University of Piraeus
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The Role of Political Uncertainty and of Internet Sentiment on the Deposit Flights in Greece

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“In the long term we are all dead”
J.M. Keynes

To the rational dreamers

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Abstract

I examine the bank deposit behavior of Greek households over the period 2008-2017 and its relation to political uncertainty. During this period the fear of "Grexit" led depositors to withdraw their money from bank accounts. In order to capture uncertainty, I utilize the spread between Greek and German 10-year sovereign bonds rates. It has an economically and statistically significant negative association with bank deposits. The results show that a rise in spread of 100 basis points led to a decrease of 6,8% in deposits. I also utilized The Political Risk Rating for Greece from PRS Group but proved to be insufficient to provide any explanation. The Google query term "Drachma" established a statistically significant negative relation. Rise in searches for the term "Drachma" in Greek can be interpreted as a rise in fear of depositors for a possible "Grexit" a fact that is confirmed from the results. A rise of one point of the Google Trends for the term "Drachma" leads to a decrease of 0,01% in deposits

Keywords: *Deposits flight, Internet Sentiment, Greek Crisis, Market discipline, Google Trends, Banks, Political uncertainty*

Εξετάζω την συμπεριφορά των ελληνικών νοικοκυριών όσον αφορά τις καταθέσεις τους για την περίοδο 2008-2017 και την σε σχέση της με την πολιτική αβεβαιότητα. Κατά την διάρκεια αυτής της περιόδου, ο φόβος του «Grexit» οδήγησε τους καταθέτες να αποσύρουν τα χρήματα τους από τους τραπεζικούς τους λογαριασμούς. Για να προσδιορίσω την πολιτική αβεβαιότητα, χρησιμοποιώ το spread της απόδοσης μεταξύ των Ελληνικών και των Γερμανικών δεκαετών ομολόγων η οποία είναι οικονομικά και στατιστικά σημαντική μεταβλητή και έχει αρνητική σχέση με την πορεία των τραπεζικών καταθέσεων. Τα αποτελέσματα δείχνουν ότι μια αύξηση του spread κατά εκατό μονάδες βάσης οδήγησε σε μια μείωση της τάξης του 6,8% στις καταθέσεις. Επίσης χρησιμοποίησα τον Δείκτη Πολιτικού Κινδύνου από την PRS Group αλλά αποδείχθηκε ανεπαρκής για να παράσχει κάποια εξήγηση. Ο όρος αναζήτησης στο Google «Δραχμή» είχε μια στατιστικά σημαντική αρνητική σχέση. Η αύξηση των αναζητήσεων για τον όρο «Δραχμή» στα ελληνικά μπορεί να ερμηνευθεί ως μια αύξηση του φόβου των καταθετών για ένα πιθανό «Grexit», ένα γεγονός που επιβεβαιώνεται από τα αποτελέσματα. Μια αύξηση κατά μια μονάδα των Google Trends για την αναζήτηση του όρου «Δραχμή» οδηγεί σε μείωση κατά 0,01% τις καταθέσεις.

Λέξεις κλειδιά: *Φυγή καταθέσεων, Διαδικτυακό συναίσθημα, Ελληνική Κρίση, Πειθαρχία Αγοράς, Google Trends,Πολιτική αβεβαιότητα*

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January 2018, Piraeus *Panagiotis Pastroudis*

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Chapter 1: Introduction

The aim of this Master's thesis is to conclude what were the factors that had great significance for deposit flights in Greece. Having in mind that the banking system was secured during this period we have to assume that other reasons made depositors to withdraw their money.

The main focus is given to the political uncertainty that was very high in Greece. This happened why during the financial crisis that started on 2010 for Greece there was a constant fear that Greece would exit the EMU. Also, the political landscape fully changed during the years of the crisis.

Part of this thesis is also to examine whether internet sentiment is a factor for the development of deposits. Nowadays internet is a useful source of knowledge but also a source of data. It will be examined if data from internet searches can be an indicator of how depositors feel. In other words, if the data from internet searches can be an indicator for depositor sentiment.

To achieve this the first step was to study the literature about the behavior of depositors. Mostly focus was given to market discipline literature. Literature of market discipline provides models for the evolutions of deposits. Most of these models use bank specific and macroeconomic variables as determinants of deposits. Particularly interesting were researches from Latin America because there were cases that did have similarities with Greece.

The other focus of the literature review is on how internet data is used on research. The focus is on research that has been done in the use of data from Google for predicting unemployment but also the use of such data in finance. The other part of the literature review was a brief historical review of the Greek crisis that started on 2010 with the implementation of the IMF ECB EC programs. This historical review is crucial because it can be understood how Greek citizens and by that Greek depositors were thinking on that period

Consequently, it was assumed that an empirical research would provide an explanation regarding the behavior of depositors during a period of political uncertainty. This research proved that with econometric tools, a substantial evaluation of the Greek case can be achieved. It is examined whether the lending spread and its volatility, affects the level of deposits, what is the effect of a political certainty index and if a new tool from Google is capable on interpreting the present and predict the future. Greece is a textbook case, since through the beginning of recession the level of household deposits has diminished considerably, while being a part of a monetary union, meaning restrictions on the policies follower and a stable democracy of the developed world. Hence the conclusions drawn, should shed light to the arising questions.

Chapter 2: Literature Review

There is extensive literature about depositor behavior. By the phrase depositor behavior, we refer to the decision of depositors regardless if there are individuals or Business units of banking services to withdraw or deposit their money to and from banks. Most of the models for the behavior of depositors. We will try to understand, which are the main factors that define the choice of a depositor to whether decide to keep money on a bank account rather than obtain it in form of cash or other safe havens like gold for example. In our case we try to understand what these fundamental factors in the case of Greece would be. The case of Greece during the period of the recent crisis that started with the austerity program of 2010 cannot be seen as a bank crisis. Buy this we mean that the reasons that made people in Greece to want to withdraw their deposits from Greek Banks were not generated from mismanagement of Greek banks but from the General uncertainty for the future of Greece in terms of remaining in the Eurozone or not.

Most of the models for the moves of deposits come the from literature about "Market Discipline». By Market discipline is described a certain process that depositors approve or disapprove certain decisions of the Management of banks. Depositors can do that by "voting with their feet" which means that when they feel that a Bank becomes riskier they remove their money from the bank. On the contrary when they approve the Management's decisions regarding risk they keep or even multiply their deposits on a specific bank or the banking system as a whole.
Many papers have been written in terms of the factors that change the deposits over time. Most of them give an interest to factors that have to do with the fundamentals of banks and macroeconomic factors. As bank specific variables for example, Levy-Yeyati et al. (2010) et al they use the interest rate of deposits, furthermore they use total assets, nonperforming loans to total loans, capital to assets ratio and return over assets. On the same page as bank fundamentals D'Amato et al. (1997) use the same.

2.1.1 Functions of Banks and Deposits

Banks have a fundamental role in making the economy work and they cannot be compared with any other company. The most basic role of banks is to stand in the middle of Net Savers and Net Borrowers. A net saver is an economic agent who has a surplus of income that he would not like to consume for the present time. On the other side of the river are the Net Borrowers who have a deficit of income at present time and

needs to money from Net Saver. In an economy without banks, a net saver would have to find a net borrower and agree on a loan. This of course is not done in modern economies and banks play a crucial role on that. Saunders & Cornett (2013)

One of the most basic products that banks offer to their clients when they are net savers are the deposits. Net savers have the ability to lend money to a bank. In exchange bank offers Net savers safety for their money. This is not the only thing that a depositor gains because the depositor also gets interest, a return for putting his money in the bank. There are four most common types of deposits are savings deposits, demand deposits current deposits and time or term deposits. Also, there are the certificates of deposits. For the case of time or term deposits the depositor cannot withdraw his money for a given time period without a penalty Sapountzoglou & Pentotis (2009)

Banks have among other roles, have the role of a broker between the net savers and the net borrowers. Net Savers go to banks to and deposit them in a bank account. Simultaneously Net borrowers go to banks to demand lending. Net Savers have an incentive to deposit their money in the bank.

2.1.2 The Latin American Cases

During the literature review I came by the variables that are connected to the fluctuation of deposits. In their paper D'Amato et al. (1997) in their research for the Argentinian banking crisis of 1995, the variables that they choose to use as factors of the behavior of depositors are bank specific but also Macroeconomic variables. First of all the Dependent variable they use the daily change of the logarithm of deposits for each bank. As bank specific variables they choose to use the average of the interest rates of the bank on its liabilities in foreign currency which for their case is dollars. Also, they use the same rates for liabilities in peso since they examine the case of Argentinian banks.

As Macroeconomic variables they choose to use variables that are available can be found on a daily basis. Those variables are the change of the total deposits on the banking system, the change in the argentine bond prices, the change in the Argentine stock index, the change in the level of the reserves of the Argentinian Central Bank. Also, they use the average interest rate of the Argentinian interbank market. Also, they use specific methods that we will analyze later to find contagion of between Argentinian banks.

Their first step is to categorize the banks in 8 groups which consist of National public Banks, Provisional Public banks, Foreign banks Private wholesale banks, Cooperative banks, Large retail banks, Small retail banks and Interior banks. As a first step of their

empirical analysis they tried to detect interaction. between the data. They achieved that by applying Vector Autoregressive Regression Models. The dependent variable was the percentage of deposit change for each type of banks. They discovered that the Argentine bond was also included as the only variable that was finally included was the price of the Argentinian bond. In terms of variables they also used dummy variables for the days of the week and they found out that Monday was significant.

They also performed a Granger Causality test between the variables calculated from the VAR equation statistics. The results of the Granger Causality tests showed that changes in deposits of Cooperative Banks Interior Banks and small retail banks wholesale banks where caused by changes in deposits in Wholesale banks with a positive relation. Furthermore, Changes in deposits in interior banks were caused by changes in small retail banks. Changes in deposits of Cooperative banks, Interior Banks, Small retail Banks and Wholesale banks are caused changes in deposits of Large retail banks with a positive relation.

For the case of the deposits of Large Retail Banks changes are caused by the change in deposits of National Public banks with a positive relation. Also, it is found that there is negative causality between wholesale banks and foreign banks. These primary results made the authors understand that there is a case of contagion between banks.

Their first action was to estimate a panel for the daily changes of bank deposits in the Argentinian banking system. The dependent variable is the change of the logarithm of deposits. The independent variables are bank fundamentals and the macroeconomic variables as described before. After that they test for residual co-movement of the first regression for a time effect in the panel data analysis. By this methodology they try to determine the factor of contagion. Their second step is to add to the basic panel model what they refer to as "contagion variables". As "contagion variables" they refer to the lagged deposits of other banks. After that they test again for time effects.

One other approach for the determinants of bank deposits is by Levy-Yeyati et al. (2010) who examine bank deposits in the period from 2000 to 2002 to in Argentina and Uruguay. This was a period of economic crisis for Latin America. As dependent variable they use both monthly and daily data of the level of deposits. For Argentina they examine both local and foreign currency deposits. For the case of Uruguay, they only examine the case of deposits in foreign currency because the 80% percent of total deposits in that specific country were in foreign currency. As bank specific variables they derive data from the monthly banks' balance sheets and income statements. The variables of their interest are the Total Assets of the banks, the ratio of nonperforming loans to total loans, the ratio of capital to assets.

In their research they also contain macroeconomic variables with which they want to show the effect of country risk and exchange rate risk. As a measure of country risk, they use the spread of the sovereign bonds of Argentina and Uruguay from the United

States of America bond of same maturity. As a measure of the exchange rate risk they use the "*12-month non-deliverable forward exchange rate contract relative to the spot exchange rate*" in Argentina. But for Uruguay they use a different measure which is the spread of interest rate on peso time deposits relative to the same rate in on similar US Dollar deposits.

i stands for each individual bank and t stands for the period which is monthly. F is the symbol used for the bank specific variables which consist of Total Assets of the banks, the ratio of nonperforming loans to total loans, the ratio of capital to assets. They also A which is log of total bank assets as a proxy for the size of the banks and they also. Ai is a variable that stands for bank specific effects. For the of Total Assets of the banks, the ratio of nonperforming loans to total loans, the ratio of capital to assets they use the lag of these factors. In fact, they use the forth lag of each of these factors. The decided to do so because these bank specific characteristics are derived from the Balance Sheets and Income statements of the Banks and because of that fact depositors will learn them with delay. That means that a depositor will decide whether to withdraw his deposits having into his mind bank specific data that discover the bank fundamentals four months before.

Levy-Yeyati et al. (2010) don't limit their study to the monthly evolution of deposits. In their second model they examine the daily evolution of deposits both in Uruguay and in Argentina. To do so they use data from the daily levels of deposits in the whole banking system of Argentina and Uruguay. The rationale behind his approach is that during crisis periods there are events, news for example that may drive the behavior of depositors. To be more specific besides the macroeconomic and bank specific factors during turbulent times positive or negative news may affect the decision of a depositor on whether to keep his money on the bank or not. Especially in cases that depositors are afraid that a negative for example political incident will put into danger a specific bank or the banking system as a whole.

In this model they perform event studies to show the decisions of the public after certain positive or negative news. The dependent variable is the level of deposits in the banking system of Argentina. The independent variables are dummy variables to proxy the negative or positive news events. When there is good news that are believed to reassure depositors for the safety of their deposits the dummy variable has the value 1. When there is negative news that are going to panic the depositors and make them want to withdraw their money the dummy variable takes the value of -1. They perform these event studies for both deposits in peso and deposits in US Dollars. In the case of the event studies the null hypothesis is that the mean of the dependent variable remains the same after the event. The alternative hypothesis is that the mean will be lower after the event.

The first step in their analysis is to estimate the VAR model. After that they obtained the impulse response function of the country risk variable the currency risk variable and the negative or positive news variable. By this functions Levy-Yeyati et al. (2010) obtain the reaction of deposits 20 days before and after each event for the case of Argentina and 10 days before and after the event for the case of Uruguay. The reaction is taken to a one "standard deviation change" for each macroeconomic variable and its independent of changes in other variables. They continue, by obtaining from the residuals of the different VAR equations the five largest shocks to each of the macroeconomic factors.

Following that, using the impulse response function they find the deposit change that have been caused by each one of the biggest five shocks. Because the impulse response function is measuring the deposit change per standard deviation change in each Macroeconomic variable they scale the residuals by the standard deviation of each variable and then multiply each by the impulse response function. Their last step is to add the impact of each sock to in order to have the cumulative effect of these shocks to deposits. This is done due to the fact that these shocks are independent.

Another interesting research was made by Steiner & Barajas (2000). In their paper they tried to examine if there was Market Discipline in Colombia for the period between 1985-1999. The data they use come from the time period of 1985-1999 and they extract them from the bank balance sheets. As bank specific variables they choose to use the non-performing loans divided by total loans *(NPL)*, The non-performing loans divided by total assets *(NPLASS)*, loan loss provisions divided to assets *(PROV)* the capital of the bank divided by the assets of the bank (KASS), the coverage of the nonperforming loans *(COVGE)=KASS+PROV-NPLASS*. The return on equity *(ROE)* and liquidity which is total reserves divided by assets.

They also use a time variable to capture if there is a period of crisis or not. To select if a time observation belongs to bad or good times and they name it *BADTIMES*. That can help in identifying when liquidity is a good sign for the depositors and when it is not. They multiply the variable bad times with the variable liquidity. By doing so and constructing the new variable *BTLIQ* they manage to check whether depositors think that liquidity is a good indicator bad only when there is a negative environment.

The non-fundamental variables they choose to use is a variable for the perception of a bank as big or not by depositors. This variable is the Total real assets of a bank. As control variables they take the number of branches available and the deposit interest rate. The interest rate is derived from the banks income statements as the "ratio of interest paid to the average stock of deposits.

The macroeconomic variables they use are the changes in the growth of the Gross Domestic Product of Colombia also they use the interest rates of the sovereign bonds

of Colombia. To distinguish if depositors viewed differently a bank depending on its ownership status they used two dummy variables. The first was introduced to distinguish between state and private banks. The second was introduced to distinguish banks between foreign-owned and Colombian owned banks.

Their methodology was to use a six-month period panel data analysis. The sample consisted of 25 to 33 banks. The number of the banks is not stable due to the closings and openings of banks through the years. They used both fixed effects and random effects methods They moved a step further to apply a more extended empirical model to understand the behavior of depositors. In this analysis the dependent variable is the growth of total deposits. Their first step was to control for endogeneity between the deposit interest rates and the bank fundamental variables. To achieve that they applied a two staged least squares model.

As instrument variables they chose to use the lending interest rate, the required degree ratio and the ratio Non-interest expenses to assets. After that they perform a new regression with the deposit growth as the dependent variable but in this case the first change is that the independent values are the per use the predicted interest rate from the 2sls procedure and that the only fundamental variables used are the coverage of loans and liquidity. The rest of the model remains the same.

In another research by Martinez Peria & Schmukler (2001), they work with data from Chile Argentina and Mexico. The bank level indicators they use are derived from the CAMEL rating system which stands for capital adequacy asset quality management earnings and liquidity. To measure capital adequacy, they use the capital to assets ratio. Asset quality is measured by the ratio of non-performing loans to total loans. Their other variables are, the ratio of real estate loans to total loans and the ratio of personal loans to total loans. To measure bank profitability, they use the return on assets ratio.

As an indicator of efficiency, they use the ratio of non-interest expenditure to total assets. To measure the banks liquidity, they choose to use the cash to assets ratio. Also, for the same aim the use the ratios of bonds to assets and investments to assets. Their methodology is panel data regression which is described by the following equation. Once again, i stands for each bank and t for the time period. In this case again the bank fundamentals are fused with a lag because depositors learn them with a delay.

2.1.3 The Case of Switzerland And Deposit Insurance

Another view for depositor behavior is given by Birchler & Maechler (2001) This paper is again on research for Market Discipline. Its main difference with the other cases that we have examined is the fact that the country that is presented is Switzerland. Switzerland in contrast to Argentina Peru and Mexico that the other authors had studied, is an advanced economy. Furthermore, there were not huge political shocks during the period of the sample. Another difference in their work is that they also give attention to

insured and uninsured deposits in contrast with most of the other authors. In their paper there are 3 different theoretical questions that they try to answer by their research.
The first is if "*the supply of uninsured savings as fraction of total savings is related to movements in bank fundamentals."* Birchler & Maechler (2001). This question reminds us of the most common research issue in market discipline literature which is how much are the bank fundamentals responsible for change in deposits. The difference here is that it is not the deposits as a whole or its movements which is studied. In this case Birchler & Maechler (2001) study the fraction of uninsured savings as a fraction of total savings. As in many countries happens in Switzerland too there is a framework for security of deposits.
As they state, there are three types of insured deposits. The first type is connected with the nature of the bank, to be more specific there is a State Guaranty for all deposits which are allocated on cantonal banks. The second case of insurance for deposits is the "Priority Insurance" for savings less than CHF 30000 per depositor which before 1997 was CHF 10000 per depositor. The third type of insurance is the "private liquidity insurance" this scheme protects depositors up to CHF 30000 for each one of them. In 1993 this scheme has changed, and the new scheme is that there is a total amount of CHF 1 billion to cover the depositor losses. The second hypothesis that they examine is if "the fraction of uninsured savings deposits is more responsive to movements in bank fundamentals at regional banks that is in at cantonal banks" They study this hypothesis because as we seen before in the deposit insurance schemes in Switzerland, there is state guaranty to cantonal banks.
Having this fact in mind Birchler & Maechler (2001) are trying to see if depositors in non-cantonal banks will be more sensitive in changes of bank fundamentals. This is expected because depositors who know that their money is safe will be less sensitive to changes in bank fundamentals. The third Hypothesis that they are testing is "If after the 1997 priority insurance revision a larger percentage of savings deposits exceeds CHF 10000" With this hypothesis Birchler & Maechler (2001) are trying to see if more depositors allocated more of their money in the banks since the limit of insurance was exceeded from CHF 10000 to CHF 30000. Again, in this case we expect that depositors will be less sensitive to changes in Bank fundamentals since there is a better coverage for them.

