Loss Provisions to total gross loans and accounts for loan losses estimations. ACC denotes the accounting specific variables and MAC the macroeconomic factors. Note that t corresponds to the examined quarter. Moreover, in order to capture the dynamics of explanatory variables over previous quarters, we extend our empirical research by including one additional lag for both accounting and macroeconomic factors. Hence, our second econometric model is expressed as follows:

$$LLP_t = a_1 + a_3 ACC_{t-1} + a_3 MAC_{t-1} + \epsilon_{t-1} \quad (2)$$

All the investigated independent variables along with their expected signs are briefly presented on Table 1.

Table 1: Presentation of variables

	Symbol	Explanation	Expected Sign
<i>Accounting Variables</i>	LLP	Loans Loss Provisions to total gross loans	(+)
	CAP	Bank capital and reserves to total assets	(-)/(+)
	LtA	Loans to total assets ratio	(+)
<i>Macroeconomic variables</i>	DEBT	Quarterly Public debt as % of GDP	(+)
	GDP	Quarterly percentage growth rate of GDP	(-)
	INFL	Quarterly average inflation rate	(+)/(-)
	UNEMP	Quarterly percentage of Unemployment	(+)

One of the investigated independent accounting variables is the previous quarter's loan loss provisions (LLP_{t-1}). Given the dynamic persistence of loans provisions, we expect a positive correlation with the dependant variable (Laeven and Majnoni 2003, Fonseca and Gonzalez, 2008). According to Quagliariello (2007), the inclusion of lagged terms of the dependent variable on the right hand side of the equation violates the exogeneity assumption for regressors, thus more sophisticated dynamic econometric techniques are required to provide unbiased estimations. Therefore, "when the lagged depended variable is added as explanatory variable, OLS becomes inconsistent since regressors are correlated with the error term". In this context, the implementation of GMM technique is considered more appropriate than other static techniques (Quagliariello, 2007). Capital ratio (CAP) is the second accounting variable included to our model and measures the risk that a financial institution can undertake. Losses from bank assets can have negative impact on bank capital (Cambazoğlu and Karaalp, 2013). Generally, capital indices are commonly used in the literature. However, they are recorded ambiguous results regarding the sign of their

impact on banks asset quality (Boudriga et al., 2009; Fiordelisi et al., 2010). On one hand, it is considered that low capital indices deteriorate bank asset quality (Berger and De Young, 1997, Vogiazas and Nikolaidou, 2011). On the other hand, it is argued that high capital ratios are linked to more risky banking activities (Rime, 2001). Banking liquidity is measured by LtA index, which demonstrates the funds that a financial institution has utilized into loans from its assets. LtA is expected to exert a positive effect on LLP, since high values of the ratio might signal higher defaults (Sinkey and Greenwalt, 1991, Khemraj and Pasha, 2009, Dash and Kabra, 2010, Festić and Repina, 2009 and Cotugno, Stefanelli, Torluccio, 2010). Based on the aforementioned discussion we state the following hypothesis:

H₁: Accounting information affect LLP significantly

Given the fact that the current financial crisis revealed the importance of linking macroeconomic variables to the financial stability's banking system (Espinoza and Prasad, 2010), we investigated the impact of macroeconomic environment on loans loss provisions. Therefore, GDP growth rate (GDP), inflation rate (INFL), unemployment (UNEMP) and public debt (DEBT) were also included to our model in order to capture the economic conditions in Greece for the period 2000-2012 and how they affected the LLP index. GDP and UNEMP account for the existing economic activity and highlighting the effect of business cycle to loan quality (Quagliariello, 2007 and Salas and Saurina, 2002). Consequently, we expect a positive relation between LLP and unemployment and negative with GDP. Moreover, INFL affects borrower's ability paying their loans. However, its impact on loan quality can be either negative or positive. On one hand, it is argued that high inflation rates decrease the real value of loans and therefore improve the payment capacity of borrowers. On the other hand, it is considered that a high inflation rate deteriorates the payment capacity of borrowers when salaries are stable. The positive impact of inflation is also supported from the fact when lending interest rates are floating, banks adjust the interest rates in order to maintain their interest income (Nkusu, 2011, Rinaldi and Sanchis-Arellano, 2006). Finally, variable DEBT was included to our investigation, since the current crisis in Greece firstly affected fiscal indices and then extended to the banks. Considering this point, we anticipate a positive association between loan quality and public debt. The positive relationship between NPL and public debt in Eurozone was also confirmed by the study of Makri et al. (2011). Given the above discussion, we formulate the following hypothesis:

