ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

ΣΧΟΛΗ ΟΙΚΟΝΟΜΙΚΩΝ ΕΠΙΣΤΗΜΩΝ

ΤΜΗΜΑ ΟΙΚΟΝΟΜΙΚΗΣ ΕΠΙΣΤΗΜΗΣ

Credit risk management and profitability of European commercial banks. (The Greek case)

ΣΩΤΟΠΟΥΛΟΣ ΧΡΗΣΤΟΣ

Διπλωματική εργασία υποβληθείσα προς μερική εκπλήρωση
των απαραιτήτων προϋποθέσεων
για την απόκτηση του
Μεταπτυχιακού Διπλώματος Ειδίκευσης

Αθήνα

[Φεβρουαριος, 2018]

Υπεύθυνος καθηγητής: ΤΖΑΒΑΛΗΣ ΗΛΙΑΣ - ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

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Abstract

Nowadays, banks are the biggest financial institutions all over the world. The business of Banks involves different types of risks. Due to the important role banks have in modern economies they should operate in such ways so as to keep all types of risks in low levels. Credit risk is one of the most substantial risks that banks have to cope with while they operate. This happens due to the fact that granting credit is one of the major sources of income in commercial banks. Consequently, we can say that credit risk management influences either positively or negatively the profitability of the commercial banks. The purpose of this dissertation is to investigate and examine if there is a relationship between credit risk management and profitability of European commercial banks. If there is a relationship between those then we are going to try to find in what way credit risk management affects the profitability of commercial banks. In our research model, we use ROE (return on equity) as proxy of profitability while NPLs (Non- performing loans) is defined as proxy of credit risk management. For this research, we managed to collect data from 15 of the largest commercial banks in Europe from 2007 to 2016.

Acknowledgment

At this point I would like to thank two bright economists, my brother Kyriakos Sotopoulos and my friend George Gounaris for their support and the most valuable conversations we had on the banking system and credit risk management that really helped me to delve deeper into the notions I present in this Dissertation.

Athens
January 2018

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Abbreviations

NPL Non-Performing Loan
ROE Return on Equity
ROA Return on Assets
P-value Probability Value
NBG National Bank Of Greece
ECB European Central Bank

Chapter 1: Introduction

Financial institutions are facing a lot of problems and difficulties all these years because of a big and important amount of factors. A main reason for this situation is the poor risk management related to the portfolios. Also, a lot of times financial institutions do not pay the proper attention to the economic changes that occur through the years. Furthermore, a significant role plays the lax credit standards which concern both the borrowers and the counterparties. As we all know banks today are the biggest financial Institutions around the world. There are many types of banks and there are many differences between them. The most important differences are related to the services that banks provide. For example, commercial banks which are the banks we are going to analyze in our research hold deposits from individuals and companies bundling them together as loans, operating payments mechanism, etc.

In recent years, finance officers have faced a lot of challenges. These challenges are mostly related to the complexity of financial markets due to the fact that the demand for financing rises rapidly, so it is necessary for the financial officers to possess knowledge of such complicated financial environments and try to find economic tools to measure losses which may arise in worst case scenarios. This can be done by measuring the major risks. Credit risk is one of the major risks in banking environment because lending is included.

Hull states that Commercial banking in almost all region has been subject to a big amount of regulations. One regulation declares that the commercial banks must keep absorbing loss if unexpected things happen. This kind of capital requirement is especially directed by Basel Committee which has as main purpose to improve the key supervisory issue and develop the quality of banking supervision (Bis.org, 2014). There are many examples that indicate bad controlling. For Instance, in 1974, some disruptions took place in the international financial markets. West Germany's Federal Banking Supervisory Office withdrew Bankhaus Herstatt's banking license after finding that the

bank's foreign exchange exposures amounted to three times its capital. In the same year, the Franklin National Bank of New York also closed its door after racking up huge foreign exchange losses (Bis.org, 2014). Therefore, banks in other countries took substantial losses on their unsettled trades with Herstatt. All these made Basel's Committee treatment strict by putting banking regulations and supervisory practices.

1.1 Research question

It is commonly known that when a bank functions either well or not it faces risks. Maybe the most important risk that faces is credit risk which plays a rather significant role in bank's financial performance. There is a great interest in studying credit risk management and the interest grows more if we try to study the relationship between credit risk management and the profitability of commercial banks. Until now we haven't found a research which can lead us in appropriate and well understanding results about the correlation between those two. Furthermore, it is vital to study the European market because it has shown us that it is a very stable market through the years and also, we have enough data which will help us have the desirable results.

Because of all these and because of the interest we acquired from suitable information that we have studied until now we made the following question.

Is there a relationship between credit risk management and profitability of commercial banks in Europe and if truly exists, in what way does credit risk management affects the profitability of commercial banks (2007-2016)?

1.2 Research Purpose

As we said before, the question leads us to study the relationship between credit risk management and the profitability of commercial banks in the European market. So, this is our research purpose. First, we have to find if the relationship between those truly exists and then we have to find in what way credit risk management affects the profitability. We are going to use some indicators as variables to help us do the research. We are going to indicate credit risk management by using NPLs (Non-Performing Loans) and profitability by using ROE (Return on Equity). If the relationship exists then we are going to examine if this connection is positive or negative and how stable it is. This research will be conducted through a decade that we chose (2007-2016).

1.3 Choice of subject

First, as I was trying to decide which topic I should choose in order to implement my research I thought that I should choose a topic that would have an empirical framework. I didn't want to implement just a theoretical dissertation. After a search, I did on the Internet I decided to do a research on credit risk management and the profitability of commercial banks. My motivation was the fact that nowadays many financial institutions do not work properly because of risks and especially credit risk. This can be explained easily due to economic crisis. Not all people can pay back their loans so bank's non-performing loans increase rapidly. There is surely a big interest in studying this situation. Secondly, another motivation that pushed me in studying this situation is a relative. We have made a lot of

conversations about economic crisis, financial institutions and in what way they operate and cope with the risks they face. I believe that except for the subject I was studying in the university which had to do with banking risk the greatest motivation is that I want to be a part of this whole situation. I would like to have a daily job which deals with banking risks and particularly with credit risk. I think that I will make a good start for my career through this research.

1.4 Commercial Banking

Most of the governments believe that it is vital for individuals and companies to trust the banking system. An issue that regulations focus on is the capital that a bank should keep. Furthermore, another issue is related to the activities that a bank should conduct. In the last century bank regulation has affected the organization of commercial banking in different countries. To illustrate this, we consider the case of the United States. The United States has an unusual large number of banks (5,809 in 2014). This leads to a relatively complicated payment system compared with those of other countries with fewer banks. There are a few large money centre banks such as Citigroup and JPMorgan Chase. There are several hundred regional banks that engage in a mixture of wholesale and retail banking, and several thousand community banks that specialize in retail banking. (Hull, 2012, p.26)

Chapter 2: Banking System

2.1 Regulations

It is well known that banks take risks. The risks are very vital for banking stability and for the growth of economy. Besides this the most important is how these risks can be controlled.

2.1.1 Basel I

It was December 1987 when a capital measurement system was approved by the G10 governors and later released to banks in July 1988 (BCBS, 2013, p. 2).

This system referred to the Basel Capital Accord. The first role that the accord has is the promotion of reliability and stability of the international banking system by cheering international banking organizations to improve their capital positions. The second role is to provide fairness for competitions among banks (Patricia, 1999, p. 1).

The Accord required a minimum capital ratio of capital to risk-weighted assets of 8% to be implemented by the end of 1992 (Ferguson, 2003, p. 396). In this Basel Accord, the risk-weighted-assets concern only with credit risk and addressed other risks only implicitly (Ferguson, 2003, p. 396). The capital included two components, Tier 1 capital and Tier2 capital. Tier 1 capital was to be applied to all international banks equally and Tier 2 capital was to be tailored to each country's unique domestic banking system (Maurice, 2004, p. 22).

Yet, this accord has been condemned because of its simplicity. For example, all loans by a bank to a corporation have a risk weight of 100% and require the same amount of capital. A loan to an AAA credit rating corporation should need the same amount of regulatory capital as the loan to a BB credit rating corporation. This kind of limited differentiation indicated that the calculated capital ratios could be uninformative and may provide misleading information about bank's

true capital adequacy (Ferguson, 2003, p. 396). Moreover, the limited differentiation has created incentives for banks to get into arbitrage activities and take advantage by selling, securitizing risky assets (Ferguson, 2003, p. 396 & 397). Banks then can otherwise escape exposures for which required capital is higher than the market requires and follow those for which the capital requirement is lower than the market would apply to those assets (Ferguson, 2003, p. 396 & 397). As a result, some banks can hold too little capital for their risky assets even though they have met the 8% risk-weighted-assets requirement.

2.1.2 Basel II

After Basel I Basel II appeared which was a new accord. This new accord has been presented to keep pace with the increased sophistication of lenders' operations and risk management and overcome some of the distortions caused by the lack of granularity in Basel I. Lenders had been able under Basel I to reduce required capital in ways that did not reflect lower real risk (in what has become known as regulatory capital arbitrage). The intention is that Basel II will support required minimum capital more closely with lenders' real risk profile.

