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Faculty of Social Sciences
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MASTER'S THESIS

Liquidity creation and banks‘ capital effect: GIIPS countries case

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Declaration of Authorship

The author hereby declares that he compiled this thesis independently; using only the listed resources and literature, and the thesis has not been used to obtain a different or the same degree.

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Prague, May 10, 2018

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Abstract

This study observes the impact of regulatory capital on liquidity creation of banks in GIIPS countries over the period 2006-2016. The results are estimated by conducting a panel data analysis and evaluating Fixed Effect model proceeded by a 2SLS regression method. The results show that there exists a negative relationship between regulatory capital and liquidity creation. They give support to policymakers of Basel III/CRD IV to be concerned about the consequences of imposing higher capital requirements. Furthermore, size of the bank is correlated negatively with liquidity creation, and financial crisis does impact the magnitude of the relationship between regulatory capital and liquidity creation. Nevertheless, we suggest that new buffers on liquidity and capital requirements should be accompanied by other prudential tools to ensure a stable financial system in GIIPS countries.

JEL Classification	E58,F33, G21, G28
Keywords	Regulatory Capital, Liquidity creation, Bank Regulation, Fixed Effect

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Abstrakt

Tato práce zkoumá dopad kapitálových požadavků na tvorbu likvidity bank zemí GIIPS mezi lety 2006-2016. Výsledky jsou odhadnuty analýzou panelových dat za pomocimodelu Fixního efektu a 2SLS regresní metody.

Výsledky ukazují, že existuje negativní vztah mezi kapitálovými požadavky a tvorbou likvidity. Slouží tak jako podpora tvůrcům Basel III/CRD IV, při posuzování dopadů zavedení vyšších kapitálových požadavků.Dále bylo zjištěno, že velikost banky je negativně korelována s tvorbou likvidity a že finanční krize má vliv na významnost vztahu mezi kapitálovými požadavky a tvorbou likvidity. Přesto navrhujeme, aby nové polštáře likvidity a kapitálové požadavky byly doprovázeny ostatními nástroji, z důvodu zajištění stabilního finančního systému v zemích GIIPS.

Klasifikace	E58,F33, G21, G28
Klíčováslova	Kapitálové požadavky, Tvorba likvidity, Bankovní regulace, Fixní efekt

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Acronyms

ABSPP	Asset-Backed Securities Purchase Programme
BIS	Bank of International Settlement
BLUE	Best Linear Unbiased Estimator
CAD	Capital Adequacy Ratio
CBPP3	Third Covered Bond Purchase Program
CET 1	Liquidity Coverage Ratio
CRD IV	Capital Requirement Directive IV
CRR	Capital Requirement Regulation
ECB	Europe Central Bank
EU	European Union
FE	Fixed Effect
GDP	Gross Domestic Product
GIIPS	Greece, Ireland, Italy, Portugal, Spain
GMM	Generalized Method of Moments
HDI	Herfindahl Index
IV	Instrumental Variables
LCR	Liquidity Coverage Ratio
LR	Liquidity Requirements
NPLs	Non-Performing Loans
RE	Random Effect
REPO	Repurchase Agreement
RWA	Risk-Weighted Assets
TLTRO	Targeted longer-term refinancing operations
VIF	Variance Inflation Factor
2SLS	Two-Stage Least Square

Master's Thesis Proposal

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Motivation:

There are two main motivations related to this study. The current economic situation in GIIPS countries and new regulation issues introduced in Basel III. Banking sector plays a significant role for all countries included in this dissertation (Portugal, Italy, Ireland, Greece and Spain). Considering latest economic development in European Union and the introduction of new regulatory rules of Basel III motivates the author to conduct this research by what extent liquidity creation affects bank capital or vice versa, with a concentration to this group. This peer group in aggregate is characterized by a significant increase in the level of non-performing loans, high level of public debt, low share prices and a decrease in profitability of banks. They have become more vulnerable to domestic and international shocks. Return on asset decreased on average and operated profit as decreased significantly well.

Moreover, there will be a useful link of this study with the impact that new liquidity and capital requirements have on profitability and portfolio of banks included in the research.

Hypotheses:

The aim of this study is to measure the causality effect of liquidity creation on bank capital, how these two figures are calculated and related to each other. This effect is calculated empirically by Berger and Bouwman in 2009 and applied in many papers. The proposed hypothesis on framing the causality effect between liquidity creation and bank capital are:

1. “Financial fragility crowding out” theory. It concludes that increased capital impedes liquidity creation.

2. “Risk absorption” theory, which is the opposite version of “financial fragility crowding out” theory. It claims that increased capital of the bank induces higher ability of them to create liquidity

Methodology:

This study intends to explain the relationship between liquidity creation and bank capital. In study will be taken cross-sections from different banks of each country (preferably quarterly) for a time range of 2006-2016. The main source of getting these data will be Bankscope, otherwise will be used statistics from their websites and Central National Banks. What is needed for the model are balance sheet and off-balance sheet data. Usually Berger and Bouwman model include control variables like total asset, equity ratio, non-performing loan ratio, loan concentration index (HHI index), GDP growth and Interest rate spread. It also involves dummy variables depended on mergers of banks. Classification of data of the banks will be needed. Firstly, there should be a categorization of assets and liabilities in liquid, semi-liquid and illiquid. Then there will be assigned weights into each of them, and lastly, the Berger and Bouwman model suggests a classification according to maturity and category (MAT and CAT) for balance sheet items and off-balance sheet items. To test the hypothesis of the study Granger Causality test will be implemented. In this way it will be proceed to measure how liquidity creation has emerged and how it varies in different banks.

Expected Contribution:

This study exists already for United States banks, overall Euro Area banks, China, Germany and the Czech Republic. What distinguishes this dissertation from others is the area of focus GIIPS. Such study has never been conducted for all these countries jointly, therefore will be a useful source in academic studies. Also, it is inferred to give a critical opinion on importance and impact of new regulatory issues of Basel III, (which is expected to be implemented by the end of 2018).

Moreover, this research will be able to give some suggestions on preventing a potential upcoming crisis for Italy in specific (as it is expected from many researchers lately) and on a recovery plan, this peer group is going through.

Outline:

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1 Introduction

Throughout the global financial turmoil of 2008, the financial sector has gone through a very high liquidity risk. The subprime US market crisis induced a decrease in value of mortgage-backed securities. Because of this loss of confidence in the market, the European interbank lending went under pressure. The interbank interest rates rose sharply, and investors sometimes found it difficult to raise cash through asset sales. In response to this financial distress, European Central Bank (hereafter ECB) and U.S Federal Reserve injected billions into the interbank lending market. Despite this liquidity injection in the market many banks failed to overcome financial problems. Economic vulnerabilities have been the center of attention for European Union banking sector. The introduction of Basel rules on liquidity and capital requirements are anticipated to have an impact not only on macroeconomic developments of the union but also on the business model of banks. The primary focus of such regulations is to improve banking sector stability and their capital resilience.