H₂: Macroeconomic environment affect LLP significantly

4. Empirical Results

4.1 Descriptive Statistics

Table 2 reports the descriptive statistics of the examined variables over the period 2001-2012. Regarding loan quality, the mean value of LLP reaches the 4,2% and 4,1% of total loans on t and t-1 respectively. Capital ratio, records a minimum of 6,1% across all

time lags and a maximum of 11,5% on period t. Variable LtA demonstrates, a maximum of 0,582 and a minimum of 0,337. The mean value of GDP growth rate ranges from -0,602% to -0,747%. The negative values indicate that over the period 2001-2012 Greece marked with negative economic growth. Additionally, for the same period unemployment presents a minimum of 7,47% and a maximum of 26,43%. The mean value of inflation rate is 0,26 approximately. Finally, public debt as percentage of GDP ranged from 97,3% to 170,6%.

Table 2: Descriptive Statistics of the examined variables

Variables	Mean	Median	Max	Min	SD
LLP _t	0,042	0,036	0,113	0,025	0,020
LLP _{t-1}	0,041	0,036	0,103	0,025	0,018
CAP _t	0,082	0,079	0,115	0,061	0,011
CAP _{t-1}	0,081	0,079	0,105	0,061	0,009
LtA _t	0,491	0,509	0,582	0,348	0,057
LtA _{t-1}	0,490	0,508	0,582	0,337	0,060
DEBT _t	116,941	107,950	170,600	97,300	20,793
DEBT _{t-1}	116,653	107,900	170,600	97,300	20,660
GDP _t	-0,747	0,386	3,791	-8,000	3,091
GDP _{t-1}	-0,602	0,397	3,791	-8,000	2,953
INFL _t	0,255	0,267	0,667	-0,167	0,189
INFL _{t-1}	0,260	0,267	0,667	-0,167	0,188
UNEMP _t	11,669	10,117	26,433	7,467	4,673
UNEMP _{t-1}	11,355	10,000	25,467	7,467	4,180

Note: Where LLP is the aggregate of loans loss provision to total gross loans, CAP is the capital ratio defined as bank capital and reserves to total assets, LtA is the loans to total assets ratio, DEBT is the public debt as a percentage of GDP, GDP is the annual percentage growth rate of GDP, INF is the annual average inflation rate and UNEMP is the unemployment rate. t corresponds to the examined year.

4.2 Econometric Results

The results of GMM estimations for equations (1) and (2) are presented on Table 3, where the coefficients of the independent variables, their corresponding p-values, the R² and the adjusted R² for all the examined specifications are recorded. Starting with the adjusted R² indicator, it is noted that the explanatory power of both models is very high, since it ranges from 97,6% to 98,3%. The use of LLP as indicator of loan quality unveiled interesting results. Starting with model (1), it is observed that UNEMP and LLP of the previous quarter records positive and statistically significant relationship with LLP. Additionally, CAP exerts negative and significant impact on LLP. Model (2) demonstrates

similar results. Specifically, variables DEBT, UNEMP and LLP of previous quarter, seem to affect positively loan quality, while CAP negatively. However, it has to be mentioned that INFL, GDP and LtA do not exert significant impact on bank asset quality.