There are three pillars where Basel II is based on. Those are the following :

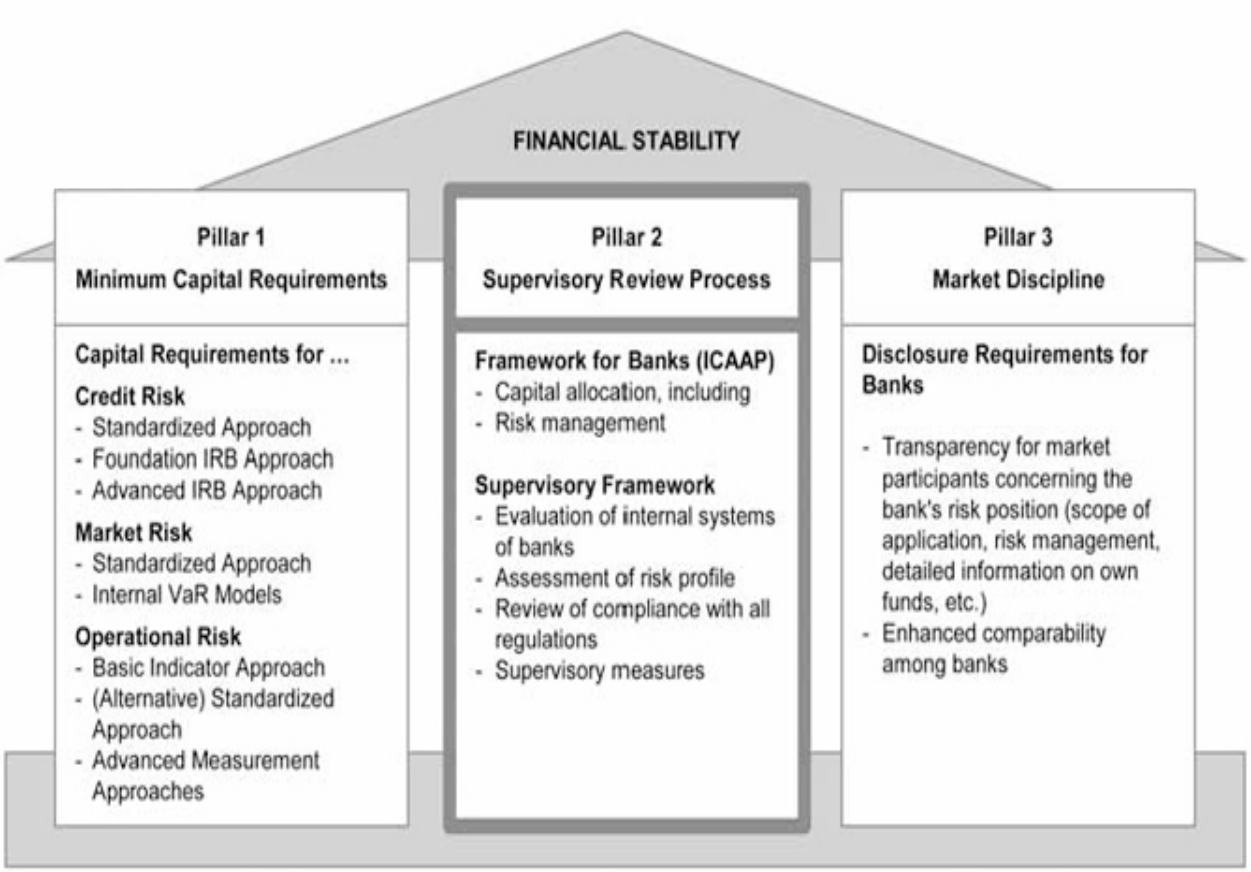
1. Minimum Capital requirement
2. Supervisory Review
3. Market Discipline

The 3 Pillars of Basel II preserve the key principles of the new regime.

Pillar 1, calculates the risk weights to control a basic minimum capital figure. The Accord provides for a choice of ways to calculate required capital. The simplest is the standardised approach, which provides set risk weights for some asset classes and requires the weight on others to be determined by the public credit rating assigned to the particular asset by the rating agencies. Lenders are able to choose the more sophisticated 'internal ratings based' (IRB) approach, either foundation, advanced or retail. These allow lenders to use their own risk models to determine appropriate minimum capital. Pillar 1 also requires lenders to assess their market and operational risk and provide capital to cover such risk.

Pillar 2, lenders are required to assess risks to their business not captured in Pillar 1, for which additional capital may be required (for example the risk caused by interest rate mismatches between assets and liabilities).

Pillar 3, requires lenders to publish information on their approach to risk management and is designed to raise standards through greater transparency.



2.1.3 Basel III

Basel III is a complete set of reform measures, developed by the Basel Committee on Banking Supervision, to strengthen the regulation, supervision and risk of the banking sector. Basel's committee mandate is to strengthen the regulation and practices of banks with the purpose of enhancing financial stability.

Basel's III purpose is to improve the banking sector's ability so as to be easier for shocks to be absorbed from stresses either financial or economic..

The following two approaches to supervision are complementary as greater resilience at the individual bank level reduces the risk of system wide shocks:

A) Microprudential, regulation which will help raise the resilience of individual banking institutions to periods of stress.

B) Macroprudential, system wide risks that can build up across the banking sector as well as the procyclical strengthening of these risks over time.

From 1993 to 2008 the total assets of a sample of what we call global systemically important banks saw a twelve-fold increase (increasing from $2.6 trillion to just over $30 trillion). But the capital funding these assets only increased seven-fold, (from $125 billion to $890 billion). Put differently, the average risk weight declined from 70% to below 40%. One of the main reasons the economic and financial crisis became so severe was that the banking sectors of many countries had built up excessive on and off-balance sheet leverage. This was accompanied by a gradual erosion of the level and quality of the capital base.

According to Hull (2012), the final version of Basel III was published in 2009 and there are six parts in the regulations:

1. Capital definition and requirements
2. Capital conservation buffer
3. Countercyclical buffer
4. Leverage ratio
5. Liquidity ratio
6. Counterparty credit risk

As said by these regulations, the development has shown that credit risk management plays a very vital role in bank's operation. Capitals to absorb risks are one of the most essential parts that banks need to consider.

2.2 Banks Risk management

Risk management's major and main purpose is to avoid large losses. First of all, the procedure of managing the risk starts by identifying the risk. Then comes the measurement and the quantification of risk and then the development of a way or a strategy to manage it.

Risk management identification has a number of steps. The most vital step is to start analysing the sources of possible risks or defining threats. Secondly, measurement needs to quantify the risk which has been identified in the identification step (Van Gestel & Baesens, 2008, p.42). For example, individual needs to measure the real default probability and how much the change of risk drivers influence the default probability. In this step, statistical analysis is analysis needed for the risk measurement (Van Gestel & Baesens, 2008, p.42). After this we proceed to the next step of risk management which is to treat the risk. Van Gestel and Baesens say that there are four ways so bankers can deal with risks. Those four ways are: risk avoidance, risk reduction, risk acceptance and risk transfer. The first way which is risk avoidance is a simple way of action which implies that individuals can invest their money in products with low risk (Van Gestel & Baesens, 2008, p.43). Avoidance does not imply avoiding all risks. One strategy can be investing in counterparts with low exposure risk or investing only small proportion in counterparts with high default (Van Gestel& Baesens, 2008, p.43). Risk reduction states reducing the portion of risk taken which means use collateral to reduce the actual loss. Risk acceptance is commonly applied for low-risk assets (Van Gestel & Baesens, 2008, p.43). It emphasizes the diversification of investments in various sectors and countries. And risk transfer implies transfer risk to other institutions such as banks, insurances or companies. This treatment provides a guarantee to credit risk such as credit derivatives (Van Gestel & Baesens, 2008, p.43).When treatment finishes then implementation has to take place where implementation demands people, statistical model and IT

infrastructure to measure the risk of current and future investment. Risk management's implementation most of the times is supervised by senior managers. All of the risks have to be reported and monitored. Finally, managers have to evaluate this process of credit risk management and check if it is effective enough. This step refers to check whether the final risk taking keeps in line with the strategy and in a correct way of application. Specifically, it means the evaluation of risk drivers and measurement process (Van Gestel & Baesens, 2008, p.43).


Risk Tracking
& Control
Risk Management
Planning
Risk
Identification
Risk
Assessment &
Prioritisation
Quantitative
Risk Analysis
Risk Response
Planning

2.3. BANKING RISK

As we stated before, banks face a lot of risks while they operate. There is a big amount of risks they have to deal with but the main and most important risks are the eight following: Credit risk, market risk, liquidity risk, operational risk, legal risk, business risk, strategic risk, reputation risk. Banking system in modern economies is too risky for sure and that happens due to the fact that the main business that banks deal with is lending money to individuals and to companies. This leads us to the result that credit risk is maybe the most important risk banks have to face through their operation.

