Non-Performing Loans management in the European Banking sector

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SCHOOL OF ECONOMICS, BUSINESS ADMINISTRATION & LEGAL STUDIES
A thesis submitted for the degree of
Executive Master in Business Administration (E-MBA)

February 2019
Thessaloniki – Greece
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I hereby declare that the work submitted is mine and that where I have made use of another’s work, I have attributed the source(s) according to the Regulations set in the Student’s Handbook.

February 2019
Thessaloniki - Greece
Abstract

This study examines the methods applied for the NPLs management and their effectiveness in the European banking sector. In addition, we investigate the new accounting standard- IFRS 9- that its adoption has become mandatory since January 1st 2018 for all financial institutions, and its impact on the NPLs. From the assessment of the four systemic Greek banks, we find that IFRS 9 has a considerable impact on the loan loss provision and consequently their capital adequacy. It should be mentioned, that for some banks the effect of IFRS 9 on capital ratios was more significant and as a result they barely managed to reach the minimum requirements. Finally, through the analysis of KPIs for the four Greek systemic banks, we assess the effectiveness of NPLs management and the methods that have already been implemented.

Keywords: Non-Performing Loans, Non-Performing Exposures, Internal & External Management, IFRS 9, Impairment, Loan Loss Provisions, KPIs.

Chalkiadis Georgios
28.02.2019
As another educational journey has ended with the completion of this dissertation, I would like to express my gratitude to my supervisor Dr. Christos Grose for his continuous support and guidance in completing my dissertation. I would also like to acknowledge my friends and classmates Gkrimpizi Thomais and Protogerou Marina for their support, help and fruitful collaboration during the EMBA programme. Last but not least, I am really grateful to my friends and family for their understanding, encouragement and assistance throughout all this difficult period.
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## Abbreviations

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<tbody>
<tr>
<td>AMC</td>
<td>Asset Management Company</td>
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<tr>
<td>AQR</td>
<td>Asset Quality Review</td>
</tr>
<tr>
<td>BCBS</td>
<td>Basel Committee on Banking Supervision</td>
</tr>
<tr>
<td>BIS</td>
<td>Bank for International Settlements</td>
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<tr>
<td>CRD</td>
<td>Capital Requirements Directive</td>
</tr>
<tr>
<td>CRR</td>
<td>Capital Requirements Regulation</td>
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<tr>
<td>EAD</td>
<td>Exposure of Default</td>
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<tr>
<td>EBA</td>
<td>European Banking Authority</td>
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<td>ECB</td>
<td>European Central Bank</td>
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<tr>
<td>ECL</td>
<td>Expected Credit Loss</td>
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<tr>
<td>ELA</td>
<td>Emergency Liquidity Assistance</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>FVOCI</td>
<td>Fair Value Through Other Comprehensive Income</td>
</tr>
<tr>
<td>FVPL</td>
<td>Fair Value Through Profit or Loss</td>
</tr>
<tr>
<td>GFC</td>
<td>Global Financial Crisis</td>
</tr>
<tr>
<td>GMM</td>
<td>Generalized Method of Moments</td>
</tr>
<tr>
<td>IAS</td>
<td>International Accounting Principles</td>
</tr>
<tr>
<td>IASB</td>
<td>International Accounting Standards Board</td>
</tr>
<tr>
<td>IBNR</td>
<td>Incurred But Not Reported</td>
</tr>
<tr>
<td>IFRS</td>
<td>International Financial Reporting Standards</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicators</td>
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<tr>
<td>LGD</td>
<td>Loss Given Default</td>
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<td>LLP</td>
<td>Loan Loss Provisions</td>
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<tr>
<td>NPEs</td>
<td>Non-Performing Exposures</td>
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<tr>
<td>NPLs</td>
<td>Non-Performing Loans</td>
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<tr>
<td>PD</td>
<td>Probability of Default</td>
</tr>
<tr>
<td>POCI</td>
<td>Purchased or originated Credit - Impaired</td>
</tr>
<tr>
<td>SPV</td>
<td>Special Purpose Vehicle</td>
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<tr>
<td>SSM</td>
<td>Single Supervisory Mechanism</td>
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<tr>
<td>UtP</td>
<td>Unlikely to Pay</td>
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1. Introduction

The collapse of Lehman Brother’s and the global financial crisis that followed had a tremendous impact on the stability and health of the banking system. The GFC brought forward the weaknesses and risks that European banks were exposed. The supervisory authorities to protect the banking system, issued guidelines, policies and adjustments to existing regulatory frameworks in order to achieve a prudential framework, enhance supervision, resulting in more resilient banks. One of the major risks and problems that all financial institutions were facing and some still are, is the increased volume of non-performing loans, as a result of the excessive lending, risk taking and lack of adequate capital and liquidity buffers (Committee on the Global Financial System, 2018). Therefore, it is understandable that proper and effective management of non-performing exposures is a key element not only for a bank to overcome credit risk issues, but also to help it achieve sustainable development.

The 2007 crisis, despite any improvements in the supervisory framework, once again confirmed the importance of credit risk and the need to develop methods of managing and dealing with it. Securitization of assets and default risk swaps contributed to be globally spread, which led the weaker banking countries to a difficult position (Committee on the Global Financial System, 2018). When banks are burdened with a large number of problem loans in their balance sheet, the criteria for granting new loans are tightened which results in the occurrence of the credit crunch phenomenon. This phenomenon can have a negative impact on the economy by decreasing (suffocating) economic growth as no capital is channeled into the private sector (companies), affecting a company’s liquidity which will consequently lead to bankruptcy (ECB, 2017, Lamandini et al., 2017).

The supervisory authorities taking into account the importance of proper and timely identification and management of NPEs, issued guidelines to tackle this problem. Anastasiou (2016), distinguishes the methods to manage NPLs in two major categories; the ex-post and ex-ante methods. In the ex-ante methods, he presents the prudential policies and regulations set by the Supervisory Authorities and underlines the
importance of more stringent supervision. In the ex-post methods, the most commonly used method, is the transfer of NPLs on an Asset Management Company (AMC). Taking into account the extent of state intervention the methods that can be found are the purchasing of a bank’s NPLs by a government agency, the purchasing of troubled assets with bonds guaranteed by the government and the State Owned Banks (SOB), a mechanism were the government could take over for a while the management of problematic banks. The best solutions for proper NPL management is the combination of state intervention through public funds (bailout scheme) and sale of troubled assets to AMC (Balgova et al., 2017).

The focus of this study is first to determine the effect of NPLs not only in the banking sector but also in a country’s economy. In addition, we examine the importance in implementing the right method to reduce these exposures. The adoption of common reporting standards and guidelines for the proper management of NPEs by supervisory authorities aims to harmonise practices among member states and thus succeed in the operational goal of mitigating this risk. Finally, we investigate the NPLs management in the four systemic Greek banks and try to assess the result in implementing these common practices.

The study is structured as follows. In the first chapter is discussed the empirical research that has been conducted in the existent literature. In the second chapter, there is a brief presentation of the definitions and classifications of NPEs according to EBA’s guidelines. Additionally there is a discussion on the determinants affecting NPEs formation. In the third chapter, the methods of NPEs management, either internally or externally are discussed. In the fourth chapter, the new accounting standard (IFRS 9) is analysed as well as its impact on a bank’s loan loss provisions and capital adequacy. The following chapter, the methodology of this study is outlined while in the sixth chapter the results of the study are discussed. Finally, in the last chapter the conclusions of this study are presented.
2. Literature Review

In this section, we present the empirical literature that has been published in the last decade. During our research, we have found papers that approach the problem of NPLs from various angles and perspectives. Non-performing loans is a subject frequently studied and investigated in the academic world and as a result we can find extensive international literature. Based on the scope that these papers examine the NPLs, we have sorted these into two major categories. The first one (and the most frequent) is the examination of NPLs’ determinants, while the second one refers to the effects of NPLs.

2.1 Determinants of NPLs

The determinants used in international literature to measure the quality of loan portfolios are numerous and can be further sorted into two major categories. The first consists of macroeconomic factors, including all indicators reflecting the macroeconomic and regulatory environment in which financial institutions operate. The second category consists of accounting and microeconomic factors, i.e. figures derived from the banks’ financial statements. One of the most widespread ways of measuring the quality of the loan portfolio is the ratio of NPLs. The weaknesses of the banking system appear to be limited not only to the deterioration of the bank’s loan portfolio, but capital adequacy ratios, liquidity and off-balance sheet items appear to have a significant impact on banking crises and pose a threat to overall financial stability.

Klein (2013), examines the determinants of NPLs in Central, Eastern and South-Eastern Europe (CESEE) for the years 1998-2011. His findings show that there is a positive relationship between NPLs and a country’s key macroeconomic indicators. Specifically, an increase in unemployment and inflation will cause an increase in NPLs. Apart from country specific factors affecting NPLs, his research shows that there are also bank specific factors. An increase in a bank’s profitability will lead to a decrease in NPLs while an increase in risk taking will cause an increase in NPLs. Overall, his paper confirms the assumption that sustainable growth and banking system are strongly and
positively correlated. Similarly with Klein, Jakubík and Reininger (2014), investigate the determinants of NPLs in CESEE. It should be mentioned that they differentiate from Klein’s aforementioned research paper, by including in their model only macroeconomic variables and none of the bank specific variables that Klein uses. They use quarterly data for 9 CESEE countries and they apply GMM in order to eliminate possible correlation problems between the independent variables and the error term of their model. The key finding of their research is that economic growth plays a pivotal role in the NPL development. In addition, their research shows that stock index also affect NPLs as it is key indicator of economic development.