Table 3: Econometric Results of Equations (1) & (2)

Variables	Model (1)	Model (2)
C	0,006 (0,444)	-0,003 (0,703)
LLP _{t-1}	0,809*** (0,000)	0,768*** (0,000)
CAP _t	-0,116** (0,021)	
CAP _{t-1}		-0,107* (0,090)
LtA _t	-0,002 (0,874)	
LtA _{t-1}		-0,001 (0,901)
DEBT _t	-0,001 (0,845)	
DEBT _{t-1}		0,001* (0,068)
GDP _t	-0,005 (0,141)	
GDP _{t-1}		-0,003 (0,511)
INFL _t	0,001 (0,810)	
INFL _{t-1}		-0,005 (0,794)
UNEMP _t	0,001*** (0,001)	
UNEMP _{t-1}		0,001*** (0,000)
R ²	0,980	0,985
Adjusted R ²	0,976	0,983
N obs	48	47

Note: Table shows the coefficients estimates (coefficients in boldface are significant), and p-values of the GMM regression model..* Significance at the 10% level **Significance at the 5% level, ***Significance at the 1% level. Where LLP is the aggregate of loans loss provilsion to total gross loans, CAP is the capital ratio defined as bank capital and reserves to total assets, LtA is the loans to total assets ratio, DEBT is the public debt as a percentage of GDP, GDP is the annual percentage growth rate of GDP, INF is the annual average inflation rate and UNEMP is the unemployment rate. t corresponds to the examined year

5. Discussion

The results of our econometric analysis, provide strong evidence that hypothesis 1 and 2 are confirmed, since both accounting specific and macroeconomic factors seem to determine the loan quality, as literature review proposed.

Firstly, past loans' experience, proxied by LLP of previous quarters, proved to be significantly related with the loan quality of current period. This result highlights the dynamic persistence of problem loans through periods. This finding is also confirmed by Laeven and Majnoni (2001), Jimenez and Saurina (2006), Fonseca and Gonzalez (2008), Louzis et al. (2010) etc. Capital ratio is an indicator that can determine the risk behaviour of banks. However, prior studies have documented mixed results regarding its impact on loan quality (Ahmed et al., 1999, Boudriga et al., 2009 and Fiordelisi et al., 2010). On one hand, positive relationship between LLP and CAP illustrate that banks probably use LLP as a tool of income smoothing and create risky portfolios. On the other hand, negative relationship can be associated with Moral hazard Hypothesis, revealing that bank managers increase the riskiness of bank asset portfolio when low capital ratios are recorded. In the case of the Greek banking system, contrary to Louzis et al. (2010), it is confirmed Moral Hazard Hypothesis. Similar results are also recorded by Berger and DeYoung (1997), Ahmed et al. (1999), Salas and Saurina (2002) and Espinoza and Prasad (2010). Apart from the aforementioned accounting ratios, profitability indices (ROA and ROE) are also employed in similar studies. However, data constraints prevented the calculation of ROA and ROE.

Regarding macroeconomic indicators, it was confirmed that in Greece economic conditions have significant impact on loan quality. Specifically, it was observed a positive relationship between LLP and unemployment, supporting the view that unemployment reduces households' disposable income and weakens borrower's ability to pay their loan installments. Similar results were recorded to Brookes et al. (1994), Louzis et al. (2010), Nkusu (2011) and Vogiazas and Nikolaidou (2011) etc. Finally, sovereign debt problems were proved to determine loan quality, since public debt as percentage of GDP was found to be positively related to LLP. According to Reinhart and Rogoff (2010), sovereign debt crises proceed or occur at the same time with banking crises. This can be explained from the fact that when governments stop financing national banks, the latter reduce their lending activities (Reinhart and Rogoff, 2010). Therefore, debtors cannot refinance their loans and pay their loan installments. Additionally, when public debt increases, governments take fiscal measures by reducing social expenditure and salaries, influencing negatively the disposable household income (Perotti, 1996). This finding is line with Makri et al. (2011) who found that debt problems define the level of NPL in EMU countries.

6. Conclusion

In the present study, we provide strong evidence about the factors influencing aggregate loan quality in Greece over period 2001-2012. Main goal of our study was to record results covering the period of the prolonged recession in Greece. Implementing

GMM estimation on aggregate banking data, we found that both accounting specific and macroeconomic factors seem to define credit risk. It is worth mentioning that is the first study in Greece, which investigates the impact of various accounting and macroeconomic ratios to LLP. Based on the existing literature, aggregate data could provide valid findings for the total stability of a country's banking system. Our conclusions are in line with previous empirical studies, as capital ratio, loan loss provision of previous quarter, unemployment and public debt influence significantly bank asset quality.

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