1. Credit risk
2. Market risk
3. Liquidity risk
4. Operational risk
5. Legal risk
6. Business risk
7. Strategic risk
8. Reputation risk

2.3.1 CREDIT RISK

Credit risk is the risk that rises when individuals or firms who have borrowed an amount of money from a bank fail to meet their obligations based on the agreement they have made. Credit risk management has as purpose to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks have to achieve the credit risk inherent in the entire portfolio and also in the individual credits or transactions. It is vital for the banks to check the interactions between credit risk and other risks that they face. The effective credit risk management plays significant role to risk management and leads to success of any banking organisation. There are many sources of credit risk. For most of the banks the main source of credit risk is loans. But, we can see that banking organizations are dealing with credit risk in not only loans but also in acceptances, interbank transactions, trade financing, foreign exchange transactions, financial futures, swaps, bonds, equities, options, and in the extension of commitments and guarantees, and the settlement of transactions. Banks should now have to be aware of the need to identify and control credit risk as well as to determine that they hold adequate capital against these risks and that they are adequately compensated for risks incurred. Banking supervisors are inspired by the basel comitee to endorse credit risk management practices. Also, it is vital that the principles that we mentioned earlier not only should be used in lending businesses but also in many other actions that credit risk exists.

2.3.2 MARKET RISK

When an investor is involved in financial markets there is always the possibility to have losses because of the factors that influence the general performance of the markets. This what we call market risk. Market risk is also known as systematic risk and it cannot be eliminated through diversification, though it can be hedged against. Sources of market risk include recessions, political turmoil, changes in interest rates, natural disasters and terrorist attacks. There are four main causes of risk that influence the overall market: interest rate risk, equity price risk, foreign exchange risk and commodity risk.

Interest rate risk: When volatility increases because of alterations in interest rates then we have interest rate risk. Those alterations in interest rates can cause also some other risks to arise such as options risk, repricing risk basis risk or term structure risk

Equity price risk: Equity price risk is the risk that arises from security price volatility – the risk of a decline in the value of a security or a portfolio. Equity price risk can be either systematic or unsystematic risk. Unsystematic risk can be mitigated through diversification, whereas systematic cannot be. In a global economic crisis, equity price risk is systematic because it affects multiple asset classes.

Foreign Exchange Risk: Foreign exchange risk which is also called currency risk is the risk which arises because of the volatility that exists in the currency exchange rates. Because of business due to imperfect hedges global firms may be unprotected to currency risk

Commodity Risk: The volatility in market price because of price variation of a commodity is called commodity price risk. Commodity risk affects various sectors of the market, for example airlines and casino gaming. The price of commodity can be affected by seasonal changes or technology or maybe from politics too.

2.3.3 LIQUIDITY RISK

Liquidity risk is the risk rising from the lack of marketability of an investment that cannot be bought or sold quickly enough to prevent or minimize a loss. With liquidity risk, typically reflected in unusually wide bid-ask spreads or large price movements, the rule of thumb is that the smaller the size of the security or its issuer, the larger the liquidity risk. *Liquidity risk* generally arises when a business or individual with immediate cash needs, holds a valuable asset that it cannot trade or sell at market value due to a lack of buyers, or due to an inefficient market where it is difficult to bring buyers and sellers together. For example, consider a $1,000,000 home with no buyers. The home obviously has value, but due to market conditions at the time, there may be no interested buyers. In better economic times when market conditions improve and demand increases, the house may sell for well above that price. However, due to the home owner's need of cash to meet near term financial demands, the owner may be unable to wait and have no other choice but to sell the house in an illiquid market at a significant loss. Hence, the liquidity risk of holding this asset.

2.3.4 OPERATIONAL RISK

Operational risk summarizes the risks a company undertakes when it attempts to operate within a given field or industry. Operational risk is the risk not inherent in financial, systematic or market-wide risk. It is the risk remaining after determining financing and systematic risk, and includes risks resulting from breakdowns in internal procedures, people and systems.

Categories of operational risk

- Internal fraud (Barings),

- External fraud (Republic NY corp. Lost $611 million because of fraud committed by a custodial client,
- Employment practices and workplace safety (Merrill Lynch lost $250 million in a gender discrimination lawsuit),
- Clients, products, & business practices (Household International lost $484 million from improper lending practices),

- Damage to physical assets (911 attacks),
- Business disruption and system failures (Solomon Brothers lost $303 million from a change in computing technology).
- Execution, delivery, and process management: failed transaction processing or process management, and relations with trade counter-parties and vendors. E.g., Bank of America and Wells Fargo Bank lost $225 and $150 million, respectively, from systems integration failures and transactions processing failures. (Risk Management and Financial Institutions by Zhipeng Yan)

2.3.5 LEGAL RISK

Legal risk generally happens in financial contracting which is separated from the legal implication of credit, counterparty and operational risk (Santomero, 1997, p. 89). New status, tax legislation, court opinions and regulations can lead formerly well-established transaction into contention (Santomero, 1997, p. 89). There is another type of legal risk which can be the result from a bad act that bank's management has made or when an employee has broken the rules and has violated the regulations or laws. (Santomero, 1997, p. 89).

2.3.6 BUSINESS RISK

Business risk is the possibility that a company or an organization is not going to have the anticipated profits or worse than that the possibility for a company to have losses rather than profits. There are many reasons and factors which play significant role and affect business risk. Some of them are: competition, government regulation, sales volume, per-unit price. A solution to business risk is for a financial institution to choose a capital structure with a lower debt ratio so as to manage to meet with its financial obligations.

2.3.7 STRATEGIC RISK

If a business plan does not succeed then it is very likely for a loss to arise. For instance, if bad business decisions are taken or the execution of these decisions are not proper or maybe a failure to pay attention in substantial changes in the business environment can cause strategic risk to be increased. A useful subdivision of strategic risks is:

Business risks: Business risks which come from the choices that the board takes about the products or services that the firm supplies. They include risks which are related with changes in technological environment and they affect sales and production. Also, they include economic risks affecting product sales and costs.

Non-business risks: They are the risks which do not arise from the products or the services that a firm supplies as in business risks. They are related to the way that the whole organisation deals with its environment and are not affected by the decisions that directors make.

2.3.8 REPUTATION RISK

As reputational risk, we define the risk arising from negative perception. Reputational risk is multidimensional and reflects the perception of other market participants. Reputational risk is when a bank or a firm faces the threat or danger to lose the good name or standing of a business or entity. Reputational risk can occur through several ways: directly, indirectly or tangentially. Directly is the result of the actions of the company itself, indirectly is the result which comes maybe from the actions of an employee or employees and tangentially which is through other peripheral parties, such as joint venture partners or suppliers. In addition to having good governance practices and transparency, companies also need to be socially responsible and environmentally conscious to avoid reputational risk.

2.4. RELATIVE IMPORTANCE OF RISKS AND INTERACTIONS BETWEEN THEM

The relative importance of different types of risk depends on the business mix. Credit risk is important in commercial lending, retail lending, and a financial institution's derivatives business. Market risk is important in trading and some investment banking activities. Hull says though that now operational risk is considered by many to be the most important risk for financial institutions. Operational risk is important in asset management.

As Hull mentions there are interactions between the different kinds of risks. For instance, when a swap is traded this trade makes market and credit risk interact. If a financial institution's counterparty defaults, credit risk exists only if market variables have moved so that the value of the derivative to the financial institution is positive. Another interaction is that the probability of default by a counterparty may depend on the value of a financial institution's contract (or contracts) with the counterparty. (Hull, 2015, p.552). As the Long-Term Capital Management saga clearly shows, there can exist relationships among market risks and liquidity risks. There are as well relationships among market risks and operational risks.

2.5. PROFITABILITY OF BANKS

The main source of a bank's profit comes from the fees that it charges for its services and the interest that it earns on its assets. Its main expense is the interest paid so as to face its liabilities. Loans to individuals, businesses, and other organizations and the securities that it holds are the main assets of a bank while its main liabilities are its deposits and the money that it borrows, either from other banks or by selling commercial paper in the money market. Banks increase profits by using leverage, and sometimes they use too much leverage. Profits can be measured as a return on assets (ROA) and as a return on equity (ROE). We can devide the factors of profitability into two categories: The external determinants and the internal determinants. The external determinants cannot be controlled by the management and the internal determinants can be controlled. (Guru et.al, 1999, p.3; Kosmidou et.al, 2005, p.3). This paper focuses on internal determinants because we want to see how credit risk management affects bank's profitability. We use ratios as indicators to represent

the profitability of banks because it is said that measurement with ratios is preferred since they are inflation invariant and they will not be affected by price changes.

2.5.1 RETURN ON EQUITY (ROE)

Return on equity (ROE) is a measure of profitability that calculates how many dollars of profit a company generates with each dollar of shareholder's equity. The formula for ROE is:

ROE = Net Income/Shareholders' Equity

ROE is sometimes called "return on net worth. "

For instance, let's suppose that firm X generated 10$ million in net income last year. If firm X's shareholder's equity equalled $20 million last year, then using the ROE formula, we can calculate firm X's ROE as:

ROE = $10,000,000/$20,000,000 = 50%

This means that firm X generated $0.50 of profit for every $1 of shareholders' equity last year, giving the stock an ROE of 50%.

