

An assessment of the systematic risk & economic performance of Greek banks during the financial crisis

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Abstract

This dissertation aims to examine the banks' position during the recent financial crisis of 2007, focusing on the case of Greece. For this purpose, dissertation is divided in two parts. The first one is the literature review part, where is analyzed the current situation of banks and especially during the recent financial crisis and the second one is the empirical analysis part, where examination of the position of European banks including Greece is being investigated as well as the stocks' beta of four Greek banks. Those banks are Alpha Bank, Eurobank-Ergasias bank, National bank and Piraeus bank. The selection criterion of the specific banks was the large transaction volume that these banks presented over the last years. Each bank's position was examined with the calculation of the mean and median of specific financial ratios: Loans to deposits, loans to assets, equity to loans, deposits to assets and net interest income to interest income ratios. As for the performance, profitability and efficiency of banks, National Bank of Greece is performing better and then follows Alpha Bank, Piraeus bank and Eurobank-Ergasias bank. Financial position of the four banks examined indicates that during the crisis they need to take into consideration the low levels of net interest income to interest income ratios and also the levels of loans to assets and deposits to assets ratios. Better asset management is proposed in order to successfully organize their basic operations, deposits and lending. As for the systematic risk of their stocks, indeed the stocks' beta as derived from the relevant regressions was generally increasing from 2007 to 2011 for each bank, suggesting increasing systematic risk. Last but not least, as the stocks' beta was for each year of the study above unity, this implies systematic risk of their stocks.

Declaration of Originality

*"I hereby declare that this thesis has been composed by myself and has not been presented or accepted in any previous application for a degree. The work, of which this is a record, has been carried out by myself unless otherwise stated and where the work is mine, it reflects personal views and values. All quotations have been distinguished by quotation marks and all sources of information have been acknowledged by means of references including those of the Internet. **I agree that the University has the right to submit my work to the plagiarism detection sources for originality checks.**"*

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List of Abbreviations

LTCM	Long Term Capital Management
ABCP	Asset Backed Commercial Paper
ECB	European Central Bank
IMF	International Monetary Fund
EFG	Eurobank Ergasias Bank
NBG	National Bank of Greece

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Chapter 1: Introduction

This thesis aims to study Greek banks' position and how it is associated with the Global Financial Crisis during 2007 – 2011, focusing on the case of Greece. Liquidity is one of the most popular issues economists have examined lately, especially when concerning the recent financial crisis which first occurred in the U.S. and the Eurozone Sovereign debt crisis later. Especially for the latter, Smaghi (2011) suggested in a conference in Milan that discrepancies observed in liquidity terms as anticipated by the Basel II regulation, will not only affect European commercial banks' liquidity coverage ratio, but also the European Central Bank's too. Due to this predicament, Smaghi proposed a way for the banks to bolster their liquidity. According to him, banks should keep their most liquid assets on their balance sheets, and pledge the more illiquid ones as collateral in the European Central Bank through liquidity-supply operations. Moreover, as Chardouvelis (2009) implied, recovery from the recent financial crisis has not been achieved yet, especially due to liquidity deficiencies. In specific, after Lehman collapsed in 2009, liquidity faced severe shocks. Intra-banking lending was reduced, because banks preferred putting excessive liquidity in central banks than lending to one another.

Great discussion has also occurred for Greek banks' liquidity during the recent financial crisis. As in the Wall Street Journal Pangalos (2011) pointed out, Greek banks confront severe liquidity problems. Liquidity problems as he presents, are a consequence of the decrease in deposits and the increase in withdrawals. As it is suggested, deposits from individuals and businesses fell from €238 billion in 2009 to €206 billion in 2011. In the June of 2011, the deposits fell to €188 billion. As a result, liquidity ratios' levels from 2007 to 2011 are important to be examined for Greek banks. Liquidity though is not the only problem appeared in the recent financial crisis. Another aspect that is interesting to be examined is also the risk of Greek banks. In particular, have Greek banks become riskier to invest during the past years 2007-2011?

1.1 Aims and Objectives

Research aim of this dissertation is to examine Greek banks' position during the recent financial crisis of 2007 and how the latter affected them. For the fulfillment of the research aim of this thesis, further research objectives should be set. In particular, how the recent financial crisis affected the four major Greek banks as for their financial ratios? Has the position of Greek banks deteriorated during the crisis? What is the position of Greek banks during the crisis as for the systematic risk of their stocks? Are their stocks risky or not?

1.2 Structure

For the purpose of the assignment to be fulfilled, this present study will be divided in six chapters. Chapter one is the present introductory, defining the aims and objectives of the study, its significance, as well as the limitations that arise during the analysis of this subject. Chapter two comprises the literature review part. In chapter two, it is presented the basic theoretical background of the recent Subprime Mortgage Crisis and Eurozone Sovereign Debt Crisis. Furthermore, this chapter includes the theoretical background of financial crises and the impact those had in banks' liquidity. Moreover, recent bibliography is presented, for the current position of banks' liquidity during the most recent Global Financial Crisis. In the end of this chapter is also presented a short literature review on the association of banks' risk and the recent financial crisis.

Chapter three is providing the methodology of this present assignment. In particular, in this chapter methodology describes the empirical framework that is about to followed in the empirical analysis chapter. Additionally, this chapter provides the research methods, techniques and tools that are about to be used. Chapter four is the empirical analysis. In this chapter, financial ratios of four Greek banks (Alpha, EFG, National Bank, Piraeus bank) are calculated and are presented the relevant descriptive statistics. In this chapter will also be tested the hypotheses derived from literature review chapter. Chapter five is the most significant for this thesis, as the empirical findings are interpreted and connected with the literature review part. Chapter six is the last one in this dissertation. In this chapter are analyzed the concluding remarks of this study, highlighting the most important results that are significant for the fulfillment of aims and objectives.

1.3 Significance

This assignment provides further study of the way Greek banks were affected from the recent financial crisis as for their performance, through the calculation of specific financial ratios during 2007-2011. The significance is twofold. First, even though Greek Debt Crisis has been in the centre of interest among Eurozone countries, there are not many empirical studies examining the position of Greek banks during the recent financial crisis. Furthermore, literature has not thoroughly examined the banks' risk during the crisis, especially when concerning the systematic risk of their stocks. Thus, this research sheds light especially on Greek banks' position during the crisis, examining their performance during the same period as well as the systematic risk their stocks present.

1.4 Limitations

This analysis aims to calculate financial ratios from the banks of Greece and to estimate the systematic risk of their stocks, during the period of 2007-2011. Although all banks' position is examined and financial ratios are calculated, in this point there should be presented a limitation. This would be the fact that financial ratio analysis would have been different if 2012 financial statements were available. Especially in the case of Greece, Private Sector Involvement affected heavily Greek banks liquidity, by the exchange of old bonds with new ones. If 2012 was included in this analysis, the results could have been more informative. The same applies for the stocks' beta, as announcement of PSI in banking sector have caused further decline in their price.