Beck et al. (2013), estimate the macroeconomic factors that influence NPLs ratios for 75 countries covering the period 2003 – 2013. Their findings show that there is a strong relationship between NPLs and economic growth, represented in their paper by the real GDP growth. Furthermore, countries with high volume of lending in foreign currency and the exchange rate depreciations that face, will affect negatively NPLs. Finally, the find that NPLs increase as the stock prices drop. Later in 2015, Beck et al. by applying dynamic panel estimation methods, come to the same conclusions as in 2013. Another interesting approach of macroeconomic factors and NPLs is that of Irina and Angela (2016). Their research in 11 CESEE countries, indicates that the most important macroeconomic factors affecting a country’s NPLs are the public debt, the GDP growth and the unemployment rate. Their empirical results are strongly correlated with the existing literature and confirm the notion that the economic growth of a country plays a pivotal role in the health and soundness of its banking sector. The relationship between real GDP growth and the NPL ratios is investigated by Mohaddes, Raissi and Weber (2017). They incorporate a dynamic panel-threshold model for a sample of Italian banks in 17 regions for the years 1997-2014, and they find that by achieving a real GDP growth by 1.2% and above for a number of years, will have a significant impact in the reduction of the NPL ratios. Cerulli et al. (2017), identify GDP growth, high interest rates and efficiency in the judicial system as the three major macroeconomic determinants of NPLs. High interest rates have an adverse effect on the ability for an individual to pay back the debt which consequently
leads to an increase of NPLs. Finally, it is understandable that lengthy judicial procedures can cause a significant increase to an NPL.

There are a lot of academic papers that incorporate in their research a combination of bank specific and macroeconomic variables to ascertain the impact on NPLs. Louzis et al. (2012), apply dynamic panel data methods to identify factors affecting NPLs in Greek banks. They differentiate from other similar studies by analyzing the impact on consumer loans, mortgages and corporate loans. Regarding the macroeconomic variables, their results show that for all the aforementioned loan categories, these variables play an important role. For corporate loans the most significant macroeconomic factor is the real GDP growth rate while for consumer loans is the interest rates. For mortgages the impact of macroeconomic factors is moderate. Another important finding is the importance of the adoption by the banks of proper risk management methods and regulations.

Cucinelli (2015), examines not only the relationship of credit risk and a bank’s lending behaviour but also the difference of the implemented credit policy between commercial and cooperative banks. She analyses data from 488 listed and unlisted Italian banks for the period 2007-2013 and incorporates both macroeconomic and bank specific variables. Her research shows that a bank’s lending behaviour is strongly correlated with the credit risk of previous years. An increase of credit risk (i.e. increase in NPLs) will reduce the risk tolerance of the bank. Finally, she finds that there is not any indication of different behaviour between commercial and cooperative banks during the financial crisis. In another study of hers in collaboration with Gai, Ielasi and Patarnello (2016), investigate the determinants of the Unlikely-to-Pay (UtP) and the effect on performing and non-performing loans. Based on the definitions issued by European Banking Authority (EBA), UtP is a criterion for a loan or exposure to be recognized as non-performing. Studying this criterion (UtP) is important as it is considered to be a future challenge for the banking system due to the fact that the transition from UtP to performing is a key element in the bank’s endeavor to reduce NPLs. They select data (bank specific and macroeconomic) from 73 Italian banks and for the period of 2010 – 2016 in order to cover the European debt crisis. By applying
dynamic GMM their results show that sound and proper UtP management is an important factor to reduce the UtP ratio and consequently for these loans to be able to transition to performing loans.

Anastasiou, Louri and Tsionas (2016), in their study not only investigate the factors affecting European banks’ NPLs but also try to discern the effect of NPLs factors in core (e.g. Germany, France) and periphery (e.g. Italy, Greece, Portugal) countries. By applying advanced econometric methods such as Fully Modified OLS and Panel Cointegrated VAR, they find that the factors affecting NPLs differ among European countries and specifically in the core and periphery countries of the euro area. For example, they find that quality of management (assessed in their research with the ratio of ROA and ROE), and moral hazard (in their research is examined with the loan to deposits ratio) affect significantly NPLs of both core and periphery euro area countries while size of a financial institution (examined in their paper with the logarithm of total assets) affects more the periphery. Finally, the periphery is affected more by interest rate margins and fiscal consolidation while the core countries are affected more by credit to GDP. In another paper of theirs (2016), by applying GMM estimations in a panel dataset of 15 European countries concerning the period of 1990 – 2015 (quarterly data), they determine the factors affecting NPLs. From the country specific variables, unemployment and growth (as a percentage of GDP), affect strongly the increase of NPLs. The same can be said for the tax on personal income and the output gap (variables used for the first time in their study). Finally, regarding bank specific determinants of NPLs, significant impact have the risk preferences and management skills.

The significance of regulatory and risk management methods in reducing NPLs examine Erdinç and Gurov (2016). In a panel dataset of banks from Eurozone and emerging European countries concerning the period 2000-2011, they apply GMM estimation methods in order to investigate the compliance of the Basel Accord, Internal Ratings Based approach. Their research indicates that the application of the IRB according to the Basel Accord directives had a significant impact in the reduction of NPLs. In addition, the authors state that the Eurozone countries adopted more the IRB
approach than the emerging European countries and therefore the increase of the NPLs level was considerable.

The effect of a country’s fiscal policy on its NPLs investigates Siakoulis (2017). By applying panel data statistical methods to a sample of 31 countries for a period of 15 years, he shows that the austerity measures a government imposes will have a negative impact on the NPLs as it will make it more difficult for individuals to pay back their loans (household and business loans). His findings show that the decline of a bank’s asset quality can be explained by fiscal and macroeconomic factors.

The relationship between NPLs and corporate governance research Tachouna et al. (2017). They apply GMM dynamic panel data method and principal component analysis in order to study the effect of corporate governance to the NPLs of 184 US commercial banks during the period 2000 – 2013 (before and after the global financial crisis). Their study shows that small banks apply corporate governance that has a positive impact on the reduction of NPLs, while medium and large banks face the opposite problem. This is due to the fact that these banks take more risks in their lending policies.

Sztojanov and Guica (2017), investigate the role that foreign currency loans played in the financial crisis and the NPLs in Central and Eastern Europe (CEE) based on the bank ownership. Their results show that the level of NPLs in state owned banks was more heightened than in private owned banks. Another approach of NPLs and bank ownership is that of Us (2018) who estimates the factors affecting NPLs in Turkish banks before and after the global financial crisis. He illustrates that macroeconomic and policy related factors have a major impact on NPLs in a post crisis period with the fiscal policy to be the most important NPL determinant. Taking into account the way that the Turkish economy operates, the above results are completely understandable. For the bank specific variables, Us states that the significance of these variables depends on the ownership of the bank.
2.2 Effect of NPLs

Accornero et al. (2017) study the effect of non-performing loans on a bank’s credit supply to non-financial Italians firms concerning the period 2008 – 2015. The dataset that they use is unique as it combines not only data from the Italian banks but also data from 2.5 million borrowers (derived from the Italian Credit Register). Their research shows that there is a negative relationship between NPLs and bank credit supply. From the bank specific variables perspective, changes in capital ratios affect credit supply. Finally, the authors advise that forced liquidation of NPLs may have adverse consequences to banks in case of losses because it will force the banks to reduce their capital ratios.

Another interesting perspective in the existing academic literature is the impact of the NPLs on a bank’s profitability. Louzis and Vouldis (2015), examine the drivers of profitability in Greek banks by implementing dynamic panel data methods in a sample of all Greek commercial banks for the years 2004 – 2011. Their findings indicate that there is a substitute relationship between interest and non-interest income with the non-interest income to be adopted by efficient banks as a mean to increase revenues rather than start an “interest war” with the competition. Finally, Bhaarathi (2018) investigates 93 Indian banks regarding the relationship of asset quality and profitability. His results shows that there is a negative correlation between NPLs and profitability. An increase in NPLs will cause in a decrease of asset quality which will also cause a decrease in ROE and ROA (measures of profitability).

The research papers in the international and domestic literature dealing with the problem of NPLs are quite numerous. In fact, it is one of the most frequently discussed issues in the world in the last decade. Almost all of the papers we presented, examine the causal relationship between macroeconomic and bank specific figures with NPLs. There are also many other papers dealing with this particular issue, but they are very much covered by the ones mentioned above.
3. Non – Performing Loans (NPLs) – An overview

This chapter will introduce basic terms and concept regarding NPLs, the determinants that affect these loans and the impact not only on a bank’s performance but also to the economy. Finally, there is going to be a brief presentation of the above mentioned problem of troubled assets (NPLs) in the European Union (EU).

3.1 Definition and classification of NPLs

One of the main tasks of a bank is to provide loans to companies which will help them expand by investing these funds and consequently create jobs. From these transactions, a bank makes money by charging an interest. The GFC has led a lot of individuals (companies and households) to financial difficulties which affected their ability to keep up with their loan agreements. It should be mentioned that non-repayment of debt obligations has detrimental effect on a bank’s balance sheet, asset (loan portfolio) quality and profitability. When a debtor stops paying back the loan, after a specific time period set by supervisory authorities, the loan will be characterized as non-performing.