During the financial disturbance the European countries who felt the most were the so-called GIIPS (Greece, Italy, Ireland, Portugal and Spain). These disturbances turned out to be severe since most of the banks had created excessive leverage backed by the low quality of capital. In addition to that, banks were also holding insufficient liquidity buffers, which made the banking system unable to deal with this massive exposure. Thus, the crisis expanded into large scale by contracting the economy overall. The engagement of banks into deleveraging process itself aggravated the financial downturn. A vast induction of liquidity and capital support was needed to help financial markets recover from the turmoil. Taking into consideration the scope, speed and the impact that financial crisis had in market urged regulators focusing more on stability and resilience of the banking system.

The Basel Committee ratified many reforms to strengthen the regulatory capital framework and increase the resilience of banking system. The last crisis led to a failure of capturing the risks of on- and off-balance sheet items, which soon after directed into destabilization of the markets. New regulations, which seek higher requirements on capital, are expected to have an impact on liquidity. According to Berger and Bowman, (2009) there could be an opposite effect of capital into liquidity; meaning that higher capital requirements could decrease liquidity of banking system.

This work aims to measure the effect that bank's capital has on liquidity. By doing so, it will be possible to measure the impact of capital requirements on the capability of banks to create liquidity in the market. The main objective of the research is to conduct a study on banking sector of 5 countries of European Union: Greece, Italy, Ireland, Spain, and Portugal. Since 2008 financial markets of these countries have lost their resilience and new regulations are expected to have a significant impact on their business models.

New regulations imposed to Liquidity Requirements and Capital Ratios are being essential topics for the banking sector. Thus, it is critical to get to know the correlation between these two indicators Liquidity and Capital Adequacy Ratio (hereafter CAD). The importance of this study counts on the interpretation of significance that banks financial indicators has on liquidity. Many similar studies are dedicated to determinants of CAD, Liquidity ratio and their effects on bank's balance sheet. What this research brings new is the scope of countries taking into the study. So far, no such research is conducted for these countries. There exist for Eurozone, Turkey, Middle East countries, Czech Republic, for but not for GIIPS countries. This research is intended to bring value to regulators, investors, and households interested in soundness and resilience of banking sector. Financial markets are tightly interconnected with each other, and this study is expected to have immense significance in the banking sector. Furthermore, it could give space to other studies being conduct in more detail for each of the countries individually.

The core hypothesis of the paper lies on financial fragility crowding out and risk absorption. Diamond and Rajan (2015) state in one of their research on financial intermediation and delegated monitoring that "Financial Fragility crowding out" hypothesis predicts that liquidity creation is reduced due to excess level of capital thus higher capital ratio induces less liquidity. From the literature, the crowding out effect differs for large and small banks (Gorton and Winton, 2014). The reason behind this is the internal structure that banks have. Therefore, the question rises if higher Capital requirements impact the amount of Liquidity in GIIPS country. On the other hand, "Risk absorption" hypothesis argues that the more liquidity creates higher chances for severe losses. Berger and Bowman (2009) indicate that the risk absorption hypothesis is linked highly with large banks rather than small one, this due to many factors such as large banks is more exposed to regulatory rules; they are subject of greater market discipline, and the fact that they should offer more substantial loan amounts.

This thesis intends to find the effect and magnitude that size of bank has on liquidity creation. Usually it is expected that bigger banks hold less liquidity as they

rely on the notion of: “to big to fail”. Nevertheless, different results are retrieved from other studies. The recent financial crisis is included in study in order to check for structural breaks. The aim of these structural breaks is to find whether financial crisis impacts the relationship of capital requirements and liquidity. It is in the scope of this paper to conclude if regulator should take actions during crisis period or not.

The study uses data from Bankscope for several banks of the group scope for a timeframe of ten years (2006-2016). To estimate the results of regression we run Fixed Effect model within estimators, which is preceded by Two-Stage Least Square regression. Our main findings suggest that regulatory capital is significantly and negatively correlated with liquidity creation. In addition, size impacts significantly liquidity creation as well but with a negative sign. The estimation of structural breaks suggest that financial crisis appears to have significant effect on the relationship between regulatory capital and liquidity.

The organization of the research is as follow: the second chapter gives a general literature review of financial intermediary theory and the importance of capital regulation. The analysis continues with a comprehensive view of the current macroeconomic situation on European Union and main regulation developments. The third chapter develops the main hypothesis and the reasoning behind them. The forth chapter elaborates methodology, while the fifth chapter concludes the main results and further suggestions for the future studies.

2 Literature Review

2.1 Financial Intermediation theory

The traditional definition of a bank is that it represents a financial institution which deals with deposits and advances and other related services. It provides liquidity to customers and institutions, and it is an intermediary channel of transferring funds from those with excess liquidity to those with lacks of liquidity. The importance of sustainable and robust banking systems relies on the fact that it is the core channel which provides services to all consumers, corporations, and governments. It involves everybody in the intermediation process. Therefore, the impact of any disturbances in the system is vast and quickly widespread. Definition of the bank is broad, but this paper tends to focus more concerning capital and liquidity side of it.

Financial Intermediation theory stresses the role of banks and other financial intermediaries regarding transaction cost and asymmetric information that exists in the market. In their paper, Allen and Santomero (1996) emphasize two central roles of financial intermediaries

The first role is dedicated to the ability of financial intermediaries to transfer risk in a complex financial market. This role is based on the conventional theory of Arrow – Debreu model[1].Banks have a position in the market just because markets are imperfectly driven. If financial markets were perfect, investors and savers could own all the necessary information and the role of intermediaries in this case diminishes. On the other hand, other critics of this theory suggest that the purpose of financial intermediaries is broader than that (Scholtens and Wensveen, 1999). Banks nowadays perform more complex services despite the declining prices of information. They see

[1]Arrow-Debreu Model is a fundamental model used in the General Equilibrium Theory. It analyses the situation of financial markets which are very competitive. The model states that in such market with finite numbers of consumers, commodities and production units the equilibrium of the economy is characterized by a set of prices at which the excess demand is zero for every commodity, and producers make zero profit. The market-clearing prices are reached through "a fictitious price-setter," which facilitates the price adjustment following a set of rules that resembles the way in which prices are reached in the real competitive economy (Finance, 2018).

risk as a very crucial element of financial intermediation. Banks play an essential role in risk transforming and risk managing function.

