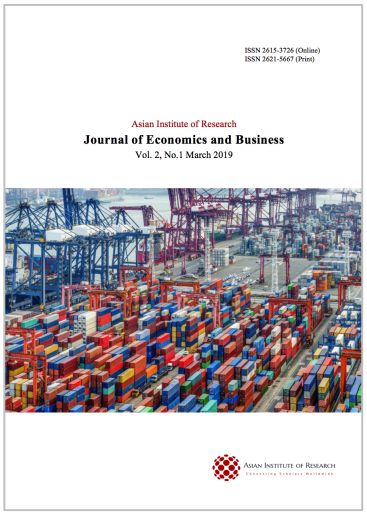

Journal of Economics and Business

Rigas, George, Theodossiou, George, Rigas, John, and Goulas, Apostolos. (2019), The View of the Citizens in Thessaly Region Regarding the Creation of Non-Performing Loans (NPL's) in Greece. In: *Journal of Economics and Business*, Vol.2, No.1, 18-31.

ISSN 2615-3726

DOI: 10.31014/aior.1992.02.01.63

The online version of this article can be found at:
https://www.asianinstituteofresearch.org/

Published by:
The Asian Institute of Research

The Asian Institute of Research *Journal of Economics and Business* is a peer-reviewed International Journal. The journal covers scholarly articles in the fields of Economics and Business, which includes, but not limited to, Business Economics (Micro and Macro), Finance, Management, Marketing, Business Law, Entrepreneurship, Behavioral and Health Economics, Government Taxation and Regulations, Financial Markets, International Economics, Investment, and Economic Development. As the journal is Open Access, it ensures high visibility and the increase of citations for all research articles published. The *Journal of Economics and Business* aims to facilitate scholarly work on recent theoretical and practical aspects of Economics and Business.

ASIAN INSTITUTE OF RESEARCH
Connecting Scholars Worldwide

ASIAN INSTITUTE OF RESEARCH
Connecting Scholars Worldwide

The Asian Institute of Research
Journal of Economics and Business
Vol.2, No.1, 2019: 18-31
ISSN 2615-3726

DOI: 10.31014/aior.1992.02.01.63

The View of the Citizens in Thessaly Region Regarding the Creation of Non-Performing Loans (NPL's) in Greece

George Rigas[1], George Theodossiou[2], John Rigas[3], Apostolos Goulas[4]

[1] Department of Animal Production. University of Thessaly Larissa (TK 41100), Greece. E-mail: g.rigas@teilar.gr
[2] Department of Business Administration. University of Thessaly Larissa (TK 41100), Greece. E-mail: e-mail: geortheo@teilar.gr
[3] BAIN CAPITAL CREDIT, European Portfolio Operations, London, United Kingdom. E-mail: ioannis.rigas@windowslive.com
[4] Department of Planning and Regional Development, University of Thessaly, Greece, e-mail: goulasap@yahoo.com

Corresponding Author: George Theodossiou, Department of Business Administration. University of Thessaly Larissa (TK 41100), Greece. Tel: +302410684465. E-mail: geortheo@teilar.gr

Abstract
This paper presents the investigation of the factorial composition and the internal coherence of a questionnaire on the statements of the citizens on non-performing loans (NPLs) and the reasons of their appearance in Greece, based on data gathered from a sample of 216 citizens region of Thessaly. The questionnaire consists of two categories of questions that refer to: (a) statements of citizens about NPLs (scale A) and (b) statements of citizens on the reasons for the occurrence of NPLs. NPL is any loan that the borrower has delayed more than 90 days to pay the agreed interest or agreed installments. A performing loan provides the bank with interest income that it needs in order to make a profit and grant new loans. When customers fail to comply with the agreed repayment arrangements for 90 or more days, the bank must ensure that more funds are available, based on the assumption that the loan will not be repaid. This limits its ability to grant new loans. Factor analysis identified 8 factors for scale A and 8 for scale B, which interpret 75.86% and 75.23% of the total variation in the respective data sets. The same results have emerged both in the hierarchical cluster analysis method for the clustering of the topics (variables) of the two scales (A and B) and in the residuals method for each subject. The analysis of variance (ANOVA) showed that the most important factors of scale A can be considered the "the state should legally protect only the first home of economically weak citizens and reward consistent borrowers" and of scale B the: a) informing citizens about the risk of over-borrowing and restricting bank lending facilities; b) to manage more efficiently the loans granted; c) the Greek Economy have to become more competitive and more efficient; (d) to have a more cautious interest rate policy in times of economic prosperity; e) avoiding populist policies and tackle citizen movements like "I do not pay" and f) leverage to be significantly reduced (a large number of post-dated checks).

Keywords: Bank, Factor, and Cluster Analysis, Non-Performing Loan (NPL), Questionnaire, Scales

1. Introduction

A loan is considered to be non-performing (NPL) when the borrower has delayed more than 90 days to pay the agreed interest or agreed installments. Non-performing loans (NPLs) are also called bad loans ("red loans"). A

performing loan provides the bank with interest income that it needs in order to make a profit and grant new loans. When customers fail to comply with the agreed repayment arrangements for 90 or more days, the bank must ensure that more funds are available, based on the assumption that the loan will not be repaid. This limits its ability to grant new loans.

In order to ensure their successful operation in the long run, banks have to keep the level of NPLs at a minimum so that they continue to make profits from new loans to customers. By keeping too many NPLs in a bank's balance sheet, its profitability is affected as its lending activities will no longer earn enough profits. In addition, it should ensure that sufficient funds are available if it is necessary to write down the entire amount of the loan at some point in time. Over the past decade, the quality of bank loan portfolios in most countries around the world has remained relatively stable until the financial crisis in 2007-2008. Since then, the average quality of banking assets has deteriorated strongly due to the global economic downturn.

The economy of the euro-area is heavily dependent on lending banks. Monetary policy tools use this fact. The ECB can raise or lower interest rates with which banks can borrow money from it. This enables it to influence private sector borrowing costs and thus ensure that inflation remains below but close to the 2% level in the medium term. But if banks are oversupplied by NPLs, they will not be able to provide significant credit, making this mechanism for affecting interest rates in the private sector unproductive.

Non-Performing Loans-NPLs is an indicator of the quality of banks' assets, which in turn is an important indicator of the performance of a country's banking system, among other performance indicators. An NPL is an obstacle for both lending banks and borrowers. For a debtor, an NPL pledges valuable collateral, and unpaid debt makes it harder for new financing and investment (Bernanke et al., 1999). High NPLs indices on banks balance sheets hinder banks profitability, aggravate market confidence and slow down economic growth. NPLs reflect the quality of bank lending, and overall, reflect the credit quality of lending of the banking system of a country or region. For most countries, total NPLs were relatively low prior to the 2008 financial crisis, but they have been increased significantly during and after the 2008 financial crisis, forcing banks' supervisory/regulatory authorities to intervene for addressing growing NPLs in the banking sector.