As non-performing, it was widely used to classify a loan that had past due which exceeded the 90 days criterion while a loan with less than 90 days past due, was considered to be a performing loan without any impact on a bank’s reporting. However, this rule was not adopted by all governments and their Central Banks. Taking into account the need to overcome the definition of NPLs problem and as a result to adopt common reporting standards at EU level, the European Banking Authority (EBA), issued in July 2014 the “EBA FINAL draft Implementing Technical Standards on Supervisory reporting on forbearance and non-performing exposures under article 99(4) of Regulation (EU) No 575/2013”. The adoption of these guidelines and reporting standards by financial institutions was strongly encouraged by supervisory authorities as it was used in exercises such as Asset Quality Review (AQR), Stress Test etc.
According to EBA, Non-Performing Exposures (NPEs) are the exposures that satisfy one or all of the following criteria:

- Exposures that have over 90 days past due.
- There is an assessment of the borrower being unable to repay its credit obligations (Unlikely-to-Pay criterion, UtP). For this criterion there is not any consideration of days past due and collaterals are not realised.
- Exposures are either impaired or defaulted.

It should be mentioned that NPLs are included in the above mentioned term as NPEs refer to all credit exposures such as loans, debt securities as well as loan commitments. However, the terms NPLs and NPEs are used interchangeably. Another important aspect of the NPE definition is the “pulling effect” where all the exposures of one borrower are considered to be non-performing, even if 20% and more of its exposures have past due greater than 90 days.

Furthermore, EBA provides guidelines regarding forbearance measures that financial institutions can implement and especially in the viability assessment of these practices. Before implementing any forbearance measures, banks are obliged to conduct thorough affordability assessments. These measures are strongly correlated not only with the financial situation of a debtor but also with the market conditions that may likely affect its ability to pay back the debt. In a way they are adjustments to the covenants (terms) of a loan agreement with the sole purpose of helping a borrower that is facing financial difficulties to repay its debt. The aim of forbearance measures is to help debtors either to avert entrance of a performing exposure to non-performing status or to exit the non-performing status.

A forborne exposure can classified as performing or as non-performing. A forborne exposure is considered to be performing when there are not any past due more than 90 days (after the implementation of restructuring measures), the past due amounts or written-off prior the restructuring have been paid and there are not any other non-performing exposures. Following the implementation of forbearance measures, the exposure will be monitored for one year in order to determine the viability of the
restructuring and repayment of the debt. During this year, which is called “cure period”, the exposure will be classified as “non-performing forborne”. After the expiration of the “cure period”, the exposure will be monitored for at least two more years and will classified as “performing forborne”. At the end of the probation period, the exposure will be classified as “performing” (only if there is not any kind of deterioration of the borrower e.g. no past due).

3.2 Determinants

In the previous chapter, we presented the determinants of the NPLs, through various empirical studies (Louzis et al., 2011, Beck et al., 2013, EBA, 2016a and many others). All these studies have identified macroeconomic and microeconomic (bank-specific) variables that affect the NPLs of a country. Each country is affected differently by its amount of NPLs. In theory, a developed country has the infrastructure and institutional framework to cope with the lesser shocks and more effectively the increase of the NPLs. To sum it up we can identify the following determinants.

Regarding the macroeconomic factors, we have:

- **The growth rate of an economy**, has a negative correlation with the NPLs, since in times of recession, financial institutions apply stringent criteria to grant a loan due to the increase numbers of impaired loans.

- **Real estate prices**, are negatively correlated with the NPLs as a decrease to RE prices, due to a decrease in demand and an increase in supply, will result in an increase of NPLs. As a result, loans and exposures with real estate as collateral will be affected.

- **Interest rates**, which increase when borrowers have difficulty in repaying their obligations (late fees), and consequently causes an increase to the NPLs due to the increased interest payments. Another example is the case of floating rate loans (Louzis et al., 2012).

- **The unemployment rate** has a positive correlation with the NPLs as an increase in unemployment, leads to a decrease of a borrower’s income, which affects its ability to repay the debt. Changes in unemployment is considered a good indicator of the recession (Charalambakis et al., 2017).
• *Inflation,* affects NPLs in a positive way as an increase of inflation will lead to a decrease of the real income of a debtor which will consequently affect the repayment of its debtor (Beck et al., 2013 & Klein, 2013)

Regarding the bank specific, we can identify as significant determinants of NPLs, the risk management practices of a bank, the corporate governance, and management quality of a financial institution, the risk appetite of a bank (lending behavior), capital ratios and loan loss provisions. The reasons and the rationale behind these choices have been explained in the literature review chapter.
4. Management of Non-Performing Loans

In this section, we are going to discuss methods that have already been applied or going to be applied, in order to mitigate the risk that NPLs impose in the financial stability of Europe and the world in general. We begin with a brief presentation of the methods that were proposed by SSM through the guidelines that issued in early 2017 and already banks use for managing this problem internally. Afterwards, we move to the methods applied when management of NPLs is performed externally by implementing different approaches.

The selection of internal or external NPLs management methods depends on a number of factors such as the extent of the problem, the country and its legislation, the size of the financial institution, its strategic goals etc. Scardovi (2016), recommends as a selection criterion the comparison of the NPL’s portfolio Net Present Value (NPV) with its liquidation-market and fair value. The calculation of the NPV is derived from the future expected cash flows, excluding direct (e.g. legal and court fees) and indirect costs (e.g. employees salary) and discounted at a rate that considers credit risk, recovery period and market volatility. When the fair value of the NPL portfolio is greater than the NPV, then the bank should incorporate internal management methods. If the fair value is greater than the NPV and the liquidation value is smaller than the NPV, then it is prudent for the bank, apart from managing internally the NPLs, to consider also the external management methods such as the direct sale of the NPL portfolio to a third party. Finally, in the case of the liquidation value being greater than the NPV, the bank should only consider the external management methods.

4.1 Internal management of NPLs

The implementation of an internal management approach requires the existence of highly specialized and knowledgeable personnel, an NPL Workout Unit. This Workout Unit must not be the same as the unit responsible for granting the loan, in order to avoid any conflict of interest. We can identify the following methods in the internal management approach; forbearance measures, legal processes and foreclosure/liquidation.
4.1.1 Forbearance Measures

Forbearance measures, as it was explained in the previous chapter, are in a way adjustments to the covenants (terms) of a loan agreement with the sole purpose of helping a borrower that is facing financial difficulties to repay its debt. The implementation of forbearance measures should aim to the repayment of a debt which will consequently contribute to the sustainability of a borrower and not to postpone the recognition of the exposure as impaired or defaulted so that a bank can manipulate its financial reports. In order to ascertain the best possible solution for both borrower and bank, the bank compares the Net Present Value (NPV) of the proposed restructuring plan (i.e. future cash flows that will be paid during the repayment period of the restructuring plan) with the NPV of the liquidation process (foreclosure and auction of collaterals). However, an important aspect that banks should examine, apart from the above-mentioned NPV comparison, is the future impact on the borrower’s growth and sustainability that will further affect the economy. The restructuring solutions that banks provide can be categorised, based on the time horizon, into short and long-term measures (ECB, 2017, Basel Committee, 2016).

Short-term restructuring solutions are measures applied to help borrowers that face temporary difficulties in keeping up with the debt repayment plan. It should be noted that these solutions have a strict time constrain of two years maximum application. An example of this kind forbearance measures is the granting of a grace period where the borrower has the chance not to make any kind of payment (either principal or interest or both) for a specific time period, usually up to one year (rarely up to two years). Another short-term solution is the payment of interest only or the reduction of the of the payment instalment. Table 1 has more examples of short-term measures.
In the case of long-term measures, the bank can provide the borrower with more permanent solutions in repaying the debt. Reduction of the interest rate is one of the most commonly used solutions as well as the acquisition of additional collateral (usually real estate collaterals as these have higher value). Another measure is the reduction of the debt by voluntary sell of a borrower’s asset/property (sometimes a property used by the bank as collateral) or/and the write-off of a part of the debt. If these two are combined, a bank can write-off part of the debt that cannot claim in the future due to lack of additional collateral. Therefore, there will remain part of the debt that is viable and can be repaid in the future. Finally, it is worth noting that all the aforementioned plans can be applied separately or in tandem depending on the borrower while in a long-term plan there is also the capability of implementing short-term solutions (long-term plans can be used in tandem with short-term ones).

The key element and prerequisite in the consideration of applying forbearance measures, is the viability of the restructuring plan. To simplify, it should answer the following question; will this plan lead to a reduction in the borrower’s debt?

### 4.1.2 Recovery - Foreclosure - Liquidation

In this stage, there are cases of NPLs that the assessment for viable forbearance measures was negative i.e. the examination of a borrower’s capability to repay the debt through a viable restructuring plan. The bank will start the legal process that will lead to the repayment of the debt or part of it based on the collaterals’ value (secured or non-secured loans). Before proceeding with the foreclosure and auction of a
collateral, the bank can accept the voluntary sale of a borrower’s property (even if it is used as a collateral of a loan), to repay the total or part of the loan. Similar solution with the above is the voluntary surrender of an asset. Another method that the bank’s workout unit can apply is the seizure of receivables such as rent from a property or other claims that the borrower has from third parties. Finally, the bank could examine the possibility of full debt write-off under specific circumstances. Table 2 has more examples of foreclosure and liquidation measures.