Secondly, Allen and Santomero (2016) argue that activity of financial intermediaries is related to participation cost. In the mid-1990s the trading costs were lowered and as a result, the value of people's time increased significantly. Also, regarding risk management, financial intermediaries focus more the existence of market imperfection and costs of financial distress. In contrast Scholtens and Wensveen (1999) claim that the argument of Allen and Santomero (2016) is vague and as not only the number of mutual funds has risen rapidly from the 1990s, but also the direct participation of households in the market. Furthermore, financial risk management purpose is to protect other companies from bankruptcy and to boost their cash flow against economic disturbances[2].

[2]Scholtens and Wensveen (1999) in their paper conclude that current financial intermediation theory fails to provide a satisfactory understanding of the existence of financial intermediaries.

2.2 Capital Regulation Importance

Banking Regulation came as a need of monitoring the risks that depositors of banks were facing due to microeconomic and macroeconomic concerns. According to a report of Biggar and Heimler (2005), bank's creditors were unable to monitor risks originating on the lending side of a bank but also not being able to track the stability of overall banking system in case of a turmoil. Therefore, banks have been subject to some strict regulatory provisions which included an extensive list of restrictions. Restrictions on interest rate controls, restrictions on portfolios of assets that banks can hold, restriction on depository insurance, on capital requirements, reserve requirements, etc.

The fundamental importance of regulations is addressed to stability and soundness of financial institutions and the whole financial market. From the literature regulation of banks seems to be important because of two main reasons: the systemic danger of a bank failure and moral hazard.

In simple words, banks' principal activity relies on the ability to accept liquid deposits redeemable on demand and provide illiquid loans with a long time to maturity. In case banks do not possess enough reserves, they will not be able to meet their obligation on providing back funds to their customers. The problem will grow bigger if several banks in the market will face the same issue. Thus, the impact of not meeting the obligation will cause a bank run and cause disturbances in the financial market[3].

The literature reveals few guidelines. Systemic risk is defined as "an event that influences the entire banking, financial and economic system, rather than just one or a few institutions" (Bartholomew& Whalen, 1995). According to Kaufman & Scott (2003) systemic risk possesses the nature of a chain-reaction. For instance, if Bank X defaults on paying back obligations to Bank Y, the latter will face the issue of paying back on time the commitments to Bank Z and so on. Consequently, if one of the banks faces difficulties in reaching its obligations, the risk grows larger. Banks are interconnected with each other overseas through their interbank deposits, payments system but also through their similar services provided in the market. To this extent,

[3]A bank run is defined as sudden and heavy cash withdrawals by depositors who have lost confidence in the viability of a bank or expect the local economy to crash or slow down drastically. (Business Dictionary,2018)

the adverse shock transmission process occurs faster. Banks with enough capital will remain solvent in the market, while the others with not sufficient capital to absorb losses will be insolvent, by increasing in this way the shock's magnitude (Cerutti et al., 2012). Additionally, Dragan et al. (2013) claim that to achieve financial stability and to reduce systemic risk and bank contagion effects, the design of prudential regulation and early identification of systemically important institutions is needed. It also requires a macro-prudential risk approach that takes into consideration the links between banks and their connections with other financial institutions.

A second issue that emerges mostly in discussions of the banking sector and bank regulation is the supervision of moral problems. [4]Moral hazard refers to changes in the behavior of one participant in response to rearrangement of the risk. One party always possesses more information than the other party involved in the business. According to Kareken and Wallace (1978) moral hazard problems can easily arise in the relationship between banks and the agents to whom they provide funds. Also, it has been recognized that the presence of deposit insurance gives rise to a moral hazard problem between banks and depositors, because depositors know they can take more risk. In their paper Duran and Lozano-Vivas (2014) argue that the three pillars of Basel II appear to have a limited ability to weaken moral hazard incentives for European Union banking system. Regulatory capital requirements seem to be the only variable that disincentives risk shifting among banks. They lead banks to have capital buffers above the legal minimum, which discourage them from transferring risk to creditors. Consequently, the new regulation in Basel III that promotes the buildup of conservation buffers could help to mitigate moral hazard.

[4]In a financial market, there is a risk that the borrower might engage in activities that are undesirable from the lender's point of view because they make him less likely to pay back a loan. It occurs when the borrower knows that someone else will pay for the mistake he makes. This in turn, gives him the incentive to act in a riskier way. (Business Dictionary,2018)

2.3 Recent Development of Liquidity Regulation

Liquidity at a bank is a measure of its ability to readily find the cash it may need to meet demands upon it. It can come from direct cash holdings in currency or on account at the central bank. However, more often liquidity originates from holding securities that can be sold quickly with a minimal loss.

Capital is the most important safety buffer for a bank. It possesses the ability to recover from substantial losses and give confidence to the bank in its safety. However, Douglas E. J. (2014) argue that an immediate cause of a bank's failure is usually a liquidity problem that makes it impossible to survive a classic "bank run". On the other hand, Douglas and Dybvig (1983) argue that deposit insurance can eliminate bank runs. But of course, the objective of deposit insurance is to help banks deal with these panic runs rather than substituting the liquidity that they need for day-to-day deposit withdraws.

Rajan et al. (2002) argue that banks face a demand for liquidity from their depositors as well as from customers who purchase loan commitments that can be exercised in the future, thereby obliging the bank to lend when customers comply with these commitments. The attribute that banks make loan commitments is closely linked with contributions of many studies from Diamond (1984) and Ramakrishnan and Tharkor (1984) who monitored the credit behavior of borrowers. Thus, banks as lenders make commitments to lend in the future. Such obligations create liquidity as they provide borrowers insurance against being restricted in the credit market. Greenbaum et al. (1993) show that loan commitments improve ex ante welfare. They regress the bank's choice as a tradeoff between reputational and financial capital. When the bank makes a loan commitment, it provides liquidity for the borrower but uses up its financial capital, and when it does not respect this commitment, it dissolves its illiquid reputation capital and preserves its financial capital.[5]

[5] Reputation capital is often seen as a form of non-cash remuneration for their efforts, and generally generates respect within the community or marketplace where the capital is generated.(Business Dictionary,2018)

Basel Committee on Banking Supervision paid attention to strengthening the liquidity framework of the banking system. The package of new rules of Basel III introduced two minimum standards for funding liquidity. These standards have separate but complementary objectives (Supervision, 2010).

First, the Liquidity Coverage Ratio (hereafter LCR)[6]standard aims to ensure that banks have sufficient liquidity to survive a short-term stress scenario lasting for one month. It does this by ensuring that banks have an adequate stock of unencumbered high-quality liquid assets that can be converted easily and immediately in private markets into cash to meet their liquidity needs for a 30-calendar day liquidity stress scenario" (Basel Committee on Banking Supervision, 2013)

Secondly, the Net Stable Funding Ratio (hereafter NSFR)[7] guarantees that banks have sufficient stable funds to survive a long-term stress scenario lasting for one year.