Chapter 2: Literature Review

2. 1 Overview and background

The term Sub-prime before 2008 was unknown to most of the world as Mathieson (2008) said, cited by Lewis (2009). But, now it is a common term and it is used globally in order to characterize the recent financial crisis. Moreover, according to Lewis (2009), despite the meaning of “subprime” is now common all over the world, the effects a specific sector of the U.S residential market had to the whole world are surprising. Lewis (2009) based on Hughes (2008) data, who has estimated the cost of money needed for the recent financial crisis in contrast with other predicament like the World War II, the Marshall Plan, the Louisiana Purchase, the race to the moon and all NASA spending’s, loan and savings, as well as Korean, Vietnam and Iraq wars, resulted in an inflation adjusted figure that amounts up to less than the current financial crisis. Specifically, only the cost of money of the World War II is close to the current financial crisis.

Literature has shown that subprime mortgage crisis started from the early 2000s. In particular, crisis was the result of extensive house purchasing during the same period. Subprime mortgage crisis in specific refers to the housing bubble occurred from 2000-2005, as a result of the vast amount of loans given at subprime rate. This situation has ended up to home loan foreclosures, due to the inability of paying off the loans. (Foote et.al, 2008; Baily, Litan & Johnson, 2008)

Housing bubble was an outcome of the tension home buyers had to borrow at subprime rates, which were lower than the lowest ones, with the impression that the price of their home would increase, in order to refinance for lower payments. Inflation of housing prices though was not only the result of refinancing for lower payments, but also of consumer spending. Consequently, equity of homes was increased through refinancing and part of it was used for consumer spending. (Longstaff, 2010; Yeager, 2011)

The bubble occurred in late 2005 and led housing prices to decrease, rather than increase. Furthermore, home loans with variable rates could not be paid off, causing a drop in housing values. This incident has led to an accumulation of a great number of homes for

sale, causing prices to decline much more. Subprime mortgage crisis was also caused by mortgage companies, which tended to invest in hedge funds that turned out to be worthless. Thus, those companies have been accountable for a part of subprime crisis, because they had to proceed in bankruptcy and foreclosure of loans. Inability of refinancing with other lenders was a consequence of the difference between the value of their homes and the loans. In fact, the value of homes was lower than the value of the loans. (Sanders, 2008; Ackermann, 2008)

Eurozone crisis was first anticipated in 2008 as a result of the combination of the Global Financial Crisis, as well as the crisis that European countries had to face, revealing the anomalies of the common currency, euro. This incident was responsible for an additional recession to Eurozone countries, disclosing discrepancies among the countries. (Lapavitsas, et al, 2010; European Commission, 2009) Eurozone crisis was first tangible in 2009, in Greece. Greece's government deficits were difficult to be managed without external funding. (Nelson, Belkin, & Mix, 2011) For this purpose, Greece received in the spring of 2010 a bailout package of €110 billion, by the European Union, the International Monetary Fund and the European Central Bank, or else called troika.¹ Greece after receiving this loan was asked to cut short public spending. In May of 2010, the foundation of a contingency fund of €500 billion was approved to bolster the union in general.²

As for other Eurozone countries, those in need of enforcing their economies due to severe problems they faced were Ireland³ and Portugal during 2010,⁴ Italy in 2011⁵ and Spain in 2012.⁶ Those economies have experienced the consequences of the housing bubble. Ireland received a €67 billion bailout and Portugal a €78 billion in May 2011. Italy and Spain presented as a result of the housing bubble high unemployment rates, reaching 20% most

¹ <http://www.france24.com/en/20100502-eu-approves-greece-bailout-package-110-billion-euros-three-years-juncker>

² http://topics.nytimes.com/top/reference/timestopics/subjects/e/european_sovereign_debt_crisis/index.html

³ http://www.nytimes.com/2010/12/07/world/europe/07ireland.html?_r=1&pagewanted=all

⁴ <http://topics.nytimes.com/top/news/international/countriesandterritories/portugal/index.html>

⁵ <http://topics.nytimes.com/top/news/international/countriesandterritories/italy/index.html>

⁶ <http://www.economist.com/blogs/freeexchange/2012/06/euro-crisis-4>

of the times. Eurozone fell into a second recession. In specific, the gravest recessions have been anticipated in Greece and Spain. Especially in the case of Greece, in 2012 a second bailout package of €130 billion was approved and was also demanded in return a slash of budget and privatization proceedings. In Europe, an extensive financial panic could end up in a “plague”, likely to affect other countries of Europe too apart from Greece. In particular, Spanish banks’ position was impaired due to the uncertainties caused by Greek problems.⁷

2.2 Global financial crisis and effects on banking sector

As Brunnermeier (2009) said, the current financial crisis is much more of a “banking crisis”, skipping the fact that the securitization that took place is more extensive than in a “classical banking crisis”. In addition to this, Brunnermeier (2009) indicates that liquidity evaporation is one of the main reasons why liquidity shocks can be transformed into a financial crisis. According to him, liquidity dries up when risk cannot be shared optimally to expert investors. Also, liquidity takes the form of funding liquidity and market liquidity, where funding liquidity refers to a situation that it is easy for expert investors and arbitrageurs to get funding from financiers and market liquidity refers to how easy is to acquire money by selling an asset, instead of borrowing it. Thus, funding liquidity is much more of an issue of debt that a cash flow may generate, when at the same time market liquidity is a transfer of an entire cash flow.

Liquidity creation and banks are two concepts which have been associated in existing literature. Bank’s liquidity creation is based on financial intermediation theory. In particular, the existence of banks in the economy is rather a product of this theory. In the beginning, banks’ role in the creation of liquidity was through the provision of loans, which are considered illiquid assets and the receipt of liquid assets, such as deposits. (Bryant, 1980; Diamond & Dybvig, 1983; Allen, Carletti, & European University Institute, 2008) But as economies and banking systems develop, there is more in the liquidity creation. Recent literature is moving towards a liquidity creation concept that is a result of loan commitments and other claims to liquid funds. (Holmstrom & Tirole, 1998; Kashyap,

⁷http://topics.nytimes.com/top/reference/timestopics/subjects/e/european_sovereign_debt_crisis/index.html

Rajan, & Stein, 2008; Allen, Carletti, & European University Institute, 2008) This role of banks in liquidity creation though, can make them more vulnerable to a bank run. Such withdrawals of large amounts of cash or equivalents are usually responsible for further contagion effects, and those effects are then accountable for crises. (Diamond & Dybvig, 1983; Chari & Jagannathan, 1988; Dell’Ariccia, Detragiache, & Rajan, 2008; Berger & Bouwman, 2009) But, what is really liquidity?

In general, liquidity is a concept that involves two main different notions: Market liquidity and funding liquidity. Market liquidity refers to the case where an asset or financial instrument can be traded without significant effects on its price. (Muranaga & Shimizu, 1999; Gennotte & Leland, 1990; Grossman & Miller, 1988) On the other hand, funding liquidity refers to the facility of withdrawing cash or cash equivalents. This can be achieved either by selling an asset or by borrowing. Liquidity crisis is therefore a result of evaporation of both market and funding liquidity, no matter which type of liquidity evaporates first. (Brunnermeier & Pedersen, 2008; Drehmann & Nikolaou, 2009; Aikman, et al., 2009)

During the current financial crisis of 2007, market liquidity was the first to evaporate, as a consequence of the inability of valuing and trading new financial products in the market. (Brunnermeier, 2009; Borio, 2008) There are some cases though, that funding liquidity was the one to evaporate first. To give an example, this occurred in the turmoil incurred by Long Term Capital Management (LTCM) in 1998. This incident was an outcome of the extensive withdrawal of investors’ funding, as well as of the demands for higher rates. (Committee on the Global Financial System, 1999)

Recent financial crisis has been a trouble for banks’ liquidity. This was reflected on interbank funding in the financial markets of the U.S, Europe as well as of the United Kingdom. Banks were more and more reluctant to borrow to others, because they wanted to preserve some assets in case the situation became harsher and as a protection against uncertainty from the counterparties. According to Berger and Bouwman (2009), banking crises, including the current, have immediate effect on liquidity. Their findings show that in the credit crunch of 1990 and the current crisis there was a prior abnormal positive liquidity creation along with lending standards’ looseness.