The fast increase in NPLs has made banks more sensitive to crises and has significantly limited funding with consequences for economic activity. The increase in the ratio of NPLs may be due to macroeconomic as well as banking factors. The subsequent banking crisis can affect the economy in numerous ways, such as a decline in GDP growth and undermining the country's credibility. Therefore, it is important to identify the factors affecting NPLs and to develop policies by both banks and governments to ensure that appropriate preventive measures are addressed. NPLs together with liquidity risk is the most significant problems for commercial banks, especially after the financial crisis.

The rise of NPLs in many Central and Eastern European countries (CESEE) exerts strong pressure on banks' balance sheets, with a negative impact on bank lending, thus affecting economic activity and creating problems for a sustained recovery. Recognizing the seriousness of this situation, policymakers have prioritized the problem of NPLs. The recent rise in NPLs is evident both in retail and in business. The upward trend in NPLs began immediately after the 2008 crisis, but the sharp rise occurred after one year when in most CESEE economies GDP shrank. Since then, NPLs have continued to grow, showing a strong and negative correlation with the rate of economic recovery. Its upward trend has led to rising unemployment in the region, which, combined with a depreciated currency and rigorous financial conditions, has reduced borrowers' repay-ability.

The rest of the work is as follows. Section 2 is dedicated to literature review relevant on NPLs. In Section 3 empirical data are provided that relates NPLs and the real Greek economy. Section 4 presents the research hypotheses. Section 5 gives a description of the data set and the methodology followed for extracting the key representative factors (questions) of the two scales (categories) of topics - questions. Section 6 discusses the results. Section 7 concludes and offers some policy actions to eliminate NPLs.

2. Literature Review

The recent financial crisis that began in 2008 has highlighted the weaknesses in the banking sector worldwide, which have helped to increase the ratio of NPLs. The rise in NPLs reduces bank profits, resulting in bank recapitalization and a high rate of NPLs, generates systemic risk, worsens deposits, limits credit provision to the economy and reduces future GDP growth.

One of the first studies that investigated the reasons for the creation of NPLs are those of Berger and De Young (1997). With the help of Granger causality, they tested four assumptions about the relationship between cost-effectiveness, loan quality and bank capital using for the period 1985-1994 a sample of US commercial banks. The four cases were reported as "bad management," "bad luck," "moral hazard" and "skimping." They found that the bad management case was superior to the others. They also concluded that the increase in the rate of NPLs was due to the low capital ratios of the banks, which led them to high portfolio risk. Berger & De Young (1997) hypothesized that there is a positive causal relationship between NPLs and high-cost efficiency and found two-way causality. This means that low profitability is a bad management signal, which means that NPLs may grow. Williams (2004), who studied the relationship between cost-efficiency and quality of loans for European savings banks and Louzis et al. (2010), who investigated the determinants of NPLs in the Greek banking system, supported this assumption.

Many researchers studied the impact of the country's macroeconomic factors on NPLs and found that they have a significant impact. Espinoza and Prasad (2010) studied the determinants of NPLs for the Gulf Cooperative Council (GCC) banking sector and noted that when economic growth slows, interest rates rise and risk aversion declines the ratio of NPLs increases. Some of the researchers examined the macroeconomic variables and the role of microeconomic factors that found to improve the interpretative potential of the estimated models. Ghosh (2006**)** used both financial and macroeconomic variables and studied the impact of corporate leverage on NPLs and found that the lagged value of corporate leverage is a major contributor to NPLs.

Louzis et al. (2012) studied the determinants that affect the NPLs of the Greek banking sector. They found that the effects of macroeconomic variables were almost the same in the various alternative models, which also used specialized lending factors as explanatory variables. They conclude that impaired loans are significantly related to various macroeconomic factors, such as real interest rates, GDP growth rates, and unemployment rates. Banks' management, expressed by returns on equity and assets, has a significant impact on NPLs. Klein (2013) studied the financial and macroeconomic factors in Central, Eastern and South-eastern Europe (CESEE) for the period 1998-2011 that affecting NPLs. He found that although the level of NPLs can be attributed both to the macroeconomic factors and to the specific banking variables, banking variables have lower explanatory power. In addition, they examined the feedback results of NPLs on the above variables. Examining feedback results generally outlines strong macro-financial linkages to CESEE. His analysis showed that there is a significant impact from the banking sector to the real economy.

Figlewski et al. (2012) claims that the creditworthiness of banks is affected by the following macroeconomic factors: factors related to the direction of the economy (change in real GDP, change in consumer climate, etc.), factors related to macroeconomic conditions (unemployment rate, inflation, etc.) and financial factors (interest rates, bond yields, stock exchange returns, etc**.).** Messai (2013) in her work for NPLs studied the existence of a relationship between three specific bank variables concerning the change of the loans granted, the reserves for the loan losses and the profitability of assets and three macroeconomic factors using a sample of 85 banks from the Italian, Greek and Spanish banking sector for the period 2004-2008. These three countries had higher NPLs between the countries of the European Monetary Union (Euro countries) in the post-crisis period. She found that unemployment negatively affected households' holdings and further increased debt. She also showed that there is a significant positive relationship between the unemployment rate and the ratio of NPLs and concluded that rising unemployment reduces household purchasing power and leads in a reduction of output production. In addition, NPLs increase banks' provisions. A restriction in employment means a reduction in the real demand, which results in lower production for corporations, which leads to a reduction in revenue and a rise in debt.

It was found that other macroeconomic factors such as interest rate, inflation, and exchange rate affect banking assets. Several studies have found that stock prices also affect NPLs. The impact of inflation has not been accurately established. Higher inflation may facilitate debt repayment by reducing the real value of the loan, but may also reduce the real income when wages are stable. In the case of variable interest rates, higher inflation may result in higher interest rates due to monetary policy measures taken to fight inflation **(**Nkusu, 2011). He created an econometric model that explains NPLs with macro-performance variables using annual data from a sample of 26 advanced economies for the period 1998 to 2009. He concluded that the deterioration of the macroeconomic environment due to higher unemployment, low growth or decline in asset prices is linked to debt servicing problems. On the other hand, an improved macroeconomic environment leads to a decrease in NPLs.