As transmitted by Basel Committee on Banking Supervision (2013) this imposition encourages banks to maintain a stable funding profile concerning the composition of their assets and off-balance sheet activities. A sustainable structure of funds reduces the chance that bank will end up with the risk of liquidity failure. The NSFR limits the dependence on short-term funding encourages better measurement of funding risk across all on- and off-balance sheet items, and uphold funding stability. With the last financial crisis, the interbank lending system stagnated because of solvency issues that GIIPS countries were passing. To induce the same interest rates for the whole Eurozone, ECB provided liquidity for GIIPS countries by shifting money flows from TARGET 28 creditors to GIIPS countries, which they turned out to be debtors.9 In this

[6]Liquidity Coverage Ratio is calculated as the ratio of Stock High Quality Liquid Asset over Total net cash outflows over the next 30 days.

[7]Net Stable Fund Ratio is the proportion of available amount of stable funding over the required amount of available funding.

[8]TARGET2 is a payment system owned and operated by the Eurosystem. It is the leading European platform for processing large-value payments and is used by both central banks and commercial banks to process payments in euro in real time.

[9] See Appendix A, Figure Nr. 1.

way, the channel was transmitting the excess liquidity from countries like Germany and France into GIIPS countries with liquidity problems. The process of interbank lending in Euro Area made the balance sheets of banks to be expanded and therefore to increase the risk and exposure. Credit flow in TARGET 2 is relocated into National Banks accounts and from there into commercial banks accounts. The system itself has some drawback. It threats the ability of ECB to influence interest rates in the countries where money is flowing to, and therefore GIIPS countries use a substantial amount of debt at the cost of the countries with a surplus of money Sinn and Wollmershaeuser (2011). Target balances started to grow substantially after 2007.

2.4 Recent Developments of Banking Sector in GIIPS

The 2008 financial crisis brought into light many obstacles for European economic system. On top of these issues were liquidity and banking resilience. As mentioned previously, ECB as the central institution tried to create many facilities to boost liquidity in the market, but also to reduce adverse effects of the shock that captured European countries.

GIIPS countries were the most affected by these economic contractions and therefore characterized by a massive level of debt (Areppim, 2012). Italy recorded a government debt of 131.8% (2014), while Greece topped the record debt level of 179.4% (2014) (Economics, T., 2014). As a result, the lack of customer confidence reduced significantly lending in cross-border in GIIPS area. Depositors shrunk their exposure by withdrawing money from banks, mainly due to the uncertainties raised in the banking system. In addition, low economic growth and non-stable fiscal policies diluted asset value of banks, by deteriorating in this way their balance sheets items (Areppim, 2012). The decrease in commodity prices[10], induced lower inflation rate for European Area, but volatility remained high. Money market interest rates declined continually by reaching the lowest level in 2015[11] (ECB, 2015). Under these developments associated with high volatility and low stock prices, economic uncertainty increased, especially for Greece. With the UK referendum, volatility amplified even more.

New measurements of monetary policies in 2014, which were featured not only by low financing costs but also from an overall improvement of credit growth, expanded the net worth in Europe Area. Specifically, negative deposit rates evaporated profitability of banks[12]but on the other hand, increased the assets price by expanding the value of banks' balance sheets. (ECB, 2015; Communications, 2014) On the other side the US money market fund reform, which came into force in October 2016, is

[10]Especially, decrease of oil price right after 2008.

[11]Figure Nr.1 in Appendix A depicts the interbank lending rates development.

[12]Profitability ratios shown in Appendix A Figure Nr.1.

expecting to bring tensions into Libor rates and the cost of funds in dollar for international banks operating in Europe.[13] (Rennison, 2016; Espania, 2016)

Recovery period in Europe is taking longer than predicted mainly because of low productivity and difficulties on monetary policy adjustments. Lack of monetary policy adjustments are not only related to the cost of keeping interest rates low for too long, but also the existence of macroeconomic diversities between European countries (Stark, 2011). Interest rates are near zero percent, and fiscal policies shrinkage is expected to continue because central banks cannot undertake adjustment actions. Some researchers suggest that the biggest problem with the Euro crisis stays to the fact of difficulty to adjust their policies, persistent banking problems, and debt overhang. (Eichengreen et al., 2013).

Under these severe developments especially in core-periphery banking markets like GIIPS, ECB implemented several policies regarding liquidity. The aim of them is to reduce further deterioration of market conditions in European countries. The issuance of TLTRO (targeted longer-term refinancing operations), ABSPP (asset-backed securities purchase programme) and CBPP3 (third covered bond purchase program) generated liquidity for most of the banks, by facilitating in this way credit flow. ECB issued two long-term refinancing operations with maturity on 36 months. (Louri et al., 2016).

The first operation was announced on 22nd December 2011 by stirring up liquidity on 523 banks with the amount of 489 billion euro, and the second was delivered on 1st of March 2012 with an overall amount of 530 billion for almost 800 banks. Several banks in GIIPS have been rescued through the recapitalization of their balance sheets and through the policy to decrease risk-weighted asset by selling out bad sovereign debts, distressed bonds, and low rated securitized assets. (Louri et al., 2016). Besides

[13]The reform brings into focus the preservation of capital through investments in short-term funds with lower risk profile, but also it introduces liquidity fees and redemption restrictions for these investments. Even though it is created to bring transparency for investors it is expected to bring uncertainty for banks operating in European market mainly due to boost of the cost of funds (ECB,2018).

all, aid given to GIIPS countries did not help their economies to recover fully[14]. Low GDP growth rate still characterizes them. [15] In 2015 the rate of Non-performing loans (hereafter NPLs) reached 12% in Euro Area, 20% in Italy, 35% in Greece. While comparing to Germany, the rate of NPL was only 2 %. The main reason behind this is the fact that in GIIPS countries NPL rate was closely connected with high unemployment level, low growth of GDP and lower estate prices. For instance, in Greece, an additional factor is closely related to bank management, and researchers have found a negative effect of inferior bank management on NPL ratio. (Tsionas et al., 2016)

[14] The public aid given to these countries reached the amount of 40% of Eurozone GDP, which is considerably high.

[15] Appendix A, Figure Nr.1.

2.5 Regulatory Developments

The financial turmoil of 2008 escalated in Europe by increasing uncertainties in the banking sector. European banking industry started to lose its resilience. Being said the main challenges for regulators were not only to reduce the vulnerability of banking market but also to decrease the risk of systemic fails. Since then, the proposed measures from Basel Committee started to be implemented in whole EA. New rules, which have come in the form of Capital Requirement Regulation and Directive (hereafter IV / CRR), are considered completed. By the end of 2017, a review of the implementation was expected to be done. (ECB, 2017). In recent years the regulation has shifted more on the market oriented forms. Thus, Basel Committee with its capital requirement reforms developed a path to a stronger bank competition (Biggar and Heimler, 2005).