Apart from measuring profit, ROE measures efficiency as well. When ROE which is a ratio is rising, it implies that a firm is increasing its ability to generate profit without needing as much capital. It also shows how efficiently a company's management is organising the shareholders' capital. In other words, having a high ROE is better. If ROE decreases then usually there is problem. However, it is vital to say that if the value of the shareholders' equity goes down, ROE goes up. Therefore, write-downs and share buybacks can artificially boost ROE. Likewise, high levels of debt can artificially increase ROE; after all, the

more debt a company has, the less shareholders' equity it has, and the higher its ROE is.

2.5.2 Return On Assets (ROA)

Return on Assets (ROA) is a form of return on investment which measures the profitability of a business in relation to its total assets. ROA which is a ratio is an indicator which shows the performance of a company and how good the company is on making profit from the capital that she has invested in fixed assets. If the return is high then the management is more productive and efficient on utilizing economic resources. Below you will find a breakdown of the ROA formula and calculation.
The formula for ROA is:

ROA = Net Income / Average Assets

Where, net Income is equal to net earnings or net income in year (annual period). Average Assets is equal to ending assets minus beginning assets divided by 2.

Return on assets is a vital ratio which plays role in analysing a company's profitability. It can be used so as to compare a company's performance between periods, or between two different firms which have similar size and compete in the same industry. When we use ROA we must know that it is important to consider the scale of a business and the operations that are performed. For instance, a business that is capital-intensive and possessing high value fixed assets will have a higher asset base than a similar business with a lower asset base. Though the two may have a similar income, the business that is more capital-intensive will have a lower ROA due to the larger denominator.

2.5.3 Hypothesis behind NPL (Non-Performing Loans) creation

Berger and De Young (1997) tried to understand the reasons behind NPLs creation. They used Granger-causality techniques so as to test four hypotheses concerning the relationship between loan quality, cost efficiency and bank capital taking a sample of US commercial banks for the period 1985-1994. These four hypotheses were “bad luck”, “bad management”, “skimping”, and “moral hazard”. After they had specified the hypotheses they started to construct a model and by using Granger-causality techniques they tried to examine which hypothesis is more related to the data they had collected. The results showed them that bad management was the one of the four hypotheses which was more vital and played the most significant role in whole sample that they examined. The results showed them also one more reason for having NPLs increased. This reason is because bank capital ratios were low, suggesting at moral hazard incentives driving inadequately capitalized banks towards taking a high portfolio risk.

Apart from Berger and De Young (1997), Podpiera and Weill (2008) examined the existence of a causal relationship between NPLs and cost efficiency. They did that by taking a dataset which included all Czech Banks from 1994 to 2005. They extended on the Granger causality framework that Berger and De Young (1997) used by applying the generalized method of moments (GMM) and using dynamic panel estimators. The results showed them that bad management was the hypotheses which was related to the NPLs increase.

2.6. Altman's Z-score

Altman's Z-score is a statistical tool which is used to calculate the probability that a company will go bankrupt. Altman tried to devise the Z-score in 1960's but his try to predict which companies are going to go bankrupt at that time was almost impossible. Nonetheless, Altman added multivariate analysis. This analysis is a technique which was used to reflect the effects of ratios on the predictiveness of his model and also to reflect the way that these ratios influence each other in the model and show how useful they are. Z-score was advanced after the evaluation of 66 firms. He organised 22 ratios in categories. Those categories are liquidity, profitability, leverage, solvency and activity and finally he reduced the ratios in to five only.

At this point we are going to make an example to see how Altman's Z-Score works.

The formula for the Z-Score (which incorporates those seven simple pieces of data) is: Z-Score = ([Working Capital / Total Assets] * 1.2) + ([Retained Earnings/ Total Assets] * 1.4) + ([Operating Earnings/ Total Assets] * 3.3) + ([Market Capitalization/ Total Liabilities] * 0.6) + ([Sales/ Total Assets] x 1.0)

Generally, if we have high chance of bankruptcy then the score is low. For example, a Z-Score above 3.0 indicates financial soundness below 1.8 suggests a high chance of bankruptcy.

Z-Score for Private Companies

In 2002, Altman encouraged a revised Z-Score formula for private firms. The private company version weights the variables differently

and uses book value of equity in place of market capitalization. The formula is:

Z-Score = ([Working Capital / Total Assets] x 0.717) + ([Retained Earnings / Total Assets] x 0.847) + ([Operating Earnings / Total Assets] x 3.107) + ([Book Value of Equity / Total Liabilities] x 0.420) + ([Sales / Total Assets] x 0.998*)*

Chapter 3: Empirical Framework

3.1 Data Collection

First of all, we have to describe the relationship and the difference between the sample and the population. Often many people and especially students cannot understand the exact difference of those two. Let's see which is the difference of between sample and population.

First, our sample is the group of European commercial banks who actually participate in our study. These are the banks who actually complete our survey. Banks who could have been participants in our study but did not actually participate are not considered part of our sample.

On the other hand, our population is the broader group of banks to which we intend to generalize the results of our study. Our sample will always be a subset of our population. Consequently, we can think that our sample is the aquarium and our population is the ocean.

The purpose of this dissertation is to examine if there is a relationship between the profitability of European commercial banks and their credit risk management from 2007 to 2016. If indeed there is some kind of relationship between those two then we are going to try to distinguish it and see in what way the credit risk management affects bank's profitability. The reason we chose 15 banks from the large number of banks in Europe is because those banks have the largest total Assets which means that the regulators control those banks more strictly and it is easier for us to find the results we are seeking. Another reason for this choice is the fact that these 15 banks have published the data we actually needed for our research and we could have access to them easily. Speaking of the period we chose to analyse (2007-2016) we can say that it was a wise choice because we

had many economic events and may economic problems in European banks and generally in European economy. For instance, we can see the big economic crisis Greece went through and suffers until today. Not only Greece suffers this situation but some other European countries also. Our desire initially was to try to analyse a larger period not only the decade from 2007 to 2016 because we thought that the results of our analysis would be more stable and trustworthy but it was impossible cause data for other periods was hard to find.

The variables we are going to use are:
NPL (Non-Performing Loans) which is going to be the proxy for credit risk management.
ROE (Return on Equity) which is going to be the proxy for profitability
Net Profit & Total Assets

3.2 Hypotheses

After having selected the proxies that we are going to use to represent credit risk management and the profitability we are going to assume the following. It is worth to mention at that point that other authors have been comprehensive about the relationship between credit risk management and the profitability of banks so this is what pushed me in studying this.

Hypotheses 1: There is no correlation between NPL, ROE

Hypotheses 2: There is no correlation between ROE, Net Profit

3.3 Common known problems

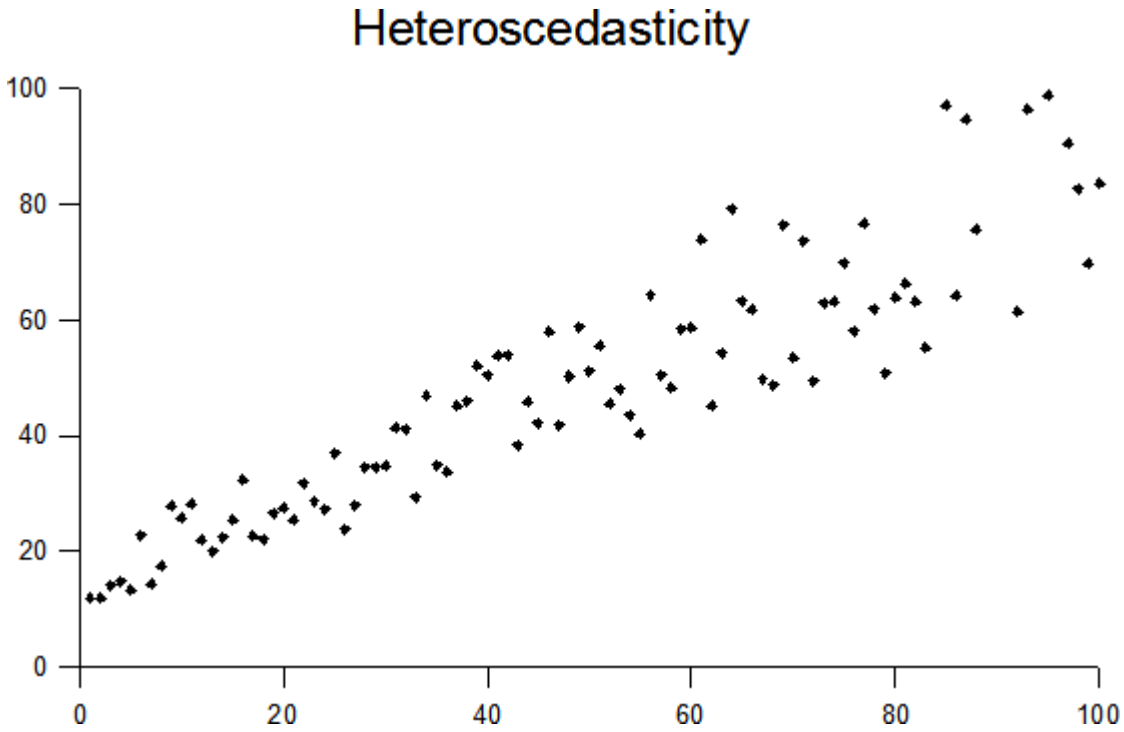
3.3.1 Multicollinearity

Multicollinearity occurs when two or more of our variables are highly correlated. In other words, one predictor variable can be used to predict the other. This creates unnecessary information, skewing the results in a regression model. Just to understand multicollinearity better we can state some examples. First, a person's height and weight or years of education and annual income. We can see that those predictor variables are highly correlated between them.