Frank et al. (2008) studied the linkage between market and funding liquidity during the recent financial crisis. By developing a time-series GARCH model, they resulted in a sharp interaction of market and funding illiquidity in the recent financial crisis. Furthermore, they examined the way liquidity shocks were transmitted to other U.S financial institutions and to abroad as well. Results from data extracted during the period 2003-2007 showed that some of the factors that assisted in the transmission of liquidity shocks are the range of ABCP (Asset Backed Commercial Paper) and LIBOR-OIS spreads, and CDS prices. In fact, conditional correlations between ABCP – LIBOR, ABCP-CDS, LIBOR-CDS and Returns-CDS are high, showing the interaction between market liquidity and funding liquidity, as factors of transmission of liquidity shocks. These correlations were proven statistically significant.

The connection between the current economic crisis and the problems banks faced in terms of liquidity was made by Cornett et al. (2011). In specific, liquidity problems in banks have been caused due to the collapse of asset-backed as well as mortgage-backed securities markets. Also, Cornett et al. (2011), state that the effects on banks' liquidity during the current crisis are various. Those banks core deposit-backed as well as equity capital funding-backed used to lend the other commercial banks, until liquidity dried up and therefore faced severe problems. On the other hand, those banks that held non-liquid assets reduced lending and increased liquidity of assets instead.

Spiegel (2011) also studied the effects of the recent financial crisis on banking sector. Once the financial crisis hit, interbank lending was reduced, for fear the loans would not have been paid back. (Brunetti, Di Filippo, & Harris, 2011). As Maddaloni and Peydró (Maddaloni & Peydro., 2011) presented, governments may follow policies like lowering lending standards of banks, even not during economic crises. Lowering lending standards may either lead to more investments and increasing economic activity or to economic deterioration if the government policy fails. Maddaloni and Peydró continue their analysis by presenting relevant evidence of the recent financial crisis, showing that most governments had kept low rates for a long time, lending even those of poor credibility.

Acharya et al (2009) studying the way liquidity affects banks and economy in general, showed that bank liquidity as a result of the financial crisis moves countercyclical. That is, when the economic environment is not favorable, banks tend to keep more liquidity. In contradiction, if there is economic prosperity, banks keep low liquidity. What made

matters worse in the current financial crisis, was the fact that there have been many years of economic prosperity and lending was big enough, resulting to low liquidity levels. The sudden hit of crisis, found most of financial institutions undercapitalized.

2.2.1 The case of Greek and European banking sector

For the recovery from Greek debt crisis, in the summit of G-8 in Deauville in France on 28th May 2011, it was decided by France and Germany that private bondholders should contribute in the reduction of the Greek debt, to support Greek economy. This term is commonly known as Private Sector Involvement (PSI) and was firstly introduced in the fore-mentioned summit of G-8.⁸

This term means that banks, insurance companies, pension funds, institutional investors or savers and ordinary investors (but not states or international organisations) are willing to reduce the value of their initial investment in Greek bonds instead of losing all their money in the case of a general default. In March of 2012, six major Greek banks have agreed to exchange bonds. It is estimated that the exchange of old bonds with new ones will reduce their face value by 53.5% and their net present value by 75%. In April, four major banks, National Bank, Alpha Bank, Eurobank and Piraeus Bank, reported great losses, reaching even €28 billion, due to their participation in the Private Sector Involvement, by the exchange of Greek bonds. (Kontogiannis, 2012).

In this predicament, Greek banks would not have been unaffected. In particular, banks are required to operate in an environment of continuously decreasing growth rates, increasing rate of the loans in delay, and of general difficulties concerning the access of money markets and capital markets. The institutions which were the most affected from the crisis were the real estate companies, but major problems face banking and insurance companies as well. (Nelson, Belkin, & Mix, 2011)

As for Greek Banks' Credibility, after the disclosure of the Greek fiscal aberration, chain reactions took place. The first reaction was from the part of the Credit Rating Agencies which having been criticised for the failure of their estimates prior to the international financial crisis, rushed to review the case of Greece. The downgrades of Greece were

⁸ <http://www.economist.com/blogs/charlemagne/2011/12/germany-france-and-euro>

consecutive. Fitch was the first to downgrade Greece on 22 October, one day after the disclosure of twice the deficit in 2009, one grade, from A to A-. On 8th December, Fitch downgraded Greece again, from A- to BBB +. Standard & Poor's also downgraded Greece on December 16th from A- to BBB +. Moody's downgraded Greece as well on 22nd December from A1 to A2. (Nelson, Belkin, & Mix, 2011)

The main effects observed as a consequence of this downturn in the banking system are the increase in non-performing loans, increase in banks' funding costs and also reduction in demand for financial products. In this context banks without exceptions listed as their basic priorities to ensure liquidity and capital through capital injections, issuing of bonds, securitisation, etc., to maintain quality in the loan portfolio with more stringent credit checks, and containment of operating costs by reducing costs and staff compensation. (European Commission, 2009) According to a report from Piraeus Bank (2011), deposit base had declined from 2009 to 2011 about €55 billion. Thus, debt crisis in Greece is still a threat, because there are still problems of solvency and liquidity. (Chardouvelis, 2009) Private Sector Involvement is another factor that leads to bank liquidity problems and recovery from crisis is not feasible yet.

In Europe, as it was mentioned in the overview, not only Greece faced grave problems, but also Ireland, Portugal, Italy and Spain. For this purpose, it is now important to examine each country's bank liquidity position. As for Spanish banks, the losses reported were more than expected. This is the main reason why a top minister implied that Spanish Banks might be in need of further help of European Central Bank (ECB). In specific, deputy economy minister Inigo Mendez de Vigo stated that European Central Bank's further liquidity boost would be of assistance. IMF appreciated for the Spanish banking sector that a liquidity injection of €40 billion would be necessary. Spain did not accept IMF's proposal for slashing public sector salaries as well as increasing VAT. To bolster banks' liquidity, a bailout of €100 billion was recommended, but investors were not convinced.⁹

When it comes to Italy, Italian banking system is formed from many small and medium sized banks and few large ones. The main problem Italian banking system had to encounter just with the apparition of the global financial crisis was the devaluation of assets, due to Lehman Brother's collapse. (Di Quirico, 2010) Italian banks have also confronted harsh