<table>
<thead>
<tr>
<th>Resolution and Closure Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Out-of-Court Settlements</td>
</tr>
<tr>
<td>Voluntary Surrender</td>
</tr>
<tr>
<td>Mortgage to Rent/Lease</td>
</tr>
<tr>
<td>Voluntary Sale of Property</td>
</tr>
<tr>
<td>Settlement of Loans</td>
</tr>
<tr>
<td>Loan Sale</td>
</tr>
<tr>
<td>Auction-Collateral Repossession</td>
</tr>
<tr>
<td>Auction-Collateral Liquidation</td>
</tr>
<tr>
<td>Closure via Bankruptcy Process</td>
</tr>
<tr>
<td>Full Debt Write-off</td>
</tr>
</tbody>
</table>

Source: ECB, Bank of Greece

4.1.3 Debt-to-Asset/Equity Swap

Debt-to-Equity/Asset Swap is a method used to exchange a borrower’s debt or part of it, with a borrower’s equity or assets. As a result the debt will either be eliminated or reduced to more manageable levels and the borrower (especially in the case of a company) will be able to continue to operate. In the case of debt-to-asset swap, we can observe that it is similar with the voluntary sale of a borrower’s property (asset) to a third party with the difference the third party is the bank. This method can be used in both the aforementioned stages, as a restructuring measure or as recovery solution. Finally, the bank should exercise great caution in adopting this solution and there has to be careful consideration and examination of all available data in order to avoid acquiring an asset that will not allow the bank to extract the asset’s accurate value in the appropriate time horizon (ECB, 2017).
4.2 External management of NPLs

In the external NPLs management methods, the bank applies solutions that affect instantly its balance sheet as the NPLs are removed from it. The most commonly used methods for managing externally the NPLs are the joint ventures, the direct sales, asset management companies and securitization.

4.2.1 Joint Venture (JV)

By entering in a joint venture arrangement, the bank can co-operate with a third party to manage the NPLs. The third party can contribute in this arrangement with cash, experienced personnel, know-how and competencies. As a result, the risk of the NPLs portfolio will be shared as well as the gains from managing such portfolios (Campos et al. 2018). This method is the exception of the off-balance aspect as the bank keeps the NPLs on its balance sheet even though it transfers its NPLs to an SPV – Special Purpose Vehicle. An example of such a joint venture arrangement is the case of the platform Pillarstone of the KKR investment firm and two Greek banks (Alpha Bank and Eurobank) in 2016. Another example of JV is the Project Solar which is an agreement between the 4 Greek systemic Banks and doBank S.p.A. for the management of €1.8bn SME NPE common borrowers (Piraeus Bank, corporate announcement).

4.2.2 Direct Sale

In this case, the bank sells directly a portfolio of NPLs to a third party (e.g. investment firms and hedge funds) directly or through an SPV. The major benefit for the bank is the immediate removal from its balance sheet. In addition, it is a method that does not require a lot of effort from the side of the bank and it is quick. However, the bank will report a one-off loss as a result of the difference between the price that the NPLs were sold and their book value (ECB, 2017, Campos et al. 2018). An example of direct sale is the case of Piraeus Bank SA and project Amoeba, the sale of a corporate loans portfolio total amount of €1,950mn of legal claims (€1,450mn gross book value) with Bain Capital Credit LP (Piraeus Bank, corporate announcement).
4.2.3 Asset Management Company (AMC)

An AMC is a company that acquires a bank’s (or sometimes more than one bank) NPLs with the sole purpose to reduce or even eliminate them in the future (usually in a long time horizon). This company, depending on the ownership structure, it can be classified as Government/ State- backed when the State sponsors it or private if it is sponsored by individuals such as other banks (sometimes the bank that the NPLs are originated) and private funds. The main benefit of this method is the clean-up of a bank’s balance sheet as its NPLs are transferred to the AMC (Lehmann, 2017 and Lehmann, 2018). Therefore, the uncertainty of the bank’s asset quality is reduced which will further affect positively its capital requirements. Another benefit of an AMC, is that by gathering NPLs of the same class (e.g. mortgage loans or commercial loans secured with real estate properties), the AMC can achieve greater recovery rate as it will be able to incorporate economies of scale. In addition, there will not be any kind of high demand from shareholders to reduce the NPLs contrary to the banks that hold the NPLs. As a result, the AMC will have at its disposal more time to reduce the NPLs and consequently, it will be able to sell the assets used as collaterals at more favourable prices and avoid fire sales (Financial Stability, 2nd progress report, 2018).

However, an AMC (and especially in State sponsored ones) to succeed in the maximization of its NPLs value, should have suitable valuation methods and competent corporate governance. Regarding corporate governance, it is worth mentioned that there should not be any kind of conflict and meddling from political figures or parties. Another factor impeding the success of an AMC is the type of exposures that the company acquires. It has been shown that an AMC manages to succeed in its objective of maximizing NPLs value when the exposures are backed with real estate assets like mortgage loans or development loans. This is due to the fact that prices of real estate depend on the market conditions of an economy. Finally, the establishment of an AMC costs a lot of money and requires significant investment in developing appropriate infrastructure in IT systems, procedures and human resources. Examples of state-owned AMCs in Europe, is the case of Ireland with NAMA in 2010 and the case of Spain with SAREB in 2012 (Campos et al. 2018).
4.2.4 Securitization

Securitization is a method used to transform a combination of assets pooled together with their expected cash flows, into interest bearing securities to be traded in the market or sometimes to be used as collateral for financing from Central Banks. These assets if are secured, their collaterals follow the securities (Asset-Backed Securities). In the case of NPLs securitization, the bank transfers the non-performing assets to a third party usually an SPV, which issues interest bearing securities. These securities (debt instruments) are then traded in the market in different tranches. The SPV will assign a servicer – usually a third party but sometimes the originator (seller) of the assets (i.e. the bank) – to manage the NPLs and collect the expected cash flows. The cash flows that the NPLs will generate are paid to the SPV, which will then use these funds to pay interest and principal to the investors of the debt securities (Caselli et al. 2017, Fell et al. 2017). The two important factors that affect the success of a NPLs securitization is the quality of the assets to be transferred to the SPV (as high quality of assets will be easier to predict expected cash flows) and the ability of the servicer (high competency of the servicer will lead to an increase of cash flows).

Due to the fact that NPLs are transferred to the SPV, the bank’s balance sheet will be cleaned of any NPLs and consequently its credit risk will be reduced significantly. However, the complexity of the method in combination with the high-imposed regulatory charges, makes it more difficult for European banks to implement it. This method has been applied in Italy, which issued senior tranche notes backed by the government’s guarantee (Popolare di Bari, Carige and Creval with total volume of €3 billions). An alternative to a state guarantee is the incorporation of private insurance. This will help the SPV to sell the securities at a lower price as the risk will be reduced due to the insurance (Campos et al. 2018).
5. IFRS 9 and the impact on NPLs

In this section, there is going to be a brief presentation of the new financial standard (IFRS 9), that its implementation has become mandatory in Europe, and to be more precise in its impact on NPLs.

5.1 The new accounting standard

As a consequence of the global financial crisis, the G20, in collaboration with the International Accounting Standards Board (IASB), issued new guidelines for the classification and measurement of financial instruments. IFRS 9 "Financial Instruments" refers to the classification, measurement, impairment and hedge accounting of financial assets and liabilities. It replaced IAS 39 "Financial Instruments: Recognition and Measurement", and its implementation is mandatory from January 1st 2018. The transition to the new standard has an impact on the readjustment on banks’ financial reporting and a drastic increase in provisions, eventually leading to a reduction in capital ratios (requirements). The model addresses a key issue of the financial crisis, ex post recognition of losses and introduces a forward model of expected credit losses (3-stages impairment depending on the credit deterioration of loans portfolios).

One of the most important aspect of this standard is the new approach for the calculation of the impairment allowances, the Expected Credit Loss (ECL), which replaced the incurred loss approach of the previous standards, IAS 39. The failure in many financial institutions to recognise credit losses derived from financial instruments and to report them in a timely manner was perhaps the most important reason for the increased capital requirements during the GFC. IAS 39 approach was heavily criticized for the delayed recognition of credit losses. It prescribed the ex post recognition of credit losses, while the "loss event" and its "reliably measurable impact" were subject to many interpretations and, therefore, ambiguity. The model thus proved "too little, too late" (Picker et al., 2016). This negative aspect of the IAS 39 attempts to correct the ECL method of IFRS 9. The ECL approach is a method that
incorporates a forward calculation of loss allowances for loan portfolios, by taking into account criteria based on various economic and risks variables. It provides a probability-weighted result that reflects the time value of money and the best possible information available at the reporting date (past events, current conditions, reasonable and supportive information).