A problem that usually occurs is how are we going to understand or detect multicollinearity. An easy way to detect multicollinearity is to calculate correlation coefficients for all pairs of predictor variables. Correlation coefficients are used in statistics so as to measure how strong relationship exists between two variables. We can see perfect multicollinearity if the correlation coefficient is exactly +1 or -1. If we have this result then we have to remove one of the variables of the model if possible. Multicollinearity can lead our regression in having awkward unreliable and unstable results such as very small t-statistic and very wide confidence intervals which means that it is difficult for us to reject the null hypothesis. Also, we may have as a result large standard errors.

3.3.2 Heteroscedasticity

Heteroscedasticity comes from a Greek word and means data with a different scattering. More simply whatever is not homoscedastic is heteroscedastic. More technically, it refers to data with non-equal variability across a set of second, predictor variables.



Many times, in statistics we don't care about heteroscedasticity. But if we are running a regression analysis heteroscedasticity can lead us in false results and we will have biased coefficients. As a result, we want to make sure that we are not in this situation. The easiest way is to make a scatter graph. If there is heteroscedasticity, the good news is that using OLS to estimate provides unbiased estimates of the coefficients. But it also creates two different problems: (1) the OLS estimates of the coefficients are inefficient and (2) ignoring

heteroscedasticity leads to biased estimates of the OLS standard errors in practice and hence biased statistical tests of the coefficients. (Heteroscedasticity in Regression: Detection and Correction by Robert L. Kaufman)

3.3.3 R-squared

R-squared is a measure in statistics which shows us how close the data are to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determination for multiple regression.

The definition of R-squared is straight forward. It is the percentage of the response variable variation that is explained by a linear model. Or:

R-squared = Explained variation / Total variation

R-squared is always between 0 and 100%:

- 0% indicates that the model explains none of the variability of the response data around its mean.
- 100% indicates that the model explains all the variability of the response data around its mean.

Generally, a high R-squared, shows us that the model fits our data well. However, there are vital conditions for this recommendation that we will state them both in this post and our next post.

Chapter 4:

4.1. Empirical Model

The technique we decide to use to build the model is Ordinary Least Squares (OLS). Our empirical model is the following.

$$Yi = \beta o + \beta 1 X1i + \beta 2 X2i + \ldots + \beta \kappa X \kappa i + ei$$

Therefore, we are going to perform the following regression.

$$ROE = \beta o + \beta 1 * NetProfit + \beta 2 * NPL + \beta 3 * TotalAssets + et$$

It is a linear model which contains one dependent variable and three independent.

There are 7 assumptions to make for OLS estimators to be best available:

1. Linear regression model.
2. The error term has a zero population mean.
3. No correlation between the error term and the explanatory variables
4. No serial correlation.
5. No heteroscedasticity.
6. No perfect multicollinearity
7. The error term is normally distributed.

4.2 Heteroscedasticity Test

At this point of our research we are going to conduct a heteroscedasticity test. In other words, we are going to check if the variance of ROE is stable. The command we use in Stata program is:

<< estat hettest iid >>

The null hypothesis is that the variance of ROE is stable and the alternate is that the variance is not stable.

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROE

         chi2(1)      =     3.15
         Prob > chi2  =   0.0758
```

The results show us that p-value for X^2 equals to 0.0758 which is greater than 0.05 so we accept the null hypothesis which tells us that ROE has stable variance.

Furthermore, by using the command **"estat hettest NPL TotalAssets NetProfit, iid"** in Stata program we can check if any variable causes heteroscedasticity in our model.

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: NPL TotalAsets NetProfit

         chi2(3)      =     3.42
         Prob > chi2  =   0.3306
```

We can see from the results that p-value for X^2 equals to 0.3306 which means that no variable causes problem in our model.

4.3 Results

Source	SS	df	MS	Number of obs =	150
				F(3, 146) =	4.76
Model	6.71008981	3	2.2366966	Prob > F =	0.0034
Residual	68.5603043	146	.469591126	R-squared =	0.0891
				Adj R-squared =	0.0704
Total	75.2703941	149	.50517043	Root MSE =	.68527

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
TotalAsets	-1.40e-11	1.28e-10	-0.11	0.913	-2.67e-10	2.39e-10
NetProfit	7.41e-08	1.98e-08	3.75	0.000	3.50e-08	1.13e-07
NPL	2.01e-09	3.21e-09	0.63	0.532	-4.34e-09	8.37e-09
_cons	-.0626742	.072701	-0.86	0.390	-.2063565	.081008

The Stata output showed us some interesting and secure conclusions for both the hypothesis we made in previous chapter. As we can see from the output, NPL's p-value is equal to 0.664. If we compare this with the level of statistical significance which equals to α=5% immediately we cannot reject the null hypothesis which shows us that there is no correlation between NPL and ROE. On the other hand, Net Profit's p-value equals to 0.000 which easily tells us that the independent variable Net Profit plays a very important role in the profitability of a commercial bank. The results are not in accordance with the results of previous researches that have been conducted including the research of Ara, Bakaeva and Sun (2009) and Tibebu (2011). We can say that our data play a significant role in our results in the period we conduct the research (2007-2016) and this happens because of the bad economic situation in Europe at that time. Also, if we have a look at the results and especially in R-squared and adjusted R-squared we can understand that although there is no correlation between the variables and most of them are statistically insignificant we have a good fit model finally because of R-squared which equals to 98%. This was actually an expected result because as we have previously told this is a common problem for such models because of

multicollinearity. Another clue that makes us doubt about the data that we have analyzed are the coefficients of our independent variables. For instance, if we check NPL's coefficient we can see that it is positive which means that if we increase a bank's NPLs this will lead in increasing the profitability also. If we think it logically this cannot happen in real life and this makes us assume that banks at that period have appeared some strange data. Our model though justifies us in a way because as we know in reality, banks have a lot of issues and uncontrolled mode. At this point we ought to emphasize that the profitability of a commercial bank depends on many factors and especially on internal control, external control and external factors like the economic environment that a bank functions. Based on this, economic crisis has a great effect on banks and the system's risks affect a lot the profitability of the banks. Finally, ROE can be affected irregularly in economic crisis periods that's why we don't have correlation between ROE and every variable separately.

4.4 The example of Greece

In this chapter, we will analyze the case of Greece as well as the four biggest banks that operate in it so as to examine the lucrative process, the results of the financial crisis and the effort for reconstruction. The four big banks about which we will examine are Alpha Bank, Eurobank, Piraeus Bank and National bank of Greece. The data we have collected are from 2007-2016 in order to give more emphasis to the period of economic crisis. By analyzing the data we made some very interesting observations about the profitability of banks. It presented some particular and irrelevant variations due to non normal data we collected about the independent variables.

Firstly, we are going to examine Eurobank by presenting some tiers and some diagrams showing how the profitability is changing through those years.

4.4.1 Eurobank

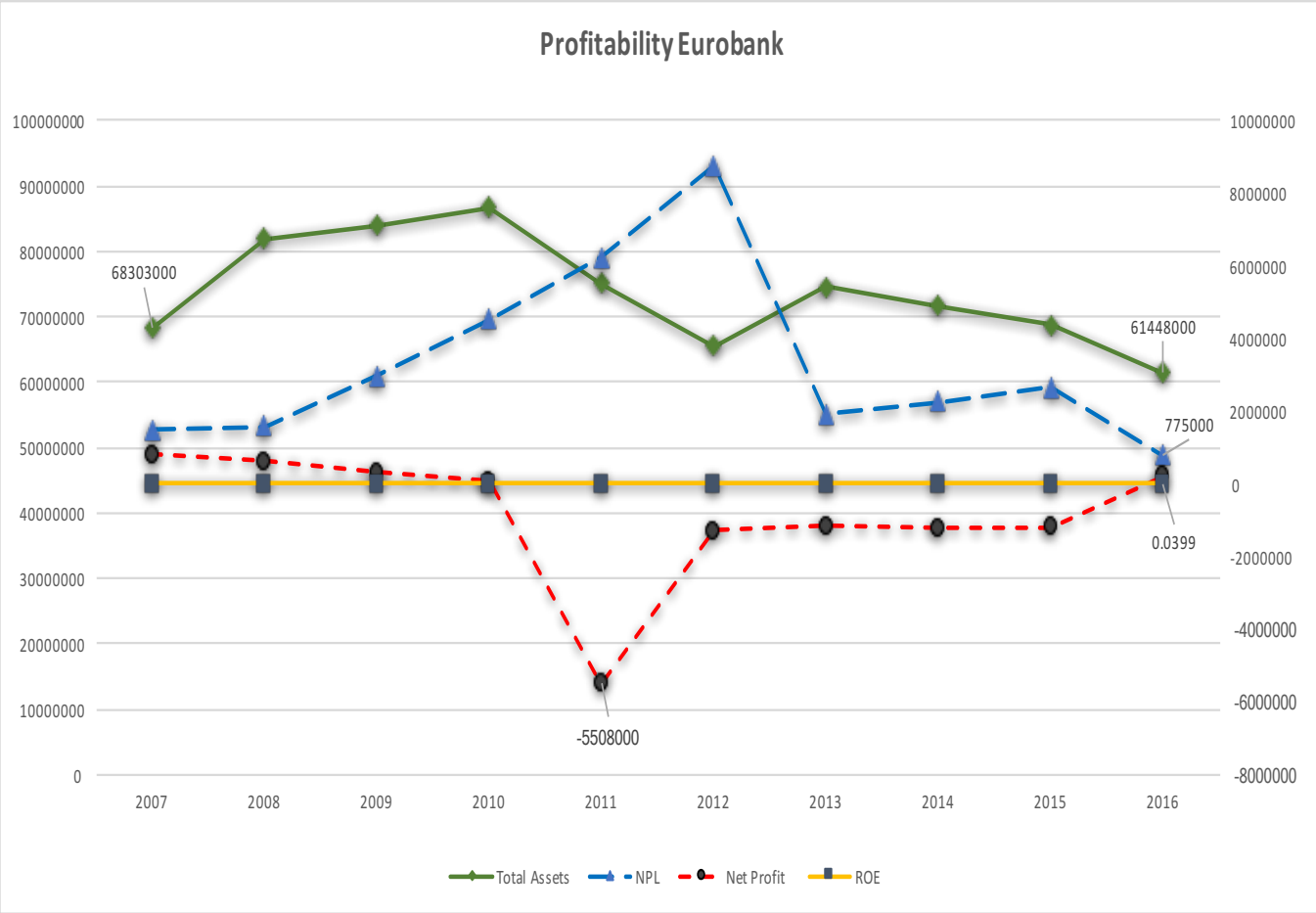
As it appears in the chart below, Eurobank presents a lot of changes through the years that we examine. Especially the years 2009 to 2012, when the economy of the country faces economic crisis we notice an uncontrollable process of the bank. For example, in the year 2011 the Non-performing loans were equal to 6 billions, at the same time that the profitability was negative and well equal to -5.5 billions Euro.