⁹ <http://www.cityam.com/latest-news/spanish-banks-may-need-ecb-liquidity-help>

liquidity problems, according to Morningstar banking analyst Erin Davis. One of the largest banks, UniCredit has claimed extensive access to European Central Bank Funding for Italian banks in general, expanding collaterals' range. This drift was about to enforce Italian banks to fund their balance sheets, because some of them are unable to do so. Furthermore, it should be taken into account that UniCredit as well as Intesa Sanpaolo, two of the biggest banks in Italy, are downgraded to BBB level from Morningstar, while others rate them in the mid-A range. As Davis stated, although Morningstar has formed a more gruelling rating for these banks, in the end this rating was proved to be consistent, given the present situation of Italian banks.¹⁰

Ireland in 2009 was about to encounter insolvency of its banks. The problem faced Irish banks excluding the Bank of Ireland was the fact that their equity value was negative, due to the fall short of assets in comparison with the liabilities. Irish state in order to solve this problem proceeded to liquidity injections. Irish banks' liquidity crisis was an outcome of the slash of external lending from international markets. This shortage of liquidity has made Irish banks to seek new sources of funding. This source was the European Central Bank, which flooded Irish banking system with liquidity. (Markúsdóttir, 2011)

For the case of Portugal, as Ricardo Salgado states, the problem is not only appointed in Portugal's banking system, but in Europe in general.¹¹ More and more banks in Europe rely heavily on European Central Bank's liquidity injections, not only as a result of liquidity shrink, but also of lack of trust. Portuguese banks as others in Europe depend on European Central Bank's liquidity injections. Extensive access to ECB funds was about to counterbalance the loss of access to wholesale financing markets experienced by the Portuguese banking sector. Rescue of Portuguese banking sector was based on a bailout of €78 billion from European Union as well as the IMF. (European Commission, 2011)

Germany is the most powerful economy of the Eurozone. Despite this fact, financial institutions in Germany in 2008 faced severe problems, which led German government to adopt the "German Stabilisation Act", a rescue package of €500 billion. (Fried, Frank,

¹⁰ <http://www.morningstar.co.uk/uk/660/articles/102276/Italian-Banks-Point-to-Serious-Liquidity-Problems.aspx>

¹¹ <http://go.bloomberg.com/euro-crisis/2012-03-06/ecb-largesse-bypassing-portugal/>

Harris, Shriver & Jacobson LLP, 2008) As Reuters implied, German banks need recapitalisation of €127 billion. Recapitalisation refers only to the ten biggest banks.¹²

ECB provided liquidity to the banks in need, in order to reduce interbank spreads, via open-market operations. This policy which was followed during the recent crisis was not successful, because the market did not stop demanding high rates for interbank loans. Brunetti et al. (2011) proposed that everything that functions under normal circumstances it is not certain that it will also be productive during a crisis. As an example, a bank may be not considered solvent for a long time during a crisis, whilst under normal circumstances it would. Liquidity problems arose due to the aggressive intervention of ECB. Lenders are more suspicious when ECB is following aggressive policies in order to provide liquidity and believe that things are worse than they appear. Brunetti et al. also shows that given poor market conditions ECB provided liquidity and that liquidity provision led to further deterioration of the market, which needs more and more liquidity injections.

2.3 Banking sector and risk during the recent financial crisis

In this section will be exposed a brief literature review on banks' exposure to risk during the recent financial crisis, as there is not rich literature on this subject particularly. Although banks seem to better manage risk than other institutions, during the recent crisis did not succeed in maintaining their profits and experienced losses instead. For this purpose, it is therefore important to examine if the risk has risen during the past years during the crisis.

In Huang, Zhou and Zhu (2009) study, results showed that after the collapse of Lehman Brothers in the U.S, systemic risk of banks has presented constant increases, as a result of liquidity evaporation and increase in risk aversion too. Another paper from Acharya, Pesersen, Philippon and Richardson (2010) studied the systemic risk of banks during the recent financial crisis in 2007-2009. Through stress-tests and performance tests, including stocks' beta, they concluded that the risk of banks was increasing.

Bessler and Kurmann (2012) have examined the banks' position in the European Monetary Union (EMU) and the United States (US) during 1990-2011, in order to compare the risk before and during the crisis period. According to them, banks experienced sovereign risk

¹² <http://www.creditwritedowns.com/2011/09/german0banks-need-capital.html>

during the recent financial crisis. This form of risk was reflected in stock prices, something that increases systematic risk through the increase in each bank's stock beta.

2.4 Conclusion

Throughout the chapter of literature review was illustrated the overview and background of the Subprime Mortgage Crisis in the U.S, the Eurozone Crisis and Greek Debt Crisis as a part of the Eurozone Crisis. Having presented this background, banks' liquidity position was analyzed, as many scientists believe that the recent financial crisis was more of a "liquidity crisis", affecting primarily the banks. As this dissertation aims to present the Greek banks' position during the recent financial crisis, there has been a brief interpretation of some key elements which characterize the Greek banking sector and a comparison among other Eurozone countries. Last but not least, there has been exposed the literature based on risk exposure of banks during the recent financial crisis.

2.5 Formation of Hypotheses

Based on literature review chapter, the hypotheses set for further examination are the following:

Ha: Greek banks' systematic risk increased during 2007-2011.

Hb: Greek banks' systematic risk decreased during 2007-2011.

Chapter 3: Methodology

3.1 Overview

This study was conducted in order to examine banks' position during the recent financial crisis, focusing on the case of Greece and how the latter affected them. This chapter will thoroughly explain the research design, the instruments that will be used to answer the research aim, objectives and test the hypotheses set, the model specified, data collection process and data analysis methods.

3.2 Research Design

In this present thesis, the descriptive method of research will be used. This type of research is primarily based according to Creswell (1994) on gathering a certain amount of information about a specific condition. Central position in descriptive method of research holds the focus on describing a condition and not judging or simply interpreting the results. Descriptive research sheds light on a specific situation for which have been set hypotheses for verification, as came up from literature review. The main advantages of this method are its rapidity as well as its practicality when it comes to financial aspect. Furthermore, an equally significant asset of this method is its flexibility, the ability to conduct investigation on matters which arise during the examination of a situation, forming a general proposal framework for further examination.

Given the prior introduction of descriptive research, it can be assumed that this type of method is describing the nature of a certain condition, as it is observed at the time the study takes place and is focusing on the cause that led to a phenomenon. Descriptive research aims at creating a coherent framework for people, events or situations. (Maxwell & Satake, 2005) In this present study, there will be obtained a profile of Greek banks as for their liquidity and for their stocks' risk during the crisis. Descriptive method presupposes knowledge of the researcher of the phenomena, before data collection. It is used this type

of research in order to collect secondary data for formulating conclusions and further recommendations. (Maxwell & Satake, 2005)

In this study, the descriptive research method was employed so as to examine the effect of the recent financial crisis on banks' position, focusing on the case of the Greek banking sector. The researcher adopted this research type setting as the objective to obtain second hand data via the banks' websites. This method offers advantages for the researcher because it is flexible, as for the type that data can be handled and interpreted. In particular, based on descriptive method, both qualitative and quantitative data can be used, which gives the opportunity to the researcher to select the method that suits best for data gathering. (Gravetter & Forzano, 2008) The aim of the research is to determine the association of the recent financial crisis and banks' position in Greece. Banks' position will be analyzed through the presentation of several financial ratios and their descriptive statistics and the estimation of the beta of their stocks, through the regression of the volatility (risk) of their stocks on the volatility (risk) of the stock market as a whole. Thus, descriptive method is the most suitable, because it implies use of quantitative methods.