Empirical studies such as Gebhardt and Novotny-Farkas (2011), Oosterbosch (2010) and Ozili (2017) reinforce the argument that the stricter rules in accounting for loan loss provisions and the adoption of IAS 39 have contributed significantly to reducing procyclicality. Leventis et al. (2011), analyse data from 91 European banks in order to show that the adoption of IFRS has curtailed the opportunistic behavior of banks’ managers and has significantly reduced earnings manipulation through the LLPs. Onali and Ginesti (2014) point out to a broadly positive response of investors to the accounting reform of the financial instruments evaluation model. According to their findings, investors seem convinced that IFRS 9 adequately addresses the problems that had arisen from IAS 39. In addition, they consider beneficial the existence of common, internationally accepted accounting principles and standards that contribute to uniformity, comparability and reliability.

Under the new accounting practice (IFRS 9), all exposures are considered as a source of future credit risk (Gebhardt, Novotny-Farkas 2011), which is accounted for from the first day of their recognition. There is a strong correlation between the probability of default and macroeconomic factors such as growth rates, inflation, interest rates, unemployment, various market indicators and the overall economic situation and institutional framework of a country. The assessment of loan impairment is made with criteria that are more stringent and studies has shown that will increase loan loss provisions (Plata et al., 2017; Ntaikou, Vousinas, 2018).

**5.2 Impairment**

Financial institutions are required to calculate expected loan losses due to defaults at each reporting date (publication date of their financial statements). Estimates of loan losses indicate potential credit risk. Impairment losses - which are calculated based on
accounting rules and information - decrease the value of the financial instrument for which they are formed and are recognized in the income statement as an expense (Gebhardt, Novotny-Farkas, 2011). IFRS 9 addresses a key issue of the financial crisis, the late recognition of credit losses. A new three-stage evaluation process is introduced; Expected Credit Loss (ECL) model. The calculation of ECL, is a probability-weighted result that takes into account the time value of money and all the best possible information available at the reporting date (past events, current conditions and other information that will help in the future risk inference). The new impairment approach is applicable to financial assets measured at amortised cost, financial assets measured at FVOCI, loan commitments and financial guarantee contracts not measured at FVPL and lease receivables (Picker et al., 2016).

5.2.1 Three - stage evaluation
Contrary to the approach in IAS 39, the new model calculates impairment allowances for a bank’s loan portfolio before an actual loss event becomes real. Impairment of a financial instrument is defined as the expected loss in contractual cash flows over its residual life and is evaluated in three (3) stages. As a transition criterion from one stage to the next is the indication of a significant change in credit risk from the date of the initial recognition of the instrument. Therefore, the initial estimate of expected future losses is redefined at each reporting date and reflects changes in the credit quality of a financial asset.

Stage 1
It refers to financial instruments that credit risk have not changed since inception date or low credit risk without significant deterioration at the reporting date. Expected credit losses are calculated from the first day, taking into account the default probability for the next 12 months since the reporting date, while interest income is calculated at the gross carrying amount of the asset.
**Stage 2**

In this stage, we find non-impaired financial instruments with a significant deterioration in their credit risk since the date of initial recognition, but no valid evidence of default and inability to pay back the loan. This category contains non-defaulted exposures (performing portfolio), performing exposures with more than 30 days past due, exposures with early warning signs and forborne exposures. The impairment approach is based on all potential default events that may occur not only in the next 12 months, but also over the expected life of the asset (lifetime ECL) and interest income arises from the gross carrying amount.

**Stage 3**

In this stage, we have objective evidence of impairment of the financial instrument at the reporting date and the asset has been categorized as non-performing. Indicatively, we have cases of exposures with more than 90 days of past due, forborne exposures with past due, Unlikely-to-Pay, non-performing exposures, default cases, debt securities with an external credit rating that corresponds to bankruptcy, and financial assets acquired, with a large discount due to being already credit-impaired (Purchased or Originated Credit Impaired - POCI). Stage 3 exposures are determined according to the default definition of the Capital Requirements Regulation (CRR 575/2013). According to the article 178 of CRR, a borrower is in “default” if the institution considers that the obligor is unlikely to pay its credit obligations to the institution (Utp criterion) and/or the obligor is past due more than 90 days on any material credit obligation to the institution (delay criterion). Impairment is assessed in the same manner as in stage 2 (Lifetime ECL). Interest revenue is now based on the net carrying amount of the instrument.

Financial instruments, which fall under the above-mentioned stages 1 and 2, are usually assessed on a collective basis. In IAS 39 it was the performing portfolio and the calculation of impairment was not significantly affected by credit risk parameters and models. In particular, there was no provisioning or formation of collective provision in cases of imminent exposure. Even if the credit risk was significant, it was taken into
account only when it affected the asset, as it is calculated in IFRS 9 Stage 3 (Incurred But Not Reported - IBNR).

Forborne exposures of Stage 3, remain in this stage for at least 3 years. If at the end of the three years there was not any delay in payments and there are no signs of deterioration in credit risk and no indication of default, then the asset can be transferred to stage two where it should remain for at least a year. Under the above-mentioned conditions, the asset can then move to Stage 1 and be assessed as performing loans based on default probabilities within the next twelve months. It is reasonable that viable forbearance measures can lead to sustainable repayment and thus a gradual reduction of impairment provisions (Plata et al., 2017). To sum it up, it is evident that the transition of an instrument from Stage 1 to Stage 2 can cause a significant increase in the provision for impairment, which will have an impact of the profit or loss of an institution and thus its capital. Figure 1 presents the main features of the 3 stages approach of the new standard.

![Figure 1 Expected Credit Loss](source: PwC 2014)

5.2.2 Measurement of expected credit losses

The Expected Credit Losses (ECLs) of a financial instrument over a reporting period reflect the weighted average probability of loss that may arise from default events
during its residual life. Credit loss is defined as the difference between the remaining contractual cash flows to be received and the expected cash flows discounted to the reporting date. Therefore, ECLs essentially represent the present value of all expected cash flows. The life of a financial instrument is defined as the duration of its maximum contractual and initial life, without taking into account any renewals or extensions that may occur in the future. Revolving credits, which are evaluated over a longer period (overdraft accounts, credit cards), are excluded.

ECL can be calculated with the following mathematical formula (Ernst & Young, 2018):

$$ECL_T = \sum_{t=0}^{r} \frac{PD_t \times LGD_t \times EAD_t}{(1+r)^t}$$

where $r$ is the effective interest rate at initial recognition and $t$ is the time horizon of the assessment.

**Probability of Default (LGD)**

Expresses the likelihood that the borrower will default. In stage 1, the probability of default refers to possible events that will take place within the next 12 months, while in stage 2 it covers the entire life of the financial instrument. In stage 3, the default is now a fact and the PD is equal to 1 or 100%.

**Loss Given a Default (LGD)**

LGD shows the percentage of failure to recover the value of a financial instrument, taking into account any collateral and planned payments (calculated as 1 minus the recovery rate considering collateral and collection action). The LGD is affected, specifically, by the estimated value of the instrument at that time, the type, value and time required to realize on the collateral (liquidation and foreclosure procedures), as well as whether or not a contractual repayment plan is maintained.
Exposure At Default (EAD)

The book value of the financial instrument (credit exposure) at the time of default, indicating the exposure of the financial institution to risk at that time. For example, in case of bank loan EAD is the loan balance at the time of default.

Under IAS 39 portfolio valuation was based on objective events that took place after initial recognition. In IFRS 9, the default risk is calculated at different times and the results are taken into account and discounted to reflect the time value of money. However, one negative aspect of the new standard is the lack of definition for the "default" term, even though past due of more than 90 days is a valid presumption of default and inability to pay. Financial institutions have the discretion to define the "default" and are obliged to disclose the criteria for the adopted default definition.

To determine a significant increase in credit risk and the probability of default, various information and factors are taken into account, which differ depending on the type of financial instrument and risk category (Ernst & Young, 2016). These are valid information which are collected without effort or cost, dealing with not only the past and present situation but also forecasts, which contribute to the assessment of a number of factors whose deterioration may be the cause of an increase in credit risk and the likelihood of default.
6. Methodology of Analysis

This section of the study will focus on the methodology that will be implemented in order to assess the management of Greek NPLs and the impact of IFRS 9 implementation on the four Greek systemic banks. There will be a brief presentation of the ratios that will be used in the aforementioned assessment.

6.1 Financial Ratios Analysis

In this study, we are going to assess the financial ratios that are commonly used by not only the Supervisory Authorities (ECB, EBA, BoG) but also in the relevant literature review that has already been discussed. One of the most frequently used methods to examine the soundness of a financial institution is the CAMEL method that is similar with the financial ratios methods that we apply here. Christopoulos et al. (2011), apply CAMELS to determine the predictive ability of this method in the case of Lehman Brothers’ bankruptcy. The following assessment will be two fold; first we focus on the analysis of financial ratios with regard to the asset quality, capital adequacy, profitability, efficiency and liquidity of these four banks. On the second part we examine the impact of the First Time Adoption (FTA) of the new accounting standard (IFRS 9) to Greek banks. It should be noted, that as this research is about the management of NPLs, there is a strong focus on the asset quality of the banks’ balance sheet.