Bofondi and Ropele (2011) used annual data from Italian banks for the period 1995-2008 and studied the macroeconomic variables impacting impaired loans households and businesses. For household loans before the crisis, there was a positive relationship between NPLs and interest rates and unemployment and a negative relationship to real estate prices and GDP growth. The results for business loans showed a positive correlation with the ratio of interest expense to EBITDA and the unemployment rate, while the impact of the consumption of durable goods was negative. After the financial crisis resulted that the increase in problematic households' loans is related to lower consumption and higher unemployment, while for companies' loans the increase in NPLs is due to lower GDP growth. Cifter (2015) received a sample of ten Central and Eastern European (CEE) countries and investigated how banking concentration affects NPLs. This relationship was examined both in the short and long term, and it was found that the concentration was not significant. Thus, he concluded that "the concentration of banks cannot affect systemic stability in the CEE countries."

There are indications that NPLs have anti-cyclical behavior. This is explained by the fact that real GDP growth means an increase in income that leads to improved debt servicing of the borrowers, and when there is a slowdown in the economy, the rate of NPLs usually increases as unemployment rises, income is reduced, and borrowers cannot repay their debt. (Fofack, 2005; Jimenez & Saurina, 2006; Charalambakis et al., 2017; Baudino & Yun, 2017) investigated the relationship between macroeconomic and bank variables and NPLs, based on the aggregate Greek loan portfolio. They showed that deteriorating macroeconomic conditions (very high unemployment rates) and political uncertainty were the main reasons for the increase in Greek NPLs from 2012 onwards. In addition, they found that liquidity risk and the bank's specific capital are the determinants of NPLs only under normal economic conditions, with the exception of banks' profitability. The deterioration in the ratio of NPLs may be due to both banking factors and macroeconomic conditions **(**Berge**r** and De Young, 1997; Louzis et al.,2012).

Empirical data in Greece and internationally indicate that NPLs have anticyclical behavior. The deterioration in macroeconomic conditions, rising unemployment, and declining GDP, reduce the debt service capacity and therefore have a negative impact on NPLs. The bank factors mentioned in the literature that have a negative impact on NPLs are credit conditions, cost-effectiveness, management performance, size, the risk profile of banks and market power **(**Louzis et al., 2012). Radivojevic and Jovovic (2017) used data from 25 emerging countries and concluded that NPLs can be interpreted by macroeconomic variables such as inflation and GDP as well as by bank variables such as CAP, ROA and lagged NPLs rate. The level of NPLs has increased significantly since the last financial year of 2008, and the relationship between declining banks' credibility and NPLs appears as the main reason in the failure of credit policy **(**Saba, 2012**)**.

The stability of the banking system and the likelihood of distress depend to a large extent on the ratio of NPLs, which means that NPLs are an indicator of non-fulfillment of obligations (defaults) in the financial sector. **(**Makri et al., 2014) identified for the period 2000-2008 the factors that influenced the rate of NPLs in the euro area banking system and found a strong relationship between NPLs and a number of macroeconomic factors (unemployment, government debt, GDP growth) and bank factors (ROE, the rate of NPLs of the previous year and the capital adequacy ratio). In addition, a statistically significant positive relationship is resulted between: 1) NPLs and public debt, 2) NPLs and the unemployment rate, and 3) the dependent variable NPLs and its lagged value. Balgova et al. (2016) found that the reduction in NPLs has a medium-term positive impact on the economy. Countries with new credit inflows are growing faster, and economies that actively try to resolve NPLs problem are doing comparably well. On the other side, when the problem of NPLs is ignored, economic performance

reduces: the foregone growth due to the overrun of NPLs may exceed 2 percentage points per year as long as the problem exists.

Ozili (2018) studied the impact of financial development on NPLs using a global sample. The findings indicate that two financial development proxies, foreign bank presence, and financial intermediation, are positively related to NPLs. In the regional analysis, there is a negative relationship between NPLs and bank liquidity and regulatory capital, implying that the banking system with greater liquidity and regulatory capital has fewer NPLs. Anastasiou et al. (2016) investigated the causes of NPLs in the euro area banking sector for the period 2003-2013 and separate periphery from core country determinants. The increase in NPLs after the crisis has threatened the power of many European banks and the stability of the banking sector. They found that the same macroeconomic and bank factors affect the NPLs, but their impact is stronger in the periphery. NPLs showed an upward trend (greater in the periphery) since 2008 in the euro area, and this is related to the deterioration of macroeconomic conditions, particularly regarding growth, unemployment, and taxes. Interest rate margins and fiscal consolidation are significant for the periphery while credit to GDP is significant for the core.

3. NPLs and Banks in Greece

In Greece, the financial crisis began as a sovereign debt crisis and evolved into a strong banking crisis. The key policies for dealing with the crisis were extreme austerity, internal devaluation and structural reforms for fiscal consolidation (Raftopoulou, 2015). These policies have created a deep recession with high unemployment, enough poverty, reduction in disposable income and a large number of padlocks. This has resulted in reduced deposits, limited liquidity, deflation, and reduced property prices. Greek citizens did not meet their obligations and at the same time faced a large public debt, which was added to them. Increased bad banking requirements threaten bank balance sheets, reduce liquidity provision, resulting in a contraction of economic recovery. The total private debt consisting of debts to the State, public enterprises, pension funds, etc. far exceeds nominal GDP.

The deterioration of macroeconomic conditions, with rising unemployment and falling GDP, has a negative impact on NPLs as debt servicing of borrowers is reduced. Among the bank-specific factors mentioned in the literature that affect NPLs are the size, cost-effectiveness, management performance, credit conditions, market power, and bank risk profiles. The Greek economy is an interesting case study of the factors that have defined the recession conditions of the Greek economy since 2008. According, Charalambakis et al. (2017) «in 2009, the economy went into recession, resulting in a fall in GDP of 3% in 2009 and an increase in the NPLs ratio by 3.5 percentage points. In 2010, financial markets began to lose faith in Greece ability to service their public debt, and after several months of negotiations between the country and EU leaders, Greece received its first rescue plan from the European Union and the IMF to ensure debt service and prevent a default. Greece has pledged to adopt a sharp fiscal consolidation that has led to further recessionary pressures and has rapidly increased NPLs. The increase in NPLs created unemployment, which further worsening the macroeconomic environment».

NPLs and reduced liquidity are the most important risks for commercial banks, especially in times of economic crisis. The Asian crisis of 1997 is a typical example of a banking crisis. The real economy in Asia suffered considerable losses. NPLs are the most important challenge faced by euro area banks, and especially in the countries that found in IMF-EU support programs, such as Greece, Ireland, and Portugal, seem to be facing the biggest threat. The management of this problem will enable banks to re-contribute to the growth of their economies (Anastasiou et al., 2016).

Reducing the high stock of NPLs, restoring the mediating role of banks, and shaping a viable business model are the key challenges facing Greek banks. Effective management of NPLs is of paramount importance for the stability of the banking system, economic growth, and social cohesion, according to the Governor of the Bank of Greece**.** Until 12/2018**,** the decrease in non-performing exposures stems primarily from write-offs and, to a lesser extent, from loan sales. This partly explains why the ratio of nonperforming exposures remains persistently one of the greatest in the euro area (47.6%). Despite the progress achieved so far, much remains to be done. Greek banks have already submitted revised business targets for NPLs, covering the period until 2021. "In the coming period,

loan sales, loan receipts, liquidation of collateral and successful loan adjustments, so that the percentage of non-performing exposures in all exposures drops to about 20% or less **(**Stournaras, 2018).