The research is using secondary data, from the websites of the banks that are members in the Athens Stock Exchange (ASE) market. The data for the estimation of stocks' beta are extracted from DataStream. The data collected are quantitative and thus quantitative data collection method is used. This method relies on the quantification of the connection some variables might have. As a consequence, this data collection method forms relationship among variables. Moreover, this method allows some level of objectivity in the results, because the researcher does not involve in the study. As for quantitative instruments, these appear in the form of numerical data and statistical analysis. Based on this, thorough description of data collection and data analysis will be made in the following sections. (Vogt, 2006; Creswell, 1994)

Quantitative as a descriptive method of research approach does not allow biasedness either in data collection process or in interpreting data. As for data collection, this method forms an objectivity framework that overcomes individuality. When research demands measurement of cause and effect relationships, quantitative method is the most appropriate. Cause and effect relationship also claims a level of objectivity, collecting information that analyses and synthesizes prior experience on the subject being studied. (Maxim, 1999)

3.3 Instruments

In this study, will be used several instruments in order to fulfill its aim and objectives and to test the hypotheses derived from the literature review part. Research aim of this assignment is to examine the effects on banks' position during the crisis, focusing on the case of Greece. For this purpose, data is extracted for the period 2007-2011. 2007 as it was stated in the literature review chapter was the year that Global Financial Crisis was first anticipated and this is the main reason why it is considered as a starting point for this analysis.

Financial ratios reflect the position of banks and how this position changed especially during the crisis, during the period 2007-2011. The effects of the crisis on banks will be examined with the use of certain financial ratios. These ratios are the following:

Financial Ratios:

1. $\frac{\text{Loans}}{\text{Deposits}}$

This index is particularly important for the banking industry, because it shows whether a bank provides more loans than the deposits it has. An index close to unity indicates that every euro deposited from customers to the bank is granted as a loan to another customer. If it is less than one, then it means that the deposits of the bank are higher than its lending. That does not make use of all bank deposits to loans. Finally, a ratio higher than unity indicates that the loans given to customers outweigh the deposits. This means that using the total deposits of the bank and funds from other investment activities in order to allocate funds. (Ketzer, Doogar, & Jensen, 1990)

2. $\frac{\text{Loans}}{\text{Assets}}$

The above ratio shows the percentage loans held from the assets of a bank. Thus, it reflects the percentage of loans which are a part from a bank's assets. This ratio and

the following one examine which part of loans comes from other sources, other than deposits. (Ketz, Doogar, & Jensen, 1990)

3. $\frac{\text{Equity}}{\text{Loans}}$

The above ratio relates the equity of the loans a bank grants to its customers. The index that relates deposits with loans gives some information about which percentage of the loans granted come from customer deposits. This index though shows the percentage of loans which come from a bank's funds and not necessarily only from its deposits. (Ketz, Doogar, & Jensen, 1990)

4. $\frac{\text{Net Interest Income}}{\text{Interest Income}}$

This ratio connects the net interest income of the banks to the total interest income. The higher this ratio is, the better the performance of banks, as related expenses are small. As this ratio approaches unity, net interest income and interest income are close to each other, signaling a small amount of expenses. (Ketz, Doogar, & Jensen, 1990)

5. $\frac{\text{Deposits}}{\text{Assets}}$

This index shows the part deposits hold out of assets. It reflects the ability of banks to utilize investments in assets so as to attract deposits from customers, as it is one of the main sources of obtaining cash. (Ketz, Doogar, & Jensen, 1990)

3.4 Data collection process

To fulfill the aim and objectives and to test the hypotheses of this thesis, several data will be collected in order to calculate the liquidity ratios and to estimate stocks' beta. In specific, data will be extracted for four Greek banks, which are members of the Athens Stock Exchange Market, Alpha Bank, Eurobank Ergasias Bank (EFG), National Banks and Piraeus Bank, during 2007-2011. As for the estimation of stocks' beta, data for the volume of transactions of each stock and the total volume of transactions in the stock market have been extracted from DataStream, from 01/02/2007 to 11/03/2010.

For the calculation of the financial ratios, financial statements of each of the four banks examined were useful tools. Thus, financial statements from those banks were collected and analyzed, from 2007-2011. To find the data needed for the calculation of the index which connects loans with deposits, loans can be found in the balance sheet, as a part of total assets of the bank. Deposits on the other hand can also be found in the balance sheet, but is a part of liabilities.

As for the ratio which links loans with assets, loans and assets are a part of the balance sheet of banks, in total assets. Moreover, for the calculation of the index which associates equity and loans, equity can be found in balance sheet too, as a part of liabilities. Loans as it was stated above are a part of total assets is the balance sheet. The next ratio which will be calculated is the one which provides the ratio of net interest income and total income. Net interest income as well as interest income can be found in the income statement of banks. Last but not least, for the calculation of the ratio of deposits to assets, deposits can be found in the balance sheet, in liabilities side and assets in the balance sheet too.

3.5 Data analysis

After selecting the relevant data and calculating the financial ratios as described thoroughly in previous sections, there will be made descriptive statistical analysis as well as quantitative statistical analysis. First of all, some basic descriptive statistics will be calculated for each bank. These are the mean, median, standard deviation, as well as coefficient of variation from 2007 to 2011. This will assist in the effort to compare ratios of the banks which are being examined. The next step is quantitative analysis, through regressions, as described in previous section.

For each bank of the four will be run five different regressions for each year from 2007 to 2011. The dependent variable will be the annual volatility (risk) of each bank's stock and the independent one the volatility (risk) of the stock market. For these regressions E-Views will be used. The beta coefficients as derived from the regressions are the stocks' beta. The stocks' beta will be compared with 1, as risky stocks present a beta over 1, safe stocks a beta below 1 and stocks with ideal risk premium a beta equal to 1.

Chapter 4: Empirical Results/ Findings

4.1 Financial Ratios

In this section, will be presented the descriptive statistics of each financial ratio calculated for each of the four banks examined, from 2007 to 2011 as a whole. The financial ratios as calculated are found in the appendix, page 45, table 3. In the following table, are calculated the mean, median, standard deviations and coefficient of variation of each ratio.

Descriptive Statistics

		loans / deposits	loans / assets	equity / loans	deposits / assets	net int income / int income
alpha	mean	1,349	0,636	0,077	0,476	0,402
	median	1,278	0,632	0,078	0,490	0,403
	st deviation	0,157	0,017	0,044	0,042	0,048
	coef of var	0,116	0,027	0,571	0,088	0,120
efg	mean	1,063	0,478	0,093	0,457	0,251
	median	1,000	0,476	0,117	0,459	0,251
	st deviation	0,166	0,045	0,054	0,069	0,022
	coef of var	0,157	0,093	0,583	0,150	0,086
nbg	mean	1,013	0,608	0,112	0,610	0,589
	median	1,001	0,606	0,141	0,637	0,607
	st deviation	0,153	0,033	0,075	0,082	0,076
	coef of var	0,151	0,054	0,676	0,134	0,129
piraeus bank	mean	1,408	0,655	0,062	0,469	0,330
	median	1,398	0,650	0,088	0,465	0,328
	st deviation	0,148	0,022	0,074	0,039	0,051
	coef of var	0,105	0,033	1,195	0,083	0,154

Table 1: Descriptive statistics of financial ratios during 2007-2011.