6.1.1 Asset Quality

In this category, we are assessing ratios regarding NPLs and NPEs and their coverage through loan loss provisions. The definitions of NPLs and NPEs, have thoroughly explained in a previous section. NPLs and NPEs ratios, are the NPLs and NPEs over gross loans. High value of these ratios can be interpreted as a high probability of bank failure due to participation in high-risk lending policies. The coverage ratios examine the percentage of NPLs or NPEs that are covered by LLR. The higher these ratios are the better for the bank.
6.1.2 Capital Adequacy
This is an important aspect of a bank’s financial position that is strongly supervised by Central Banks, as it is a measure of a bank’s stability. It is the percentage (as we discuss about ratios) of minimum capital that a bank must have in order to be able to absorb losses and thus be viable. In this study we incorporate the total capital adequacy ratio which consists of Tier 1 and Tier 2 capital. It is prudent to mention that apart from the general minimum requirements that Basel Accord determines, the supervisor responsible for each bank (a team that consists of ECB and National Central Banks and is called Joint Supervisory Team – JST) can set additional minimum requirements which are decided through the Supervisory Review and Evaluation Process (SREP).

6.1.3 Profitability
The most commonly used ratios to assess a bank’s profitability is the ROE, ROAE, ROA, ROAA and NIM. In this study, we examine the profitability of a bank through its net interest margin. NIM for short, is the difference between the interest that a bank pays (deposits) and the interest that earns (loans) over the total interest earning assets.

6.1.4 Efficiency
In order to evaluate the efficiency of a bank, we are going to examine the ratio cost-to-income. This ratio is a clear indicator of the efficiency of a bank as it measures operating expenses over the operating income. The higher the ratio the less efficient and thus profitable a bank is and the opposite.

6.1.5 Liquidity
A good measure of a bank’s liquidity is the ratio of loan-to-deposits. This ratio is calculated as the total outstanding loans to total deposits that a bank has. Low-value of this ratio means that the bank uses its own deposits to give loans, which can be interpreted as low profitability. On the other hand, high-value of this ratio means that the bank has not enough liquidity and thus needs to borrow money to re-loan it to its customers. This however, can lead to higher profitability as it lends money to higher rates than it has borrowed.
6.2 Data Description

The financial data that were used in this dissertation were downloaded from Thomson One database as well as the banks’ web sites. We did not use Bankscope database of Bureau and Van Dijk because quarterly data are not available in this database while in Thomson One are. In addition, the data for the Greek macroeconomic indices were obtained from OECD database. The period that we selected to assess is Q1 2016- Q3 2018 because capital controls were already imposed for the last six months. Therefore, the Greek economy and the banking system was already adapted (to an extent) to this measure. The rationale behind the choice of the four systemic banks was not only due to the importance of these financial institutions to the Greek financial system but also because these banks are supervised directly from ECB through SSM. Therefore, all the previous discussion of managing NPLs (NPEs) in the Europe are applicable to Greece and these four banks.
7. Empirical Results and Analysis

In this section, we are going to examine the case of the four Greek systemic Banks and particularly the issue of NPLs and the impact on their performance. In addition, we are going to examine the impact of the IFRS 9 implementation on these four banks. The ratios that were used have been described in the previous section.

7.1 Brief overview of the Greek economy

In the last 8 years, Greece has undergone considerable structural improvements, which resulted in the creation of investment opportunities and in general to be a more business friendly country. The completion of the adjustment programme in August 2018 combined with the debt relief measures agreed by the Eurogroup, which made the Greek debt sustainable, had a positive impact in the recovery of the investors’ confidence. Economic growth has returned in the last year with the GDP increasing by 2.1% as a result of the increase of exports in goods and services and private consumption. However, an important problem for the Greek economy is the high rate of unemployment, despite the decreased in the last couple of years. It should be noted that this decrease in unemployment is due to the fact that a great number of Greeks have emigrated in their search for a better employment perspectives while the prevalent employment in Greece is part-time and temporary (BoG 2018).

The improvement in the Greek economy affected positively the Greek banking system. Even though banks’ asset quality improved, as a result of the decrease in NPEs, the high level of NPEs is still a major issue for Greece. Moreover, due to the easing of capital controls, the confidence in the banking system returned and as a result the increase of deposits (4.4% increase in 2018).
7.2 Greek Banks and NPLs

The GFC affected tremendously the Greek economy and as a result the banking sector. The volume of NPLs has increased significantly since 2009, which resulted in the recapitalisation of the Greek banks 3 times already.

Asset Quality

As it was previously mentioned, Greek banks in the last decade are having significant issues with the volume of their troubled assets and specifically with NPLs, consequence of Greek economy’s downturn. As we can observe from Table 3 (Appendix section), Piraeus Bank has a bigger problem than the other 3 banks, even though in the last 3 years there has been a considerable effort to reduce NPLs. Specifically, PB has managed to reduce NPLs from Q1 2016 to Q3 2018 by €8,719mil (33.05%) while NBG, a bank in better position than the other three, managed to reduce its NPLs by €7,275mil (37.38%). The NPLs decline is due to the restructuring plan that the banks have implemented these years which incorporates forbearance measures, sales of NPLs, liquidations (mostly auctions of real estate collaterals) and collections.

<table>
<thead>
<tr>
<th>Period</th>
<th>Piraeus</th>
<th>Alpha</th>
<th>Eurobank</th>
<th>NBG</th>
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<tr>
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<tr>
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<td>23,000</td>
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<td>2017 Q1</td>
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<tr>
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<td>22,200</td>
<td>17,340</td>
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<tr>
<td>2017 Q3</td>
<td>22,058</td>
<td>21,800</td>
<td>17,016</td>
<td>16,899</td>
</tr>
<tr>
<td>2017 Q4</td>
<td>20,721</td>
<td>19,800</td>
<td>15,779</td>
<td>15,610</td>
</tr>
<tr>
<td>2018 Q1</td>
<td>20,484</td>
<td>19,800</td>
<td>15,619</td>
<td>12,717</td>
</tr>
<tr>
<td>2018 Q2</td>
<td>17,799</td>
<td>19,700</td>
<td>15,197</td>
<td>12,827</td>
</tr>
<tr>
<td>2018 Q3</td>
<td>17,659</td>
<td>18,200</td>
<td>14,015</td>
<td>12,188</td>
</tr>
</tbody>
</table>

Source: Based on data from the banks’ financial reports

Regarding the NPL ratio, PB managed to reduce this ratio by 6.50% while Alpha, Eurobank and NBG by 3.30%, 3.90% and 3.20% respectively. In respect to NPLs coverage ratio, we can observe that NBG and PB have greater coverage than the other two, which equals to 82.40% and 78.80% respectively.
Similar results can be observed for the NPEs of these four banks. Based on Q3 2018 data, NPEs decreased by 22.65% for PB, 17.39% for Alpha, 22.02% for Eurobank and 41.86% for NBG compared to Q1 2016.

The NPE ratio despite the moderate reduction remains high for all four Greek systemic banks. The highest NPE ratio is noted in PB (54.10% in Q3 2018), even though the bank managed to reduce it by 9.33% since Q1 2016. Following PB, Alpha has the second highest NPEs ratio (Q3 2018 49.90%) with a significantly lower than PB, decrease of 2.20% since Q1 2016. The NPE coverage by cumulative provisions has increased significantly in the Q1 2018 for all banks, mainly due to the adoption of IFRS 9 and the recognition of additional provisions. In Q2 2018 and Q3 2018, the NPE coverage has dropped slightly, as a result of loans sales and write-offs that banks performed.
Capital Adequacy

Based on the data presented in the following table, we can observe that even though there is a significant decrease in the regulatory capital ratio (RCR) since Q1 2016 (for PB and NBG), it is still in compliance with the CRD IV rules and Overall Capital Requirements (OCR) set by SSM through Supervisory Review and Evaluation Process (SREP). It should be noted that this decrease in RCR, is due to the adoption of IFRS 9.

Table 7 Regulatory Capital Ratio

<table>
<thead>
<tr>
<th>Period</th>
<th>Piraeus</th>
<th>Alpha</th>
<th>Eurobank</th>
<th>NBG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Q1</td>
<td>17.30%</td>
<td>16.40%</td>
<td>16.90%</td>
<td>17.20%</td>
</tr>
<tr>
<td>2016 Q2</td>
<td>17.30%</td>
<td>16.70%</td>
<td>17.10%</td>
<td>16.80%</td>
</tr>
<tr>
<td>2016 Q3</td>
<td>17.40%</td>
<td>16.90%</td>
<td>17.70%</td>
<td>16.90%</td>
</tr>
<tr>
<td>2016 Q4</td>
<td>16.96%</td>
<td>17.10%</td>
<td>17.90%</td>
<td>16.30%</td>
</tr>
<tr>
<td>2017 Q1</td>
<td>16.76%</td>
<td>17.20%</td>
<td>17.50%</td>
<td>16.00%</td>
</tr>
<tr>
<td>2017 Q2</td>
<td>16.70%</td>
<td>18.00%</td>
<td>17.60%</td>
<td>16.60%</td>
</tr>
<tr>
<td>2017 Q3</td>
<td>16.80%</td>
<td>17.90%</td>
<td>17.40%</td>
<td>16.80%</td>
</tr>
<tr>
<td>2017 Q4</td>
<td>15.44%</td>
<td>18.40%</td>
<td>18.00%</td>
<td>17.00%</td>
</tr>
<tr>
<td>2018 Q1</td>
<td>14.43%</td>
<td>18.40%</td>
<td>17.40%</td>
<td>16.60%</td>
</tr>
<tr>
<td>2018 Q2</td>
<td>13.60%</td>
<td>18.50%</td>
<td>17.40%</td>
<td>16.30%</td>
</tr>
<tr>
<td>2018 Q3</td>
<td>13.70%</td>
<td>18.30%</td>
<td>17.10%</td>
<td>16.50%</td>
</tr>
</tbody>
</table>

Source: Based on data from the banks’ financial reports

Profitability

As depicted in the table below NIM has decrease significantly for PB and moderately for the other three banks. The adoption of IFRS 9, had also an impact on NIM due to the increase of provisions as well as asset deleveraging and reduction in loan yields.
On the other hand, the reduction of ELA funding, a costly funding mechanism, affected positively the NIM.