It has been well documented that credit-less recovery is weaker, mainly because the lack of bank credit affects investment. The observed improvement in banks' liquidity, due to the gradual increase in deposits, increased access to the secured interbank market and a series of covered bond and securitization issues, is encouraging. It is very important that the release of Greek banks from the central bank for financing through the ELA will allow them to design and implement reliable medium-term credit expansion plans. Making use of the possibilities offered by digital technology, coupled with other efforts to reduce operating costs, can further improve the efficiency of banks, which is already comparable to that of Europeans. The development of jobs that generate commission income (e.g., asset management, bancassurance, etc.) can also help diversify their revenue sources. Restoring the mediation role of banks is essential for their long-term sustainability Stournaras, 2018)**.**

According to the Managing Director of National Bank of Greece Mylona P. (2018), in order to allow Greek banks to reduce their portfolios of red loans to levels agreed with the ECB's SSM, growth to move within the estimates, the improvement of the real estate market should continue and the government should intervene in a legislative way in order to provide partial assistance and through institutional changes. When real estate prices move upwards, mortgage repayment incentives also increase, which means that the growth and recovery of the property market (real estate market) are linked to NPLs. Greek banks have taken great predictions, and future efforts to reduce bad loans will be sales of red loans, according to bankers' statements. The hard issue for banks is the corporate and housing loans. Finally, in terms of auctions, the banks said that they had not worked very well and that there is room for improvement.

4. Research hypotheses

The phenomenon of the emergence and growth of NPLs after the financial crisis of 2008 has been the subject of research for several researchers worldwide. The problem of NPLs has been and still is of major concern to the Greek economy and the Greek society in general over the last decade. On the occasion of this event, we decided to address the citizens of the Thessaly region with some intellectual level, in order to capture the reasons that they believe to be the root causes of the emergence and rapid growth of the NPLs that influenced the macroeconomic variables of the country (GDP, employment, interest rates, public debt, etc.). The socio-economical characteristics of Region of Thessaly are representative of the medium of the country.

Factor and cluster analysis will be used to bring together the causes (variables) into key representative factors (causes) that interpret to a significant extent the phenomenon of the emergence and growth of NPLs. In addition, with the help of the analysis of variance, it will be investigated whether the views of the different categories of respondents, achieved by the use of categorical variables, differ from each other.

5. Data and Methodology

This work examines the factor composition and the internal coherence of the questionnaire, based on data gathered from a sample of 216 citizens region of Thessaly in order to record and study their opinion **on NPLs and the reasons of appearance in Greece.**

a. Determination of the measuring instrument. As a measuring instrument, a structured questionnaire was used with 43 questions (topics, variables) in total, consisting of: (1) questions on citizens' demographics (questions 1 to 7); (2) questions related to **citizens' statements about NPLs** (questions 8 - 26 (scale A)) and (3) questions related to **Citizens' statements of the reasons for the occurrence of NPLs** (questions 27-43 (scale B)).

The measurement of the topics of both scales was calculated with a five-point gradient. The rating includes the following replies (statements): 1 = Absolutely disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Absolutely agree. The grouping in sub-scales (factors) of the two scales A and B will be done by the Principal Component Analysis method, to be used for further analysis.

b. Data collection. Initially, a questionnaire test was conducted in March 2018 to the members of the Economic Chamber and to the faculty members of the University and TEI of Thessaly in the 4 geographical districts of the Thessaly regions. Its suitability was found to be easy to use and understandable, while the arrangements made did not influence the content of its structure. 216 questionnaires were collected after sending e-mails to members of various scientific associations (clubs) between April 2018 and June 2018. For the e-mail addresses and telephone numbers of the respondents, the lists of clubs were used. An attempt was made to contact a lot more scientists, but only 216 responded to the questionnaire completion. Lawley and Maxwell (1971) report that the use of the maximum likelihood method in factor analysis requires a sample size of 51 greater than the number of the topics of the measuring instrument **(**Anagnostopoulos &Papadatou,1992). In our case, for the A scale questionnaire with 19 topics (themes) and the B scale questionnaire with 17 topics (themes), the size of the sample satisfies the Lawley and Maxwell condition for both scales.

c. Reliability analysis. Statistical analysis of the data was done with the IBM SPSS Statistics Social Security Analysis Package 23. The reliability analysis was initially applied to the two scales of the measuring instrument: **scale A** (variables 8-26) and **scale B** (variables 27-43). The internal consistency of the two-scale questionnaires was assessed on the basis of the Alpha index of Cronbach (a-Cronbach) calculated from the application of the reliability analysis in the respective data sets.

d. Factor analysis - cluster analysis. It was followed factor analysis on the two scales by the Principal Component Analysis method in order to group the variables into sub-scales to be used for further analysis. Four steps were followed during the factor analysis: (a) the correlation matrix was created among all the topics (themes), and it was investigated the proper implementation of a factorial model; (b) it was determined the number of factors sufficient to describe the data and the good application of the chosen model was assessed; (c) for the final factorial solution, rotation of the axes was used so that the factors are clearly interpretable and (d) the factor scores for each factor were calculated.

In order to determine whether the correlation matrix of the questionnaire topics for each scale is suitable for factorial analysis, two criteria were used: the Bartlett sphericity criterion and the Kaiser-Meyer-olkin KMO index. Bartlett's test of sphericity was applied to test the null hypothesis that the correlation matrix coincides with the identity matrix, where all diagonal elements are equal to 1, and all non-diagonal elements are zeros. If the sphericity criterion is low, this assumption will be rejected, and then the decision to apply a factor analysis should be reviewed. The 'KMO' index (Kaiser-Meyer-olkih's), the measure of sampling adequacy, is an index of comparing the magnitudes of observed correlation coefficients to the magnitude of partial correlation coefficients. Small index values indicate that factorial analysis of variables is not appropriate since correlations between pairs of variables can't be explained by the other variables **(**Anagnostopoulos &Papadatou,1992).