Their research is done with the use of panel data from 250 swish banks. The data frequency is annual. Also, it should be noted that the number of the banks is not stable through the years so the panel is unbalanced. In terms of Macroeconomic variables, they use the Gross Domestic Product growth rate, the 3-month US money market rate and the consumer price index. As we saw again in the case of Martinez Peria & Schmukler (2001)
For bank specific variables they use the ones from the CAMEL rating system. To detect capital adequacy, they use the ratio of capital to total liabilities. In order to measure Asset quality, they use four different variables
The first is *NSDTL* which stands for the ratio of non-savings deposits to total deposits. The second is the ratio between liabilities to customers and mortgage lending

*(TFIN)*The third is the ratio of mortgage mending to total liabilities. The fourth is the ratio of interbank borrowing to total liabilities. For management quality, they use the non-interest expenditures to total liabilities ratio. The second is the difference between interest rate on savings deposits by the specific bank and the industry average. As measures of earnings they use Net gain to total liabilities ratio The Net commission revenues to total liabilities ratio Net interest rate revenues to total liabilities. The growth rate of total liabilities. As measures of liquidity Ratio of liquid assets to total liabilities. They also have putted in the model Liquidity insurance dummies.
DCAP is a dummy variable that they created in order to catch the difference before and after 1993.For years after 1993 it takes the value 1 if the volume of insured deposits of a bank is less than it as before. They have introduced it to find out if depositors changed their behavior because of the lower insurance of deposits.
We must keep in mind that the CHF 30000 limit was no longer available and that depositors would have to share CHF 1 billion to cover their losses. Furthermore, they introduce the variable *DCSVTL* which is an interaction term and tries to show the correlation of *DCAP* with the savings deposits to total liabilities ratio. Birchler & Maechler (2001) expect *DCAP* and the interaction term to have a positive relationship with deposits.

The new model tries to answer the question of their third hypothesis. In this case they introduce a new dummy variable which is *DPI* which is a takes the value of 1 for the years after 1997 which the priority insurance scheme was revised. The authors expect a positive relation between *DPI* and $\alpha_{\iota\tau}^{PIB97}$.Also they introduce SN30ST which stands for the number of savings less than CHF 30000 and SN30AST which stands for the total number of deposits more than CHF 30000. Moreover, they introduce two interaction terms *DPSN30ST* and *DPSN30AST* to combine DPI with *SN30ST* and SN30AST respectively. Theoretically there must be a positive relation between $\alpha_{\iota\tau}^{PIB97}$ *SN30ST* and a negative relation between $\alpha_{\iota\tau}^{PIB97}$ *SN30AST*. Test.
Although the literature on market discipline from which we try to understand the changes of deposits is based on the general argument that deposits will be connected to bank specific variables it is made clear that although they are significant depositors do not make their decisions based on them or only based on them. Looking at the results of literature especially for cases when a banking or a fiscal crisis arises, the macroeconomic variables have the dominant role in determining the course of bank deposits. Therefore as we will see on the results, there is a major importance for macroeconomic variables.

Levy-Yeyati et al. (2010), are using proxies of Country risk and Exchange rate risk as possible factors for the level of deposits. As it can be found in their results, in the case of Argentina, Country risk is a determinant of both log of peso deposits and log of dollar deposits. The interesting fact is this happens during the subperiods of crisis in their sample. When in a non-crisis period the country risk proxy is not statistically significant but during the crisis subperiods, it is statistically significant at 1% and also has a negative relation to the log of total deposits. The same pattern can be seen for the

exchange rate risk proxy. In the non-crisis periods, the exchange rate risk proxy is not statistically significant but during the crisis subperiod, it becomes statistically significant. The interesting fact is that there is an exception, when it comes to deposits in dollars, exchange rate risk remains statistically significant at 1% but the relation with the log of total deposits is positive. This can be explained by the fact that depositors, see exchange risk as not a danger for the banking system as a whole but only for their deposits in Peso.

When it comes to Uruguay, in terms of Country risk it is statistical significant and has a negative relation to the log of time dollar deposits but only for the second crisis sub period. In this case we see again that for the period pre-crisis the proxy of country risk is not statistically significant.

The other example of macroeconomic variables that have an effect on the rate of the growth of deposits, is the GDP growth rate and the interest rates on governments bonds as shown by Steiner & Barajas (2000) for the case of Colombia. Unfortunately, in the statistical tables of their results they do not provide the outcome for these variables. One other case that we see the use of Macroeconomic variables is that of Birchler & Maechler (2001)

In that case we have a model that uses the Swiss GDP growth rate since the data came from Switzerland. We see that when GDP growth rate is statistically significant at 1% in all the models produced and that it has a positive relationship with all the three different models that the test in terms of uninsured deposits. The only case that the GDP growth rate is not statistically significant is only in the specification of the sample that takes into account only cantonal banks. But as we have seen before in the research of Birchler & Maechler (2001) because of the special status of insurance that these banks have it was predictable.

2.1.4 Bank Specific Variables

Trying to understand the role of bank specific variables we should bring our attention to the empirical results of the models that were presented before. Starting from the case of Colombia Steiner & Barajas (2000) have used bank specific variables as possible determinants of the annual growth of deposits. In their case they used the first lag of bank specific variables. The rationale is that depositors when deciding if they will withdraw or deposit their money to a bank they only know the bank specific

characteristics of the previous six-month period since they use semiannual data. The capital to asset ratio is found to be statistically significant in all the specifications of the model that they have used it. They find a positive relation of this variable with the dependent variable. Also, the loan loss provisions to total assets ratio is found to be statistically significant. Like the previous variable it has a positive relation with the dependent variable.

The other variable that is statistically significant is liquidity, which is expressed as total reserves to assets ratio for periods of economic growth and for the periods that the economy did well and as the product of this ratio with a dummy variable for the periods of bad economic conditions. For the periods that the economy did well there was a negative relation with the dependent variable, For the periods of bad economic conditions there was a positive relation. So, their results agree with the theory of deposits since depositors viewed liquidity as a good sign during bad macroeconomic conditions which means that when a bank is more liquid they know that they can access their money more easily.

The other variables they used which were non-performing loans to loans ratio, return to equity ratio and the other liquidity ratios were not statistically significant. Martinez Peria & Schmukler (2001), in their analysis also use tow common variables with the previous research. The two variables are the ratios of capital to assets and the ratio of non-performing loans to total loans. They have made the study for Argentina Mexico and Chile. Capital to assets ratio when found statistically significant has a positive relation with the deposit growth, something that is expected from theory.

The non-performing loans when found statistically significant have a negative relation with deposits in the case of Argentina Peru and Mexico a fact that confirms the theoretical framework and is what we expect based on theory. Martinez Peria & Schmukler (2001) also used the real estate loans to total loans ratio. This ratio turns to be statistically insignificant in all three countries. The ratio of Personal loans to total loans has contradictory results. It is only statistically significant in Argentina for the pre-crisis period before the tequila crisis and after the tequila crisis period. In the period before the tequila crisis it has a positive relation but in the period after it has a negative relation.

In the case of Mexico, we see that it is statistically significant and has a negative effect on deposits only at the pre-crisis period and only in the 12 bank sample that Martinez Peria & Schmukler (2001) use for Mexico because in the other sample that consisted of all the banks it was not statistically significant. In the case of liquidity ratios, Cash to assets ratio is not statistically significant in Argentina. In Mexico though it has a positive relation with Medium Deposits and Large deposits in the period between February 1981 and November 1996. Another liquidity ratio that they choose to use is bonds to assets.

For the case of Argentina this ratio, when is found statistically significant, has a positive relation with deposits. According to Martinez Peria & Schmukler (2001) this is

consistent with theory but only in the case of uncertainty about deposits. When there is uncertainty about the safety of deposits, the depositors are expected to find high liquidity as an indicator of safety. This is based on the fact that as long as a bank has liquidity, depositors will be able to withdraw their money whenever they want. With that in mind depositors are expected to think that their deposits are safe and therefore a positive relation is expected. In the case of Peru, the ratio used instead of bonds to assets, is the ratio of investments to assets.

But as it can be derived from the results, investments to asset ratio is not statistically significant for the development of deposits in Peru. To find out if efficient banking management has a role in determining the decision of depositors regarding their money in the banks, Martinez Peria & Schmukler (2001) use the ratio of non-interest expenditure to total assets. AS they state on their work, theory cannot provide us with a solid view on which should be the relation of this ratio with the evolution of deposits. One option is that higher non-interest costs could be derived by higher quality of service. With that in mind depositors may connect high non-interest expenditures with better banking services, better banking services could be related to higher safety of deposits so a positive relation could be expected.

On the other hand, high non-interest expenses could be associated with lack of efficiency. With that in mind, higher non-interest expenses can be seen by depositors as an indicator for worst banking services, with that in mind depositors will feel that their money in the bank are unsafe and this fact will make them withdraw them. In the case of Argentina, when found statistically significant, non-interest expenses to total assets ratio was found to have a negative relation with deposits. The same goes for the case of Chile. The case of Mexico is quite interesting because when statistically significant, non-interest expenses to total assets ratio is found to have a positive relation. By that we can imply that Depositors in Argentina see Non-interest expenses as a sign of a non-healthy bank when people in Mexico want their banks to have high non-interest expenses since they see them as a sign of better banking services.

The other results came from Levy-Yeyati et al. (2010) who also have used banks specific variables in their research. In their research we see some common variables used like the in the papers of Martinez Peria & Schmukler (2001) and Steiner & Barajas (2000). One common principle of a variable that is tested are the non-performing loans.

Unlike the other two cases, Levy-Yeyati et al. (2010) use the ratio of 1- non-performing loans to total loans lagged for four periods. In both the countries that they study, Argentina and Uruguay this ratio is not statistically significant. This comes in contrast with the findings of Martinez Peria & Schmukler (2001) who found that in some cases the lag of non-performing loans to total loans was statistically significant for Argentina as we saw above but, in that case, the dependent variable was the total deposits whereas for Levy-Yeyati et al. (2010) the dependent variable is the value of time deposits. So, it can be inferred that maybe because of this case we see this different result.

Another variable that they have used is the fourth lag of Capital to Assets Ratio. This ratio is found to be statistically significant in Argentina only for the development of deposits in USD and only for the period of the crisis. Capital to Assets appears to have a positive relation with the log of dollar deposits. This is consistent with theory. Depositors, according to theory tend to view a more Capitalized Bank as a safer bank and this is why this result is expected. In the case of Uruguay, we see a result that is not in line with theory. The Capital to Assets ratio, when it is statistically significant, has a negative relation with the log of dollar time deposits.

It must be noted that in Uruguay is that Capital to Assets Ratio, becomes statistically significant only on the crisis period. The fourth lag of the return on assets ratio is the third bank specific variable that Levy-Yeyati et al. (2010) use in their model. Return on Assets is statistically significant and has a positive relationship with the log of peso time deposits in Argentina. This result is consistent with theory because a more profitable bank is supposed to be safer for depositors.

For Uruguayan banks the Return on Assets ratio is not statistically important. The fourth bank specific variable that they examine is the fourth lag of the log of assets. This variable is found to be statistically important and to have a positive relation with the dependent variable but only for the pre-crisis period in Argentina. In the case of Uruguay, in the sub periods that it is found to be statistically important, it also has a positive relation with the dependent variable. This fact is in line with theory, which suggests that a growing Bank in terms of Assets can be a better and safer bank for deposits.

The other results that have to do with the relation of bank specific variables with the development of deposits come from Birchler & Maechler (2001) on their research in Swiss banks. For the purpose of our research, the model that will be examined its results is the first one. The bank specific variable that they use is one that can show capital adequacy, which is (AKTL) Capital to total liabilities ratio

For Asset quality they use NSDTL Non-Saving deposits to total deposits ratio is only statistically significant in the case of Regional banks and when that happens has a negative relation. TFIN which stands for Liabilities to Customers to Mortgage Lending is not statistically significant. MORTL which stands for Mortgage Lending to Total Liabilities is statistically significant and has a positive relation with the dependent variable TBKTL which stands for Interbank borrowing to total Liabilities is not statistically significant. To proxy the good or bad management of a bank they use NIETL which stands for Non-interest expenses to total liabilities ratio is statistically significant and has a negative relation with the dependent variable.

AAIRS which stands for the difference between the interest rate on savings deposits that a specific bank offers minus the average interest rate of the Swiss banking sector. RTL which stands for Net gain to total liabilities ratio is statistically significant and has

a positive relation with the dependent variable. NCRTL which stands for Net commission revenues to total liabilities is not statistically significant NIRTL which stands for Noninterest revenues to total liabilities also is not statistically significant TLGR which stands for Growth rate of total liabilities is not statistically significant GLIQTL which stands for Ratio of liquid assets to total liabilities also turns to be not statistically important in general and is only statistically important for regional banks. So, it turns out that according to every specification of their model there are major differences.

2.1.5 Evolution of The Original Depositor Behavior Models

Oliveira et al. (2015) are taking the research for depositor behavior one step further. Their research examines the development of deposits in Brazil after the beginning of the crisis in 2008.What the try to understand through their research is if depositors take into account the systemic role of a bank. By the phrase systemic banks, is meant a bank that is very important for the banking sector and the economy in general. So, a failure in a systemic bank can create further failures and problems on the economy and on the banking system even in a domino effect. Their model is an evolution of the market discipline models.

The methodology that they follow is that of Generalised Method of Moments- Sys. Hey choose this methodology because to eliminate the case of endogenous relations between variables. With GMM Sys Blundell and Bond (2000) they can control for other determinants of deposits that are not taken into account in the model. For the identification of big banks in order to use them as a Big Bank in the model, they follow the work of Adrian and Brunnermeir (2016). The data they use is from December 2001 to December 2009.

They have created five different versions of their model. In the first version they use the growth of uninsured deposits as the dependent variable. In the second version they use the growth of total deposits as the dependent variable. In the third version they use growth of deposits held by institutional investors. In the fifth version they use the growth of CDs held by non-financial firms as the dependent variable and in the fifth version they use the growth of CDs held by individuals as the dependent variable.

The results of Oliveira et al. (2015) are very interesting and add to the theory of market discipline. It is made clear through their research is that during crisis there is a substantial move of deposits to systemic banks. To become more specific as it can be interpreted from their econometric results, the variable *(Big bank * Crisis)* is statistically significant at 1% level for the change of uninsured deposits, the change of total deposits, the change of CDs held by Institutional investors and the change of CDs

held by Non-financial firms. In all these cases there is positive relationship between *(Big bank * Crisis)* and the dependent variable. This means that depositors during the crisis, preferred to deposit their money in systemic banks.

On the other hand, in the non-crisis period depositors do not have a particular preference to systemic banks and this is derived by the fact that the variable big banks is not statistically significant in any version of their model. The variable crisis is statistically significant at 1% and has a positive relation with the deposit growth of individuals. This result is odd and can be founded on the theoretical framework because during crisis most of the people are afraid and withdraw their money. On the other hand this fact can maybe individuals stop investing in riskier assets like the stock exchange for example and deposit their money to the bank which they consider safer.

In terms of the bank specific variables, most of them are not statistically significant but, there are some interesting cases where some of them are statistically significant in some

versions of the model. To be more specific the log of assets, is statistically significant at 1% level only for the case that the dependent variable is the CDs of Non-Financial Firms. The change of the interest rate margin is statistically significant only in the case of the change of total deposits as the dependent variable and they have a positive relationship. These to results do not offer something to be discussed in terms of a theoretical background. In terms of the bank specific variables, the only result that has a particular interest is the fact that the equity to total assets ratio has statistical significance of 1% level as a determinant of the change of CDs held by institutional investors.

In this case it is clear that institutional investors take into account the equity to assets ratio to decide about the future of their money in a bank. This is rational because they are the most well economically educated depositors. So, this is why it is reasonable that they decide according to bank fundamentals. No other variable is statistically significant in this model. In a second specification of their model, they have constructed additional variables for systemic banks. In this second form there are the extra variables of Big Domestic Bank, Big Foreign Bank, Global Power house banks and their interaction with the crisis indicator.

The results of these model do not change dramatically but there are some very interesting elements in them. In this model, the crisis variable has statistical significance of 5% and has a negative relation with the growth of uninsured deposits and the growth of total deposits. This acceptable in terms of what we would wait to see because in a period of crisis people are afraid for their money and withdraw them. Also, in crisis periods the incomes are reduced so depositors withdraw their money to cover their needs.

Another interesting finding is that the interaction term of Big Domestic banks and crisis variable has statistical significance of 1% as for the growth of total deposits and the growth of uninsured deposits and 5% for the growth of the other three categories of CDs all of them with a positive relation with each of these dependent variables. This does not happen with the interaction of big foreign banks and the crisis term. Because it is not statistically significant as a determinant of the CDs of Institutional investors and Individuals. For the other types of deposits, it is statistically significant and has a positive relation with the depended variable.

Another interesting fact is that we see that there is market discipline from institutional investors to banks. This is derived by the fact that again like in the previous model of Oliveira et al. (2015) Equity to total assets ratio has a positive relation with the Growth of Institutional investors CDs with statistical significance of 1%. Here we see again that one of the bank fundamentals plays a role for the deposits of institutional investors. Also, the low-quality loans variable is statistically significant at 10% level and it has a negative relation with the growth of institutional investors CDs. These can be explained with the same argument as for the previous variable. Probably in the case of Brazil only institutional investors decide for the future of their deposits based on some bank fundamentals and these is a sign of low financial literacy in this country. So, a general conclusion that can be derived from these results is that in Brazil there was a turn of depositors to systemic banking institutions during the period of the crisis.

During my literature review I came across an interesting research done by Picorelli (2014). In that research is studying the development of deposits in the Greek Banking System during the Greek Financial Crisis. The main assumption of this research is depositors do not decide based on the financial health of the bank but based on the fear for a possible Greek Default and an exit from the eurozone. In the try to defend this view Picorelli (2014) uses a panel model

The bank specific data were derived from the banks' balance sheets and income statements. The macroeconomic data was taken from Datastream. In the estimation it is included a fixed effects. Fixed effects are preferred for heterogeneity of banks to be constant as time passes and to be correlated with the dependent variables. In this research also, the estimation is done for two different periods, one before the crisis and one after the crisis.

The results of this paper are quite interesting. There is a well-structured argument that sovereign risk has played a role on deposit flight in Greece. This can be connected with theory by the following way. Greece as a member of the eurozone shared the common currency with the other member states. Due to a continuous uncertainty for the

implementation of the austerity program that created a toxic climate for the whole economy. Depositors were afraid that a possible exit from the eurozone

Until now what we have examine in terms of literature review has to do with the research on a specific country. By that I mean that when a model was examining the development of deposits it did for a specific country even if on the same paper there was research based on data from two or three countries. Each country's banking sector was examined separately, and conclusions were made on how the same variables when we are referring to bank specific variables would create different results or same results regarding the behavior of depositors. Of course, most of the times the macroeconomic variables were the same. But in some cases, the proxy for a macroeconomic risk would be tailored if the data available were not exactly the same. In this part what is going to be studied is some literature cases that have to do with international data regarding depositor's behavior.

There has been a try to use international banking data in order to be found out if depositors discipline banks with their decision on whether they would or not keep their money deposited in a specific bank. As mentioned before this is the part of the theory that is called market discipline and the main idea behind is that depositors watch some fundamentals financial data that is provided by banks. By watching the development of this data, they valuate the health of a bank. With the data about the bank in mind, depositors will decide if they will keep their money deposited in the same bank. Another choice for them would be to move their money to a bank that they think that is healthier.

By moving their money to a bank that they consider heathier, their money will be safer. Especially in the cases that there is not a deposit insurance scheme that would protect them in a case of bankruptcy. A development of this way of thinking is that when depositors are afraid they may take their money out from the banking system. Of course, there are times that depositors may move their money across banks in search of a better yield. A good idea that I have seen in literature is that of the examination of deposit growth on the international level. This is what Berger & Turk-Ariss (2010) have tried to do. They have used data from banks in the European Union, The United States and Switzerland and they have tried to find out what drives the behavior of depositors across these countries. In their study they have used three different models, the Reduced Form, Joint Determination and Dynamic Models.