In table 1, are presented the descriptive statistics of the financial ratios which were calculated for the period of 2007-2011. Calculation of mean, median, standard deviation and coefficient of variation concern the period of 2007-2011, for each bank. Thus, it is easier to compare their position and to actually result in whether they performed during the crisis efficiently. As for Loans/Deposits, Piraeus bank presents the highest mean during the crisis (1.408) and then follows Alpha bank. (1.349). EFG and National bank also have an average loans/deposits ratio above unity. (EFG: 1.063, National Bank: 1.013). On average, for those four banks examined loans outweigh their deposits from customers. This actually

means that loans are not coming only from deposits. Median for all banks is close to the relevant level of mean, implying that mean is a representative measure for the distribution, not changing the analysis provided with the mean levels. (Alpha: 1.278, EFG: 1.0, NBG: 1.001, Piraeus: 1.398). This fact is bolstered from standard deviation, which is small. (Alpha: 0.157, EFG: 0.156, NBG: 0.153, Piraeus: 0.148). Coefficient of variation which shows the level of homogeneity in a sample is above 0.1 for all banks, suggesting that loans/deposits data year by year are not homogenous. (Alpha: 0.116, EFG: 0.157, NBG: 0.151, Piraeus: 0.105).

Loans/ Assets ratio shows if loans are holding a large percentage out of assets. For Piraeus bank this ratio on average is the highest of the four banks. (0.655). Alpha bank follows again (0.636), leaving behind NBG (0.608) and EFG (0.478). Median levels are close to the ones of the mean, not differentiating the analysis already provided. (Alpha : 0.632, EFG: 0.476, NBG: 0.606, Piraeus: 0.650). Standard deviation is low, reflecting that the mean is a representative measure for this distribution. (Alpha: 0.017, EFG: 0.045, NBG: 0.033, Piraeus: 0.022). Coefficient of variation for all banks is below 0.1, implying homogeneity of the sample. (Alpha: 0.027, EFG: 0.093, NBG: 0.054, Piraeus: 0.033).

Equity/Loans ratio shows the part of the loans which come from the bank's equity. NBG has the highest one during 2007-2011 on average (0.112) and then follow EFG (0.093), Alpha (0.077) and Piraeus (0.062). Median is close to the mean, as a result of low standard deviation which makes mean a representative measure. (Median- Alpha: 0.078, EFG: 0.117, NBG: 0.141, Piraeus: 0.088, Standard deviation- Alpha: 0.044, EFG: 0.054, NBG: 0.075, Piraeus: 0.074). As for coefficient of variation, data is not homogenous during 2007-2011, as it is way above 0.1 for all banks. (Alpha: 0.571, EFG: 0.583, NBG: 0.676, Piraeus: 1.195).

Deposits/Assets ratio indicates the part of deposits which come from assets. The higher this ratio is, the better the performance of a bank. As this ratio approaches unity, each euro invested for assets is transformed into deposits. NBG has the highest average mean of this ratio (0.610) and then follow Alpha bank (0.476), Piraeus bank (0.469) and EFG (0.457). Median levels do not change this analysis, as its levels are close to the mean. (Alpha: 0.490, EFG: 0.459, NBG: 0.637, Piraeus: 0.465). Coefficient of variation is above 0.1 for EFG and NBG (0.150, 0.134 respectively), implying heterogeneity of the sample. For the other banks though the coefficient is below 0.1. (Alpha: 0.088, Piraeus: 0.083).

Net interest income/interest income shows how close net interest income is after having deducted the related expenses to the interest income. As this ratio approaches unity the efficiency and profitability of banks are rising. NBG has the highest of the four banks average index (0.589) and then follow Alpha (0.402), Piraeus (0.330) and EFG (0.251). Median is close to the mean, as a result of low standard deviation of all banks. (Median- Alpha: 0.403, EFG: 0.251, NBG: 0.607, Piraeus: 0.328, Standard deviation- Alpha: 0.048, EFG: 0.022, NBG: 0.076, Piraeus: 0.051). Coefficient of variation is above 0.1 for Alpha (0.120), NBG (0.129) and Piraeus (0.154). Only EFG shows some homogeneity of the sample. (0.086).

4.2 Hypothesis Testing

In this point quantitative analysis will be applied so as to test the hypotheses set in the literature review chapter. In particular, has the systematic risk of the four banks which are being analyzed, Alpha bank, EFG, National bank and Piraeus bank increased or decreased? The following table 2 consists of the results of the regressions of each bank's risk of stock on the stock market risk, obtaining the beta coefficients, as the stocks' beta.

Stocks' beta					
Alpha Bank					
	2007	2008	2009	2010	2011
Constant	-0.000410	-0.000420	-1.01E-05	-7.47E-05	-0.001875
T-s statistic	-0,591	-0,32	-0,001	-0,06	-0,82
P-value (at 5%)	0,56	0,75	0,99	0,95	0,41
Beta coefficient	1,18	1,14	1,47	1,66	2,02
T-s statistic	16,78	20,86	23,1	28,89	20,39
P-value (at 5%)	0	0	0	0	0
F-statistic	281,73	434,05	533,76	834,65	415,83
P-value (at 5%)	0	0	0	0	0
R-squared	0,52	0,63	0,67	0,76	0,62
Adjusted R-squared	0,52	0,63	0,67	0,76	0,62
Efg					
	2007	2008	2009	2010	2011
Constant	-0.000458	-0.000887	0.000132	0.000159	-0.002838
T-s statistic	-0,62	-0,85	0,099	0,12	-1,27
P-value (at 5%)	0,54	0,4	0,92	0,9	0,21
Beta coefficient	1,14	1,14	1,58	1,8	2,1
T-s statistic	15,11	26,77	24,64	28,94	21,82
P-value (at 5%)	0	0	0	0	0
F-statistic	228,4	716,64	607,48	837,46	476,09
P-value (at 5%)	0	0	0	0	0
R-squared	0,47	0,73	0,7	0,76	0,65
Adjusted R-squared	0,47	0,73	0,7	0,76	0,65
National Bank					
	2007	2008	2009	2010	2011
Constant	0.000201	0.001964	0.000191	-0.000838	0.000245
T-s statistic	0,35	1,73	0,18	-0,87	0,13
P-value (at 5%)	0,73	0,08	0,86	0,39	0,89
Beta coefficient	1,38	1,62	1,7	1,61	1,9
T-s statistic	23,67	34,9	33,34	35,24	23,95
P-value (at 5%)	0	0	0	0	0
F-statistic	560,19	1218,27	1111,67	1241,58	583,64
P-value (at 5%)	0	0	0	0	0
R-squared	0,68	0,82	0,81	0,83	0,69
Adjusted R-squared	0,68	0,82	0,81	0,83	0,69
Piraeus Bank					
	2007	2008	2009	2010	2011
Constant	-0.000115	-0.000434	-0.000188	-0.000600	-0.002857
T-s statistic	-0,16	-0,37	-0,15	-0,53	-1,07
P-value (at 5%)	0,87	0,71	0,88	0,6	0,29
Beta coefficient	1,09	1,26	1,44	1,44	1,74
T-s statistic	15,17	26,42	24,29	26,98	15,1
P-value (at 5%)	0	0	0	0	0
F-statistic	230,17	697,89	589,99	727,71	228,01
P-value (at 5%)	0	0	0	0	0
R-squared	0,47	0,73	0,7	0,74	0,47
Adjusted R-squared	0,47	0,73	0,69	0,74	0,47

Table 2: Stocks' beta from 2007 to 2011.