<table>
<thead>
<tr>
<th>Period</th>
<th>Piraeus</th>
<th>Alpha</th>
<th>Eurobank</th>
<th>NBG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Q1</td>
<td>2.81%</td>
<td>2.80%</td>
<td>2.15%</td>
<td>2.80%</td>
</tr>
<tr>
<td>2016 Q2</td>
<td>2.89%</td>
<td>2.80%</td>
<td>2.19%</td>
<td>2.85%</td>
</tr>
<tr>
<td>2016 Q3</td>
<td>2.92%</td>
<td>2.90%</td>
<td>2.18%</td>
<td>2.93%</td>
</tr>
<tr>
<td>2016 Q4</td>
<td>2.68%</td>
<td>2.90%</td>
<td>2.25%</td>
<td>2.83%</td>
</tr>
<tr>
<td>2017 Q1</td>
<td>2.70%</td>
<td>3.00%</td>
<td>2.31%</td>
<td>3.04%</td>
</tr>
<tr>
<td>2017 Q2</td>
<td>2.71%</td>
<td>3.10%</td>
<td>2.40%</td>
<td>3.06%</td>
</tr>
<tr>
<td>2017 Q3</td>
<td>2.73%</td>
<td>3.10%</td>
<td>2.38%</td>
<td>3.07%</td>
</tr>
<tr>
<td>2017 Q4</td>
<td>2.80%</td>
<td>3.10%</td>
<td>2.41%</td>
<td>3.07%</td>
</tr>
<tr>
<td>2018 Q1</td>
<td>2.33%</td>
<td>3.00%</td>
<td>2.51%</td>
<td>2.87%</td>
</tr>
<tr>
<td>2018 Q2</td>
<td>2.46%</td>
<td>3.00%</td>
<td>2.50%</td>
<td>2.70%</td>
</tr>
<tr>
<td>2018 Q3</td>
<td>2.43%</td>
<td>2.90%</td>
<td>2.49%</td>
<td>2.73%</td>
</tr>
</tbody>
</table>

Source: Based on data from the banks’ financial reports

**Efficiency**

To evaluate the efficiency of the four Greek banks we are going to examine the cost-to-income ratio (C:I). From the table 9 below, we can observe that Eurobank has the lowest ratio while NBG has the highest ratio. Especially for NBG we can observe that there is a significant increase since Q1 2018. This deterioration can be attributed not only in the decrease of operating income but also in the increase of operating expenses due to the voluntary exit schemes (VES) that banks incorporated in order to achieve a reduction of employees.
### Table 9 Cost-to-Income

<table>
<thead>
<tr>
<th>Period</th>
<th>Piraeus</th>
<th>Alpha</th>
<th>Eurobank</th>
<th>NBG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Q1</td>
<td>54.00%</td>
<td>47.80%</td>
<td>49.20%</td>
<td>57.00%</td>
</tr>
<tr>
<td>2016 Q2</td>
<td>53.00%</td>
<td>48.20%</td>
<td>49.20%</td>
<td>56.00%</td>
</tr>
<tr>
<td>2016 Q3</td>
<td>52.00%</td>
<td>48.40%</td>
<td>48.30%</td>
<td>57.00%</td>
</tr>
<tr>
<td>2016 Q4</td>
<td>56.00%</td>
<td>48.20%</td>
<td>48.10%</td>
<td>57.00%</td>
</tr>
<tr>
<td>2017 Q1</td>
<td>53.00%</td>
<td>46.30%</td>
<td>48.80%</td>
<td>51.00%</td>
</tr>
<tr>
<td>2017 Q2</td>
<td>51.00%</td>
<td>46.20%</td>
<td>49.50%</td>
<td>50.00%</td>
</tr>
<tr>
<td>2017 Q3</td>
<td>51.00%</td>
<td>46.60%</td>
<td>48.10%</td>
<td>51.00%</td>
</tr>
<tr>
<td>2017 Q4</td>
<td>53.00%</td>
<td>47.60%</td>
<td>47.50%</td>
<td>53.00%</td>
</tr>
<tr>
<td>2018 Q1</td>
<td>56.00%</td>
<td>49.90%</td>
<td>48.50%</td>
<td>51.00%</td>
</tr>
<tr>
<td>2018 Q2</td>
<td>55.00%</td>
<td>49.50%</td>
<td>47.80%</td>
<td>73.09%</td>
</tr>
<tr>
<td>2018 Q3</td>
<td>54.00%</td>
<td>50.70%</td>
<td>47.20%</td>
<td>72.68%</td>
</tr>
</tbody>
</table>

Source: Based on data from the banks’ financial reports

### Liquidity

With respect to the banks’ liquidity, we can state that there is a moderate improvement since Q1 2016. This is due to the increase of deposits as a consequence of the gradual improvement of the Greek economy and the easing of capital controls that the Greek government imposed in 2015. In addition, the introduction of the Deposit Guarantee Scheme (DGS) helped to strengthen the confidence in the banking system, which played a pivotal role in the increase of the deposits.

### Table 10 Loans-to-Deposits Ratio

<table>
<thead>
<tr>
<th>Period</th>
<th>Piraeus</th>
<th>Alpha</th>
<th>Eurobank</th>
<th>NBG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Q1</td>
<td>128.00%</td>
<td>148.00%</td>
<td>125.11%</td>
<td>92.00%</td>
</tr>
<tr>
<td>2016 Q2</td>
<td>123.00%</td>
<td>143.67%</td>
<td>119.93%</td>
<td>91.00%</td>
</tr>
<tr>
<td>2016 Q3</td>
<td>121.00%</td>
<td>140.35%</td>
<td>117.23%</td>
<td>89.00%</td>
</tr>
<tr>
<td>2016 Q4</td>
<td>113.00%</td>
<td>134.79%</td>
<td>114.77%</td>
<td>88.00%</td>
</tr>
<tr>
<td>2017 Q1</td>
<td>116.00%</td>
<td>133.51%</td>
<td>115.10%</td>
<td>88.00%</td>
</tr>
<tr>
<td>2017 Q2</td>
<td>113.00%</td>
<td>128.00%</td>
<td>113.81%</td>
<td>86.00%</td>
</tr>
<tr>
<td>2017 Q3</td>
<td>109.00%</td>
<td>128.52%</td>
<td>112.02%</td>
<td>83.00%</td>
</tr>
<tr>
<td>2017 Q4</td>
<td>97.00%</td>
<td>120.00%</td>
<td>109.65%</td>
<td>80.00%</td>
</tr>
<tr>
<td>2018 Q1</td>
<td>102.00%</td>
<td>115.67%</td>
<td>102.37%</td>
<td>76.00%</td>
</tr>
<tr>
<td>2018 Q2</td>
<td>98.00%</td>
<td>111.19%</td>
<td>99.50%</td>
<td>74.00%</td>
</tr>
<tr>
<td>2018 Q3</td>
<td>102.00%</td>
<td>105.62%</td>
<td>95.64%</td>
<td>72.00%</td>
</tr>
</tbody>
</table>

Source: Based on data from the banks’ financial reports
7.3 IFRS 9 impact on Greek Banks

In this section, we examine the four Greek systemic Banks. This part will cover the up to nowadays expected impact of this new accounting standard on the assessment of loan impairments, equity and consequently capital requirements of these four Greek Banks.

The implementation of IFRS 9 for the Greek Banks was mandatory from January 1\textsuperscript{st} 2018. This was due to the provisions of Regulation (EU) No 2017/2395, which amends Capital Requirements Regulation (EU) No 575/2013, which all banks adopted. According to the above Regulation, “as regards transitional arrangements for mitigating the impact of the introduction of IFRS 9 on own funds and for the large exposures treatment of certain public sector exposures denominated in the domestic currency of any Member State”\textsuperscript{1}. Based on this amendment banks can mitigate the negative impact of IFRS 9 on their CET-1 capital due to the increase in ECL provisions, by adding back to their CET-1 capital portion of this increase in ECL provisions (phase-in approach). This will be applicable for the first five years of the IFRS 9 adoption while the proportion that banks are allowed to add back in 2018 amounts to 95% which will gradually be reduced to 25% by 2022.

IFRS 9 has introduced the ECL approach, an approach that will lead to an increase in loan loss provisions and consequently affect a bank’s capital adequacy (Plata et al., 2017; Ntaikou, Vousinas, 2018). Table 11 shows the needs for additional loan loss provisions per product category for the four systemic Greek banks. Apart from NBG, we can observe that the increase in LLP refers to business loans with Piraeus Bank to require the most (€1bn) and NBG the least (€0.3). Overall, the higher need for additional LLP has Piraeus Bank with €1.6bn while the other three, Alpha Bank, NBG and Eurobank have needs equal to €1bn, €1bn and €1.1 respectively.