DGR stands for the deposit growth rate, DRP stands for deposit risk premium Bankrisk stands for the risk of a bank and more specifically it is consisted of two ratios, equity to assets and non-performing loans to total loans ratio. Obviously, Berger & Turk-Ariss (201) follow the literature on market discipline because these to ratios are widely used as determinants of the bank risk. Equity to assets, measures the percentage of assets that is covered by a bank's equity in other words or with more simple words the money that the shareholders of a bank have invested in it. Non-performing loans to total loans ratio

is a valuable ratio of risk. As seen before in other research, the nonperforming loans are the loans that are not fully or partially repaid. By knowing this ratio, we can have a measure of the quality of the loan portfolio of the bank.

W stands for bank controls. They control for the size of a bank, the market share of the bank, the fact that a bank is foreign or not and the fact that a bank is a Bank Holding Company. As measure of the bank size they use the natural logarithm of total assets. As a measure of the market share they use the assets of the specific bank compared to the assets of a banking system of each country. For the nationality of the shareholders of a bank, they use a dummy variable which takes the value one when the majority of a bank's shares belong to foreigners. In order the model to distinguish the Bank Holding Companies from the rest of the banks they use a dummy variable that takes the value one when the specific institution is a Banking Holding Company.

It must be noted that as it happens in the rest of the Market discipline literature and more specifically on the models for the development of deposits, the variables that they use to measure the bank risk and are on their first lag. This is done because depositors, when they take a decision about depositing or withdrawing money, have the information from the balance sheets and income statements of the previous time period. A difference in this research is that the bank control variables, are not lagged as it happens in other papers that I read. In my opinion this happens because Berger & Turk-Ariss (2014) have in mind that depositors will only check for bank risk as it is described by the nonperforming loans to total loans ratio and by equity to asset ratio. The other banks specific variables are not lagged because depositors know if a bank is owned by foreigners or if a bank is a Bank Holding Company.

The most interesting results are obtained from their dynamic model. It is a GMM model Blundel & Bond (2000). The main difference of this model in comparison to the other studied models is that it takes into account the deposit growth rate of the previous time period. This is why in this case the results of the Dynamic model are more interesting to be noted. They have made four different versions of their model in terms of the depended variable. They have chosen the deposit growth rate for US banks, for EU banks, for banks that are listed on stock exchange and for banks that are not listed on a stock exchange. Also, they examine their model in 2 different samples, one for large banks and one for small banks. They define large banks as banks which have more than 50 billion dollars in total assets.

The results of this particular model are quite interesting. The equity to assets ratio is statistically significant at 10% only for the US banks and has a positive relation with the deposit growth rate. This result is in line with the theoretical framework because banks with higher equity to assets ratio should be considered safer by depositors. The lagged deposit growth rate is statistically significant at 10% level for US banks and for banks that are not listed and statistically significant at 5% level for banks that are listed.

In all of these cases there is a positive relation between the deposit growth rate and its lag. This is a very interesting finding because it shows that depositors watch the level of deposit in banks and that they perceive the development of deposits as a sign of whether they should or should not keep their money in a bank. On the other hand, this finding may have to do with the business cycle. Maybe in periods of Growth there are many time periods that depositors add to their deposits. Also, in periods of recession people withdraw their money in order to consume. This finding could be a start for some new research on the issue.

The bank size variable is statistically significant at 1% level for US banks and unlisted banks with a positive relation. From this fact we can understand that when a bank is not listed, its size in terms of assets plays a key role for depositors in order to select it for their deposits. The GDP growth rate is statistically significant at 5% level for EU banks and Unlisted Banks when it is not for US banks. From this result we can understand that European depositors are more sensitive to the fluctuations of the GDP and tend to deposit more in times of economic growth and deposit less in times of recession. In general, from this model we derive that here is a much higher market discipline in US banks than in EU banks.

From the literature it is clearly derived that Bank Specific Variables have a crucial role for the development of deposits. Also, it has to be noted that this applies for non-crisis periods. In crisis periods, other factors like the macroeconomic environment or contagion between banks have a greater significance in making depositors to decide to withdraw their money.

2.2 Internet Sentiment

In recent years the use of internet has totally changed the life of modern people. Information that in older times would be very difficult to be found, nowadays is only a few clicks away from every internet user. The only things that are needed is a functioning personal computer and an internet connection. These things are easily found for most people in western societies. So, it is quite rational to say that since there is so much information available, it is expected that people will try to find it and use it in all aspects of their life, from the simplest everyday question to scientific research.

The easiest and most convenient way for an internet user to find what he is looking for is through various search sites. Through these sites, a user can be redirected to the internet site that contains the information that he or she is looking for. The most common search site that is used worldwide, is Google.com. The use of Google as an internet search machine is dominant worldwide. Of course, there are other sites like Bing.com or Yahoo.com and Baidu.com but when we see a 90% of users to choose Google.com it is clear that there is one dominant player in the internet search market.

This is a fact that we have to keep in mind when we want to investigate how data from internet use can give as answers to scientific questions. The use of Google.com is so frequent that in many languages we found the phrase Google it which means search for what you are looking for in Google.com

Having in mind that there is one internet searching site that is chosen by 90% of internet users worldwide it is clearly understood that the data from Goolge.com can be a very valuable source of information. The vast majority of Internet users worldwide, choose Google.com when they search the internet for information. It is rational to say that the data from queries on Google.com are a very good image of what is in people minds. Since someone uses Google.com to find information, the data from Google.com queries can inform us about what internet users are looking for and ever what they are thinking of or what they are anxious for. With that in mind having access to this data can help us understand what internet users want to know at a specific time

2.2.1 Google Trends

The data from the search queries of internet users have been made available by Google.com to the public. This can be done through a tool that is called Google trends. In the next few lines, an explanation of how this tool works will be given. A user can enter the site of Google Trends. When this internet site is downloaded, the user can see a banner that queries can be inputted. Also, on the right side of the webpage the user can select the specific country that data of internet search queries will come from. Google trends categorizes the available data in six major categories which are Business, Entertainment, Health, Sci/Tech which stands for science and technology Sports and Top stories. The user can choose the country or the American State that they wish to study data for. Also, he can choose to find data on a worldwide basis.

In case someone wants to look for the volume of a specific query, for example Apple meaning the Apple computer company, he has to input the specific query in the search box. When that is done google will ask for the specific “Apple” that the user is looking for meaning that he can be looking for the computer company or the fruit. Google trends gives the user the opportunity to specify his search in terms of the time period that he is searching, the country that he is searching, the category of the query as explained before and the web search type.

The web search type option gives the user the ability to choose if the queries were for image search, news search and Google shopping and YouTube search. The data are available back to 2004. Depending on the time period that the user is requesting the data are provided on an hourly daily weekly or monthly basis. For example if a user

decides to request the data of the query for Apple, he can decide the time period, the country from the queries were made and the categories of the query.

After that he can export the data on a csv excel file and he is able to use them. As Choi and Varian (2009) state, Google Trends does not provide the user with the raw level of each query. It provides the total query volume for search term in a given geographic region divided by the total number of queries in that region at a point in time Choi and Varian (2009). This means that when data are extracted from Google trends, it is not the simple number of queries for the particular search term per time period. The number of queries is divided by the total number of queries so that a query share is created. After that, the query shares numbers are normalized. With the query numbers normalized, they start at 0 on the January first, 2004 which is the date from which data are available. For the dates after this date, the query index takes prices indicating the percentage deviation from the query share on first of January 2004. When data is extracted on a csv excel file, they take values from 0 to 100.

2.2.2 Google Trends As A Tool For Research

During the last years, the value of big data has been recognized by many researchers in many different scientific fields. There is a great interest in obtaining and analyzing big data in order to use them as a mean for better understanding of certain behaviors or even to predict events. For my analysis this is very useful because I want to check whether I can use the data from google search queries as proxies for political uncertainty. During my research on literature about using data from Google trends, I found out that they have been used for marketing purposes, finance and even in epidemiology. This fact shows that Google Trends will be a useful tool of providing data on the years to come and in many different scientific fields.

A very interesting research has been done on the use of Google trends by Hal Varian and Hyunyoung Choi. The aim of their research is to check if data derived from Google trends, can be used to watch economic activity on real time. This can be very useful because most of the data that have to do with economic activity are provided by statistical and other agencies with a time lag of one or more months. There are many examples of such data like the data for retail sales or data for unemployment claims on the United States. In their research they try to find out if the data on Google queries on Google trends can be used as proxies for economic activity indicators on the present time period. The methodology they use for their model is the seasonal autoregressive

model. In the first of their examples, they try to predict the sales of Ford cars. Choi & Varian (2009).

In this kind of model, the dependent variable is the sales of ford on the current month and the independent variables are the sales of Ford of the previous twelve months.x1 stands for the google trends index of week the first week on moth t. Et stands for the error term.
In their results they found a positive relation between the Google query variable and the dependent variable, which is statistically significant. After that they tried to see if the Google query index could help in predicting the sales of ford cars on the next month They found out that the absolute errors were smaller in the model that used the Google query index.

Based on these findings, they moved their research one step further. They tried to find out if "*the data on Motor Vehicles and Pats Dealers"* could be predicted by models using Google trends Queries Choi & Varian (2012). In this case they followed the same methodology as they did in their previous research using an AR-model with the following equation with monthly data for a period from January 2004 to July 2006.

On a second stage, they added to the model 2 new variables that represented the Google Trends Queries for two categories that are connected to the dependent variable. The results in the in-sample forecasting were quite interesting. The variables of the Google Trends Queries were statistically significant and had a positive relation with the dependent variable. To examine the out of sample forecasting power of the model, they used the data from periods k to t-1 and forecasted the value y_t by using the variablesy_{t-1} to y_{t-12} and the Google Trends queries of time t as predictors of y_t It is very interesting that by doing so, the Mean absolute error was less in the model that used the Google trends variables. To be more specific the model that used the Google trends variable has a Mean Square error that was 10.5 per cent less.

2.2.3 Google Trends and Unemployment

As it was mentioned before Google Trends can be a significant tool in order to have a clear picture of economic indicators in real time. This can be very useful because most information about economic activity is released with a significant time lag from the time it happens. The main idea is that Queries in Google can be used as a proxy for several economic releases. One other economic indicator that can be proxied through Google Trends is unemployment. Information about the development of unemployment

is provided with a delay as most of economic indicators. When reviewing the literature, I came across two very interesting research papers regarding Google Trends Data and Unemployment forecasting for two different countries, the United States of America and the Federal Republic of Germany. D'Amuri & Marcucci (2010) are focusing their research on Unemployment in the United states while Askitas & Zimmerman(2009) are focusing on Germany.

For the case of the United states, D'Amuri & Marcucci (2010) are testing the predicting power of Google trends for the development of unemployment in the US by contrasting to one other leading indicator which is has already been used. Their first step is to find the specific keyword of Google search that can be directly connected to people that are looking for jobs. They found out that the best keyword was the Google search term "jobs"

Based on the same idea, Askitas and Zimmerman (2009) are examining the predictive power of Google Trends data in the case of unemployment in Germany. In their case the first difference is that they are not using just one Google search keyword but four different phrases in German language that can be a sign of people dealing with unemployment. In the case of the research in Germany this needed in my opinion because there is a totally different culture in terms of Unemployment and stete aid in Comparison with the US. This why in my opinion, except specific German words that directly refer to job search, they also use the German equivalent of a job search advisor. In the case of Germany, it is a rational choice since state unemployment agencies are widely used by Germans in case of job searching.

Although these two researches have the same aim which is to test whether Google Trends Data can be used to predict the unemployment rate, the methodology that hey they use has differences The first main difference is that D'Amuri & Marcucci (2009) do not only check for the validity of Google Data as a leading indicator of unemployment but also comparing it with one other leading indicator of unemployment that have already been used. This other leading indicator is "*the weekly seasonally adjusted Initial Claims"* which are released by the U.S. department of labor. The fact that there is one other leading indicator already used and that it is compared with Google trends gives this research an additional interest than just searching for the predictive power of Google Trends data.

To apply the forecasting of US unemployment rate, D'Amuri & Marcucci (2009) they use ARMA autoregressive moving average models for the variable that indicates the differences between US unemployment rate. They also estimated 384 AR, ARMA and ARMAX models which they group in three main categories. These three categories

have to do with the use or not of Google Trends data as an exogenous variable and the time period of the models varying before and after 2004 that Google trends became available. After that they use an ARMAX(p,q) model

The variables that are exogenous and are used in the model are the monthly and weekly values of the alternative leading indicator. Also, as exogenous variables, they used the data from Google Trends. Furthermore, in all their models they used separately and together the data from Google Trends and the alternative leading indicator. In order to check for the validity any quality of the the Google trends data and the alternative leading indicator, D'Amuri & Marcucci (2009) use the out of sample forecasting methodology. They use models that include only Google trends variables, only the alternative leading indicator of unemployment and both.

On the other hand Askitas and Zimmerman (2009) use time series causality approach Engle & Granger (1987), Greene (2011). The dependent variable in their case is the unemployment rate of Germany on a monthly level and unadjusted. They regressed the dependent variable on its past level, the independent variables and the lags of independent variables. They use the lags of the dependent variables from time period t-1 to time period t-12. The period that they study is from January 2004 to April 2009. They selected this time periods because their paper was written on 2009 and query from Google trends was only available from January 2009.

The results regarding the use of Google Trends data to predict or in other words watch in real time the development of unemployment is quite interesting. For the case of Germany, Askitas and Zimmerman (2009) find out that data from Google trends are statistically significant in forecasting the unemployment rate of Germany. This shows us that Google trends data can be used to be able to obtain information about unemployment before the official statistics become public. Also, in the case of D'Amuri & Marcucci (2009) their results show that models which do include data from Google trends as variables are better in estimating the development of unemployment in the United States. This finding clearly shows that Google trends data can be a useful leading indicator and that it can be used in addition to other leading indicators that are currently used to predict the development of unemployment. Since there are clear signs that Google trends data can work as instruments for the prediction of unemployment, then it can be used for other economic indicators too.

2.2.4 Google Trends as An Economic Indicator of Housing Prices

It has been made clear from the analysis until know that Google queries can be a very useful source of data for research. The literature does not only focus on the use of this data to capture the development in unemployment. It is well known that economic data is provided with a delay and Google trends data can be a path to overcome this problem. Data from Google trends have been also used to examine the development of other economic variables like the house market prices.

A research by McLaren and Shanbhogue (2011) has examined if the Google trend data can be used as a variable for the development of the prices of houses in the United Kingdom. The researchers acknowledge the fact that people who want to buy or sell a house are using the internet in order to achieve their aim. Since Google is the most used internet search engine both worldwide and in the United Kingdom, they use Google queries to check if they can be a useful variable for the prices of houses in the UK. The first step that they had to take was to decide which specific google search phrase or word was the best to be used as a variable for their model.

They decided to use the term "estate agents" because they found out that The Google Trends Data for "estate agents" was highly correlated with the prices of houses. In this case, they do not use the Google trends data of the actual the same month with the prices of houses.

The methodology they used is presented here. As dependent variable they have chosen the monthly house price growth. As independent variables, they used the first and second lag of the monthly house price growth, the data from Google trends for the query "estate agents" and two more alternative indicators that have been used by literature for the growth of house prices. Their model is explained by the following equation

It has to be noted that the Google trends query and the other two indicators of house prices have been used in their first lag. McLaren & Shanbhogue (2011) decided to do so because a purchase of a house is a procedure that may take up to a month to be finished due to many different processes that take place before a transaction for the sale of a house is complete.

The results of their study are quite interesting. The Google trends query variable is found to be statistically significant and has a positive relation with house prices. By that we can assume that the data from Google trends can be a good proxy of the demand for houses. Since an increase in the search terms means that there is a real increase in

demand for houses, it is supported by economic theory that the market prices have a positive relation with the variable of the Google trends queries.

2.2.5 Internet Search Data As An Indicator Of Investor And Depositor Sentiment

As we have seen until this point in this chapter of my thesis, Google trends can be a very interesting tool for research in economics. It is clear that data from Google trends can be used to predict economic indicators like unemployment or House prices. By this use they become a useful tool on the hands of a researcher so that he or she can have proxies of economic indicators that are provided with delay.

Since Google trends can give so much usual information it is expected to be used in finance. Data from Google trends can possibly be a good image of how investors think and it may even help to predict their next moves. But before these data are used to make projections, they can to identify certain behaviors of investors. Da, Engelberg & Gao (2015) decided to create an index based on Google search Queries that could be used as a proxy for investor sentiment. In this case they want to take advantage of the fact that most investors obtain their information through the internet. It is correct to think that if an investor is worried for a specific investment or for the developments in economy he or she will try to obtain information through the internet and since 90% of users use Google as their internet search engine, Google trends can give a clear picture of what concerns the investors.

For such an analysis one specific keyword or phrase cannot be enough in order to provide a clear picture of investor sentiment. Therefore Da, Engelberg & Gao (2015) created the FEARS index. When creating this index their aim was to make the most of the data available through Google trends. In order to find the correct Google queries, they used dictionaries in order to choose word that have an economic and financial meaning and that can be connected to investor sentiment. By doing this they found a list of 118 search terms. After identifying these 18 terms, they run regressions in order to find out which of these 118 words were the most important. Also, they checked which of these words were historically related to market returns. After these procedures, they kept only the words that were related to market returns in order to be used in the FEARS index.

Return stands for the return of stock I at time t+k. FEARS at time t stands for the value of the FEARS index on time period t. Control stands for control variables for asset I on time t. As control variables, they used lagged asset-class returns, changes in the

economic policy uncertainty index (EPU), changes in the Aurora-Diebold-Scotti index (ADS), and the CBOE volatility index VIX.

They used this model to examine the relation between the FEARS index and stock returns on S&P 500. The results of this model are very interesting and give extra value to the use of Google Trends queries as data in economic and financial research. They found out that FEARS index was statistically significant when the dependent value was the market returns on day t but also when the dependent value was the returns on day t+1 and day t+2. Fears index had a negative relation with returns on day t and a negative relation with returns on day t+1 and day t+2. By that it is made clear that an increase in FEARS index, is connected with increased returns on day t+1 and day t+2. From this result it can be shown that Google trends data can be used in order to explain Market returns. In another model, Da, Engelberg and Gao (2015) used the FEARS index as independent variable and the treasury returns as dependent variable. In this case FEARS was a statistically significant variable for the Treasury returns on day t, day t+1, day t+2 and day t+3.

The difference here is that FEARS index had a positive relation with treasury returns on day t and negative relation with treasury returns on the next days. These results are the opposite of the case of S&P500 returns were on day t there was a negative relation with returns and a positive relation on the next days. This is quite interesting and in it is connected with theory of finance. Since the FEARS index wants to capture the negative sentiment or the pessimism of investors, it can show us when investors feel that the risk on the economy is higher. So, these results may be connected with how investors perceive the risk of investing on S&P500 and on treasury bonds because treasury bonds are considered to be a less risky in comparison with investing in the stock market.

These results are a great contribution to the research on using Google trends data on economic and financial research. The FEARS index is the first index which is based on data from Google trends. It takes research one step further. The main difference with other research papers is that in this case the data from Google trends are not used in a raw version. They are being processed in order to have additional value as variables. Based on FEARS index, other indexes can also be constructed that can be used in other countries since FEARS index is based on English and can be used in the US. Furthermore FEARS index can be a valuable to study not only investor sentiment but also depositor sentiment.

This is what Irresberger & Weiss (2015) did on their research on US deposits. As we have already seen, most of the research that has been done on the development of

deposits focuses on bank specific and macroeconomic variables. Their research is driven by the idea that when depositors are not certain about the health of a bank or for the banking system they will try to withdraw their deposits. In other words, their aim is to see if depositor sentiment drives the deposit growth. Except this aim, they also try to understand if depositors, when they are better informed about deposit insurance will keep their deposits on the banks.

To find out how depositors react based on depositor sentiment and and their attention to the deposit insurance schemes, Irresberger & Weiss (2015) used data from extracted from Google and more specifically from Google trends. In order to have a measure of depositor sentiment, they have chosen to use the FEARS index as introduced by Da, Engelberg & Gao (2015). Since this index worked in identifying the investor sentiment in the US it can work as an identifier of depositor sentiment for the US. They also needed an index for the attention of depositors to deposit insurance schemes. To construct this index, they followed what most of the other researchers have done in order to use the data from Google trends properly.