The determination of the number of factors for each scale (A and B) was based on the graphs of the eigenvalues of the characteristic equation of the correlation matrix and the eigenvalues criterion. The hierarchical cluster analysis method (Ward Linkage and Square Distance) was then applied to group the topics-variables of the scales A and B. The hierarchical cluster analysis tree was used to group the topics into groups. Finally, the groups formed by each of the two methods were compared for each scale separately.

e. Analysis of variance. The Analysis of variance (**ANOVA**) was used to test the significance of the difference between the mean values of the different groups created by different independent variables (age, gender, educational level, and family income) for the factors (sub-scale) of each scale of topics. The F statistic was used to test the difference of the mean values of m groups when $m \geq 3$ and the statistic t when $m = 2$. This method analyzed the factors of the two scales in relation to demographic, educational and economic characteristics, namely: gender, age, education, and family income.

f. Correlation coefficients and reordered descriptive statistics. The correlation coefficients and the descriptive statistics of the factors (sub-scales) of the two scales A and B were calculated. For the study of the correlation (relationship) between the variables, the Pearson correlation index **r** was used.

6. Results and Discussion

a. Reliability analysis - Factor analysis - Cluster analysis

The internal consistency of the two-scale questionnaires was assessed on the basis of the Cronbach Alpha Index (a-Cronbach). The A-Cronbach Index for **scale A** “Citizens' statements related to NPLs” was found to be equal to the high level of credibility a-CrA = 0.825 and for **scale B** "Citizens' statements related to the reasons for the occurrence of NPLs" was found to be equal to the high degree of credibility of a-CrA = 0.852. The reliability of a questionnaire increases with the Alpha Index. Many professional researchers require a reliably completed questionnaire to display Index a-Cr> 0.60 marker. In any case, a-Cr> 0.50 should be used to make the questionnaire reliable.

The KMO Index for the A and B scale were 0.828 and 0.828, and those for the Bartlett sphericality were 1570.21 and 1137.25 ($p < 0.001$) respectively, which means that the Factor Analysis of the variables is an appropriate statistical technique for extracting factors for both scales.

We then proceeded to extract factors using the maximum likelihood method. For each scale and topic, the "common part" (Communalities) was calculated, that is the percentage of variance of the topic, which is interpreted by the common factors.

When the common part of a topic has a value close to zero, it means that common factors do not interpret a significant percentage of the variance, so this topic counts (states) something unique. This has not been observed in any of the two scales.

Factor analysis identified 8 factors for Scale A and 8 for Scale B, which interpret 75.86% and 75.23% of the total variance in the respective data sets.

The factors of **scale A** (or sub-scales of scale A) “Citizens' statements related to NPLs” that support the theoretical dimension of the subject are:

1. AA1: Restructuring of loans and deletion of part of the debt (5 topics (A13, A14, A15, A16, A17))
2. AA2: NPLs are a serious threat to the national economy and make any attempt to recover impossible (5 topics (A4, A5, A6, A7, A19))
3. AA3: The movement "I don't pay" protects citizens with large property and ability to repay their obligations (2 topics (A9, A10))
4. AA4: The reduction of NPLs is a prerequisite for the consolidation of the banking system (2 topics (A1, A2))
5. AA5: The law should only protect the first home of economically weak citizens and reward consistent borrowers (2 topics (A12, A18))
6. AA6: With NPLs a large capital stock remains locked into non-productive assets (1 topic (A3))
7. AA7: NPLs create transactions between bad payers and specific movements (1 topic (A11))
8. AA8: The out-of-court settlement should be institutionalized for any NPL (1 topic (A8))

The factors of **scale B** (or sub-scales of scale B) “Citizens' statements related to the reasons for the occurrence of NPLs” that support the theoretical dimension of the subject are:

1. BB1: The lack of information on the risk of over-borrowing and the lending facilities of banks (5 topics (B5, B7, B8, B9, B10))
2. BB2: The ineffective management of granted loans (2 topics (B11, B12))

3. BB3: The economic crisis and the reduced disposable income contributed to the emergence of NPLs (2 topics (B1, B15))
4. BB4: The lack of competitiveness of the Greek economy and the use of failed policies (2 topics (B13, B14))
5. BB5: Over-borrowing and strategic bad-payers (2 topics (B2, B3,))
6. BB6: The low lending rates and the prevailing climate of prosperity (2 topics (B16, B17,))
7. BB7: The "I don't pay" movements contributed to the increase in NPLs (1 topic (B1))
8. BB8: The enormous number of post-dated checks (1 topic (B6))

In order to support the results of the factor analysis, we proceeded to apply the hierarchical cluster analysis method (Ward Linkage method and squared Euclidean Distance) to group the variables of the two scales.

From the dendrograms of the hierarchical cluster analysis, we observed that the 19 topics of scale A are grouped into 8 groups with the same topics which are contained in the 8 subscales (factors) determined by Factor Analysis (Table 1). The 17 topics of scale B are grouped into 8 groups with the same topics which are contained in the 8 subscales (factors) determined by Factor Analysis (Table 2), except that Factor Analysis considers B6 as a separate factor (BB8, load 0, 71) while Cluster Analysis puts it in the first factor (BB1, load 0.43) (Figure 2).

To test whether the model of the 8 factors for the scale A and the model of the 8 factors for the scale B reproduce the observed correlations between the topics satisfactorily, the residual for each topic was calculated. The residual equals the difference between the observed correlation coefficient and the estimate from the corresponding model. The tables of Reproduced correlation contained a relatively small percentage (13.45.98% for A and 15.44% for B) of the residuals with an absolute value greater than 0.10. This result indicates that the models of the 8 factors for scale A and the 8 factors scale B reproduce relatively well the observed correlations between the topics.