Tier 1. Eurobank's data for 2007-2016 in thousands of Euros

Date	Total Assets	NPL	Net Profit	ROE
2007	68303000	1474000	815000	0,1917
2008	81953000	1577000	616000	0,1717
2009	83880000	2974000	305000	0,071
2010	86685000	4534000	68000	0,0169
2011	75096000	6224000	-5508000	-0,01
2012	65547000	8729000	-1268000	-0,01
2013	74523000	1920000	-1154000	-0,3505
2014	71624000	2264000	-1219000	-0,2601
2015	68694000	2655000	-1181000	-0,2142
2016	61448000	775000	230000	0,0399

**source: Datastream*

Diagram 1. Profitability Eurobank 2007-2016



In the diagram above we can see the course of the independent variables that we investigate for the years 2007-2016. At the beginning of 2007 non-performing loans are more than the profits of the bank, but yet they don't have huge deviation. In the year 2008 and onward, the year that the crisis was more apparent, the bank started being influenced showing signs of inability to cope with it. Non-performing loans started increasing with the top year 2012, when they reacted the 8 billion Euros. In the same period the profitability of the bank is starting to follow the opposite route and it is decreasing with top year 2011, when the bank had losses equal to 5.5 billion Euros.

This difference between the profitability and non-performing loans shows the need of the bank to be helped not being able to cover its obligations itself. On the other hand, ROE as a ratio shows a relevantly stable process with minimum fluctuations as well as negative returns in the period of crisis. This need of the bank to be helped led to the decision of recapitalization. Eventually, in 2016 having gone through 2 recapitalizations and many changes in its operation the bank managed to increase the profit process reducing the NPLs to a great extend.

Source	SS	df	MS	Number of obs =	10
				F(3, 6) =	0.48
Model	.057244285	3	.019081428	Prob > F =	0.7098
Residual	.239984719	6	.039997453	R-squared =	0.1926
				Adj R-squared =	-0.2111
Total	.297229004	9	.033025445	Root MSE =	.19999

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
TotalAssets	2.55e-09	8.11e-09	0.32	0.763	-1.73e-08	2.24e-08
NPL	2.03e-08	3.20e-08	0.64	0.549	-5.80e-08	9.87e-08
NetProfit	4.81e-08	4.35e-08	1.11	0.311	-5.83e-08	1.55e-07
_cons	-.2512588	.6040747	-0.42	0.692	-1.729376	1.226859

Finally we show the STATA output as well which shows us the observations we made through Eurobank's diagram.

4.4.2 National Bank of Greece

Now, we will discuss the case of national bank of Greece. We can distinguish from chart 2 we provide below, that the bank runs more capitals but at the same time, it owns more NPLs than the previous bank. We can conclude that this occurs because the bank holds a bigger percentage of the market regarding the deposits it operates. Because of this NBG had also bigger problem through the years of economic crisis.

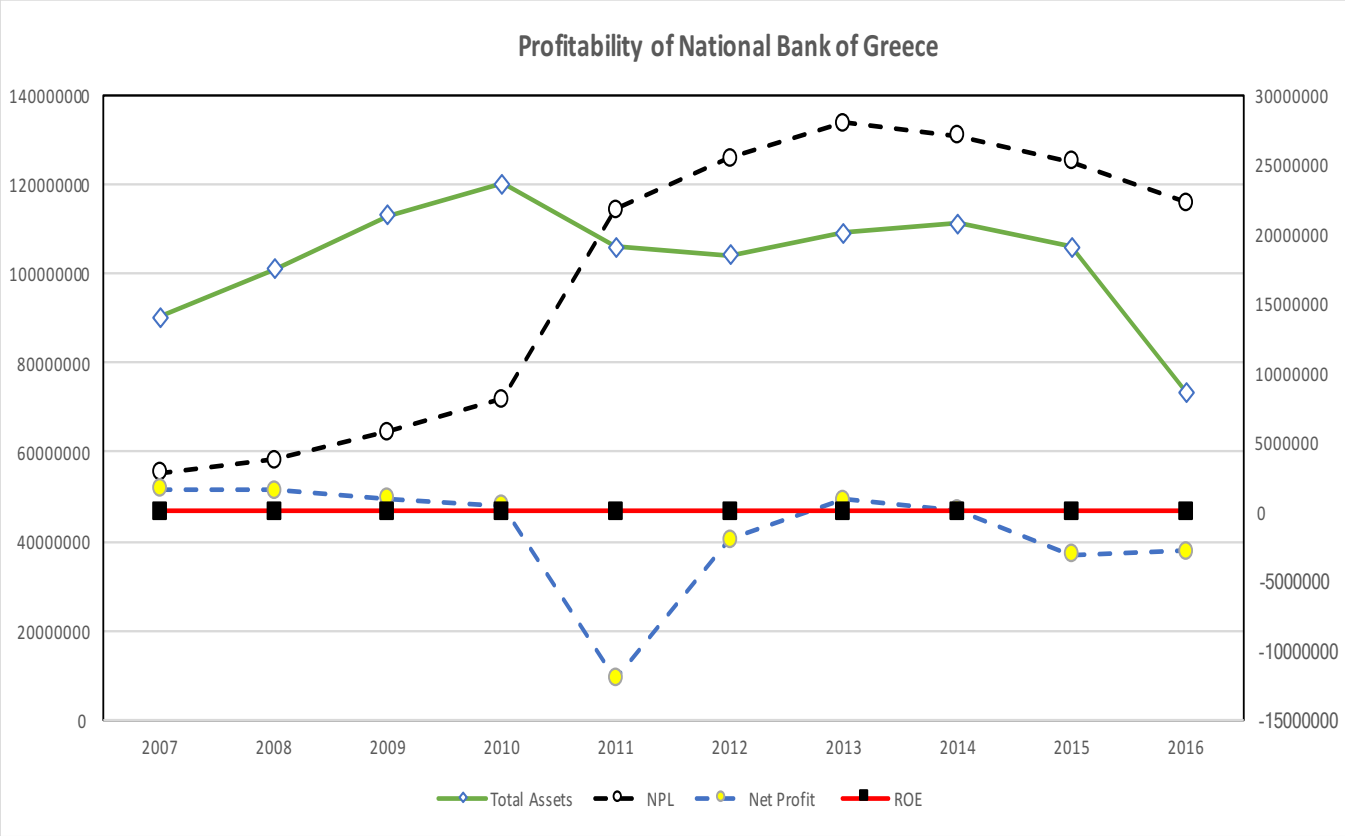
Tier 2. NBG's data for 2007-2016 in thousands of Euros

date	Total Assets	NPL	Net Profit	ROE
2007	90097244	2767797	1625315	0,2512
2008	101000000	3675600	1546012	0,277
2009	113000000	5761178	922568	0,1196
2010	120000000	8095371	443945	0,0498
2011	106000000	21714132	-12000000	-0,01
2012	104000000	25468920	-2025817	-0,01
2013	109000000	27940000	864000	0,1501
2014	111000000	27057000	66000	0,0069
2015	106000000	25213000	-3101000	-0,4386
2016	73453000	22195000	-2887000	-0,418

**source: Datastream*

For example, in 2008 the bank owns 101 billions Euro in total assets, that give as a profit only 1 billion euro the same time that NPLs rise in 3 billions euro. That year the profitability of the bank is 27%, which means that the shareholders are paid with the 27% of the net profit.