They have tried to find out which Google query could represent best the attention of depositors to deposit insurance schemes. After obtaining the data for various Google queries that could be related to deposits wanting to get informed for deposit insurance schemes, they concluded that the best Google query is “FDIC”. F.D.I.C. stands for Federal Deposit Insurance Corporation which is the organization responsible for the insurance of deposits in the US. This institution provides insurance for deposits up to the level of $250000. In that sense a depositor when his institution is insured by FDIC, does not have to be afraid of losing his money p to the level of $250000 even if his or her bank faces bankruptcy. This insurance will keep depositors from withdrawing their money since they will not be afraid of losing them and this fact could stop possible bank runs.

Chapter 3: The Greek Crisis and Political Uncertainty

In August 2008 the collapse of the investment bank Lehman brothers, created the worst financial crisis in a global level since the great depression. When this huge financial storm begun, Greece was in a very weak position to deal with in terms of its Macroeconomic conditions. Greece was suffering from the twin deficits problem which means that even before the collapse of Lehman deficits in both the current account balance and a fiscal deficit. Except the twin deficits problem Greece had also a very high rate of debt to GDP which was at more than 100%.

3.1 From Lehman Brothers To The First Greek Adjustment Program

In this uncertain environment, the Greek economy started to face the consequences of the international financial crisis with a delay in comparison with other European countries. As stated before, The Greek economy suffered from one of the highest rates of debt to GDP worldwide. In this context, fears about a possible sovereign debt crisis have started to rise. The first sign of the Greek crisis was the rise of the spread between the Greek sovereign 10-year bond and the German 10-year sovereign bond. When at the end of 2007 the spread was only at 30 basis points, in December of 2008 it rose to 200 basis points.

This fact made the refinancing of the Greek public debt far more difficult and expensive. The rising spreads were a clear sign of the fear of investors against Greece. In March 2009 spreads rose to 285 basis points. In this environment of skyrocketing interest rates for the Greek debt, the Government decided to enter the financial markets and issue bonds in order to cover the financial needs of 2009. After that, the spreads fall to the levels of 130 basis points on September 2009 Alogoskoufis (2012)

Except the sovereign debt spreads, the international financial crisis started to enter the Greek economy through the channel of banks. Greek banks were quite conservative in comparison to European banks. In terms of their strategy, they were not exposed to the toxic financial products that created problems in other European Banks. The problems from Greek banks rose from the low level of deposits. Since they could not finance loans from deposits, Greek banks were exposed to interbank lending market which was a low-cost source of liquidity on the years before the crisis. Another characteristic of the Greek banking sector was its exposure to subsidiaries especially in eastern Europe.

The crisis which first created problems in these countries was also a negative factor for the financial health of Greek banks.
The uncertainty that rose worldwide after the collapse of Lehman Brothers, increased the cost of interbank lending and became a source of instability for Greek Banks. Pagoulatos & Triantopoulos (2009)

Through the channel of the banking sector the international financial crisis entered the Greek economy. The Greek banks gradually stopped to provide the necessary liquidity to the economy. The sectors that were most affected were the constructions industry and especially the housing industry, and the shipping industry. Because of the nature of these sectors.

As a solution to the growing problem of lack of credit the Greek government of New Democracy presented a package of 28 billion euros for Greek banks which of course was accompanied with terms and requirements which could decrease the autonomy of banking institutions. One other measure taken from the Greek government at the time was the increase of the state guarantee for deposits up to 100000 euros.

At first banks did not accept the plan and tried to increase liquidity from deposits by increasing the interest rate on deposits. This was not enough and by 2009 Greek banks used the 28 billion package Pagoulatos & Triantopoulos (2009). The Karamanlis Government asked the parties of the opposition for consent on a package of measures to cope with the worsening of the economic situation, but he got a negative answer from all the parliamentary parties except Laikos Orthodoxos Synagermos. Especially the main opposition party, the Panhellenic Socialist Movement and its leader George Papandreou asked for the resignation of the government and snap elections.

3.2. Change Of Government And The First Program

On August 2009 prime minister Karamanlis resigned and a snap election took place on October 4th. The Panhellenic Socialist Party won the popular vote by 43,92% which meant a strong parliamentary majority of 160 out of 300 seats. A few days later, a shocking announcement was made by the new Finance Minister George Papaconstantinou. The government deficit which was forecasted on the level of 6% of GDP, was reviewed to the level of 12,5% of GDP. This announcement created many negative implications in the evolution of the Greek crisis.

This announcement created great concern about Greece and its ability to bring its public finances back to a situation of health and also the capacity of Greece to repay its enormous public debt. Following that announcement Fitch ratings downgraded the credit rating of Greece 2 times from A to A- and after that to BBB+ some weeks later. In December the other two rating agencies, Standard and Poor's and Moody's also

downgraded Greece's credit rating. This bad climate continued for Greece in the first months of 2010.

he Greek Government following the rise between the Greek and German bond over 300 basis points decided to act. In February and in March two packages of austerity measures were passed from the Greek parliament. These measures included rises on the VAT and rises on taxes imposed to tobacco, alcohol and on luxury items. It also included the freeze for the salaries of the public sector servants and freeze of pensions. ECA (2017)

Unfortunately these measures were not enough to convince the financial markets that Greece was on the correct path. On April 2010, Fitch Ratings downgraded Greece from BBB+ to BBB. The spread of Greek bonds rose to more than 400 basis points and on 23rd of April the prime minister of Greece asked for international assistance. After this request, on May 2010 the Memorandum of Economic and Financial policies was passed from the Greek Parliament.

3.2.1 The First Memorandum Of Economic And Financial Policies

The main element of the memorandum is that the Eurozone Member states and the International Monetary Fund would provide loans of 110 billion euros under specific terms and conditions.80 billion euros would be given to Greece by bilateral loans from the eurozone member states and 30 billion euros from the International Monetary Fund. Greece would have to reduce its deficit under 3% until 2014. The Europeans and the IMF agreed on this program since the alternative would have been the default of Greece and that could lead to the exit of Greece of the Eurozone something that could destabilize Greece but also the whole eurozone. After the Collapse of Lehman Brothers this could have been an even more strong shock for Greece the Eurozone but for the whole Global Economy.

After 2014 Greece would have to achieve high primary surpluses in order to reduce its debt. The terms of the program did not have to do only with the Greek budget. Greece had the obligation to implement structural reforms to achieve a better functioning of markets in order to improve its competitiveness. The third pillar of the program was the financial stability in Greece. To be achieved, an amount of 10 billion from the total 110 billion euros would be used for the establishment of the Hellenic Financial Stability Fund Bank of Greece (2014)

The measures that were voted and started to be implemented during 2010 were a real shock for Greek society. These events created serious political uncertainty. The government of George Papandreou came to power with an agenda that was against austerity. The austerity measures that accompanied the bailout program were not accepted by Greek public opinion. Huge demonstrations took place in Athens and in other cities that led to the death of 4 people in Marfin Bank in Athens. In this very difficult political climate, local elections took place.

That was the first difficult political test for the PASOK government. All the opposition parties even the conservative New Democracy were against the implementation of the program. Prime Papandreou and the ruling party PASOK gave special importance to these elections especially in the region of Attica. Due to the fact that he was elected with a different agenda he needed this election as an acceptance of his new policy. The results were accepted by PASOK as a win especially since the pro Government candidate won in the region of Attica which almost half of the Greek population lives. The results of the implementation of the program were mixed. On the one hand the program well was before schedule EC, ECB, IMF(2010a). From a Macroeconomic perspective inflation was higher than expected on 5,2% on October the unemployment rose to 12,2% on August IMF (2010a) The biggest achievement of the first year of the program was that General government deficit fall at 10,6% of GDP from 15,4% on 2009 Bank of Greece (2014). In Graph 3.1 the development of the spread is presented. In turbulent political times the spread was getting very high showing the anxiety of investors for the remain of Greece in the EMU. This fear had a basis since no other advanced economy did have such a recession with such a duration. The social climate was becoming more and more difficult as unemployment level started to rise in the first years of the climate as it can be seen in Graph 3.2. In such an environment of course, the economic climate was dropping as it is presented in Graph 3.3 that we can see the Economic Sentiment Index.

- See Graph 3.1. on list of Tables and Graphs-

- See Graph 3.2 on list of Tables and Graphs-

- See Graph 3.3 on list of Tables and Graphs-

3.2.2. The Second Year of The Program

As addressed before the implementation of the program was a real shock for the Greek public opinion. The reforms and the fiscal adjustment that were required by the program changed the lives of million of Greek citizens. Although the program had a good start in terms of its implementation the fact that it was so unpopular started to create problems. Also, in 2011 the first signs of the problematic implementation started to rise. On February 2011 the Troika as IMF European Commission and The ECB were called stated that the revenues were under the targets and that reforms should proceed. IMF (2011), EC, IMF, ECB, (2011a, b)

New measures were passed on July 2011 for the period 2011-2015Bank of Greece (2014). In this case the main opposition party of New Democracy voted for some of these measures but in general it kept a rhetoric against the Memorandum. During this period the political uncertainty rose to very high levels because the measures taken did not have popular support. Until July all the credit rating agencies did downgrade Greece for one more time and the most crucial downgrade of Greece was that by Standard and Poor's which downgraded Greece to default. Some days later the same happened with Fitch which downgraded Greece to CCC that is a non-investment grade.

On September the situation became far more problematic. The fifth evaluation of the programmed was paused. During that period Papandreou reshuffled his government and a new package of austerity measures was passed on September 2011. For one more time Athens faced violent clashes between citizens and the police and the stability of the government was very problematic.

After these events talks started for a new program for Greece that would reduce the Greek Public debt. These was agreed on the 27th of October 2011. After this agreement Papandreou decided to hold a referendum for the new program. This possible referendum created a great deal of uncertainty. Many people inside and outside of Greece believed that a No to the new program would have been the answer and that could lead to the exit of Greece of the Eurozone something that could destabilize Greece but also the whole eurozone.

On November 2011 Papandreou resigns the referendum never happened and Loukas Papademos former vice president of the ECB was appointed as the new Prime Minister of a coalition Government that has the support of three parties (PASOK New Democracy and Laikos Orthodoxos Synagermos)

3.2.3 PSI

On February 2012, the negotiations for the restructuring of the Greek Public Debt were over. In the Private Sector Involvement (PSI) as it was named only private investors took place. But this was not the net gain for the Greek economy. 41 billion were needed for the recapitalization of the 4 Greek systemic Banks. Also 16.2 million euros were restructured but belonged to the Greek pension funds, so it did not lead to reduction of public debt since they are public entities.

Furthermore 4,5 billion euros were borrowed from the EFSF to be given as an offset to the investors who were involved in the PSI. Also 1,9 billion euros and 11,9 billion euros were borrowed from EFSF so that the 2012 deficit and other government liabilities were covered.

Even in this amount the debt buy buck of December 2012 is added (31,9 billion euros debt reduction) and given the fact that 11,3 billion euros were borrowed so that the buyback could happen the net result of debt reduction was 51,2 billion euros Hardouvelis and Gkionis (2016), Zettlemeyer, Trebesch & Gulati (2013)
The PSI agreement was connected to a new package of financial support and a new Memorandum of Economic and Financial Policies which remained in the Greek Public Opinion as the second Memorandum. The new package of financial assistance was 130 billion euros.

After the vote for the second Memorandum and the implementation of the PSI, the political landscape changed dramatically in Greece. Both PASOK and New Democracy saw many of their MP's to leave the two parties and new parties were formed. Most of the new parties had an anti-austerity agenda and promised the Greek people that there

was a way that Greece could remain in the Eurozone but without the heavy burden of austerity.

On May and June 2012 double elections took place in Greece. This was a highly uncertain period especially between the two elections. Fears for the exit of Greece risen due to this uncertain political environment. In the elections of May 6th New Democracy was the first party but it could not form a government. Also, a historic change had happened in the Greek political landscape.

For the first time after 1977 PASOK which had won the last election in 2009 was on the third place. In the second place was the Coalition of Radical Left (SYRIZA). SYRIZA had an ambiguous political position. On the one hand it promised that there was a way for Greece to remain in the Eurozone without austerity measures. On the other hand, many party officials wanted the exit of Greece from the eurozone.

The other parties that entered the parliament were the Communist Party which was against the austerity measures wanted Greece outside the Eurozone, Independent Greeks (ANEL) which also had the opinion that Greece could remain in the Eurozone without austerity measures. Democratic Left (DIMAR) which had a more moderate approach against the austerity programs and Golden Dawn a far-right party which was against the austerity programs.

A new government was not formed and Panagiotis Pikramenos was appointed as acting prime minister until the new elections. In this landscape the Elections of June 2012 were a type of referendum for the remain of Greece in the eurozone. Between the two elections, spreads rose, and deposits had decreased. Finally, after the elections of June a new government was formed with Antonis Samaras as prime minister with the support of three parties (New Democracy, PASOK, DIMAR).

3.2.4 From Stability to The Fear fear of Grexit

After October 2012 the developments were rapid and since then uncertainty fallen. Greece started to meet its targets. The 2013 Budget was adopted on November 2012. There was a notable change on the target for the primary surplus that had to gradually rise up to 4,5% until 2016. Bank of Greece (2014).
On 2013 Greece for the first time since the beginning of the crisis had a primary surplus.

The recapitalization of the Greek Banks was over, and recession was 3,85% that was milder than the years before. Even more importantly the structural primary balance of 2013 was 4,4% Bank of Greece (2014).

In 2014 Greece for the first time after 6 years had positive growth of 0,4%. Also, on 2014 the second recapitalization of Banks took place and Greek Banks manage to raise 8 billion euros Bank of Greece (2014). Although there were positive signs for Greece political uncertainty started to rise again. SYRIZA won the European elections of 2014. Antonis Samaras proceeded to a reshuffling of his government. Yannis Stournaras who until then was Minister of Finance was chosen as the Governor of the Bank of Greece. In the position of Minister of Finance Gikas Hardouvelis was appointed. Being a former advisor of Prime Ministers Kostas Simitis and Loukas Papademos he had a clear view for the crisis.

Political uncertainty rose again in Greece. Not only an anti-austerity party (SYRIZA) was first on the European elections, but there where presidential elections coming at the beginning of 2015. The president of the republic in Greece is elected from the parliament with a majority of 180 out of 300 MP's the government majority did not exceed 160 MP's. In the case of non-election of a new president the country would have a snap election. Observing the fact that the presidential majority was difficult to be formed since SYRIZA and the other parties would not support any candidate but wanted to lead the country to a snap election political uncertainty rose. To these facts, it has to be added that the second memorandum was expiring at the end of 2014.

On December 6th Eurogroup decided that the current program would be prolonged until the end of February 2015 Eurogroup (2014). The Greek government brought the vote for the presidential election at the end of December 2014 in order to deal with the uncertainty that was created. The presidential candidate that was backed by the Government was Stavros Demas a former member of the European Commission. Stavros Demas was not elected, and Greece was getting ready for one more snap election on the 25th of January 2015.

Greece was again in very uncertain political situation. Spreads started to rise and deposits left the banking system. This had to do with the fact that SYRIZA had an ambiguous political position. Its main promise to voters was that it could keep Greece in the Eurozone but on the other hand it would abolish most of the austerity measures that had been implemented during the years of the crisis.

After the elections a new coalition government is formed. SYRIZA and ANEL two anti-austerity parties are on the government. The president of SYRIZA Alexis Tsipras becomes the new prime minister and the president of ANEL Panagiotis Kammenos becomes minister of Defense. As minister of Finance Yanis Varoufakis was chosen. That was the beginning of a new negotiation that took several months and finally leaded to a referendum and an imposition of capital controls in Greece.

On February 4th the ECB suspended the waiver of accepting Greek bonds as collaterals for liquidity from Greek banks. That would mean that Greek banks could only get liquidity from Emergency Liquidity Assistance Mechanism of the Bank of Greece. After that on February 27th the EFSF program got an extension until the end of June 2015 ECA (2017). In the months that followed the negotiations were not successful. During this period depositors were withdrawing their money from Greek Banks. This happened because of the growing fear among Greek Depositors that a deal would not

happen and Greece would exit the eurozone. On the 26th of June a referendum is called regarding the deal that was proposed by the Europeans to Greece. This fact created a bank run and on the 28th of June banks were closed and capital controls were imposed ECA (2017)

Several weeks after the closing of the banks the government finally made a deal with its European partners and the Third Package of financial assistance was agreed between Greece ESM EC ECB and the IMF.

3.3. Why Depositors Were Afraid Of Grexit

The term Grexit was first was first used by Buiter & Rahbari (2012) on an economic analysis for Citigroup. It is a mix of the word Greece and the word exit meaning the Exit of Greece from the European Monetary Union or the Eurozone. This was a constant fear of depositors during the years of the crisis in Greece. This is why withdrawals were happening when uncertainty was rising.

As Gogos, Monokroussos, & Stamatiou (2015) state, Grexit would be a catastrophic event for the Greek economy. In this analysis the focus is only on the possible consequences for depositors and not for the whole economy. Given the scenario that Greece could default and exit the eurozone, the new currency would be devaluated. Greek people had lived devaluations on the past and have in mind that their money would lose their value instantly.

But devaluation is not the only reason that created fear for Grexit among depositors. In a possible case of a Grexit. In such a case all the businesses of the private sector would have their assets in the new national currency and all their liabilities on Euro. That would create many bankruptcies. The same would apply for banking institutions so in possible Grexit not only the deposits would be devaluated but may not exist at all if the banking institutions collapse.

- See Graph 3.4 on list of Tables and Graphs-

- See Table 3.1 on list of Tables and Graphs-

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kept large amounts of cash and this is why Bank of Greece had to make extraordinary shipments of Euro Banknotes as it can be shown in Table 3.1

3.4 The Reshaping of The Greek Banking System During The Crisis

The landscape of Greek banking has totally changed since the beginning of the crisis Bank of Greece (2014) The number of banking institution is significantly smaller now than it was before the implementation of the stabilization programs. After these years that changed everything in the economy of Greece, banks could not remain unaffected. When a Banking institution faced problems regarding the continuation of its function the Bank of Greece had to intervene to secure the health and soundness of the Greek financial system Bank of Greece (2014). In such cases the options that Bank of Greece had were four.

To close and liquidate the bank something that could lead to depositors losing their money and creating a banking panic. The other choice is the recapitalization of a bank as it happened with the four systemic banks, National Bank of Greece Eurobank, Piraeus Bank and Alpha Bank Bank of Greece (2014). The creation of a bridge bank with aim to be sold in the near future. The las option was the transfer of a problematic banks sound assets to a healthy banking institution.

The first case was that of Proton bank. The bank's management followed a risky strategy. Proton was mainly an investment bank and had a high lending exposure to companies of its main shareholder Bank of Greece (2014). On October 2011 Proton was excluded from any kind of funding from the ECB. To solve this problem, Bank of Greece in cooperation with the Hellenic Financial Stability Fund decided to proceed to the creation of a "bad bank" and a "good bank" which and this was how the New Proton Bank was formed with HFSF as its main shareholder.

The second case was that of T bank. This banks capital adequacy ratio was below the legal limit, so its banking license had to be withdrawn. In this case, Bank of Greece intervened to safeguard the stability of the Greek Banking System Bank of Greece (2014). The deposits of T bank were transferred to TT Hellenic Postbank which made the highest bid. It has to be noted that before the T bank was closed, a procedure of merger had started with TT Hellenic Postbank, but it stopped due to the closing of T bank.

The third case that intervention by the bank of Greece was needed was that of three Cooperative banks. The Cooperative banks of Lesvos-Limnos, Achaia and Lamia had serious problems in terms of shortage of capital and a high percentage of Non-Performing Loans in comparison to other Greek banks Bank of Greece (2014). The three banks could not find the funds for recapitalization. In this case the Bank of Greece

suspended their banking authorizations. Deposits were safe since they were transferred to the National Bank of Greece.

The fourth case was that of the Agricultural Bank of Greece also known as ATE bank. The case of ATE bank was the most dangerous for the Greek Banking system for two reasons, ATE bank was a significantly bigger bank compared to the other cases and also the time that the incident happened was just after the second consecutive election of 2012. ATE bank had a close relation with the State, was undercapitalized and there was not any chance of recapitalization. Furthermore, it took the last place in ranking at the pan-European Stress Tests. The problem was solved by the transfer of ATE banks sound assets to Piraeus Bank which was one of the four systemic banks that were recapitalized by the HFSF.