The banking sector in European Area has low profitability nature, and this trend has been present in 2017 as well. The most significant drivers are low credit demand and extremely low-interest rates (Liikanen, 2012). In the post-crisis developments, the regulatory nature of banks has increased and lately is going to the end of the implementation of the newly imposed rules. The convergence into CRD IV regime has met in the most cases all the criteria's. Before the crisis, the substantial number of international and big banks brought most of the uncertainty in the market. Therefore, implementation of Basel III regulation is focused more on them. Many of the provisions are adopted for regional and national banks' nature of European banking system (Lamberts, 2016). The primary objective of these reforms is to create a safer, sounder and more transparent financial system to ensure sustainable growth and to be able to finance the real economy.

According to Bank for International Settlement (hereafter BIS) data, the total debt[16] has still growing trend in terms to euro area GDP. There is an increase in government borrowing but a decrease in private sector borrowing. Few problems with assets quality remain for Italy and Spain. Selling NPLs have helped on reducing problematic assets from the balance sheet of banks. Since 2008 the overall asset quality has been

[16] See Appendix A, Figure Nr.1.

improved. (ECB, 2017) Before the 2008 financial crisis, there was a trend on shifting activities of banks from lending and borrowing towards brokerage services and market–making activities. New Regulation brings an innovation for banks in their business models. Depending on their business models they cannot have market share in every area, therefore add value in areas where they have a competitive advantage. (Liikanen, 2012)

The series of Basel directives started since the capital falls in the 1960s and 1970s.The regulations shifted more on market-oriented regulation and involved a liberalization of many bank activities such as: disposed of interest rate controls, the abolition of quantitative investment restrictions, and significant liberalization of cross-border foreign banks activities (Biggar and Heimler, 2005). Regulations changed smoothly throughout years as per economic developments. Being said in 1988, the Basel I agreed on 8% capital requirements for banks. Therefore, banks were obliged to fund their activities from their funds at the amount of 8%. This regulation had its drawbacks because of a lack of focus on risk management techniques, liquidity requirements a high-risk profile of balance sheet which did not bring higher returns. In this condition, Basel II regulation with its three pillars came into force.

Pillar 1 stated that banks could use their internal risk model to calculate their risk weights of assets, while Pillar 2 assured that banks should develop internal risk management to ensure that their capital capacities are in accordance with their risk profiles. Pillar 3 introduced the need for public disclosure to guarantee market control. The last review on above regulation comes after the 2008 crisis in Basel III series. One of the main objectives of CRDIV-CRR/Basel III framework is to increase the resilience of banking sector and to increase the quality and quantity of regulatory capital. In other words, the aim is to decrease their loss absorbency in relation to RWA. By the end of the implementation of the CRD IV-CRR/ Basel III the level of CET1 ratio will reach 7% (plus 2.5% conservation buffer), TIER 1 ratio of 8.5% and a Total Capital Ratio of 10.5% (Supervision, 2010).

Liquidity Requirements (hereafter LR) were set at a minimum level of 60% in 2015 and reaching in a smooth way 100% in2018. Since 2011 NSFR has been increasing above the minimum of 100%, implemented by 80.6% of banks in Europe Area in 2016. The CRD IV-CRR/BASEL III has defined the Liquidity Ratio by TIER 1 and on and

off-balance sheet exposures, which is set at a minimum of 3%. Between June and December 2013 there was a significant increase in bank's LR which enlarged the capital above the minimum requirement. Small regional banks have shown a higher average of LR compare to international and big banks. Therefore, it indicates that there is a close relationship between developments of LR and capital. (ECB, 2017)

3 Formulation of Hypothesis

Hypothesis 1:

Tight capital requirements would lead to a reduction of liquidity creation by banks in GIIPS countries.

"Financial Fragility crowding out" hypothesis predicts that liquidity creation reduces due to excess level of capital requirements, thus higher capital ratio encourages less liquidity in the market (Diamond and Rajan, 2015). Furthermore, Gorton and Winton (2014) acknowledge that the crowding out effect differs for large and small banks. This happens due to the internal structure which these banks have. Small banks usually operate in well-segmented markets where there is an overlap between investors in equity and deposits. They fund themselves mainly with deposits and capital, while large banks with liabilities which are less liquid than deposits (Berger and Bowman, 2009). Therefore, the question rises if higher capital requirements impact the amount of liquidity in GIIPS country.

Hypothesis 2:

Banks would increase the level of capital after the growth of liquidity creation.

"Risk absorption" hypothesis argues that the more liquidity creates higher chances for severe losses due to the positioning of illiquid assets to meet liquidity demands. According to Berger and Bowman (2009), the risk absorption hypothesis is linked highly with large banks rather than small one, this due to many factors such as large banks is more exposed to regulatory rules; they are subject of greater market discipline, and the fact that they should offer more substantial loan amounts (Berger & Bowman, 2009). All these factors directly affect risk capacity and liquidity amount to which big banks are uncovered.

Hypothesis 3:

Large banks have a significant and positive contribution on higher liquidity creation.

One of the results of Berger & Bowman (2009) on liquidity creation of small , medium and large US banks, confirms that large banks contributes on higher liquidity creation compare to small ones. While Horvath et al.(2012) acknowledge that large banks can contribute more to liquidity creation in absolute terms, but might create less liquidity in relative terms when considering their total assets. The sign of the relationship between size of bank and liquidity creation is expected to be positive. From the literature, Distinguin et al. (2014) concluded a positive relationship between the size of the bank and liquidity. Large banks are more able to absorb more risks, and they are more prone to be protected by the safety net of "too big to fail". The positive relationship complies with the studies of Lakštutiene and Krušinskas (2010) and Bonfim and Kim (2012) who conclude that positive relationship between size and liquidity creation is enforced because large banks are in the sectors the important groups and their behavior gives the development of the whole sector.

Hypothesis 4:

Financial crisis impacts the relationship between liquidity creation and capital adequacy ratio.

Bouwman and Berger (2014) demonstrate that there is a significant build-up or drop-off of "abnormal" liquidity creation before each crisis, and it seems to change the direction of aggregate liquidity creation during banking crises, but not during other crises. According to them the credit crunch of 1990-1992 and the current subprime lending crisis of 2008 was preceded by abnormally positive liquidity creation by banks. Hence in one of the studies of liquidity creation of Russian banks and their effect on economic growth (2004-2015), Fungáčová et al. (2016) found out that liquidity creation behavior of banks can contribute to enlarging business cycle fluctuations. Considering the main finding from these studies, we would like to estimate whether the subprime mortgage crisis of 2008 has impacted the relationship between our two primary variables of scope.