Diagram 2. Profitability National Bank of Greece 2007-2016



Looking at the diagram 2 we can conclude the crucial situation of the years between 2009-2015. More especially in 2011 the National Bank of Greece has losses rising up to 12 billion Euro at the same time that non-performing loans were equal to 21 billion Euro and were showing upturn. Because of this difference NBG in 2012 proceeded in

one of the biggest recapitalizations that had occurred until then or else the bank would go bankrupt which meant that all the depositors would lose their money. In 2012 the banks shows a recovery caused by issuing new shares and by getting help by (ΤΧΣ). The bank went in another recapitalization in 2015 because as we can see in diagram 2 there were losses at that time.

Source	SS	df	MS	Number of obs =	10
				F(3, 6) =	1.76
Model	.256098368	3	.085366123	Prob > F =	0.2536
Residual	.290339452	6	.048389909	R-squared =	0.4687
				Adj R-squared =	0.2030
Total	.54643782	9	.060715313	Root MSE =	.21998

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
TotalAssets	6.19e-09	5.61e-09	1.10	0.312	-7.54e-09	1.99e-08
NPL	-1.14e-08	7.68e-09	-1.49	0.187	-3.02e-08	7.34e-09
NetProfit	1.09e-08	1.97e-08	0.55	0.600	-3.74e-08	5.92e-08
_cons	-.4315708	.5954216	-0.72	0.496	-1.888515	1.025373

If we have a look at the STATA output above and particularly at R-squared we can easily come to the result that there is little correlation between our variables and profitability which shows that generally there are lots of problems in the operation of the bank.

4.4.3 Alpha Bank

At this point, the next case we are going to analyze is the case of Alpha Bank.

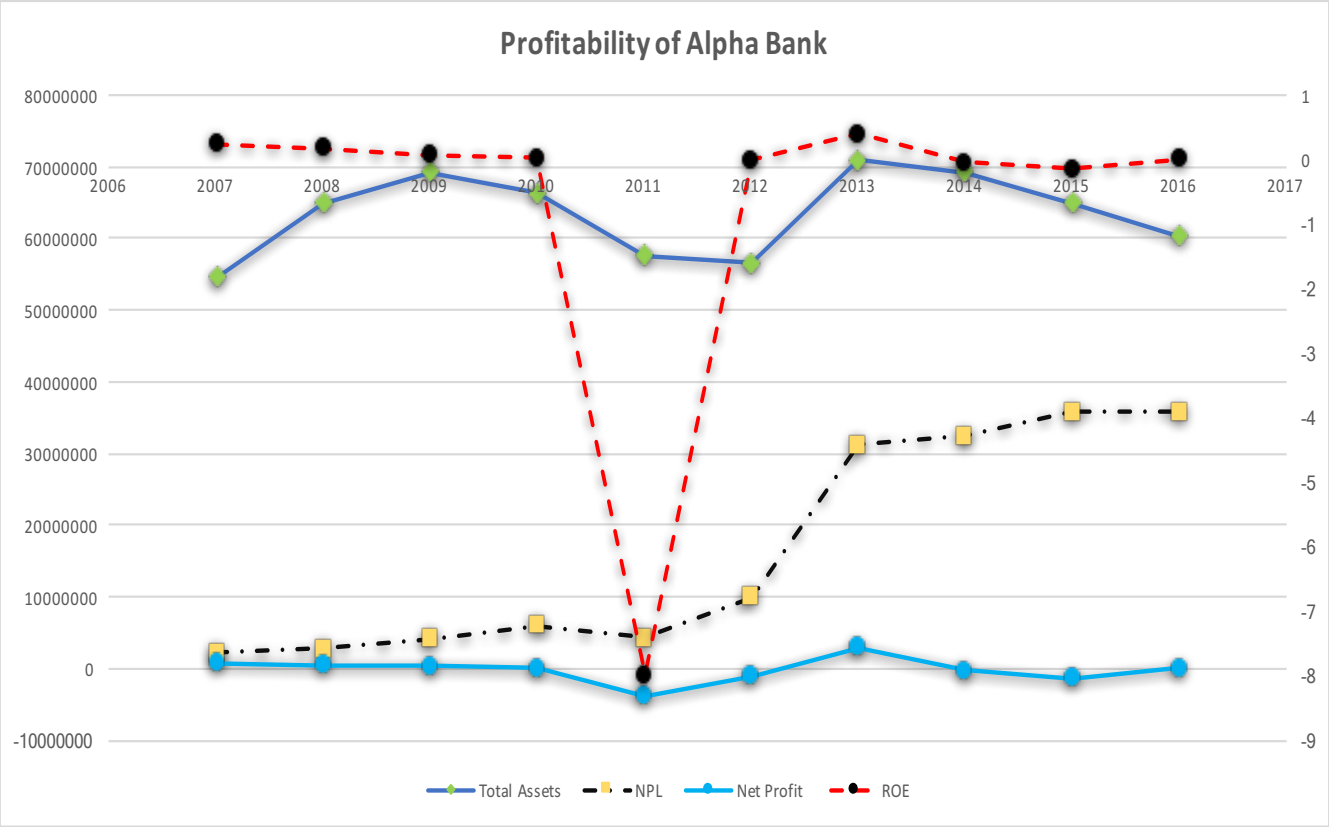
Tier 3. Alpha Bank's data for 2007-2016 in thousands of Euros

date	Total Assets	NPL	Net Profit	ROE
2007	54514032	2185660	850035	0,2522
2008	64936455	2810134	512067	0,1695
2009	69302758	4100714	349814	0,0789
2010	66370761	6070222	85649	0,0201
2011	57681071	4357137	-3810169	-7,9835
2012	56557432	10003610	-1086284	-0,01
2013	70908579	31146444	2922169	0,3964
2014	69246015	32481304	-329809	-0,0431
2015	64898058	35810829	-1371714	-0,1522
2016	60353220	35779941	42140	0,0046

**source: Datastream*

The columns that interest us more, are the ones of Net Profit and NPL. We notice that NPLs are constantly increasing with the exception of the years 2010 and 2011. Respectively Net Profit are decreasing a lot for the bank with a peak in 2011 that the bank has losses equal to 3 billion euro. In this case, when PSI took place there was a big effect and helped the bank to reduce the financial loss equal to 2.2 billion Euros. Also, ROE seems profitable for the shareholders in the beginning for instance in 2008 the ratio is equal to 17%. It starts decreasing dramatically in 2011 with lower point the -798%.

Diagram 3. Profitability Alpha Bank 2007-2016



The diagram above presents the relationship between the profitability and the rest of the variables. We can observe the course that our data followed based on the banks operation. We easily conclude that the bank's operation in 2007-2016 did not serve positively the economy and did not follow the regulation of Basel III which determines the functions and the operation of a bank.

Source	SS	df	MS	Number of obs =	10
				F(3, 6) =	3.26
Model	36.3831766	3	12.1277255	Prob > F =	0.1018
Residual	22.3532623	6	3.72554371	R-squared =	0.6194
				Adj R-squared =	0.4291
Total	58.7364389	9	6.52627099	Root MSE =	1.9302

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
TotalAssets	-3.08e-08	1.32e-07	-0.23	0.823	-3.54e-07	2.92e-07
NPL	2.63e-08	4.57e-08	0.57	0.586	-8.55e-08	1.38e-07
NetProfit	1.15e-06	4.21e-07	2.73	0.034	1.20e-07	2.18e-06
_cons	1.007988	8.228688	0.12	0.907	-19.12689	21.14286

.

By analyzing Alpha Bank's STATA output, we feel that we should emphasize that Net Profit is statistically significant with a=5% which is a matter that did not exist in our two previous situations. Furthermore, variables have bigger correlation with the profitability of the bank.