The fifth case was that of TT Hellenic Postbank. After the PSI the bank had a capital adequacy ratio of -32%. The major shareholders of this bank could not recapitalize it. Also, the Hellenic Financial Stabilization Fund was not allowed to recapitalize this bank because it was considered non-viable Bank of Greece (2014). The solution that was chosen in this case was that of the establishment of a bridge bank with TT Hellenic Postbank sound assets and the New TT Hellenic Postbank was formed. Again, thanks to the intervention of Bank of Greece, the Greek Banking system remained sound.

In 2013 that the consequences of the PSI were resolved for the Greek Banking system a new problem had to be resolved. The imported banking crisis after the Collapse of the Banking System in Cyprus. Three Cypriot banks had branches in Greece, Ban of Cyprus, Cyprus Popular Bank and Hellenic Bank. As in the other cases before, Bank of Greece had to intervene to stop the spread of the Cypriot Banking crisis to the Greek Banking System. By this intervention, the three Cypriot Banks were absorbed by Piraeus Bank. It must be noted that depositors in the Greek branches of the Cypriot banks were excluded from the bail-in that depositors in Cyprus suffered.
Finally, some other changes were the acquisition of the sound assets of FBB Bank and ProBank by National Bank of Greece. Also New TT Hellenic Postbank and New Proton Bank were acquired by Eurobank. Furthermore, deposits of Cooperative Banks of Western Macedonia, Dodecanese and Evia were transferred to Alpha bank. Bank of Greece (2014).

3.5. Measurement of Political Uncertainty

Any form of an investment has an expected return and of course this expected return is connected with the risk of not getting back the expected return but also losing the whole of your investment. There are many forms of risk but for our case we want to focus on political risk and its implications. The aim is to examine how political risk can change the view of an investor of any kind. This quest gets more interesting when the fundamental elements for an investment are positive, but the political risk is the factor that changes the decision of investor. Keeping in mind that even deposits can be seen as form of investment which is the one with the least risk of losing. It is essential for my thesis to study how political uncertainty plays a role in other investment decisions. Trying to find the research done on the role of political uncertainty I found out that there has been some work done regarding the role of political uncertainty on capital flight. First of all we need to see define what exactly is political uncertainty and policy uncertainty according to literature. Pastor & Veronesi (2013) The government cannot be seen as every other economic agent.
Political shock is a situation when unexpected information comes into knowledge of investors and citizens
Political uncertainty is a situation where investors do not know or cannot value the next move of political leaders in a country. This can be an effect of many different sources. It may arise from the extreme situation of a possible war.

In order to quantify uncertainty literature has many options. The two more interesting are the Economic Policy Uncertainty (EPU)Index Baker et al. (2016) And the Political Risk Rating by PRS Group PRS (2018). The EPU takes higher prices when uncertainty about economic policies and political uncertainty rises. The PRS Political Risk Rating for Greece gets higher prices when uncertainty is less, and it gets prices from 1 to 100.

Chapter 4: Empirical Research

In order to understand in a more efficient way the depositor behavior in recession and depression periods, the paradigm of 2009-2017 Greece was selected. The core motive behind this selection is to evaluate the banking system during bank run like situations, comprehend the depositor sentiment and estimate which variables affect depositors. Additionally, whether political and policy uncertainty aids deviation from normality.

The selected time span is a nine-year period (2008-2017), either with monthly variables or quarterly in the case of panel regressions.The variables chosen cover macroeconomic data, banking specific indices, Google trends and a political certainty index.
The specific empirical research attempts to verify the following:

- Hypothesis (1): The borrowing spread between the German and Greek 10Y bonds is statistically significant
- Hypothesis (2): The coefficient of spread is negative
- Hypothesis (3): Political Certainty index is statistically significant
- Hypothesis (4): Google Trends can be a metric that is connected to deposit flights

The procedure followed for the empirical research on the deposits of Greek banks and their fluctuations during the recession are: (i) collection of the data, (ii) estimation of several models for the banking sector as a whole and individually, (iii) hypothesis check. The description of the data follows on chapter 4.1, the estimation on chapter 4.2 and finally, the results and hypothesis check on 4.3.

4.1. Data

The data used during the empirical analysis are the usual variables that are constituted in the various international academic papers regarding similar researches. Some additional data were used in order to expand the suggested models and extract valuable conclusions and observe substantial correlations. The frequency of the data is either monthly -2009M10 to 2017M6-, or quarterly -2008:M3 to 2017:m9- for the case of panel regressions, as it will be explained in the next chapter.

The vast majority of the data, for both models that will be described was extracted through Bloomberg Database. Specifically, for the simple time series, in order to

compute the spread of the Greek lending the generic 10-year government bonds of Greece and Germany were selected. Additional variables are the economic sentiment indicator that is constructed by the European commission, the consumer confidence and the unemployment rate. The household deposits of the banking system are extracted through the Bank of Greece report and regarding the political context, the Political Risk Rating of PRS group is employed. Finally, as described in recent literature, Google trends could be an efficient way to measure household reactions. Hence various search terms regarding the Greek recession indexed by Google were integrated to the specific model.

As for the panel model, the research was conducted across the twelve individual banks that constituted the banking sector. In this case, Thompson Reuters Eikon was the source for the banking sector variables. Again, the deposits were the main aspect of the model accompanied by the indicators of Equity, Cash levels, ROA, Loan losses and Net Interest Income. Furthermore, some of the same variables used in the aforementioned model such as the political certainty index and Google trends indexes, were also included in order to create a more spherical opinion about the correlations.

Concluding, some further calculations have been made so as to manipulate the variables in to the appropriate form for regressions. The deposits in both models were converted to logarithms and then the first differences were created. The same applies for the level of unemployment. Moreover, first differences computations were made for the lending spread, political certainty, economic sentiment and consumer confidence indexes, as for the Google trend terms. Finally, the banking specific variables abovementioned were converted to ratios divided by the individual bank's assets levels.

4.2.1 Basic Model

This model is a time series model. The estimation of separate regressions demands the definition of the function and the variables included. The basic model is simplified and similar to the ones in international bibliography and adjusted to the Greek particularity. The dependent variable is the transformed household deposits, firstly turned into logarithms and afterwards taking the difference between consecutive time periods. All the independent variables used, follow the "rule" of the first differences.

The included variables consist the lag of the dependent in order to eliminate autocorrelation, economic sentiment, political certainty and consumer confidence indexes and the logarithm of unemployment. Moreover, the most viable analytics via Google trends is the term "Drachma" which is vastly populated in comparison to "Grexit" or "Greece leaving Eurozone". Here it has to be noted that these phrases are their equivalent in Greek but for reasons of understanding the English equivalent is going to be used from know on during the analysis although the data were for the original Greek ones Lastly, the most significant independent variable is the lending spread between Greece and Germany. Of course, all these expressed in econometrics terms will produce the following relation:

$$\Delta logDep_t = B_1 \Delta logDep_{t-1} + B_2 Drachma_t + B_3 \Delta SentInd_t + B_4 \Delta logUnem_t + B_5 \Delta PolCert_t + B_6 \Delta ConsConf_t + B_7 Spread_t + B_0$$

(4.1)

After several examinations, (4.1) was the concluding model to be tested and evaluated. For the sake of brevity, other models that were regressed will not be fully demonstrated but some of their results will be provided for comparison. The aforementioned function was estimated with the ordinary least squares (OLS) and the timespan was 2009:M10 through 2017:M6 which covers a large period that can describe the depositor's behavior during the recession and the political risk.

4.2.2 Panel Model

Undoubtedly with the usage of panel data, it is easier to understand weather the appearing differences within the variables and their coefficients are due to the structural differences of the individual banks, or due to the time effects. Interpreting these effects, valuable conclusions can be extracted on how the individual banks perform and how their indicators affect the depositor's behavior. The suggested regression model is slightly different to the basic discussed, excluding the hypothesis regarding Google trends. Both fixed and random effects were used in order to determine which applies preferably on the situation. Again, various models were tested but only the below will be demonstrated:

$$\Delta logBankDep_{t,j} = B_1 \Delta logBankDep_{t-1,j} + B_2\, ROA_{t,j} + B_3 LLtA_{t,j} + B_4 \Delta CashtA_{t,j} + B_5 \Delta spread_{t,j} + B_6 \Delta Polcert_{t,j} + B_7 \Delta logTotDep_{t-2,j} + B_0$$

(4.2)

Following a similar procedure regarding the dependent variable, the individual bank household deposits were converted to logarithms and then the first difference was used. One lag of the dependent variable was necessary to eradicate autocorrelation while two lags of the total deposits of the banking system were considered appropriate to be included. The first difference of spread and of the policy certainty index were used identically to the basic model described previously. The core difference between the two models, lie in the extra banking specific variables. Return on Assets, the allowed loan losses to assets and cash to assets ratios were inserted for a better review of each bank and how the depositors react to these basic "health" ratios of the banks.
Return on Assets is expected to have a positive relation with deposits since depositors would trust a more profitable bank. Loan loss to assets has an ambiguous relation since

depositors can identify it either as a positive or a negative indicator. Cash to assets ratio is expected to have a positive relation with deposits because depositors would trust more a bank that has better liquidity

For sure, there are some drawbacks with the panel regression since there were data collection issues with the banking specific variables. Moreover due to the nature of the Greek banking system and the structural problems that faced, many of the banks covered have less data available. This is the result either from mergers and the recapitalizations occurred throughout this nine-year span create various discrepancies to the sufficiency and quality of the available data. On the other hand, panel regressions could provide a better explanation during a bank run alike situation that Greece faced during 2015.

4.3 Results Analysis

In this part of the thesis we will examine the results of the two models.

4.3.1 Descriptive Statistics

The descriptive statistics are very useful in order for the model to be understood better. During the time period analyzed, Greece is in an extended recession; as a result it would be crucial to have a spherical view of the data and their fluctuations. On tables 4.1 and 4.2 are demonstrated the qualitative characteristics of the variables used on basic and panel models respectively.

The basic model (4.1), spread and unemployment are in absolute numbers, deposits are in millions, Google trend term "Drachma" is indexed like the sentiment and political certainty indexes in contrast to the consumer confidence, which is priced between -100 and 0. Regarding the lending spread, which is the core variable of the model, the mean value across the years is around 10% and gets its peak at 30% in comparison to just above 1.4% at the early stages of the recession. Hopefully most of these values have little to no meaning as for lending, since they are incentives from the secondary market and Greece was under an agreement with the EU and IMF in order to be lend with low interest rates.

The standard deviation of unemployment is similar to spread's and as it is displayed on graph 4.1 they have a similar course during this period. The first difference of spread with the first difference logarithm of deposits has a correlation of -34%, hence a reverse movement constantly, as displayed on graph 4.2. The economic sentiment index has a

relatively lesser drift amid the period with standard deviation of 7.2 and a mean of 88. In 2014 was the core elevation above 100 but without a similar movement for the deposits. Political certainty index has only minor movements across time, while consumer confidence and search term “Drachma” lie on the other end with severe volatility.

- See Table 4.1 on Tables and Graphs-

- See Table 4.2 on Tables and Graphs-

- See Graph 4.1 on Tables and Graphs-

- See Graph 4.2 on Tables and Graphs-

- See Table 4.3.1 on Tables and Graphs-

- See Table 4.3.2 on Tables and Graphs-

On graph 4.3.1 the histogram of the spread demonstrates a build up around 10% with a normal alike distribution, while the majority of the logarithms of the deposits in between 5.1 and 5.2, although a decent amount of values are at 5, hence no resemblance to a normal distribution. The economic sentiment index is mainly placed around 90 but with a significant amount of observations around 80 whilst the Google trend term drachma gathers around 10 with right outliers mainly during the 2015 period.

As for the descriptive statistics of the Panel regression. The mean value of Return on Assets (ROA) indicator, which is basically the ratio of net income to total assets is -1.6% across the banking sector; reaching a minimum of -27%.

The effectiveness of the investments is clearly minimal and that could be a clear signal to the depositors as for the viability of the organizations. Loan Loss Allowance, is a significant indicator since it provides the bank’s estimation of credit risk and the uncollectable assets of the portfolio. Finally, cash to assets mean value is over 10%, which is in accordance to the Basel III criteria for the minimum capital requirements and indicates satisfactory management and liquidity.

4.3.2 Estimation Results

4.3.2.1 Basic Model

The results of the two separate regressions are shown on tables 4.3 and 4.4. The basic model investigates whether the spread coefficient and statistically significant, and if the Google Term "Drachma" and Political Certainty index are statistically significant. The panel regression does not include the Google hypothesis. Moreover, a thorough analysis of the differences between the two regressions and which provides a better estimation is explored.

On table 4.3 are demonstrated the results of the estimation of function (1) mentioned prior. The dependent variable is the first difference of the logarithm of deposits and the first of the independent variables is the lagged version of the dependent in order to eliminate autocorrelation. Similarly the first difference of logarithm has been taken for unemployment, while for the rest of the variables only first difference calculations have been applied. As for the statistical tests, both Breusch-Godfrey LM test for autocorrelation and Durbin's alternative test for autocorrelation provided probability

values over 5% with the null hypothesis being no serial correlation, hence it can not be rejected.

- See Table 4.3 on Tables and Graphs-

Regarding the estimation of the basic model, the regression provided total statistical significance of the model. Additionally, three out of the four hypotheses turn out to be true. Spread affects negatively deposits and it is statistically significant even at 99% confidence level. Moreover the Google Trend "Drachma", which shows the volume of how much this term is searched within Google in a specific area, for our case Greece provides also a negative effect and is statistically significant proving the hypothesis true. On the contrary, political certainty index seems to have a small positive impact as expected, since the higher the value of the index the higher the trust of the society, but fails to reject the null hypothesis hence it can be assumed to be zero. Concluding the statistically significant variables, these include the lagged version of the dependent, which has positive impact as it was expected. Unemployment, which is stable in big percentages throughout the period, has zero impact since it not statistically significant.

The same applies for the consumer confidence, which is considerably volatile during this nine years. Adjusted R squared is at 41.31% meaning that the model explains the variance of the dependent variable at this level, adjusted by the number of variables. Due to the nature of the dependent variable the adjusted R squared is noteworthy.

The added variable plot, demonstrates the effect that the first difference of spread has added to the rest of the estimated model. No nonlinearity or unusual patterns are to be seen, while the slope provides the negative effect to the dependent variable. The same conclusions can be drawn for the rest of the variables, as for the first difference of spread.
In order to create a residual analysis, the residuals versus fits plot is the most appropriate tool, since it can detect non-linearity and outliers. The residuals randomly bounce around the 0 line, as a result it can be concluded that their relationship is linear. Furthermore, it is clear that the variances of the error terms are equal and there are no visible outliers since no residual seem to stand out. Lastly, since the spread is constant and the mean residual changes with the fitted values, no heteroscedasticity is present.

4.3.2.2 Panel Regression

Undoubtedly, panel regression is a convenient tool in order to observe how the banking variables change over time and measure the way they respond on macroeconomic variables that change over time but not across the individual banking entities. On table 4.4 the results of the panel estimations of the function (2) for both fixed and random effects are demonstrated jointly. Fixed effects explore the relationship between predictor and outcome variables and are used in analyses that focus on time changes and the causes within the banks. Additionally they remove the effect of the time-invariant characteristics so the actual effect of the predictors on the independent variable can be assessed. Regarding the possibility that the differences across the 12 banks that are studied, have an impact on the dependent, the random effects procedure is being follower. A Hausman test is the relevant test to prove if fixed or random effects, is the appropriate model. Out of the four hypotheses, Google Trend was excluded from this model since their quarterly data were not sufficient.

The dependent variable again is the first difference of the logarithms of the household deposits for the selected time period, but individually for each financial institution.
The lagged version of the dependent variable is used to remove autocorrelation. The particularly interesting fact is the change of the sign between the two regressions, but since the variable is not statistically significant, it does not affect the outcome. Return on Assets and Policy Certainty index are both statistically insignificant, on both regressions, with the latter proving wrong one of the three tested hypotheses. On the other hand, the coefficient of spread is negative on both regressions, substantially in

comparison to the basic model and statistically significant with 99% confidence. Consequently, the other two hypotheses yield to be true on all the proposed models.

Additionally, two lags of the total deposits, as used in the basic model, where included to use the variable as a benchmark. As expected the coefficient has a positive impact on the dependent, on fixed effects is statistically significant at 5% while at random effects is at 1%. The loan losses allowance to assets ratio appears to have a small positive effect while being statistically significant at 5% on random effects regression. In contradiction to that, cash to assets ratio is statistically significant on the fixed effects at 1%, with a noteworthy positive coefficient, while not statistically significant at all on random effects. Both regressions have total statistical significance while their adjusted R squares are relatively low. The mentioned Hausman test, has as a null hypothesis that the unique errors have no correlation with the regressors. Since the probability is less than 5% the best model to interpret the dependent's behavior is the fixed effects model.

- See Table 4.4 on Tables and Graphs-

On Graphs 4.4.1 to 4.4.6, is demonstrated the change, for some of the twelve banks separately, of the dependent variable and the core independent variable of the model, spread. It can generally be observed that the rule for all twelve banks is followed, and the movement of spreads on one direction leads the deposits to move on the opposite. The pattern is recognizable since all institutions seem to have significant correlation. Hence it does not matter whether some have better indicators, such as cash to assets ratio or equity to assets. The depositor's sentiment seems to ignore, if has to his knowledge this niche information, and give priority to other variables such as spread. Equity to assets ratio appears to follow the same pattern for the entire banking sector.

- See Graph 4.4.1 on Tables and Graphs-

- See Graph 4.4.2 on Tables and Graphs -

- See Graph 4.4.3 on Tables and Graphs -

- See Graph 4.4.4 on Tables and Graphs -

-See Graph 4.4.5 on Tables and Graphs –

-See Graph 4.4.6 on Tables and Graphs -

4.4 Conclusions

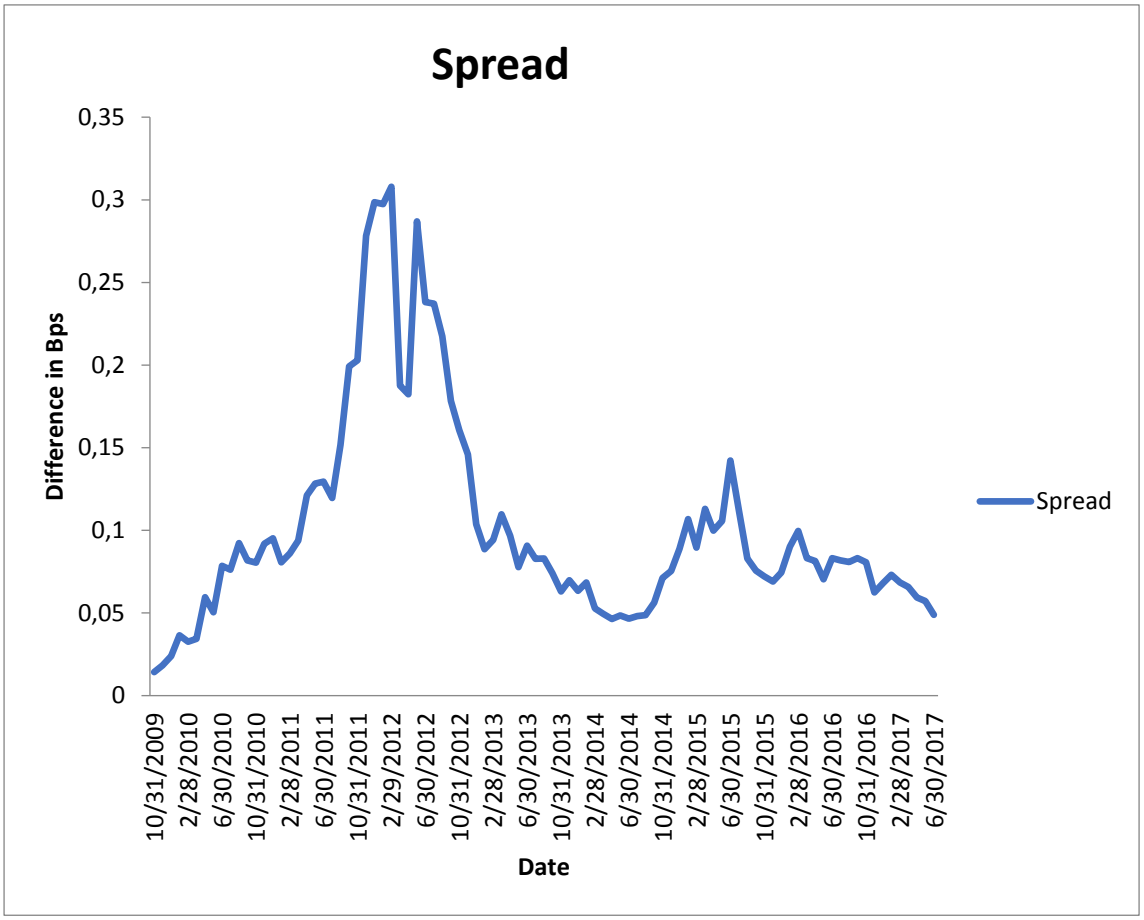
Undoubtedly, the core motive behind these econometric models, were to establish a relation between the lending spreads and the depositors' behavior. Given the results, only for the common variables, the longing affinity is succeeded.