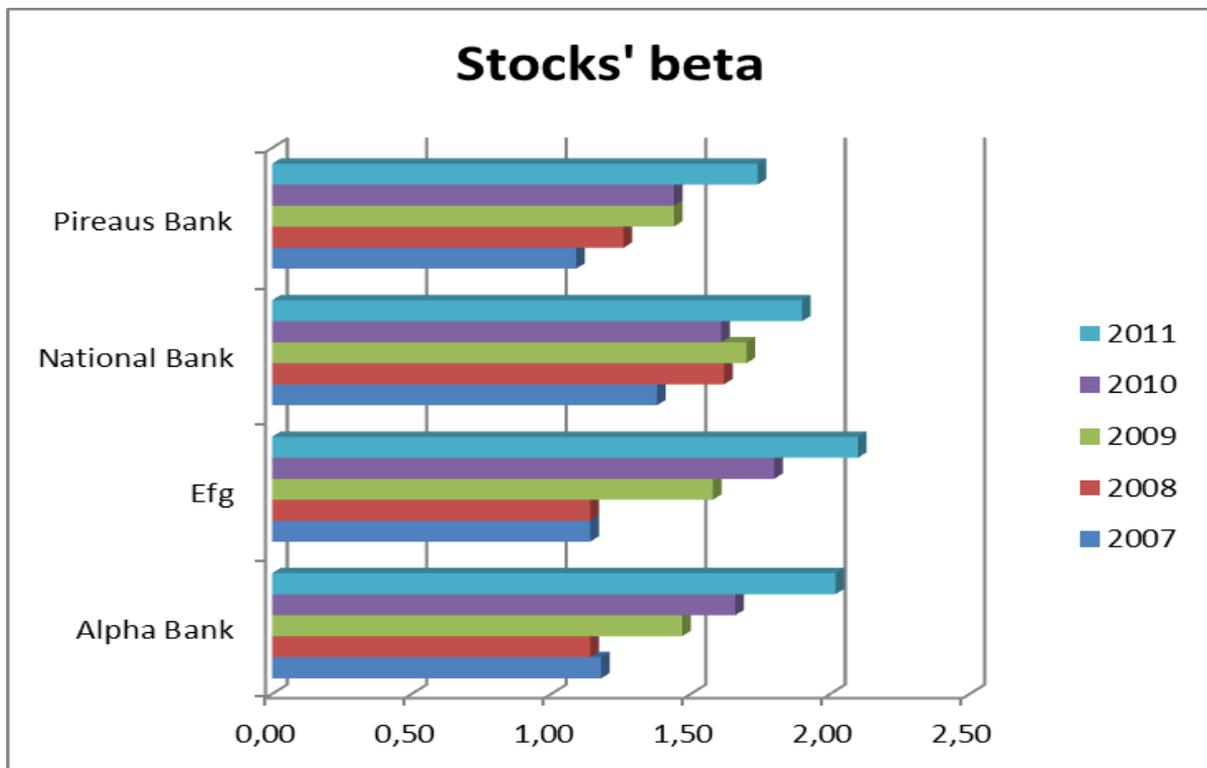
The above table presents the results of the regression of each bank's stock risk on stock market risk. From this regression beta coefficient is extracted, representing the systematic risk. Starting from Alpha bank, constant in the model is for each year non-significant, as reflected from p-values of the regressions. (2007: 0.56, 2008: 0.75, 2009: 0.99, 2010: 0.95, 2011: 0.41). Significance of the regressions is at 0.05 level, and thus a p-value over 0.05 shows that the coefficient is not significant. Beta coefficient for Alpha Bank is over 1 for each year from 2007 to 2011, showing the stock of Alpha Bank was risky. In particular, beta coefficient after bringing forward a small decline from 2007 to 2008 (2007: 1.18, 2008: 1.14) presented increases in the following years. (2009: 1.47, 2010: 1.66, 2011: 2.02). Beta coefficient's p-value shows that is significant at 0.05 level, because it is zero for each year. Alpha bank's stock was getting riskier and riskier during the recent financial crisis. Regressions were overall significant as represented from P-value of F-test. P-value of F-test was zero for each year. R-square and adjusted r-square imply that the explain ability and predictability of the model is sufficient, but not high. (2007: 0.52, 2008: 0.62, 2009: 0.67, 2010: 0.76, 2011: 0.62).

As for EFG bank, results are similar to those of Alpha bank as for the constant, because it is not significant during 2007-2011. As for beta coefficient, it was over 1 during the financial crisis, being risky too, as the one of Alpha bank. In fact, EFG's beta was in the same levels during 2007-2008. From 2008 to 2011 though presented constant increases. (2009: 1.58, 2010: 1.8, 2011: 2.1). Coefficients are significant, as individual t-tests' p-values are zero. The same applies for the overall significance of regressions, as p-values of F-tests are zero too. R-square and adjusted r-square suggest a sufficient explain ability and predictability of the model. (2007: 0.47, 2008: 0.73, 2009: 0.7, 2010: 0.76, 2011: 0.65).

The next bank for analysis is National bank. Constant is not significant for the model. Beta coefficient is again over 1, suggesting systematic risk for its stock during 2007 – 2011. Beta coefficient is presenting constant increases with only exception a small decline from 1.7 in 2009 to 1.61 in 2011 and it is significant for its each year's model. (2007: 1.38, 2008: 1.62, 2011: 1.9). Model is significant for each year studied, as p-values of F-tests are

zero. Explain ability and predictability of the model is high. (R-square and adjusted r-square: 2007: 0.68, 2008: 0.82, 2009: 0.81, 2010: 0.83, 2011: 0.69).

The last bank to be analyzed is Piraeus bank. Constant is again not significant. Beta coefficient is over 1, reflecting systematic risk of its stock. Its beta presents constant increases (2007: 1.09, 2008: 1.26, 2009: 1.44, 2010: 1.44, 2011: 1.74). Betas are all significant during 2007-2011, as t-tests' p-values are zero. P-values of F-tests for the overall significance of the model are again zero. Explain ability and predictability of the model is sufficient, as reflected from R-square and adjusted r-square. (2007: 0.47, 2008: 0.73, 2009: R-square 0.7-adjusted 0.69, 2010: 0.74, 2011: 0.47). The following bar chart compares stocks' betas for the same bank for each year from 2007 to 2011 and also compares the levels of each bank's coefficient in the same year.



Graph 1: Stocks' beta for each bank over the years during the crisis (2007-2011).

As it is presented in graph 1, in 2007 National Bank is the one having the riskier stock. This applies too for 2008 and 2009. In 2010 and 2011 though, EFG seems to have the riskier stock of all the four banks examined. In 2007, the less risky stock was Piraeus Bank's, in 2008 EFG's, in 2009 Alpha Bank's and in 2010 and 2011 Piraeus Bank's.