4.4.4 Piraeus Bank

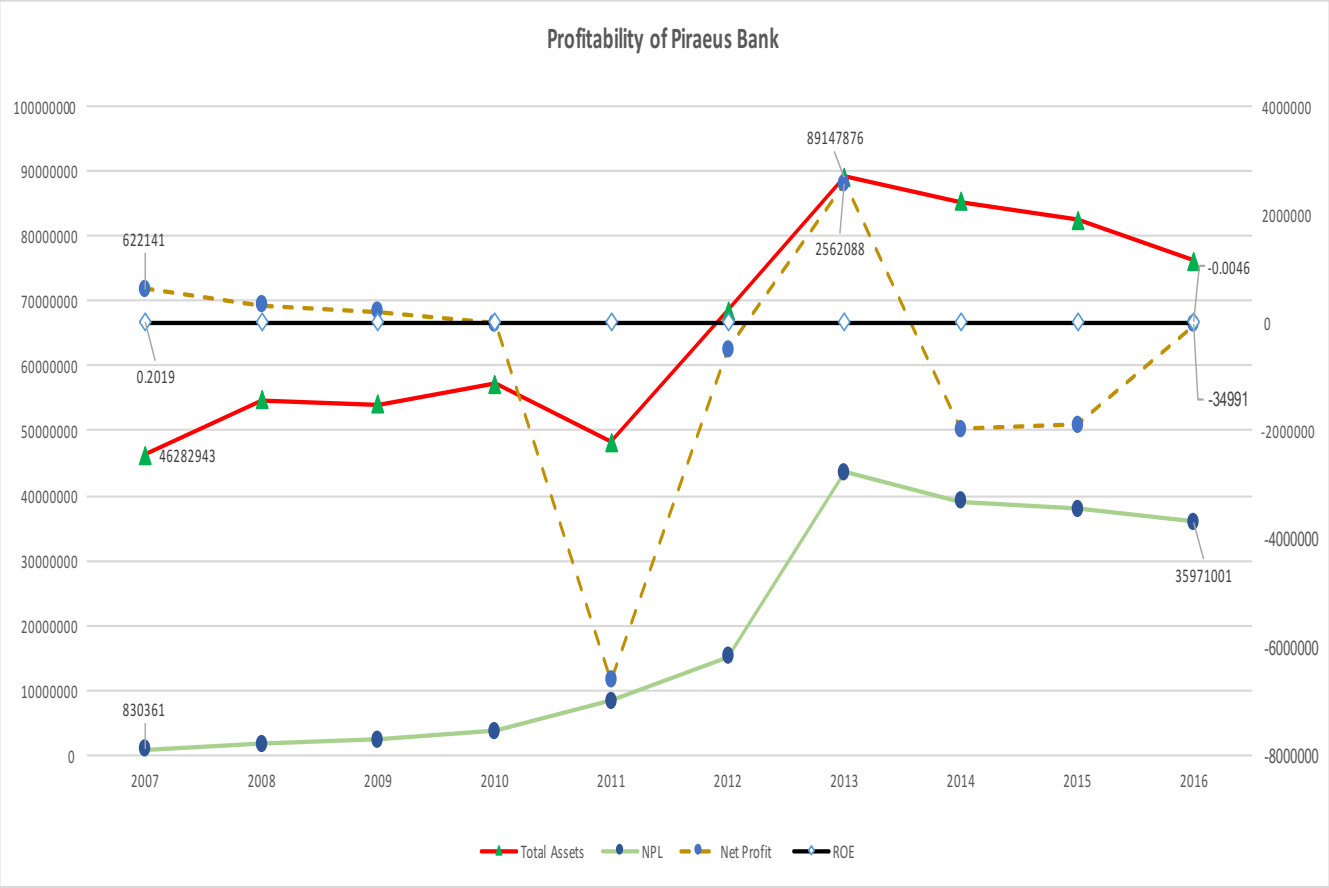
The last case we are going to examine is the case of Piraeus Bank. We can say that the situation of Piraeus Bank does not have too much differences with the other cases we examined. The only difference between them is that the changes that occur in Total Assets, in NPLs and Net Profit are more abrupt. In previous situations, we had smoother changes through the years.

Tier 4. Piraeus's Bank data for 2007-2016 in thousands of Euros

date	Total Assets	NPL	Net Profit	ROE
2007	46282943	830361	622141	0,2019
2008	54635434	1673845	315087	0,1096
2009	53997139	2399773	201749	0,0652
2010	57263458	3745800	-20474	-0,0074
2011	48174316	8290887	-6614136	-0,01
2012	68511037	15174082	-500257	-0,01
2013	89147876	43616362	2562088	0,3339
2014	85270951	39043854	-1965089	-0,2725
2015	82453447	37962302	-1892826	-0,2406
2016	76182186	35971001	-34991	-0,0046

**source: Datastream*

Diagram 4. Profitability Piraeus Bank 2007-2016



We can understand this easily from the diagram above. In 2012 and in 2015 Piraeus Bank asked for financial help from the government and the (ΤΧΣ) so as to manage to continue to operate. As far as ROE concerned at first it was in high levels in about 20% but when economic crisis occurred it started having big decrease and ROE went to -25%. This shows us that NPLs combined with the losses of the bank affect a lot the profitability of the bank. Eventually, in 2016 the bank has not managed to fully recover and continues showing negative profitability which equals to -0.46%.

Source	SS	df	MS	Number of obs =	10
				F(3, 6) =	3.25
Model	.184701736	3	.061567245	Prob > F =	0.1018
Residual	.113495789	6	.018915965	R-squared =	0.6194
				Adj R-squared =	0.4291
Total	.298197525	9	.033133058	Root MSE =	.13754

ROE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
TotalAssets	-2.14e-08	1.22e-08	-1.76	0.128	-5.12e-08	8.30e-09
NPL	1.47e-08	1.06e-08	1.39	0.214	-1.12e-08	4.06e-08
NetProfit	6.70e-08	2.30e-08	2.92	0.027	1.08e-08	1.23e-07
_cons	1.207925	.6240565	1.94	0.101	-.3190861	2.734936

As we examine thoroughly Piraeus bank's STATA output we can distinguish the high correlation between our variables and the profitability of this bank. Also, we can distinguish the significance of Net Profit. At last this bank seems to have the same situation with the other three Greek Banks.

Chapter 5: Banks and European Crisis

5.1. European debt crisis

What is European debt crisis?

It is Europe's failure. Euro that brings together 17 countries of Europe flows in a common but unstable way. For some years now, Greece, Portugal, France, Italy, Spain, Ireland and Germany suffer economic crisis threatening Europe's and the whole world's economies by collapsing.

How did this happen?

Europe was always a continent with boarders and different currencies. Trading between countries was difficult because there were large fees that should be paid and restrictions that should be considered and as a result that was slowing down the economic growth. Then World War II struck and whole Europe was destroyed. After the war, Europe had to remove those restrictions and rules because it was the fastest way to be rebuilt and get strong again. That was the idea of a united Europe. There were not anymore commercial boarders and the costs of trading were very low. Except for all these, there was a big problem that restricted and would still make trading difficult. It was the different currency that countries had. In 1999 Euro was established. It was the currency that all countries of united Europe would use and because of this ECB (European Central Bank) appeared also. Before united Europe the countries could borrow a specific amount of money from other countries with a very big interest rate. For instance, Greece would borrow money with an 18% interest rate but now until 2014 Greece could borrow a larger amount of money in a very low interest rate which would be around 3%. The big crisis burst out in United

States of America in 2007 in the real estate sector. As soon as Lehman Brothers collapsed then the crisis affected immediately the whole world's economies. First, it influenced in a bad way the advanced economies of the United States and Western Europe. The Member States of Europe were hit by the crisis in different ways and degrees. The global financial crisis affected the real economy in Central and Eastern European Union countries such as Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia, Slovakia, Romania and Bulgaria through two main perspectives. First, the credit squeeze affected the borrowing conditions both in companies and households. Second, the downturn in the global economy, affected export demand severely. Speaking of Greece, Greek economy could not function properly due to the fact that Greece could not borrow more money to cover the big expenses and meet up its obligations. Greece and other countries turned to Germany which had a healthier economy. Germany agreed to help under some restrictions of course and austerity measures so as to confirm that debts would be repaid. Generally, the situation was very unstable because countries had different cultures and this is factor that affects a lot the economies. We cannot know the conclusion but we are pretty sure that no country would rather be in disastrous domino.

5.2. Consequences of bad debt for the banks' operations

Bad debt can bring a lots of problems in banks especially when the debt collection process lasts for a long time. This can bring serious damages in the bank and an urgent solution must be found in order to avoid those damages. First of all, if debt collection is slow, bank's quantity decreases. When bank's quantity decreases and is not stable, bank cannot expand their lending and generate any profit. Companies then will not be able to get loans so as to operate properly. As a result, if this situation lasts for years' country's economy is going to be damaged. Secondly, there are many difficulties in the assets settlement. Normally, the debtor is obligated to have the same amount of deposit in the banks so as to manage for his loan to be approved.. When the loan transforms into bad debt the bank will try to settle those deposit assets in order to be paid back which is something very difficult for a bank to accomplish.

Chapter 6: Conclusion

As we said before, the purpose of this dissertation is to examine the relationship between credit risk management and the profitability of commercial banks in Europe. We have collected data from 15 of the biggest European commercial banks from 2007 to 2016. We had to use proxies for both credit risk management and profitability so as to investigate their relationship. We chose ROE (Return on Equity) as proxy for the profitability and NPL (Non-performing loan) as proxy for credit risk management. We made two hypotheses and then used the program STATA in order to run the regressions which would give us the results and answer to the big question we have made. Our empirical results show that there is no significant relationship between ROE and NPL. On the other hand, Net Profit's p-value easily showed us that the independent variable Net Profit plays a very important role in the profitability of a commercial bank. The imperfection of our model, the data and the economic situation at that time in Europe may be some reasons that we don't have substantial relationship between two proxies. If we check NPL's coefficient we can see that it is positive which means that if we increase a bank's NPLs this will lead in increasing the profitability also. So, we come to a result which shows that credit risk management and profitability have a positive relationship which is weird. Some recommendations that we could give are that banks should try harder and put more effort on credit risk management and especially on NPL control. They should take some things seriously and the make their evaluation strict and accurate regarding the ability to pay back when borrowing. Controlling this is an important aspect and they should work harder because European economies rely and depend on banks.

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