Three out of the four hypotheses were proven true on the Basic model, while two out of the three on the fixed effects panel regression. Spread is statistically significant in every regression and has negative effect to the deposits. Furthermore, its coefficient on both regressions is remarkable since it has the biggest effect in comparison to the other variables. The effort to include the political instability to the models, with the usage of PRS's Political Risk Rating did not turn out as it would have supposed to, since the results were statistically insignificant.

On the other hand, as discussed in previous chapters of this thesis, Google Trends is a promising source of search data that could provide valuable information to comprehend previous actions. Moreover, the search of term "Drachma" was proven to have statistically significant relation to the dependent variable, showing a pattern of behavior. Finally, it can be inferred that the depositors consider the most the lending spread, since it's accessible and easier to comprehend information opposing to the other factors discussed in this thesis.

Tables and Graphs

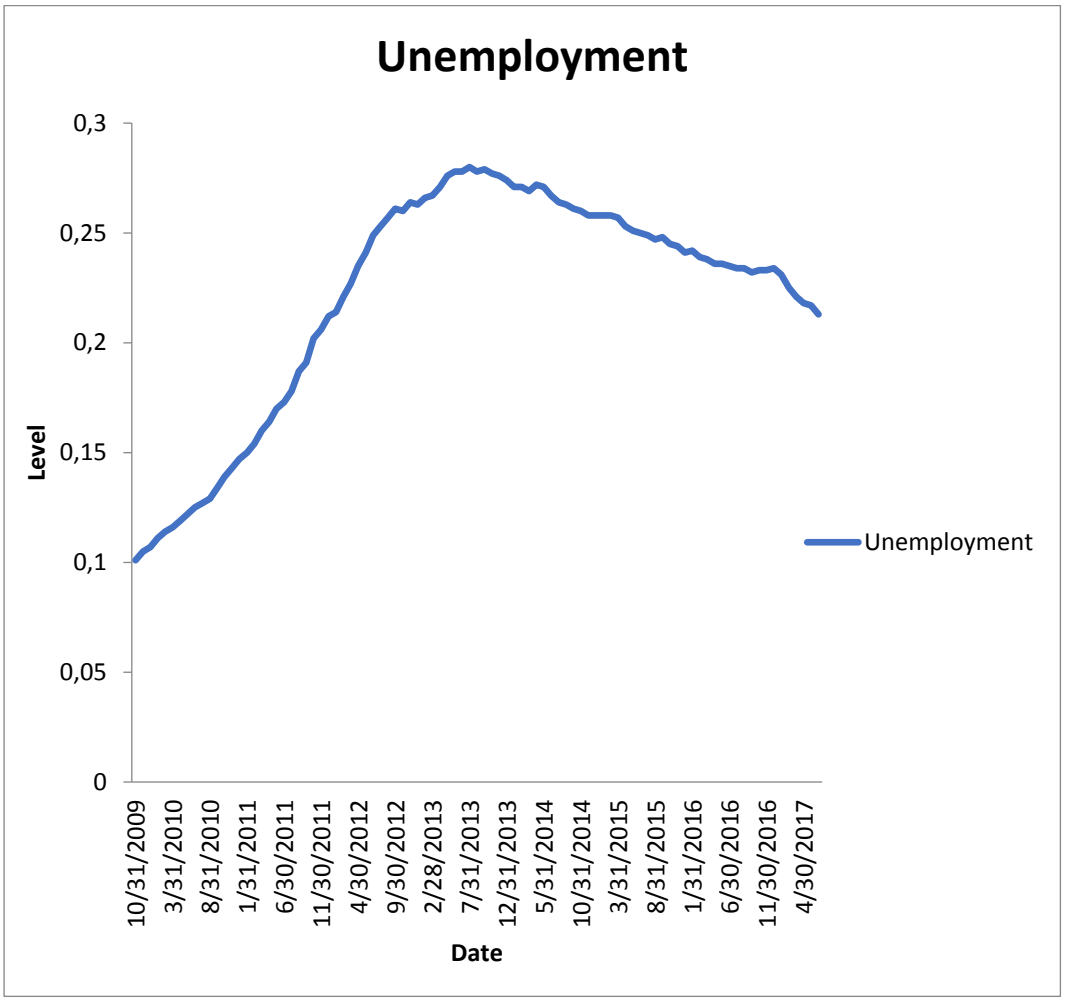
Graph 3.1 Spread between German and Greek 10-Year Government Bonds 2009-2017



Data Source: Bloomberg

Note: This graph shows the development of Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each month. The period is from October 2009 to June 2017. Data has for Spread has been derived from Bloomberg.

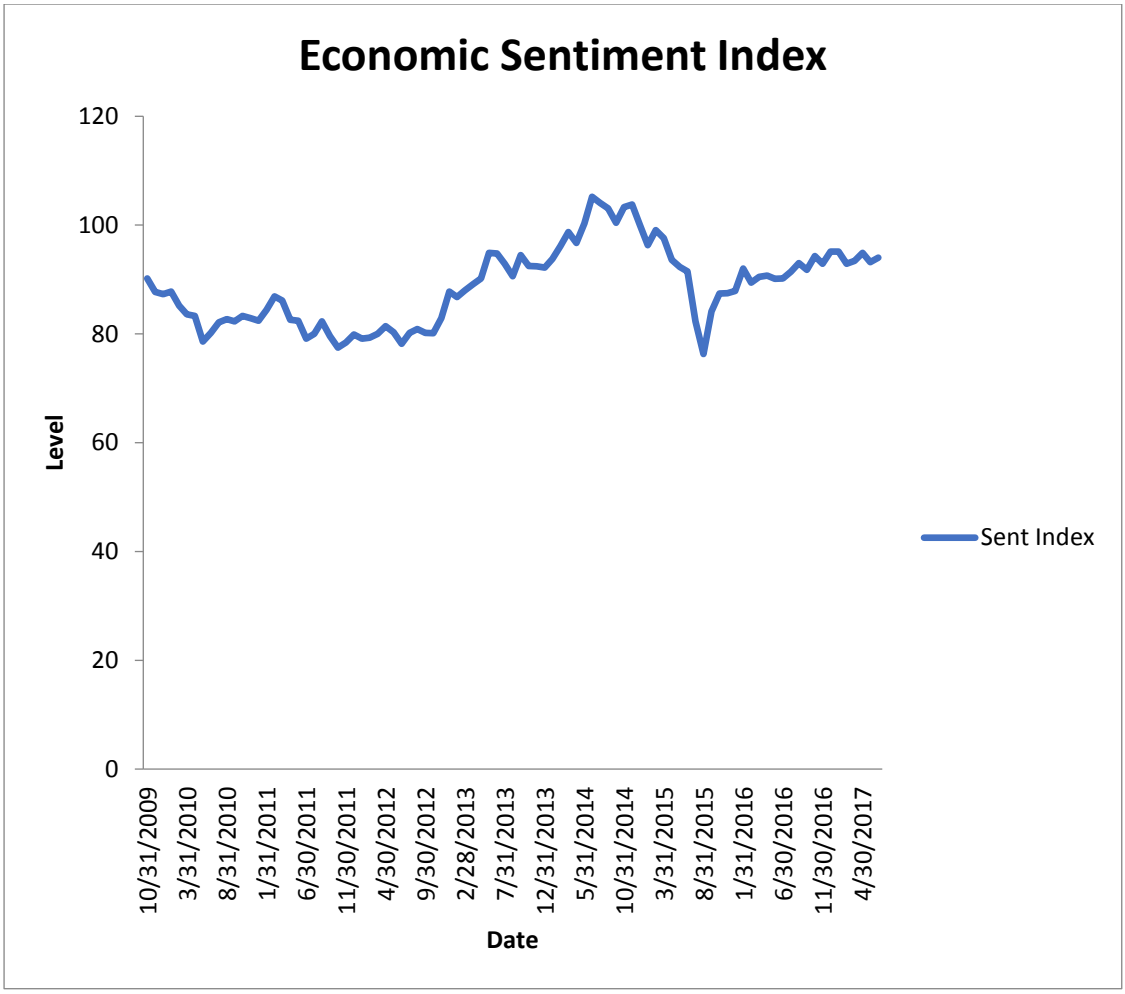
Graph 3.2 Greece Unemployment Rate 2009-2017



Data Source: Bloomberg

Note: This graph shows the development of Unemployment in Greece for the time period from October 2009 to June 2017 on a monthly basis. The Unemployment rate is monthly and it is on a year over year basis. Data for Unemployment in Greece have been derived from Bloomberg.

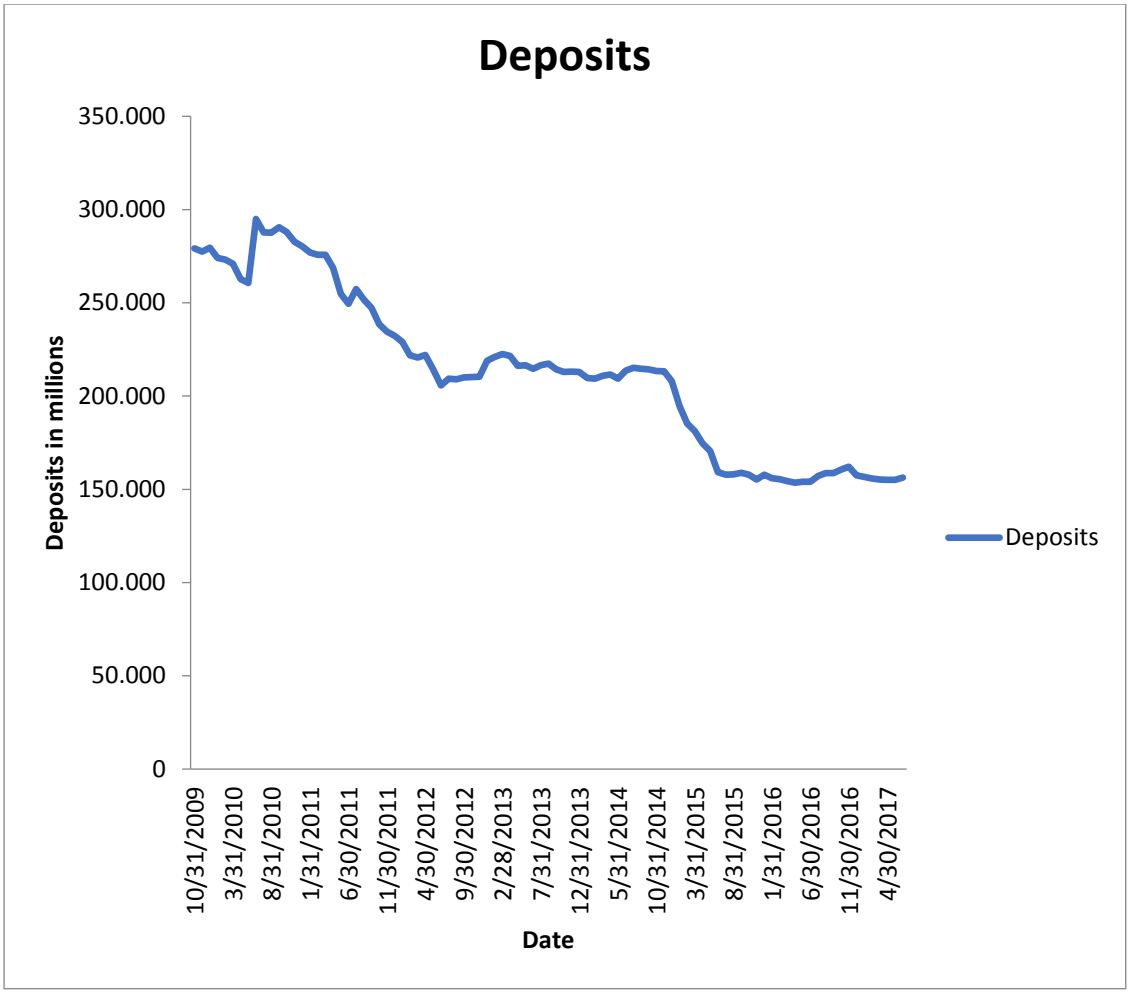
Graph 3.3 Greece Economic Sentiment Index



Data Source: Bloomberg

Note: This graph shows the development of the Index of Economic Sentiment in Greece from Eurostat for the time period from October 2009 to June 2017. The index is available on a monthly basis. The data have been derived from Bloomberg.

Graph 3.4 Household deposits in Greek Banking Sector (2009-2017)



Data Source: Bank of Greece

Note: This graph shows the development of Deposits in Greece for the period from October 2009 to June 2017. Data for deposits have been derived from the Bank of Greece and it is the total deposits of non-financial institutions and households. The unit of account for deposits is in million Euros and they refer to the last day of each month.

Table 3.1 Extraordinary Shipments of Euro Banknotes

Extraordinary Shipments of Euro Banknotes to Greece 2010-2011				
Number of Banknotes	**Denomination**	**Date**	**Country of Origin**	**Value in Euros**
15000000	**100**	**10/6/2010**	**Italy**	**1500000000**
38400000	**50**	**16/6/2011**	**Austria**	**1920000000**
36800000	**50**	**24/11/2011**	**Austria**	**1840000000**

Data Source: Bank of Greece

In this table is shown the extraordinary shipments of Euro banknotes to Greece during the period (2010-2011). During this period there was high demand for Cash from citizens that were withdrawing their money from Greek banks. In order for the need in cash to be met. Bank of Greece had to ship large numbers of bank notes to Greece.

Table 4.1 Descriptive Statistics of the Model for the evolution of Deposits in Greece 2009-2017

		Mean	Max	Min	Standard Deviation
Dependent variable	Total Deposits in Greece	135938	196860,3	98799,55	28519,28
Independent variable	Google Query "Drachma"	20,95699	99	7	15,35232
Independent variable	Economic Sentiment Index in Greece	88,75806	105,2	76,3	7,213534
Independent variable	Spread between German and Greek 10 year bond	0,1018804	0,3788	0,01423	0,0642527
Independent variable	Unemployment Rate in Greece	0,2211613	0,28	0,101	0,0528563
Independent variable	Political Certainty Index for Greece	69	74,5	64,5	3,0966
Independent variable	Consumer Confidence Index in Greece	-64,336	-27,1	-83,8	11,93

Notes:

a) The table presents the descriptive statistics of the basic model of the evolution of total bank deposits in Greece. The sample is monthly from October 2009 to June 2017.
b) Data for deposits have been derived from the Bank of Greece and it is the total deposits of non-financial institutions and households. The unit of account for deposits is in million Euros and they refer to the last day of each month.
c) Google Query "Drachma" variable stands for Google search for the Greek equivalent of the word "Drachma". This variable takes values from 0 to 100. It is provided as monthly average from the platform Google Trends.
d) Economic Sentiment Index in Greece stands for the difference between two consecutive observations of the Index of Economic Sentiment for Greece from Eurostat. The index takes monthly values. The data has been derived from Bloomberg.

e) Spread between German and Greek 10-year bond stands for the difference between two consecutive observations of the Spread between the Greek and the German 10-year bond interest rates in the last day of each month. Data has for Spread has been derived from Bloomberg.
f) Unemployment rate percentage in Greece (year over year). Data for unemployment have been derived from Bloomberg.
g) Political Certainty Index for Greece (PRS) stands for the Political Risk Rating for Greece by PRS group which take monthly values from 0 to 100. The index takes higher prices when Political Stability is higher. Data for this index has been derived from the PRS Group
h) Consumer Confidence Index for Greece is a monthly index provided by Eurostat. Data for this index has been derived from Bloomberg. All results provided are in decimals

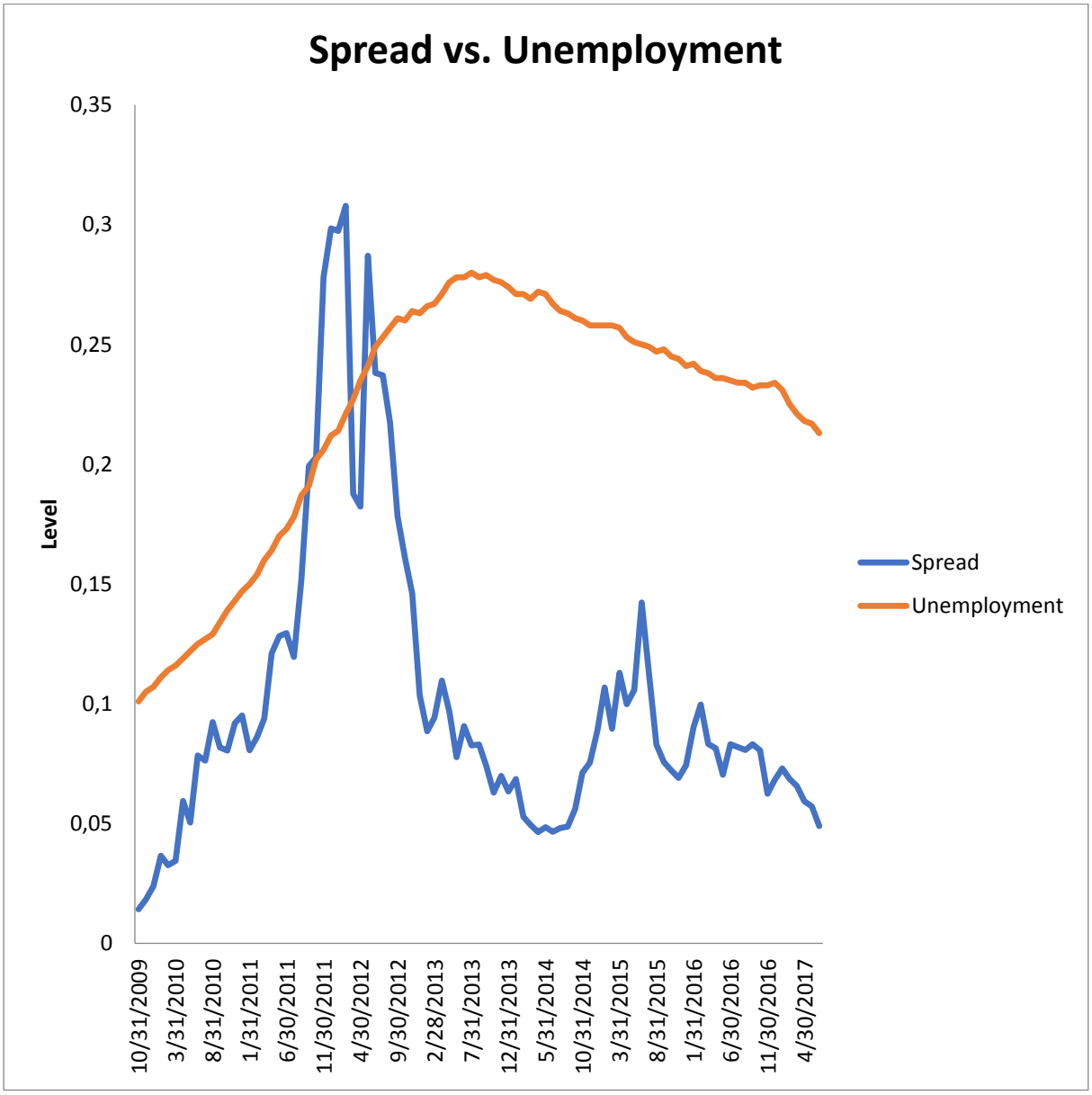
Table 4.2 Descriptive statistics for Panel model

		Mean	Max	Min	Standard Deviation
Dependent variable	Individual bank deposits of Greek Banks	38115,45	101041	1607,3	30988,75
Independent variable	Return on Assets Ratio of Greek Banks	-0,0164886	0,047	-0,27106	0,0388951
Independent variable	Cash to Assets Ratio of Greek Banks	0,1163696	0,8742238	0,0030625	0,2065893

Notes:

a) The descriptive statistics from the Panel Model for the development of Total Individual Greek banks deposits in Greece (March 2008 -September 2017) on quarterly basis. For the following variables of this model, the source of the data is the Financial Statements of Greek Banks, they have been derived from Eikon and are denominated in million Euros in the Financial Statements.
b) These data are provided on a quarterly basis the banks from which data has been used in this model are Alpha Bank, ATE Bank, Attika Bank, Emporiki Bank, Eurobank, Marfin Bank, National Bank of Greece, Proton Bank, Piraeus Bank, T Bank, Hellenic Postbank (TT), Geniki Bank.
c) The total individual Greek bank deposits as derived from the Financial Statements of the Greek banks.
d) Return on Assets Ratio of Greek Banks is the fraction of Returns to Total Assets of Greek banks.
e) Cash to Assets Ratio of Greek Banks is the fraction of Cash to Total Assets of Greek banks.