Figure 1. Grouping the topics of scale A with hierarchical cluster analysis

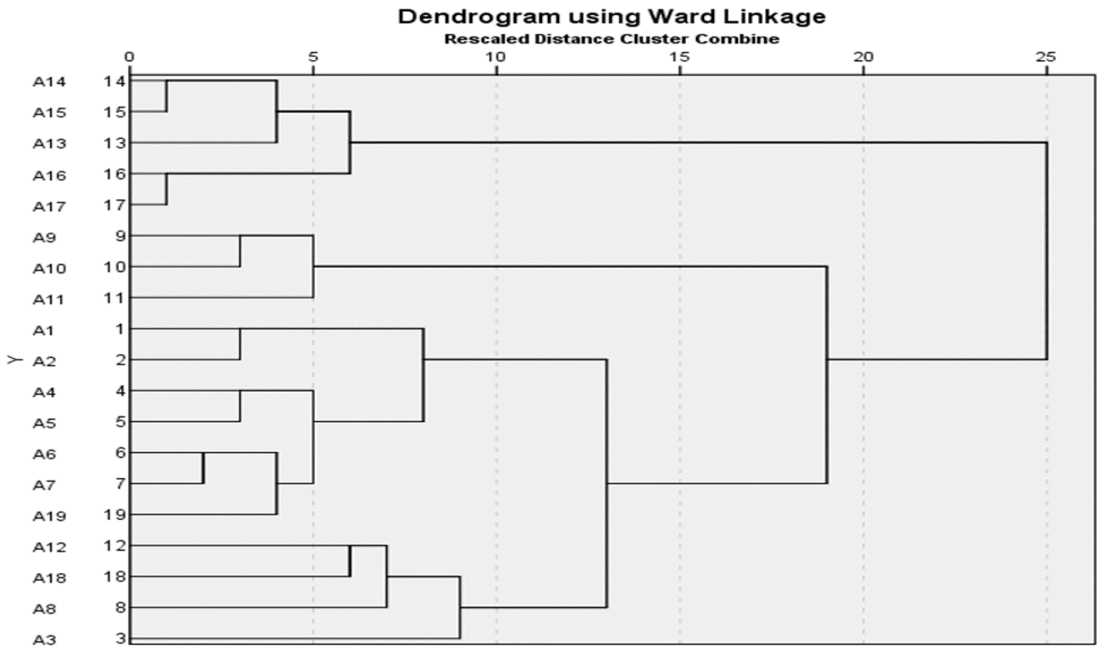

Figure 1. Grouping the topics of scale A with hierarchical cluster analysis

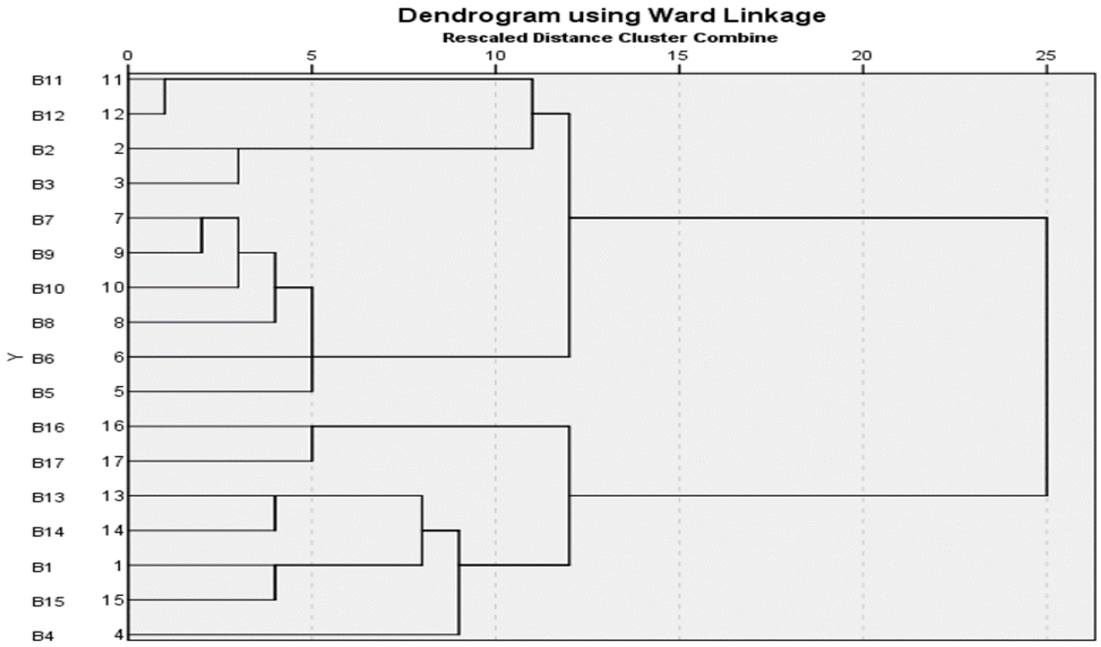

Figure 2. Grouping the topics of scale B with hierarchical cluster analysis

b. Descriptive statistics and distribution of the sub-scales

The results of the factor analysis can be considered as indicative of a grouping of the topics. On the basis of the topics involved in each factor, we formed eight sub-scales (factors) for scale A and eight sub-scales for scale B. Each topic of scale A is ranked in one of the eight sub-scales, each of which appears as the arithmetic mean of the topics that correspond to it and each topic of scale B is ranked in one of the eight sub-scales, each of which appears as the arithmetic means of the topics that correspond to it. Descriptive statistics (mean, standard error, standard deviation, and median) for the distributions of these indices (factors) are shown in Table 1 and 2. The frequency curve for all the eight indices of scale A and the eight indices of scale B is almost the normal distribution.

Table 4. Mean value, standard deviation, standard error and median for the eight subscales of the scale A

A/A sub-scales	Mean value	Standard error	Standard deviation	Median
AA1: Restructuring of loans and deletion of part of the debt	3.680	0.058	0.851	3.800
AA2: NPLs are a serious threat to the national economy and make any attempt to recover impossible	3.410	0.052	0.768	3.400
AA3: The movement "I don't pay" protects citizens with large property and ability to repay their obligations	2.830	0.065	0.957	3.000
AA4: The reduction of NPLs is a prerequisite for the consolidation of the banking system	3.720	0.055	0.805	4.000
AA5: The law should only protect the first home of economically weak citizens and reward consistent borrowers	3.920	0.058	0.851	3.800
AA6: With NPLs a large capital stock remains locked into non-productive assets	3.730	0.060	0.875	4.000
AA7: NPLs create transactions between bad payers and specific movements	3.520	0.064	0.941	3.000
AA8: The out-of-court settlement should be institutionalized for any NPL	3.590	0.065	0.960	4.000

Table 5. Mean value, standard deviation, standard error and median for the eight subscales of the scale B

A/A sub-scales	Mean value	Standard error	Standard deviation	Median
BB1: The lack of information on the risk of over-borrowing and the lending facilities of banks	4.060	0.045	0.657	4.100
BB2: The ineffective management of granted loans	3.780	0.058	0.853	4.000
BB3: The economic crisis and the reduced disposable income contributed to the emergence of NPLs	3.750	0.055	0.808	4.000
BB4: The lack of competitiveness of the Greek economy and the use of failed policies	3.590	0.056	0.827	3.500
BB5: Over-borrowing and strategic bad-payers	4.080	0.045	0.660	4.000
BB6: The low lending rates and the prevailing climate of prosperity	3.620	0.057	0.842	4.000
BB7: The "I don't pay" movements contributed to the increase in NPLs	3.310	0.076	1.114	3.000
BB8: The enormous number of post-dated checks	3.820	0.056	0.822	4.000

c. Analysis of Variance (ANOVA)

In order to test the existence of differences in the categories (groups) of the sub-scales (dependent variables) of the scales A and B, which are formed with independent variables, the social, educational and income characteristics of the citizens, the method of simple variance analysis (one-way ANOVA) was used. In particular, there were studied the existence of significant differences between the mean values of the levels (groups) of sub-scales of the two scales defined by the independent variables, gender, age, education, and family income. If the independent variable contained two levels (categories), the **t** statistic was used to test the existence of significant differences.

c.1 Analysis of variance of the sub-scales of scale A "Citizens' statements related to Social and Cooperative Enterprises."