4 Methodology

4.1 Data Description

This study exploits descriptive research method of determining the effect of bank's capital on liquidity creation of banks for five countries chosen. Also, the Quantitative Comparable Analysis will look further in the relationship of the dependent variable (Liquidity creation) with the independent variable (Capital Adequacy Ratio).

To perform the research are used data from bank's balance sheet data, and macroeconomic ones. The primary source of balance sheet data of banks is Bankscope[17]. Being a reliable and authentic data source, the results of this study are expected to be consistent and trustworthy.

Dataset incorporates yearly data from five countries over the last 11 years from 2006 until 2016 by creating a panel dataset. The selection of banks is made according to their ranks. For each country are selected top biggest banks. The overall number of banks is 37 with 4070 observations. Italy is the country with the highest number of banks taken into consideration. Table 1, represents the list of banks included in the dataset. The reason that number of banks taken into study differs for each country is due to the availability of data. From the above literature review, all countries possess same characteristics on the banking sector and economic development as well. From World Bank database it is retrieved Unemployment rate, GDP growth, and Inflation rate. ECB database is utilized to get macroeconomic data such as total deposits for each country and HDI index,

The number of banks for each country is as follows:

[17]This database offers a very detailed financial format, and it is very convenient for cross-country comparison. Also, it is updated continuously with the lasts regulatory and accounting disclosures like Basel III CET1, Total Loss-Absorbing Capacity, and Minimum Requirements for own funds (Bureau Van Dijk).

Table 1: Number of Banks

Countries	Greece	Ireland	Italy	Portugal	Spain	All
Banks	6	6	13	7	5	37

Note: Total number of banks which are taken into study for each country.

The size of the dataset decreased due to the exclusion of several banks. It is not convenient for the model to have the unbalanced panel data nature. Furthermore, the presence of outliers made it necessary to exclude some other banks as well. The sample contains largest commercial banks in each country, and therefore investment banks or banks which have not direct exposure to loan creation are excluded.

Dataset is constructed only by commercial banks by leaving out in this way all central banks. The chosen banks in the sample dedicate activities on creating loans and accepting deposits. In the end, after excluding from dataset many banks, it was still the presence of some missing observations (about75 observations.) As the number of missing data is not significant, thus imputation method is applied[18].

Table 2: Criteria for dataset creation

Top largest banks for each country
Excluded Central Banks
Excluded banks with high number of missing data
Excluded Investment Banks

Note: The criteria's selection is done by author depended also from other literatures.

The final data file of the research is a strongly balanced short panel dataset, which implies that there are many cross-section observations across a relatively short period

[18]Imputation is a technique which fills in the missing data for an incomplete dataset. (to impute=to fill in)

(11 years). Consequently, the time-series dimension is considered fixed. The last necessary adjustment made to the dataset is the exchange rate. Some of the data were available only in USD, and therefore an average exchange rate available in Bankscope database is used. The consolidated dataset is in Euro. All data have ratio-scale nature.

A panel data analysis examines hypotheses of this research. The methodology explains the relationship between dependent variable Liquidity and independent variables. Independent variables categorize into different groups such as bank's specific independent variables, independent macroeconomic variables, local market competition variables and monetary policy variables. Banks specific independent variables include Capital Adequacy Ratio (CAD), size of the bank (SIZE), market share (MSH), earning volatility (EV), profitability ratio ROE. Macroeconomic independent variables take account of inflation (INFL) and the unemployment rate (UNEMPL). Local market competition variable counts for Herfindahl Index (HI), while monetary policy variable includes the spread of short-term with long-term interest rates (LT-ST).[19] The dependent proxy of Liquidity creation is a measure of the ratio of the total liquid asset over the gross asset. In next section, it is elaborated more on construction of our variables of the model.

[19]See Table 3.

Table 3:Description of dataset

Code	Variable	Calculation	Source	Sign
		Bank Specific Variable:		
Liq	Liquidity Ratio	$\frac{Tot.Liquid\ Assets}{Gross\ Assets}$	Bankscope	
CAD	Capital Adequacy Ratio	$\frac{Tot.Regulatory\ Capital}{Risk\ Weighted\ Assets}$	Bankscope	(-)
MSh	Market Share	$\frac{GrossDeposits}{Tot.DepositsofCountry}$	Bankscope+ECB Statistics	(+)
Siz	Size	*Logarithm of Tot.Assets*	Bankscope	(+)
EV	Earning Volatility	*Standard Deviation of Return on Assets*	Bankscope	(+)
ROAE	Return on Average Equity	$\frac{Net\ Income}{Equity}$	Bankscope	(+)
		Monetary Policy Variable:		
LT-ST	Long Term-Short Term interest rates	*10 years Gov. Bonds yields- 3 months Euribor spread*	ECB Statistics	(+)
HI	Herfindahl Index		ECB Statistics	(+)
		Macroeconomic Variable:		
Infl	Inflation rate		World Bank	(-)
Unempl	Unemployment rate		World Bank	(-)

Note:Data are taken from corresponding databases for each variable. The calculations are done by author as per described formulas.

4.1.1 Construction of Liquidity Creation Measure

There are many measurements on how to approximate liquidity creation from previous empirical studies conducted.

Berger & Bowman (2009), researched the effect of capital on liquidity creation of US banks from 1993-2003. In their paper, the authors endow with four types of measurements of liquidity creation[20].They classify the items of bank's balance sheet into category or maturity and by including or excluding off-balance sheet activities. Also, Horvath at al. (2012), based their study on a sample of Czech banks from 2000-2010 by computing only two of liquidity creation measurements[21]. The development of measurements is executed in three steps. Firstly, the authors have conducted a classification of the items into liquid, semi-liquid and illiquid. Secondly, there are assigned weights on each category.[22]. Lastly, it is done a combination of assigned weights with categorized items. However, our study does not consider any of the proxies' developed by Berger and Bowman (2009) due to lack of data. Bankscope did not have full coverage of classification of balance sheet items. Instead, we concentrate on Gross Loans Measure.

Gross Loans Measure is a simple measure developed in many studies. Berger and Udell (1994) who analyzed the impact of bank's capital on lending used this measurement as a proxy. Nevertheless, our study does not take the exact measure of

[20]Liquidity creation measurements developed by Berger and Bowman (2009) are: "Cat Fat"-loans classified by category and off-balance sheet items included. "Mat Fat"-loans are classified by maturity and off-balance sheet items not included. "Cat Non-fat"-loans are classified by category but off-balance sheet items not included. "Mat Non-fat"- loans are classified by maturity but off-balance sheet items not included.

[21]Horvath et al. (2012) developed a classification of bank's balance sheet items based on maturity hence "Mat Fat" and "Mat Non-fat".

[22]A positive sign is assigned to liquid items (asset, liabilities, and equity), negative sign is assigned to illiquid items (asset, liabilities, and equity), while 0 is assigned to all semi-liquid items.