\textsuperscript{1} This Regulation was published in the Official Journal of the European Union
Regarding capital requirements, Table 12 displays the estimations of the four systemic Greek banks after the adoption of IFRS 9. There is a clear indication that the adoption of the new accounting standard will reduce significantly capital requirements. Specifically, Alpha Bank will be affected the less with a decrease in CET-1 ratio (fully loaded) by 2.4% while Piraeus Bank is the most vulnerable with a decrease in CET-1 ratio (fully loaded) by 3%. In addition, Piraeus Bank has also a need to increase Loan Loss Reserves by €1.6bn which is equal to 60%. Furthermore, even though the bank (PB) has the highest volume of NPEs (€32.5bn), it has the highest provision coverage in respect with its loans portfolio, 28.2% (Table 12).

### Table 11 Additional Loan Loss Provisions per category

<table>
<thead>
<tr>
<th></th>
<th>Alpha Bank S.A.</th>
<th>EFG Eurobank Ergasias S.A.</th>
<th>National Bank of Greece S.A.</th>
<th>Piraeus Bank S.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortgages</td>
<td>0.1</td>
<td>0.3</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Consumer</td>
<td>0.4</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Business</td>
<td>0.5</td>
<td>0.6</td>
<td>0.3</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.0</strong></td>
<td><strong>1.1</strong></td>
<td><strong>1.0</strong></td>
<td><strong>1.5</strong></td>
</tr>
</tbody>
</table>

Source: Based on data from the banks’ financial reports

### Table 12 IFRS 9 impact on Greek Banks

<table>
<thead>
<tr>
<th></th>
<th>Alpha Bank S.A.</th>
<th>EFG Eurobank Ergasias S.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan-18</td>
<td>Dec-17</td>
</tr>
<tr>
<td>Loan Loss Reserves</td>
<td>13.3</td>
<td>14.3</td>
</tr>
<tr>
<td>CET-1 Ratio (phased-in)</td>
<td>18.4%</td>
<td>18.3%</td>
</tr>
<tr>
<td>CET-1 Ratio (fully loaded)</td>
<td>18.3%</td>
<td>15.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>National Bank of Greece S.A.</th>
<th>Piraeus Bank S.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan-18</td>
<td>Dec-17</td>
</tr>
<tr>
<td>Loan Loss Reserves</td>
<td>10.2</td>
<td>11.2</td>
</tr>
<tr>
<td>CET-1 Ratio (phased-in)</td>
<td>17.0%</td>
<td>16.5%</td>
</tr>
<tr>
<td>CET-1 Ratio (fully loaded)</td>
<td>16.7%</td>
<td>13.5%</td>
</tr>
</tbody>
</table>

Source: Based on data from the banks’ financial reports
Concerning the ECL approach of the new standard, we can observe that stage 2 & 3 present the most significant change in loan loss provision compared to IAS 39. As there is an increase in credit risk, the transition from stage 1 (12-month ECL) to stage 2 (lifetime ECL) will consequently lead to an increase in LLP. From the above table, we can notice that in stage 2, the greater IFRS 9 coverage has Piraeus Bank with 11.7% and Eurobank with 10.7%. Stage 3 has the greatest coverage with NBG reaching 57.1% and NPEs €18.4bn. Following NBG, we have Eurobank with coverage 50.5% and NPEs €20.1bn while Piraeus Bank has the greatest amount of NPEs (€31.5bn) has better coverage (50.2%) than the previous mentioned banks. Finally, it should be mentioned that Alpha Bank even though has larger exposure (€29bn NPEs) than NBG and Eurobank, has better coverage (46.6%).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>17.6</td>
<td>-</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Stage 2</td>
<td>9.3</td>
<td>-</td>
<td>0.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Stage 3</td>
<td>-</td>
<td>29.0</td>
<td>12.7</td>
<td>13.5</td>
</tr>
<tr>
<td>Total</td>
<td>26.9</td>
<td>29.0</td>
<td>13.3</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Source: Based on data from the banks' financial reports
8. Conclusion

The present study focuses on the management of NPLs (generally NPEs), in the European Banking sector. In the first part we present the most relevant and representative empirical research that has been conducted worldwide with an emphasis on Europe. The majority of the empirical research ascertain that the improvement of the banks’ asset quality will have positive impact on the economy (Lamandini, 2017). Therefore, the need to identify the factors that influence this issue is imperative in order to find solutions that will mitigate these risks. One problem that was identified by supervisory authorities was the adoption of different practices and definitions in its member states. Each European country applied different terminology to define the problem of NPLs, which consequently led to different practices. EBA in order to achieve harmonisation in all European countries, issued in 2014 common technical reporting standards. The following step was the issuance by ECB through SSM, guidelines for best practices in the treatment of NPEs. These guidelines provide banks with the necessary tools to help them reduce their troubled assets and thus start again to finance projects that will help economic growth.

All the above-mentioned steps are classified in the ex-post measures that supervisory authorities have undertaken. However, these kind of measures were not enough and therefore the need for measures that will prevent such problems to rise again, was imperative to be implemented. As a result, the G20 and IASB, issued a new accounting standard (IFRS 9) that introduced a forward model of expected credit losses depending on the credit deterioration of loans portfolios (ex-ante measure). Therefore, banks will have to identify early possible deterioration of loans and report it through an increase in LLP.

Taking into account all these measures, we attempt to assess the Greek banking system regarding the management of NPLs. The four systemic Greek banks are assessed in order to determine the efficacy of the methods applied to mitigate the risk derived from the increase of NPLs. Through the examination of not only the banks’ financial data but also of other available information (corporate announcements,
news, investment analysis etc.), we can observe that even though there was a significant effort to reduce the volume of NPLs, the banks however were not able to achieve the goals set by EU and ECB. As there is a strong pressure from these authorities to succeed in the NPLs reduction, Greek banks have already started implementing measures such as sales of troubled assets while nowadays are working on the securitisation of loan portfolios (transfer to an SPV and issuance of a bond according to BoG proposal). In the last couple of months, banks also consider the transfer of all problem loans to a single AMC not only to improve their balance sheets but also to better manage these assets (creation of a single “bad” bank). However, as the Greek banking system is strongly correlated with the Greek economy, it is prudent to state that in order to be a significant improvement in the NPL front, the economy must overcome the obstacles that is facing and return to a pace of growth. Regarding the adoption of IFRS 9, the Greek banks were affected by this new accounting standard which led to an increase in LLP and consequently a decrease in capital adequacy.

Finally, it should be mentioned that the methodology applied in this study could be improved by applying econometric methods to compare the Greek banks with other countries that have faced or still facing the issue of NPLs.
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Appendix

Figure 2 Ratio of NPLs to total assets

[Graph showing the ratio of NPLs to total assets for different categories of banks over a period from December 2014 to September 2017.]

Source: EBA

Figure 3 Impact of NPLs on the economy

[Diagram illustrating the impact of non-performing loans on the economy, showing how the burden of non-performing loans affects the economy negatively.]

Source: European Commission
### Figure 4 Classification of NPEs

<table>
<thead>
<tr>
<th>Performing</th>
<th>Non-performing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fully performing</strong></td>
<td><strong>Generic criteria</strong>: past due more than 90 days and / or unlikely to pay</td>
</tr>
<tr>
<td>Loans and debt securities that are not past-due and without risk of non-repayment and performing off-balance sheet items</td>
<td>All other non-defaulted and non-impaired loans and debt securities and off-balance sheet exposures meeting the generic criteria</td>
</tr>
<tr>
<td><strong>Performing assets past due below 90 days</strong></td>
<td><strong>Defaulted</strong></td>
</tr>
<tr>
<td>Loans and debt securities between 1-30 days past due</td>
<td>Fair value option</td>
</tr>
<tr>
<td>Loans and debt securities between 31-60 days past due</td>
<td>Amortised cost</td>
</tr>
<tr>
<td>Loans and debt securities between 61-90 days past due</td>
<td>Financial guarantees given (except derivatives)</td>
</tr>
<tr>
<td><strong>Performing assets that have been renegotiated</strong></td>
<td>Other off-balance sheet items: loan commitments given</td>
</tr>
<tr>
<td>Loans and debt securities which renegotiation or refinancing did not qualify as forbearance</td>
<td>Performing or non-performing</td>
</tr>
</tbody>
</table>

**Source: European Banking Authority, 2014**

### Figure 5 Forbearance measures

- **Performing forbearance**
  - 1 year minimum
  - 2 years minimum for performing (cont'd)

- **Non-performing**
  - 2 years minimum for past due > 30 days ($157 applies)
  - 1 year minimum for performing (cont'd)

**Source: ECB 2017**
Figure 6 Simplified standard structure of a cash securitisation

Source: Caselli & Gatti 2017

Figure 7 Structure of a non-performing loans securitisation

Source: Caselli & Gatti 2017
Figure 8 NPLs Greece-Italy-Ireland-Spain-Germany-Europe

Figure 9 NPLs Greece vs Europe

Source: The World Bank
Figure 10 GDP – Greece vs European Union

Source: OECD

Figure 11 Unemployment – Greece vs European Union

Source: OECD