1. Significant differences in the level of 5% (p = 0.05) present the mean of the levels: 1) of the Subscales: AA2, AA3, AA7 and AA8 with independent variable the **''gender** ''; 2) of the Subscales: AA1, AA6 and AA8 with independent variable the ''**age**'; 3) of the sub-scale AA4 with independent variable the "**Educational level**" and 4) of the sub-scale **AA8** with independent variable the "**family income**".

c.2. Analysis of variance of the sub-scales of scale B "Citizens' statements related to the reasons for the occurrence of NPLs."

Significant differences in the level of 5% (p = 0.05) present the mean of the levels: 1) of the Subscale BB3 with an independent variable the "**Gende**r" and 2) of the sub-scale **BB5** with an independent variable the "**Educational Level**."

d. Correlation coefficients

d.1. Correlation coefficients for the sub-scales of scale A "Citizens' statements related to NPLs."

For the examination of the correlation between the variables (sub-scales) of scale A, the Pearson correlation index **r** was used. Significant correlation at p = 0.01 presents:

1. The sub-scale "AA1: Restructuring of loans and deletion of part of the debt" with the sub-scales: AA2 (r=0,270), AA4 (r = 0.194), AA5 (r = 0.382) and AA8 (r = 0.379).

2. The sub-scale "AA2: NPLs are a serious threat to the national economy and make any attempt to recover impossible" with the sub-scales: AA3 (r=0,268), AA4 (r=0,564), AA5 (r=0,376), AA6 (r=0,491), AA7 (r=0,233) and AA8 (r=0,238).

3. The sub-scale “AA3: The movement "I don't pay" protects citizens with large property and ability to repay their obligations” with the sub-scales: AA6 (r=0,179) and AA7 (r=0,465).

4. The sub-scale “AA4: The reduction of NPLs is a prerequisite for the consolidation of the banking system” with the sub-scales: AA5 (r=0,374), AA6 (r=0,563) and AA8 (r=0,234).

5. The sub-scale **“**AA5: The law should only protect the first home of economically weak citizens and reward consistent borrowers” with the sub-scales: AA6 (r=0,250) and AA8 (r=0,290).

6. The sub-scale “AA6: With NPLs a large capital stock remains locked into non-productive assets” with the sub-scales: AA7 (r=0,218) and AA8 (r=0,179).

d.2. Correlation coefficients for the sub-scales of scale B "Citizens' statements related to the reasons for the occurrence of NPLs."

For the variables (sub-scales) of scale B, significant correlation at p = 0.01 presents:

1. The sub-scale “BB1: The lack of information on the risk of over-borrowing and the lending facilities of banks” with the sub-scales: BB2 (r=0,511), BB3 (r=0,285), BB4 (r=0,258), BB5 (r=0,459), BB6 (r=0,338), BB7 (r=0,192) and BB8 (r=0,523).

2. The sub-scale “BB2: The ineffective management of granted loans” with the sub-scales: BB3 (r=0,268), BB4 (r=0,426), BB5 (r=0,380), BB6 (r=0,290), BB7 (r=0,198) and BB8 (r=0,399).

3. The sub-scale “BB3: The economic crisis and the reduced disposable income contributed to the emergence of NPLs” with the sub-scales: BB4 (r=0,448), BB5 (r=0,316), BB6 (r=0,419), BB7 (r=0,319) and BB8 (r=0,223).

4. The sub-scale “BB4: The lack of competitiveness of the Greek economy and the use of failed policies” with the sub-scales: BB5 (r=0,255), BB6 (r=0,560), BB7 (r=0,270) and BB8 (r=0,314).

5. The sub-scale “BB5: Over-borrowing and strategic bad-payers” with the sub-scales: BB7 (r=0,264) and BB8 (r=0,287).

6. The sub-scale “BB6: The low lending rates and the prevailing climate of euphoria” with the sub-scales: BB7 (r=0,188) and BB8 (r=0,293).

7. Conclusions

The present work dealt with two main components: (a) Citizens' statements on NPLs; and (b) Citizens' statements about the reasons for the occurrence of NPLs.

For the scales of topics (questionnaire) of each component the reliability analysis showed very strong (a-Cr> 0.825) and (a-Cr> 0.852) internal consistency of the questionnaires and then applied the factor analysis, which is a basic tool for checking the validity of a conceptual construction of a questionnaire when it adapts to another language. Factor analysis identified 8 factors for scale A and 8 for scale B, which interpret 75.86% and 75.23% of the total variance in the respective data sets. The same results resulted both in the hierarchical cluster analysis method for the grouping of the variables of the two scales and in the residuals method for each topic.

The variance analysis (ANOVA) showed that, in the grouped statements of citizens (factors) about NPLs (factors of scale A) most important can be considered the **AA5:** The law should only protect the first home of economically weak citizens and reward consistent borrowers, because in any of the independent (categorical) variables gender, age, education, and family income, the means of the levels do not differ between them.

In the grouped statements of citizens on the reasons for the occurrence of NPLs (factors of scale B) , the most important can be considered: 1) BB1: The lack of information on the risk of over-borrowing and the lending facilities of banks; 2) BB2: The ineffective management of granted loans; 3) BB4: The lack of competitiveness of the Greek economy and the use of failed policies; 4) BB6: The low lending rates and the prevailing climate of euphoria; 5) BB7: The "I don't pay" movements contributed to the increase in NPLs and 6) BB8: The enormous number of post-dated checks, because, in any of the independent (categorical) variable gender, age, education, and family income, the means of the levels do not differ between them.

It follows from the above that the state should by law protect only the first home of economically weak citizens and reward consistent borrowers. As regards the elimination of NPLs, it should: 1) informing citizens about the risk of over-borrowing and limiting bank lending facilities; 2) to manage more efficiently the loans granted; 3) the Greek Economy have to become more competitive and more efficient; 4) have a more cautious interest rate policy in times of economic prosperity; 5) avoid populist policies and tackle citizen movements like "I do not pay" and 6) Leverage to be significantly reduced (a large number of post-dated checks).

Acknowledgements

1. The findings of the survey and the related tables can be found in the Annex, which is available to all interested parties.
2. The present research work was co-financed from the authors Theodossiou George, Rigas John, Goulas Apostolos, and Rigas George.

References

Anagnostopoulos, F., & Papadatou, D. (1992). Productive synthesis and internal cohesion of questionnaire of recording burnout in sample of nurses. Psychological Subjects 5(3):183-202. (In Greek).