Gross Loans stabilized by Gross Asset of the bank. Rather than that, we considered broader proxy: liquid assets[23]stabilized by gross assets.

4.1.2 Explanatory Variables

The primary independent variable used to explain Liquidity creation as a dependent one is Capital Adequacy Ratio. It is expressed as the fraction of total capital[24] with risk-weight assets. Risk weight asset (hereafter RWA), in Bankscope database, is measured according to Basel II requirements.

Horvath et al. (2012) in the research on Czech banks, conclude that CAD affects liquidity creation with a negative sign. Thus, we are expecting the same sign in our regression as well.

Size of the bank is another independent variable which from the literature indicated as an essential measurement of risk and diversification policies. It is calculated as the natural logarithm of total assets of each bank considered in this study. Associated to this, Demsetz and Strahan (1997) concluded that large banks enjoy better diversification and therefore operate with lower capital ratios. On the other hand, Distinguin et al. (2014) expected a positive relationship between the size of the bank and liquidity. Large banks are able to absorb more risks, and they are more prone to be protected by the safety net of "too big to fail." Taking into consideration that we conduct the study only for big sized banks, we are expecting to get a positive relationship with our dependent variable.

Market Share variable is the ratio calculated as the total value of deposits for each bank over the total deposits of the country for each year. In measuring liquidity creation Horvath et al. (2012) considered market share to positively impact liquidity creation.

[23]Liquid Asset includes the sum of all Trading Securities, Loans and Advances to Banks and Customers (with a maturity less than three months), Reverse REPOs and Cash Collateral minus Reserves for NPLs.

[24] Total Capital is calculated as sum of: (TIER I+TIER II+TIER III)

Concerning bank profitability measurement, Return on Average Equity (ROAE) is considered into the regression. The sign of the relationship of this variable is a bit ambiguous, but in their study Angora and Roulet (2011) concluded that higher profitability for a bank increases the ability to take higher risks. From the regression of this research, it is expected a positive sign from profitability measurement. Bearing this in mind, we also expect Earning Volatility variable to result with a positive sign. This proxy is measured as the standard deviation of yearly return on asset over eleven-year periods.

Macroeconomic indicator Unemployment rate is included in the model. It is the rate for each country from 2006 until 2016. Furthermore, inflation rate is considered, as a measurement of market condition for all GIIPS countries. Economic shape plays a crucial role in liquidity. In case of an economic downturn the ability of banks to provide credits decreases (or increases in case of an economic boom).

We consider Herfindahl Index (hereafter HI) as an essential proxy which controls for local market competition. Data are extracted from ECB statistics database for each country from 2006 until 2016. The effect of this variable is ambiguous as well, but according to results of Berger and Bowman (2009); (HI) does have a negative sign on big and medium-sized banks and a positive sign for small banks. The scope of our dataset includes only big sized banks. Hence, we are expecting a positive sign from this variable.

Concerning monetary policy measurements, the measurement considered is the spread between short-term and long-term interest rates. Short-term interest rates are three months Euribor rates, while long-term interest rates are ten years' government bond yield. Both indicators are extracted in percentage from ECB database, and they are a measurement of European Area for time frame this study is conducted. This variable is expected to have a positive impact on liquidity creation as it is also stated in one of the studies about the effects of monetary policies on liquidity creation by (Bouwman and Berger, 2014).

4.2 Regression Framework

The analysis is conducted through Stata [25]statistical package. We have constructed a panel dataset and for that reason panel data analysis gives the opportunity to study the dynamics of change in cross sections with short time series. It can provide a rich and powerful by considering both: space and time dimension.

This dissertation aims to study the behavior of banks through time and consequently is a combination of time series data (years) with cross-sections (banks). According to Cameron and Trivedi (2005) advantage of panel data analysis is the increased precision and consistent estimation due to a large number of observations involved in data set. Also gives the possibility to study the behavior of banks into two dimensions: interbank analysis and intrabank analysis. As also stated in Freitas (2014) paper, interbank analysis explains the variations between banks with each other, while intrabank analysis gives the chance to find the variation of each bank throughout the time.

According to Aspachs et al. (2005) empirical study, it is believed that there is a relationship between liquidity ratio of a bank with bank-specific and macroeconomic indicators of the country. They make a combination of banks' specific variables with macroeconomic ones so that to control for the possible inferences of such factors on liquidity.

Our model is specified as follows:

$$Y_{it} = \beta_0 + \sum_{K=1} \beta_K F_{K,it} + u_{it} \qquad (4.1)$$

The dependent variable Y_{it} stands for Liquidity across banks i=1, 2…N, through time t=2006….T. "F" indicates all bank-specific and macroeconomic variables and

[25]STATA[25]/MP 14.0 statistical package. It is complete and has rich variety of procedures for panel data analysis. It can handle restricted and unrestricted dataset and provides Fixed and Random effect model through Hausman and Taylor estimators.

u_{it}entails for the error term.β_K is the vector of coefficients and $\beta_0$the intercept/constant term.

A consistent estimation method could be Pooled Effect Model. According to Cameron and Trivedi (2005) if the model is specified correctly and regressors are uncorrelated with the error, then it can be consistent to estimate by using Pooled OLS.[26] However, the error terms are likely to be correlated over time for a given individual, and it is critical to count for heterogeneity. Everything that is not explained by the model is transferred to error term, and therefore standard errors should not be used as they can be significantly biased. Thus, we test heterogeneity by running different models. For our model, Pooled OLS does not give efficient and consistent results, and we run other estimations. This estimation does not explain a lot on individual effect or time effect of our variables. Therefore, it cannot be used in the analysis and an efficient estimation method should be applied.

4.2.1 Fixed Effect Model

Fixed effect model or individual-specific models, allows each cross-sectional unit to have a different intercept term which is same through all slopes (Cameron & Trivedi, 2005). The residual of this model is decomposed into two disturbance terms. One entails the individual entity-specific effect (c_{it}) and the other the white noise (εit). The regression equation could be transformed into the following one:

$$Y_{it} = \beta_0 + \sum_{K=1} \beta_K F_{K,it} + c_{it} + \varepsilon_{it} \qquad (4.2)$$

Where: $u_{it} = c_{it} + \varepsilon_{it}$.

Therefore, the disturbance u_{it} includes the effect of all unobservable variables across entities over time.ε_{it} is assumed identically and independently distributed with zero mean and constant variance (σ^2).

[26]The results of the estimation are in Appendix B, Table 7

$\varepsilon_{it} \sim$ IDD $(0, \sigma^2)$

Usually, OLS is biased and inefficient estimation method. Wooldridge (2002), states that in case OLS is unbiased it is still an inefficient method. It will not comply with assumptions of homogeneity, homoscedasticity, and non-autocorrelation. Consequently, we conclude that it is not a feasible estimation to use in our model.