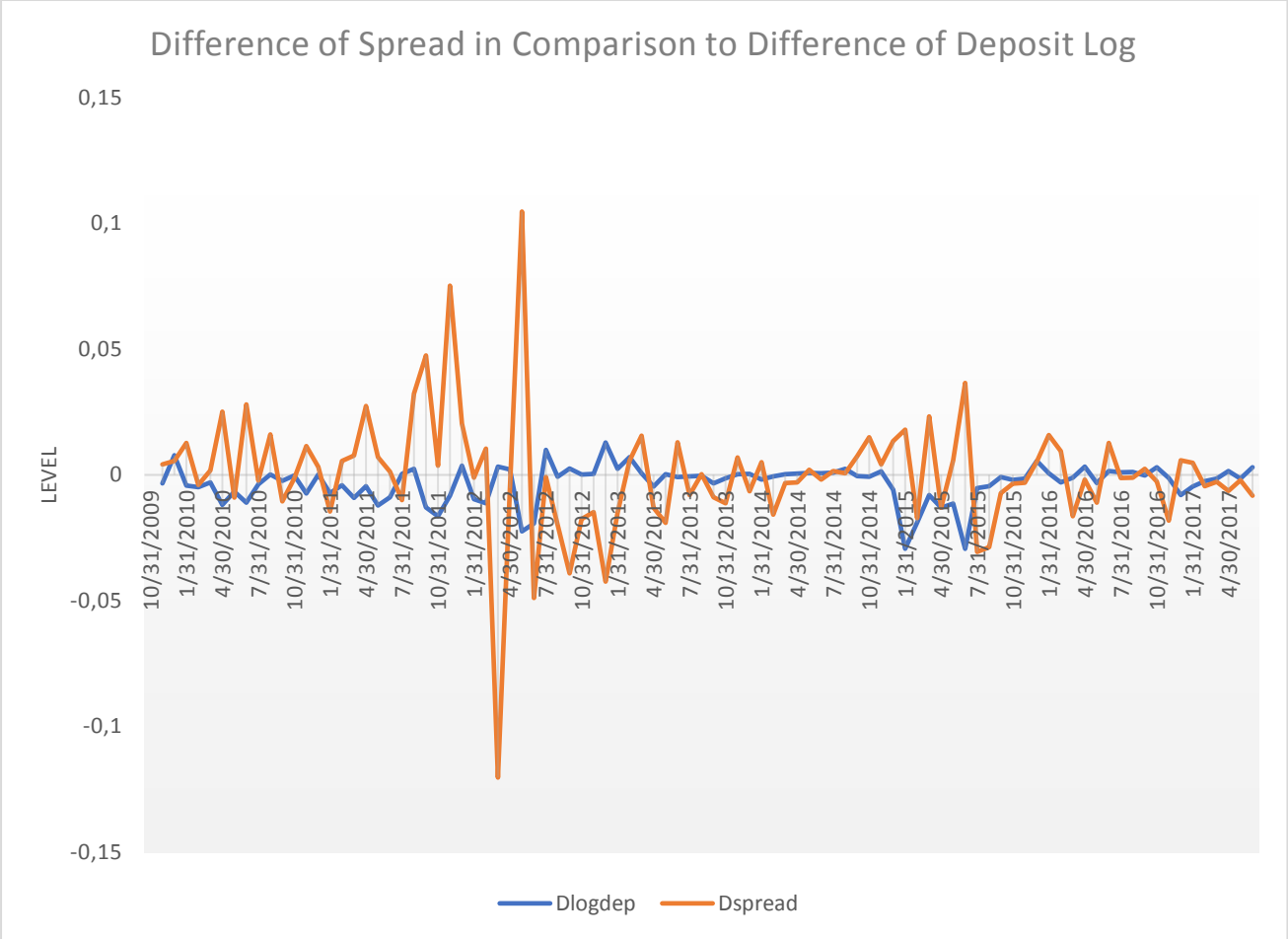
Graph 4.1 Spread vs. Unemployment



Data Source: Bloomberg

Note: This graph shows the development of Spread between the Greek and the German 10-year bond interest rates together with the Unemployment rate in Greece. Spread is denominated in basis points for the last day of each month. The Unemployment rate is monthly, and it is on a year over year basis. The period is from October 2009 to June 2017. Data has for Spread and Unemployment has been derived from Bloomberg.

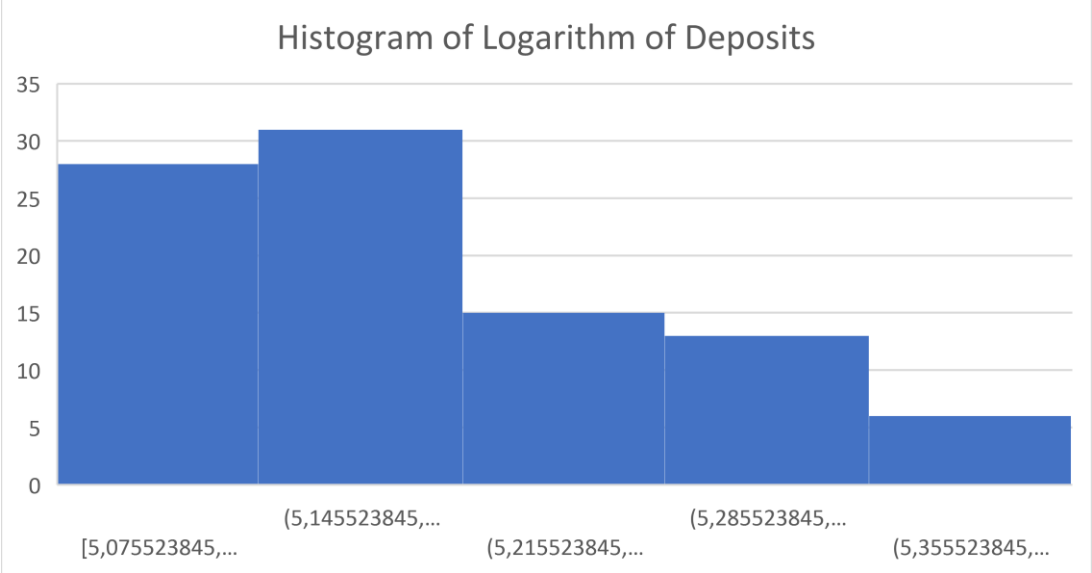
Graph 4.2 Difference of Spread in comparison to Difference of the logarithms of Deposits



Data Source: Bloomberg and Bank of Greece

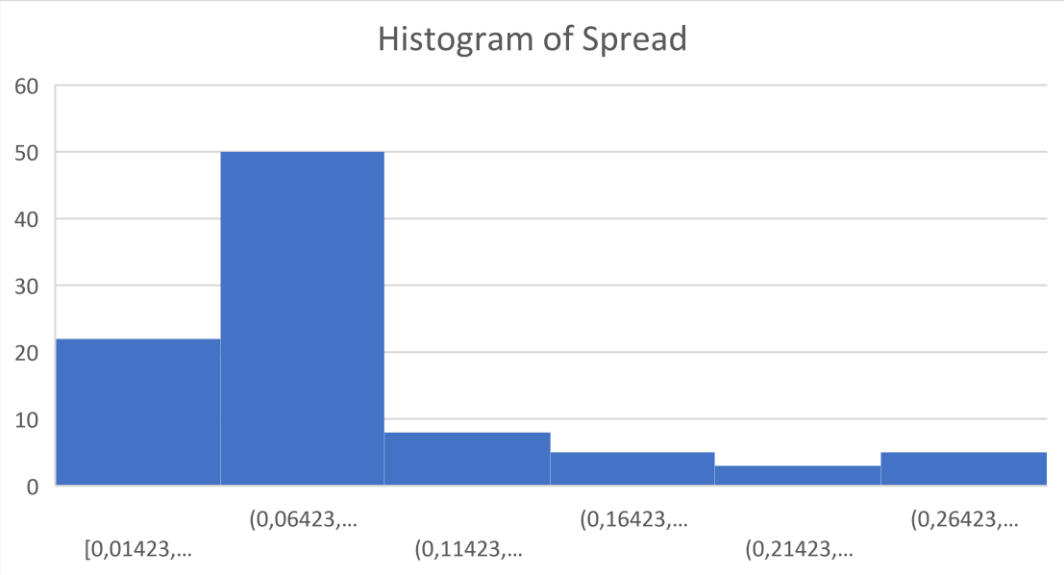
Note: This graph shows the development of the difference between two consecutive observations of the logarithm of total deposits in Greece (Dlogdep) together with the difference between two consecutive observations of the logarithm of the Spread between the 10-year Greek and German bond (Dspread). As it is shown the two variables move with negative correlation. Data for deposits have been derived from the Bank of Greece and it is the total deposits of non-financial institutions and households. The unit of account for deposits is in million Euros and they refer to the last day of each month. Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each month. The period is from October 2009 to June 2017. Data for Spread has been derived from Bloomberg. The period that this graph refers to is from October 2009 to June 2017.

Graph 4.3.1 Histogram of the Logarithm of Deposits Variable



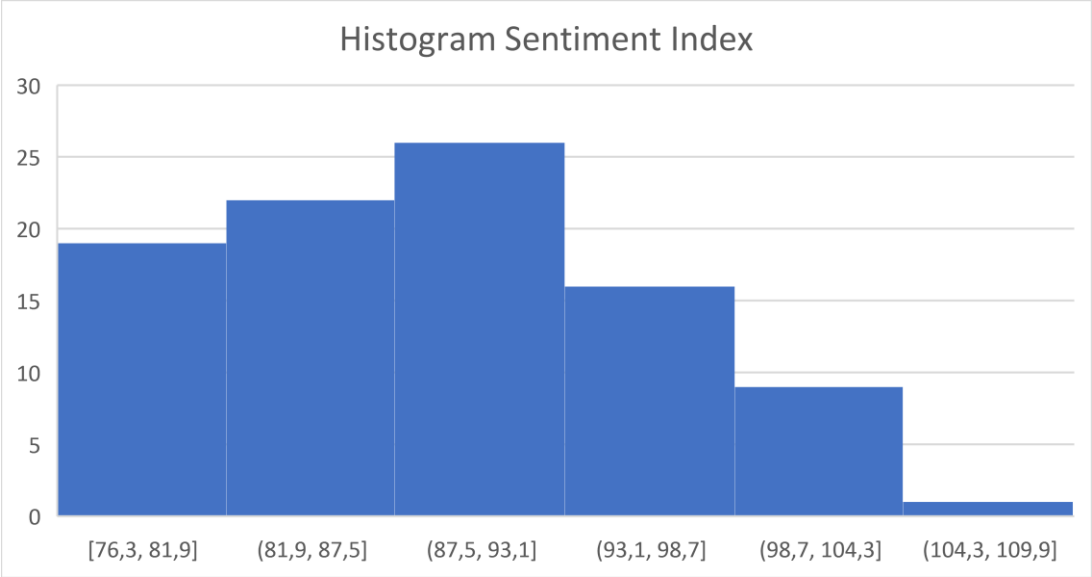
Note: This graph shows the histogram of the Logarithm of Deposits in Greece for the period from October 2009 to June 2017. Data for deposits have been derived from the Bank of Greece and it is the total deposits of non-financial institutions and households. The unit of account for deposits is in million Euros and they refer to the last day of each month.

Graph 4.3.2 Histogram of Spread Variable



Note: This graph shows the histogram of the Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each month. The period is from October 2009 to June 2017. Data has for Spread has been derived from Bloomberg.

Graph 4.3.3 Histogram of Economic Sentiment Index in Greece Variable



Note: This graph shows the histogram of the Index of Economic Sentiment in Greece from Eurostat for the time period from October 2009 to June 2017. The index is available on a monthly basis. The data have been derived from Bloomberg.

Table 4.3 Results of Model for the evolution of Deposits in Greece 2009-2017

Dependent variable	Δ Logarithm of Total Deposits in Greece			
		Coefficient	Standard Error	p- value
Independent variable	Δ Logarithm of Total Deposits in Greece (t-1)	0,3111901	0,0874972	0,001
Independent variable	Δ of Google Query "Drachma"	-0,0001264	0,0000393	0,002
Independent variable	Δ of Economic Sentiment Index in Greece	0,0009507	0,0002874	0,001
Independent variable	Δ of Spread between German and Greek 10 year bond rates	-0,0685767	0,0271088	0,013
Independent variable	Δ logarithm of unemployment in Greece	-0,1111051	0,0813499	0,176
Independent variable	Δ of Political Certainty Index for Greece (PRS)	0,0008834	0,0006824	0,199
Independent variable	Δ of Consumer Confidence Index for Greece	-0,0002192	0,0001496	0,147
	Constant	-0,0018611	0,00069	0,008
Number of observations	91	R-squared	0,4588	
Prob>F	0	Adjusted R-squared	0,4131	

Notes:

a) The table presents the results from the regression of the basic model of the evolution of total bank deposits in Greece. The sample is monthly from October 2009 to June 2017.
b) The dependent variable is the difference between two consecutive observations of the logarithm of total deposits in Greece. Data for deposits have been derived from the Bank of Greece and it is the total deposits of non-financial institutions and households. The unit of account for deposits is in million Euros and they refer to the last day of each month.
c) The first dependent variable is the first lag of the independent variable.
d) The Δ of Google Query "Drachma" variable stands for the difference between two consecutive observations of the Google search for the Greek equivalent of the word "Drachma". This variable takes values from 0 to 100. It is provided as monthly average from the platform Google Trends.
e) Δ of Economic Sentiment Index in Greece stands for the difference between two consecutive observations of the Index of Economic Sentiment for Greece from Eurostat. The index takes monthly values. The data has been derived from Bloomberg.
f) Δ of Spread between German and Greek 10 year bond stands for the difference between two consecutive observations of the Spread between the Greek and the German 10 year bond interest rates in the last day of each month. Data has for Spread has been derived from Bloomberg.
g) Δ logarithm of unemployment in Greece stands for the difference between two consecutive observations of the logarithm of the monthly Unemployment rate percentage in Greece (year over year). Data for unemployment have been derived from Bloomberg.
h) Δ of Political Certainty Index for Greece (PRS) stands for the difference between two consecutive observations of the Political Risk Rating for Greece by PRS group which take monthly values from 0 to 100. The index takes higher prices when Political Stability is higher. Data for this index has been derived from the PRS Group.
i) Δ of Consumer Confidence Index for Greece stands for the difference between two consecutive observations of the Consumer confidence index which is a monthly index provided by Eurostat. Data for this index has been derived from Bloomberg. All results provided are in decimals

Table 4.4 Results from Fixed Effects Panel Model for Deposits in Greece

Dependent variable	Δ Logarithm of Total Individual Greek banks deposits			
		Coefficient	Standard Error	p- value
Independent variable	Δ Logarithm of Total Individual Greek banks deposits (t-1)	-0,0304299	0,0747372	0,684
Independent variable	Return on Assets Ratio of Greek Banks	-0,0695772	0,0649492	0,286
Independent variable	Loan loss to Assets Ratio of Greek Banks	0,0298283	0,0554925	0,592
Independent variable	Cash to Assets Ratio of Greek Banks	0,5014868	0,1528238	0,001
Independent variable	Δ of Spread between German and Greek 10 year bond rates	-0,4053936	0,1028834	0
Independent variable	Δ Political Certainty Index for Greece	0,0008542	0,0013571	0,53
Independent variable	Δ logarithm of Total Deposits in Greece (from Bank of Greece) (t-2)	0,2611232	0,1254286	0,039
	Constant	-0,0186094	0,0107129	0,084
	Number of observations	164		
	Prob>F	0		
	R-squared	0,06207		

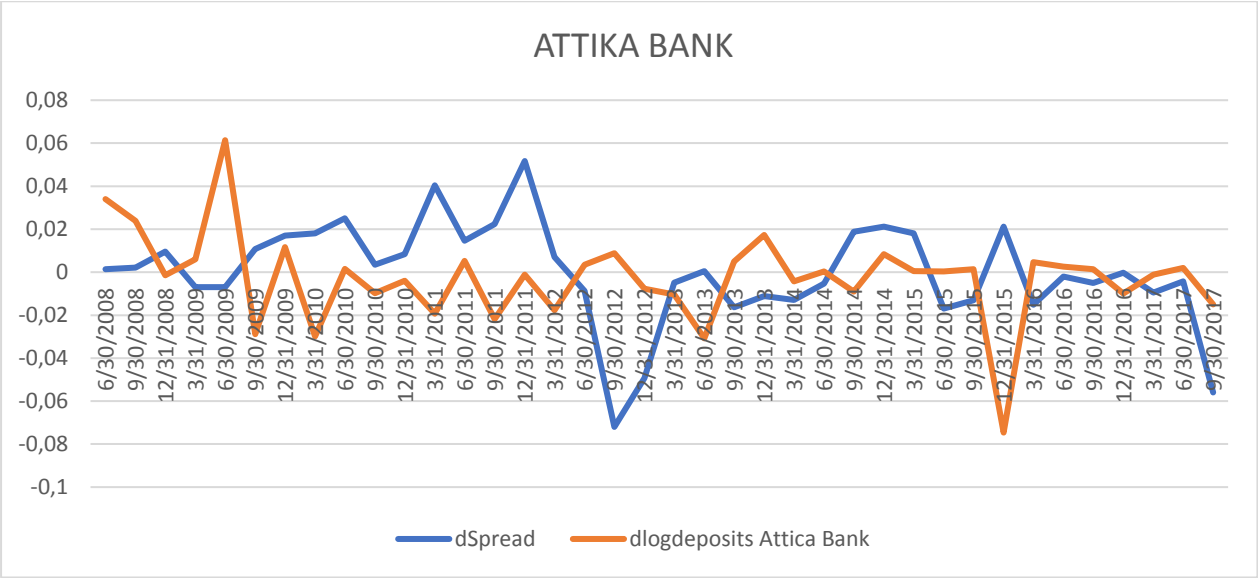
Notes:

a) The table presents results from the Panel Model using Fixed Effects for the development of Total Individual Greek banks deposits in Greece (March 2008

-September 2017) on quarterly basis. For the following variables of this model, the source of the data are the Financial Statements of Greek Banks, they have been derived from Eikon and are denominated in million Euros in the Financial Statements. These data are provided on a quarterly basis The banks from which data has been used in this model are Alpha Bank, ATE Bank, Attika Bank, Emporiki Bank, Eurobank, Marfin Bank, National Bank of Greece, Proton Bank, Piraeus Bank, T Bank, Hellenic Postbank (TT), Geniki Bank. The dependent variable is the difference between two consecutive observations of the logarithm of the total individual Greek bank deposits as derived from the Financial Statements of the banks. .