Chapter 5: Discussion

This section aims at associating the results from empirical analysis with literature review. Empirical analysis targeted at first investigation of the financial position of Greek banks and then to calculate the systematic risk of each bank's stock, through their stock's beta. In this section the research aim, objectives and hypotheses set will be fulfilled. The results are interpreted in this point, so as to conclude is whether the crisis affected the Greek banks, especially Alpha Bank, EFG, National bank and Piraeus bank.

National Bank of Greece (NBG), presents better performance and profitability than the others during the crisis, based on deposits/assets and net interest income/interest income ratios. This means that assets are used efficiently towards the attraction of deposits from customers and that net interest income, which is the interest income after having deducted related expenses, is approaching interest income. This reflects efficiency of NBG's operations. National bank has also the lowest loans/deposits mean/median ratio of the four banks examined. This fact reflects that even though the ratio's level is above unity on average (not way above unity), almost every euro deposited from customers is granted as a loan to another customer. Thus, this is another aspect which indicates that NBG is performing more efficiently than the other banks during the recent financial crisis. Furthermore, NBG's assets are not consisted on a large scale of loans, as NBG presented the second lowest index after EFG. As for the relationship of loans with equity, NBG presents the highest mean/median ratio. This result is connected with the low loans/assets ratio, as loans for NBG are considered to be rather a part of its equity than a part of its assets.

Alpha bank is the next bank which presents good performance during the crisis as for deposits/assets and net interest income/interest income ratios. Although Alpha bank has the second best fore-mentioned mean/median ratios, its loans outweigh its deposits, indicating on average that for every euro deposited, 1.349 euros are granted as a loan. The euros granted as a loan are covered from the bank's assets, as loans/assets mean/median during

the crisis is the second highest for Alpha bank. Loans do not primarily come from equity, as this ratio's mean/median is the second lowest of the four banks examined.

Piraeus bank is the third bank in the row, in terms of deposits/assets and net interest income/interest income ratios. Loans/deposits ratio for Piraeus though is the highest, reflecting that on average for every euro deposited from a customer, 1.408 euros are granted as a loan to another customer. The euros which are granted as a loan apart from deposits seem to come from its assets, as Piraeus has the highest mean/median of loans/assets ratio. Equity/loans ratio for Piraeus is the lowest of the banks examined, bolstering the tension of granting loans from deposits and assets.

EFG bank is the last one to be analyzed. Deposits/assets and net interest income/interest income ratios are the lowest of the four banks. Mean/median of loans/deposits ratio though is above unity, but not much. In fact, for every euro deposited, 1.063 on average is granted as a loan. Although most of its loans come from deposits, it seems that a part comes from equity, as mean/median of equity/loans ratio is the third best of the four banks, whilst loans/assets is the lowest.

As for the systematic risk of their stocks, it seems that the riskier stock for 2007, 2008 and 2009 was National bank's, presenting the highest stock's beta. For the years 2010 and 2011 though, the riskier stock was EFG's. The less risky stock for the years 2007, 2010 and 2011 was Piraeus bank's, for 2008 EFG's and for 2009 Alpha bank's. As for the way each bank's stock's beta was moving, in general terms with few exceptions the systematic risk was increasing during 2007-2011. The level of systematic risk in 2011 was higher than the respective level in 2007, suggesting a rise in the risk of each bond. In general, each stock was risky, as the stock's beta was over 1. The results from this dissertation are similar to studies which examine the banks' risk during the recent financial crisis and the hypothesis for the increase of systematic risk during the recent financial crisis is true.

Associating the way the recent financial crisis affected the examined banks, results are contradictive. In particular, Piraeus bank seems to present the less risky stock for most of the years, but its financial performance, efficiency and profitability was not the best, as it is the third well-operating bank of the four examined. National bank's stock presented systematic risk for most of the years studied, although its financial position during the

crisis as analyzed from the relevant ratios imply that it is performing more efficiently than the other three banks.

Chapter 6: Conclusion

In this present thesis, it was thoroughly analyzed the subject of Greek banks' position during the crisis and how the latter affected them. For this purpose, literature review focused on liquidity and risk with a reference to the general background of the Subprime Mortgage Crisis, as well as the Eurozone Crisis.

Greek banks have suffered losses and evaporation of their liquidity just with the appearance of the recent financial crisis. The things got worse when Greek debt crisis was more than ever present, in 2009. As the recent crisis is more of a banking crisis and liquidity crisis, this dissertation focused on the effects on Greek banking sector.

Results from empirical analysis for the financial position of four Greek banks, Alpha Bank, EFG, NBG and Piraeus bank, showed that during the crisis their position was on average satisfying when it comes to loans/deposits ratio, as its values do not exceed unity in a large scale. This result implies efficiency of the banks' operations. Banks' assets though consist on average in a percentage which varies from 48% to 66% of loans. Such percentages indicate that investments to assets are low. Better asset management is proposed for those banks. Equity/loans ratio is low for all banks, also reflecting the tension of granting loans mostly from deposits, implying efficiency in their operations. Deposits though are a smaller part of assets than the loans are. Thus, the proposal for a better asset management for all those banks examined is again present, as assets should be utilized efficiently to generate income through the bank's basic operations, deposits and loans. As for net interest income as a part of interest income as a whole, these financial ratios need improvement to eventually reach unity. Although it is difficult to diminish expenses, banks should give some consideration on this ratio in order to improve their efficiency and profitability.

In this dissertation though, 2012 was not included in the analysis. After having included in the future 2012 data analysis will be more informative, PSI was announced, making the financial position of banks worse. This announcement should have effect on the transactions of the stocks of those banks, causing a potential increase in systematic risk. Thus, the effects of the recent financial crisis on the Greek banking sector as a whole would be an interesting subject to investigate, not only for their liquidity position, but also

for the systematic risk for their stocks. To include 2012 data for further analysis would shed light on the way PSI as a measure of dealing with the crisis affected the financial position and systematic risk of Greek banks.

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Appendix

Financial Ratios

		loans / deposits	loans / assets	equity / loans	deposits / assets	net int income / int income
alpha	2007	1,511	0,653	0,078	0,432	0,395
	2008	1,248	0,632	0,056	0,507	0,328
	2009	1,186	0,616	0,114	0,520	0,403
	2010	1,278	0,626	0,015	0,490	0,457
	2011	1,522	0,655	0,123	0,430	0,429
efg	2007	1,000	0,545	0,126	0,545	0,236
	2008	0,980	0,468	0,089	0,478	0,225
	2009	0,917	0,421	0,131	0,459	0,251
	2010	1,074	0,482	0,117	0,448	0,271
	2011	1,343	0,476	0,000	0,354	0,275
nbg	2007	0,803	0,557	0,165	0,693	0,526
	2008	0,949	0,638	0,120	0,672	0,504
	2009	1,001	0,637	0,141	0,637	0,607
	2010	1,110	0,605	0,151	0,545	0,692
	2011	1,201	0,606	-0,020	0,504	0,619
piraeus bank	2007	1,406	0,634	0,110	0,450	0,304
	2008	1,389	0,667	0,078	0,480	0,263
	2009	1,214	0,639	0,104	0,526	0,364
	2010	1,398	0,650	0,088	0,465	0,393
	2011	1,631	0,687	-0,069	0,421	0,328

Table 3: Financial ratios of Alpha bank, Efg, National bank and Piraeus bank during 2007-2011.