Anastasiou D., Louri H., & Tsionas, M. (2016). Non-performing loans in the Euro Area: are core-periphery banking markets fragmented? Bank of Greece, Working Paper No. 219, December 2016. https://www.bankofgreece.gr/BogEkdoseis/Paper2016219.pdf

Balgova, Nies M., & Plekhanov, A. (2016). "The economic impact of reducing non-performing loans," European Bank for Reconstruction and Development Working Paper No. 193. https://www.ebrd.com/cs/Satellite?c=Content&cid=1395253022347&d=Mobile&pagename=EBRD%2FContent%2FContentLayout

Baudino, P., & Yun, H. (2017). Resolution of non-performing loans – policy options. Bank for International Settlements. FSI Insights on policy implementation No 3. https://www.bis.org/fsi/publ/insights3.pdf

Berger, A., & DeYoung, R. (1997). "Problem Loans and Cost Efficiency in Commercial Banks." Journal of Banking and Finance, 21(6), pages 849–870. https://doi.org/10.1016/S0378-4266(97)00003-4

Bernanke, B.S., Gertler, M., & Gilchrist, S. (1999) The Financial Accelerator in a Quantitative Business Cycle Framework. Handbook of Macroeconomics. John B. Taylor and Michael Woodford (Ed.), Volume 1, Chapter 21, pages 1342- 1390. http://www.econ.nyu.edu/user/gertlerm/BGGHandbook.pdf

Bofondi, M., & Ropele, T. (2011). Macroeconomic determinants of bad loans: evidence from Italian banks. Bank of Italy. Economic Research and International Relations Area. Working Paper Number 89. http://www.bancaditalia.it/pubblicazioni/qef/2011-0089/QEF_89.pdf

Charalambakis, E., Dendramis, Y., & Tzavalis, E. (2017). On the determinants of NPLs: Bank of Greece, Working Paper 220 March 2017. http://www.bankofgreece.gr/BogEkdoseis/Paper2017220.pdf

Çifter, A. (2015). Bank concentration and non-performing loans in Central and Eastern European countries, Journal of Business Economics and Management, Vol. 16(1):117-137. https://doi.org/10.3846/16111699.2012.720590

Espinoza, R., & Prasad, A. (2010). "Nonperforming Loans in the GCC Banking Systems and their Macroeconomic Effects." IMF Working Paper 10/224 (Washington: International Monetary Fund). https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Nonperforming-Loans-in-the-GCC-Banking-System-and-their-Macroeconomic-Effects-24258

Figlewski, S., Frydman, H., & Liang, W. (2012). Modelling the Effect of Macroeconomic Factors on Corporate Default and Credit Rating Transitions. International Review of Economics and Finance, 21(1), 87–105. https://doi.org/10.1016/j.iref.2011.05.004

Fofack, H., (2005). *Nonperforming loans in Sub-Saharan Africa: causal analysis and macroeconomic implications (English)*. Policy, Research working paper; no. WPS 3769. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/446961468104639856/pdf/wps3769.pdf

Ghosh, S., (2006). Does leverage influence banks' non-performing loans? Evidence from India, Journal of Applied Economics Letters, Vol. 12: 913-918 https://doi.org/10.1080/13504850500378064

Investopedia. Nonperforming Loan – NPL – Definition. https://www.investopedia.com/terms/n/nonperformingloan.asp

Jiménez, G. & Saurina, J. (2006). Credit Cycles, Credit Risk, and Prudential Regulation International Journal of Central Banking, 2006, vol. 2, issue 2 http://mpra.ub.uni-muenchen.de/718/

Klein, N. (2013). Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance, IMF Working Paper, WP/13/72. https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Non-Performing-Loans-in-CESEE-Determinants-and-Impact-on-Macroeconomic-Performance-40413

Lawley, D.N. and Maxwell, A.E. (1971) Factor Analysis as a Statistical Method. 2nd Edition, Butterworths, London. **ISBN** 0408701528.

Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and Bank-Specific Determinants of Non-Performing Loans in Greece: A Comparative Study of Mortgage, Business, and Consumer Loan Portfolios. Journal of Banking and Finance, 36(4), 1012–1027. https://doi.org/10.1016/j.jbankfin.2011.10.012

Louzis, D. P., A.T. Vouldis, and V.L. Metaxas. 2010. "Macroeconomic and Bank-specific Determinants of Nonperforming Loans in Greece: A Comparative Study of Mortgage, Business and Consumer Loan Portfolios.", Bank of Greece Working Paper 118. https://www.bankofgreece.gr/BogEkdoseis/Paper2010118.pdf

Makri, V. & Papadatos, K. (2014). How Accounting Information and Macroeconomic Environment Determine Credit Risk, Evidence from Greece. International Journal of Economic Sciences and Applied Research, 7(1), 129–143. http://ijbesar.teiemt.gr/docs/volume7_issue1/volume7_issue1.pdf

Messai, A., (2013). Micro and Macro Determinants of Non-performing Loans, International Journal of Economics and Financial Issues, Vol. 3: 852-860. http://dergipark.gov.tr/download/article-file/362822

Mylona, P. (2018).The conditions to reduce the "red" loans. https://www.cnn.gr/oikonomia/story/153514/p-mylonas-oi-proypotheseis-gia-na-meiothoyn-ta-kokkina-daneia [2018, November 5, access:2018, November 11]

Nkusu, M. (2011). Nonperforming Loans and Macro-financial Vulnerabilities in Advanced Economies. IMF Working Paper 11/161 (Washington: International Monetary Fund). https://www.imf.org/external/pubs/ft/wp/2011/wp11161.pdf

Ozili, P.K. (2019) "Non-performing loans and financial development: new evidence," The Journal of Risk Finance, Vol. 20 Issue: 1, pp.59-81, https://doi.org/10.1108/JRF-07-2017-0112

Radivojevic, N., & Jovovic, J. (2017). Examining of Determinant of Nonperforming Loans, Prague Economic Papers, 2017. Vol. 26(3), 300–316, https://doi.org/10.18267/j.pep.615

Raftopoulou K. (2015). Policy proposals for management of NPLs portfolios. Retrieved from https://eres.architexturez.net/system/files/eres2014_ind_108.content_0.pdf https://financedocbox.com/Credit_and_Debt_and_Loans/71702092-Policy-proposals-for-management-of-npls-portfolios

Saba, I. (2012). Determinants of Non Performing Loans: Case of US Banking Sector. Economic, 44(3), 81–121. http://www.rejournal.eu/article/determinants-non-performing-loans-case-us-banking-sector

Stournaras, I. (2018). Four Pillars to Address NPLs at NPL Summit 2018: Red Loans - Openings & Society. Retrieved from https://www.bankofgreece.gr/Pages/el/Bank/News/default.aspx

Williams, J. (2004). "Determining Management Behaviour in European Banking." Journal of Banking and Finance 28(10), 2427–2460. https://doi.org/10.1016/j.jbankfin.2003.09.010