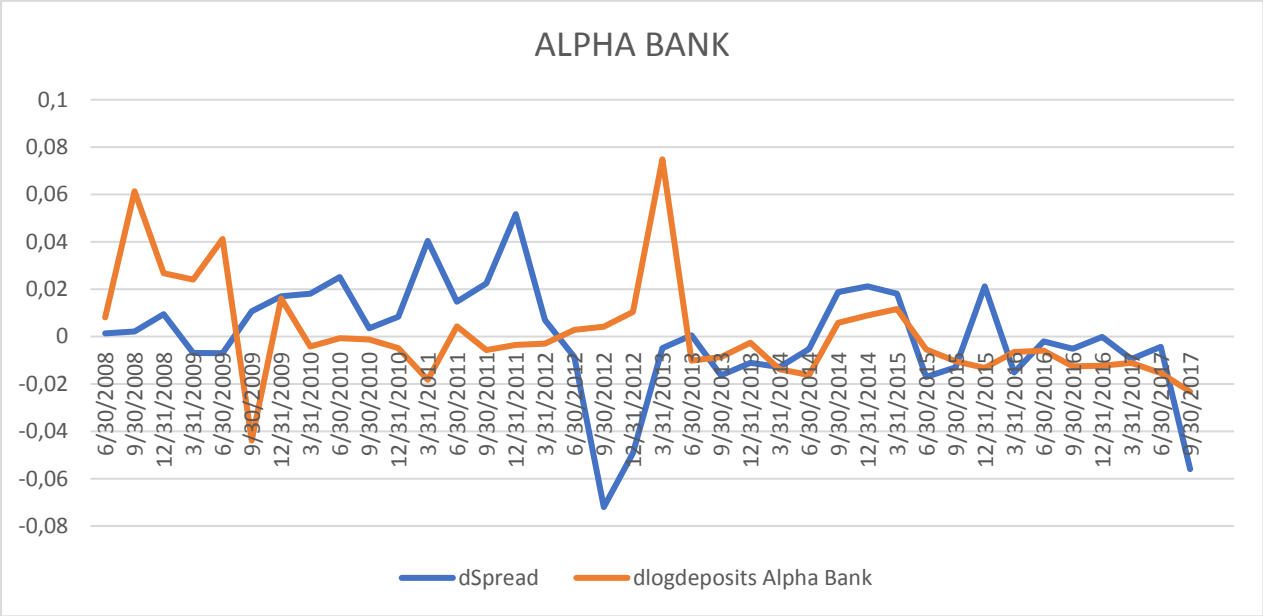
b) Δ Logarithm of Total Individual Greek banks deposits (t-1) stands for the first lag of the depended variable. Return on Assets Ratio of Greek Banks is the fraction of Returns to Total Assets of Greek banks. Loan loss to Assets Ratio of Greek Banks is the fraction of Loan loss impairments to total Assets of Greek Banks. Cash to Assets Ratio of Greek Banks is the fraction of Cash to Total Assets of Greek banks.
c) Δ of Spread between German and Greek 10 year bond stands for the difference between two consecutive observations of the Spread between the Greek and the German 10 year bond interest rates in the last day of each month. Data has for Spread has been derived from Bloomberg.
d) Δ of Political Certainty Index for Greece (PRS) stands for the difference between two consecutive observations of the Political Risk Rating for Greece by PRS group which take monthly values from 0 to 100. The index takes higher prices when Political Stability is higher.
e) Δ logarithm of Total Deposits in Greece (from Bank of Greece) (t-2) stands for the second lag of the difference between two consecutive observations of the logarithm of total deposits in Greece. Data for deposits have been derived from the Bank of Greece and it is the total deposits of non-financial institutions and households. The unit of account for deposits is in million Euros and they refer to the last day of each quarter. All results provided are in decimals

Graph 4.4.1 Difference of Spread in comparison to Difference of the logarithms of Deposits for Attika Bank



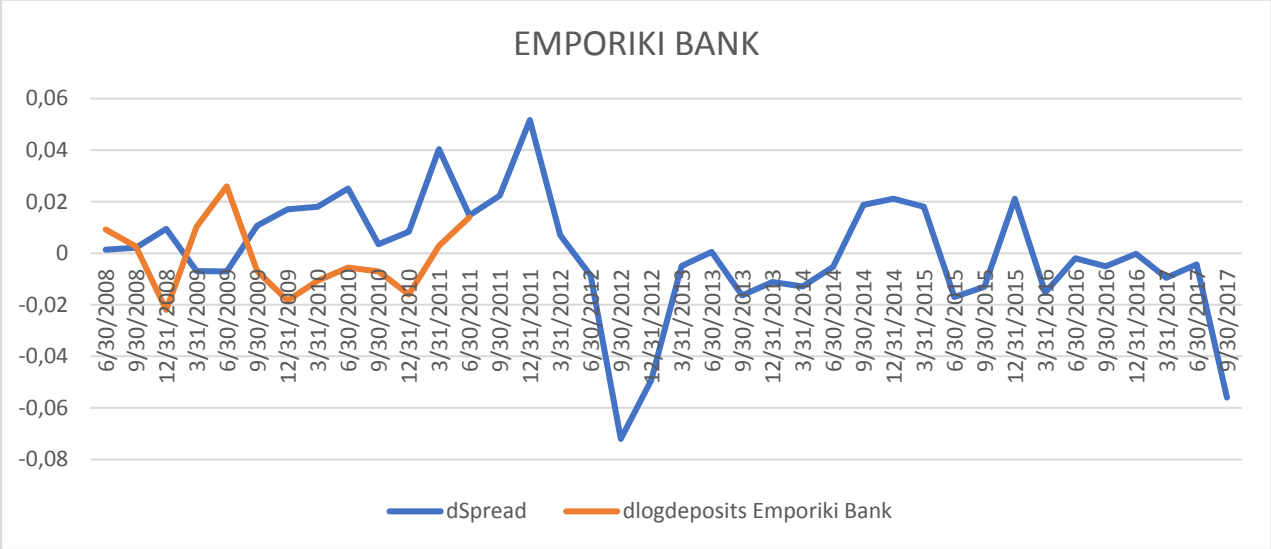
Note: This graph shows the development of the difference between two consecutive observations of the logarithm of deposits in Attica Bank (Dlogdep) together with the difference between two consecutive observations of the logarithm of the Spread between the 10-year Greek and German bond (Dspread). Data for deposits have been derived from the Financial Statements of the bank. The unit of account for deposits is in million Euros and they refer to the last day of each quarter. Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each quarter. The period is from June 2008 to September 2017. Data for Spread has been derived from Bloomberg. The period that this graph refers to is from October 2009 to June 2017.

Graph 4.4.2 Difference of Spread in comparison to Difference of the logarithms of Deposits for Alpha Bank



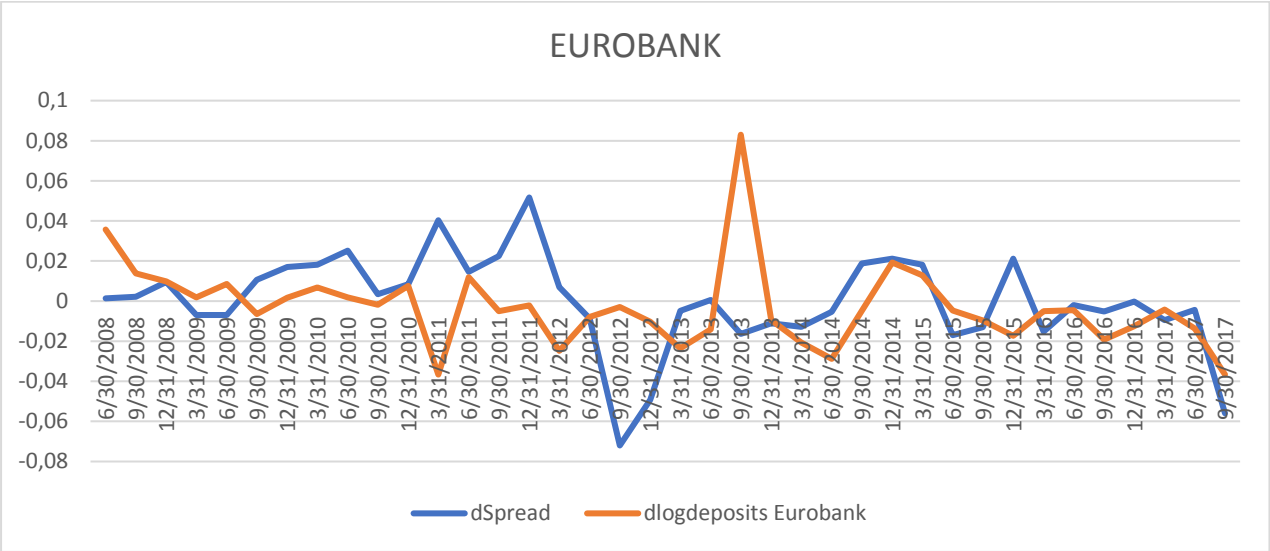
Note: This graph shows the development of the difference between two consecutive observations of the logarithm of deposits in Alpha Bank (Dlogdep) together with the difference between two consecutive observations of the logarithm of the Spread between the 10-year Greek and German bond (Dspread). Data for deposits have been derived from the Financial Statements of the bank. The unit of account for deposits is in million Euros and they refer to the last day of each quarter. Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each quarter. The period is from June 2008 to September 2017. Data for Spread has been derived from Bloomberg. The period that this graph refers to is from October 2009 to June 2017.

Graph 4.4.3 Difference of Spread in comparison to Difference of the logarithms of Deposits for Emporiki Bank



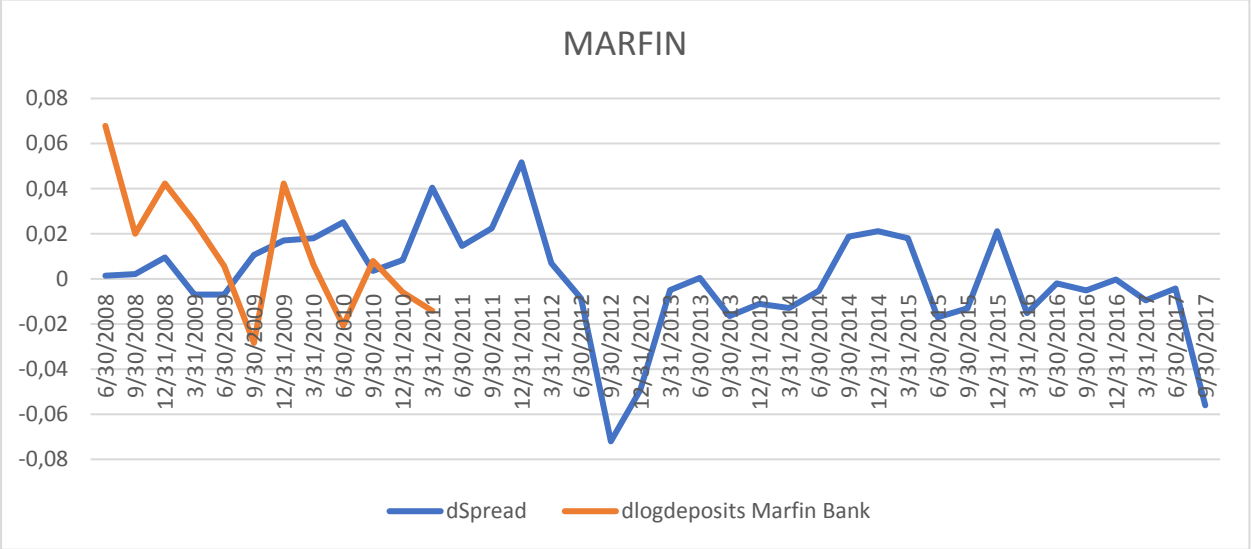
Note: This graph shows the development of the difference between two consecutive observations of the logarithm of deposits in Emporiki Bank (Dlogdep) together with the difference between two consecutive observations of the logarithm of the Spread between the 10-year Greek and German bond (Dspread). Data for deposits have been derived from the Financial Statements of the bank. The unit of account for deposits is in million Euros and they refer to the last day of each quarter. Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each quarter. The period is from June 2008 to September 2017. Data for Spread has been derived from Bloomberg. The period that this graph refers to is from October 2009 to June 2017.

Graph 4.4.4 Difference of Spread in comparison to Difference of the logarithms of Deposits for Eurobank



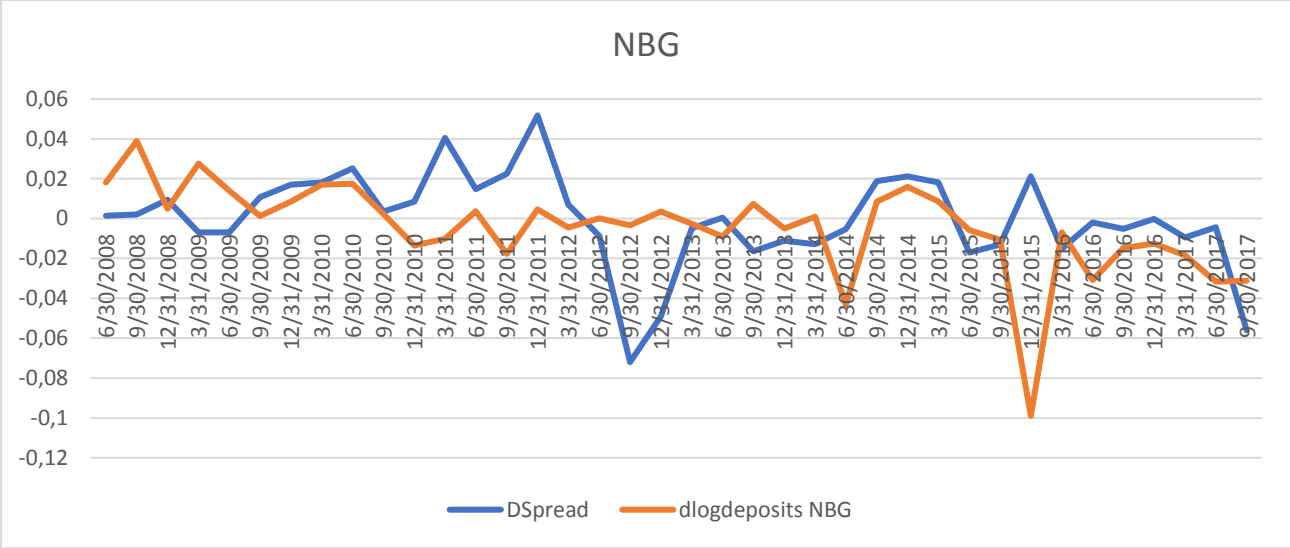
Note: This graph shows the development of the difference between two consecutive observations of the logarithm of deposits in Eurobank (Dlogdep) together with the difference between two consecutive observations of the logarithm of the Spread between the 10-year Greek and German bond (Dspread). Data for deposits have been derived from the Financial Statements of the bank. The unit of account for deposits is in million Euros and they refer to the last day of each quarter. Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each quarter. The period is from June 2008 to September 2017. Data for Spread has been derived from Bloomberg. The period that this graph refers to is from October 2009 to June 2017.

Graph 4.4.5 Difference of Spread in comparison to Difference of the logarithms of Deposits for Marfin Bank



Note: This graph shows the development of the difference between two consecutive observations of the logarithm of deposits in Marfin Bank (Dlogdep) together with the difference between two consecutive observations of the logarithm of the Spread between the 10-year Greek and German bond (Dspread). Data for deposits have been derived from the Financial Statements of the bank. The unit of account for deposits is in million Euros and they refer to the last day of each quarter. Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each quarter. The period is from June 2008 to September 2017. Data for Spread has been derived from Bloomberg. The period that this graph refers to is from October 2009 to June 2017.

Graph 4.4.6 Difference of Spread in comparison to Difference of the logarithms of Deposits for National Bank of Greece



Note: This graph shows the development of the difference between two consecutive observations of the logarithm of deposits in National Bank of Greece (Dlogdep) together with the difference between two consecutive observations of the logarithm of the Spread between the 10-year Greek and German bond (Dspread). Data for deposits have been derived from the Financial Statements of the bank. The unit of account for deposits is in million Euros and they refer to the last day of each quarter. Spread between the Greek and the German 10-year bond interest rates in basis points for the last day of each quarter. The period is from June 2008 to September 2017. Data for Spread has been derived from Bloomberg. The period that this graph refers to is from October 2009 to June 2017.

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Appendix

Table 4.3 Results of Model for the evolution of Deposits in Greece 2009-2017

Dependent variable	Δ Logarithm of Total Deposits in Greece			
		Coefficient	Standard Error	p- value
Independent variable	Δ Logarithm of Total Deposits in Greece (t-1)	0,3111901	0,0874972	0,001
Independent variable	Δ of Google Query "Drachma"	-0,0001264	0,0000393	0,002
Independent variable	Δ of Economic Sentiment Index in Greece	0,0009507	0,0002874	0,001
Independent variable	Δ of Spread between German and Greek 10 year bond rates	-0,0685767	0,0271088	0,013
Independent variable	Δ logarithm of unemployment in Greece	-0,1111051	0,0813499	0,176
Independent variable	Δ of Political Certainty Index for Greece (PRS)	0,0008834	0,0006824	0,199
Independent variable	Δ of Consumer Confidence Index for Greece	-0,0002192	0,0001496	0,147
	Constant	-0,0018611	0,00069	0,008
Number of observations	91	R-squared	0,4588	
Prob>F	0	Adjusted R-squared	0,4131	

Breysch-Godfrey LM test for autocorelation

Breusch-Godfrey LM test for autocorrelation			
lags(p)	chi2	df	Prob> chi 2
1	3.729	1	0,0535
H0: No serial correlation			

Durbin’s alternative test for autocorelation

Durbin's alternative test for autocorrelation			
lags(p)	chi2	df	Prob> chi2
1	3.504	1	0.0612
H0: No serial correlation			

Results from Fixed Effects Panel Model for Deposits in Greece

Dependent variable	Δ Logarithm of Total Individual Greek banks deposits			
		Coefficient	Standard Error	p- value
Independent variable	Δ Logarithm of Total Individual Greek banks deposits (t-1)	-0,0304299	0,0747372	0,684
Independent variable	Return on Assets Ratio of Greek Banks	-0,0695772	0,0649492	0,286
Independent variable	Loan loss to Assets Ratio of Greek Banks	0,0298283	0,0554925	0,592
Independent variable	Cash to Assets Ratio of Greek Banks	0,5014868	0,1528238	0,001
Independent variable	Δ of Spread between German and Greek 10 year bond rates	-0,4053936	0,1028834	0
Independent variable	Δ Political Certainty Index for Greece	0,0008542	0,0013571	0,53
Independent variable	Δ logarithm of Total Deposits in Greece (from Bank of Greece) (t-2)	0,2611232	0,1254286	0,039
	Constant	-0,0186094	0,0107129	0,084
	Number of observations	164		
	Prob>F	0		
	R-squared	0,06207		

Hausman Test

Hausman Test				
	Coefficients			
	(b) Fixed	(B) Random	(b-B) Difference	SQRT (DIAG(V_B-V_B) S.E.
Δ Logarithm of Total Individual Greek banks deposits (t-1)	-0,304299	-0,0313279	-0,0061758	
Return on Assets Ratio of Greek Banks	-0,0695772	-0,105768	0,0361395	0,0112756
Loan loss to Assets Ratio of Greek Banks	0,0298283	0,0879655	-0,0581372	0,0431175
Cash to Assets Ratio of Greek Banks	0,05014868	0,059853	0,4416338	0,1296275
Δ of Spread between German and Greek 10 year bond	-0,4053936	-0,3469436	-0,05845	
Δ Political Certainty Index for Greece	0,0008542	0,0008845	-0,0000304	
Δ logarithm of Total Deposits in Greece (from Bank of Greece) (t-2)	0,2611232	0,3281771	-0,0670538	0,0147047
b= consistent under H0 and Ha; B= inconsistent under Ha, efficient under H0; Test: H0: difference in coefficients not systemetic chi2(7)= (b-B)'[V_b-V_B)^(-1)](b-B)= 47,8 Prob>chi=0,000 (V_b-V_B is not positive definite)				