Another possible method of estimation is Least Square Dummy Variables (LSDV). In this technique, it is needed to analyze time and individual effect. In both estimations (time and individual) dummy variables are added[27]. One group of dummy variables stands for each bank specifically, and the other group of dummy variables stands for the time dimension. By adding dummy for each bank, pure effect of number of banks (BanksN) will be estimated and controlling in this way for the unobserved heterogeneity. The same lead to time dummy variable. Three models are run, which specifically measure: bank effect, time effect and both bank and time effect. From the result of estimation, the bank-specific effect is way more efficient and consistent than time effect. Thus, would be reasonable to consider one-way error component panel data model. However, LSDV estimation does not give consistent results as well. Wooldridge (2002) indicates that it's not realistic to use the least square dummy variable estimator when N is large. This makes the model not feasible numerically and brings the problem of multicollinearity. Moreover, as the number of regressors increases, degrees of freedom fall and the residual variances increases.Baltagi (2005) stresses that fixed or random effect models are used when OLS is not efficient and consistent. "Fixed" does not mean that variables are fixed rather than it entails that differences across banks are captured by differences in constant terms.

Our model is a one-way error component panel data model with differential intercepts across individuals. Therefore, if we average the regression equation over time it transforms into the following:

$$\overline{Y}_i = \beta_i + \sum \beta \overline{X}_i + \bar{u}_i \qquad (4.3)$$

[27]Number of dummies run in the model is N-1.

$$\bar{Y}_i = \sum_t Y_{it}/t$$
Where: $\bar{X}_i = \sum_t X_{it}/t$
$$\bar{u}_i = \sum_t u_{it}/t$$

Subtracting equation 2 from equation 3 we get:

$$(Y_{it} - \bar{Y}_i) = \beta(X_{it} - \bar{X}_i) + (u_{it} - \bar{u}_i) \qquad (4.4)$$

This deviation from mean is called Q transformation, and OLS estimator for β is called within-groups FE estimator. Baltagi (2005) points out that within-estimator cannot estimate the effect of time- and individual invariant variables since Q transformation wipes out these variables. The individual-specific intercepts are estimated as:

$$\hat{\alpha}_i = \bar{Y}_i - \hat{\beta}\bar{X}_i i = 1,2 \ldots . N \qquad (4.5)$$

Applying within-groups estimation, fixed effect term is dropped, and Wooldridge (2002) recommends that this estimation generates more efficient results for a dataset with many cross-sections and small-time periods. However, this stands true only if disturbances are serially not correlated and homoscedastic.

Another assumption of the equation (4.2) is that the unobservable individual effects $\beta_i$are random variables that are distributed independently of the regressors (Cameron & Trivedi, 2005). This model is called the random effect (RE) model. In case of one-way error component model, the equation is as follows:

$$Y_{it} = \beta_0 + \sum_{K=1} \beta_K F_{K,it} + \mu_i + \varepsilon_{it} \qquad (4.6)$$

$\mu_i \sim$ IDD $(0, \sigma^2)$

$\varepsilon_{it} \sim$ IDD $(0, \sigma^2)$

Additionally, individual error components are not correlated with each other; also, autocorrelation between cross-sections and time units is not present. But this is not valid for our model, where there is the presence of autocorrelation and endogeneity. The results of regressed random effect model are in the Appendix B, Table 7.

Whether to choose between fixed and random effect, we run Hausman test. The result of the test is depicted in the Appendix B, Table 7. It indicates that that fixed effect model is more feasible. We reject the null hypothesis of the test. P-value is lower than 0.05 so that we do not accept that there is a systematic difference between coefficients and that random effect is more efficient. Thus, the fixed effect within-estimation is consistent and efficient. In their empirical analysis, Horvath et al. (2012) finds a more efficient estimation Generalized Method of Moments (hereafter GMM) rather than FE. Also, Fungáčová at al. (2016) in the research on the effect that liquidity has on capital growth estimated both fixed effect model and GMM. From the estimation they obtained the same results with fixed effects and with GMM. They get positive coefficient for liquidity creation measure in all estimates, but the coefficient is only significant when liquidity creation is computed based on maturity classification. Nevertheless, the authors claim that fixed effects estimations do not consider the dynamic properties.

4.2.2 Instrumental Variables and Two-Stage Least Square Estimation

Our model characterizes by the presence of endogeneity, which violates Gauss-Markov assumptions on BLUE[28] estimators. There are suspected two possible reasons which cause endogeneity.

Firstly, it is suspected that omitted variables bias in the regression cause endogeneity. In our model, several variables are not measurable, and they can influence liquidity creation of a bank. The impact of risk level in banks is not considered at all, while the literature acknowledges that risk level is significant in banks activities. Also, management style of governing banks is not measurable proxy too. This measurement

[28]In statistics, the Gauss–Markov theorem, states that in a linear regression model in which the errors have expectation zero, are uncorrelated and have equal variances, the best linear unbiased estimator (BLUE) of the coefficients is given by the ordinary least squares (OLS) estimator. “Best" means giving the lowest variance of the estimate, as compared to other unbiased, linear estimators. The errors do not need to be normal, nor do they need to be independent and identically distributed (Wooldridge, 2002).

can influence estimators, but it is omitted. Many of bank-specific variables are not possible to be measured, and therefore their effect is hidden in the error term.[29]This leads to biased estimates.

Secondly, the literature has agreed that more liquidity entails more capital requirements, but it is also considered a reverse casual effect between these two variables. The presence of reverse causality effect causes the problem of endogeneity in statistical results (Berger and Bowman, 2009) but (Horvath et al., 2012) find evidence of an adverse Granger-causation in both directions between capital and liquidity creation. This research does not go further on causality test therefore we do not take in consideration.

From equation 1, we suspect that size, market share and return on average equity are endogenous.[30] Thus, each of our variables is correlated to error term. To overcome the endogeneity problem, instrumental variables are used to obtain a consistent estimator of our coefficients. According to Wooldridge (2002) the method of instrumental variables allows us to estimate the coefficient of variables consistently and getting rid of the asymptotic bias of omitted variables. With instrumental variables, we will leave the unobserved effect in the error term, but we will use an estimation method that catches the presence of the omitted variable.

All in all, instruments help us to get consistent parameter estimates. As also stated from Baltagi (2005), lagged variables could be compatible instruments.[31] We take the first lag of endogenous variables as instruments.

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[29]From omitted variable bias, we remember that the direction of the bias depends on two things: correlation of dependent variable and omitted explanatory variable; and, the correlation between the explanatory variable included and the omitted explanatory.

[30]This follows the logic that usually the biggest banks possess the largest share in the market and therefore their return on equity is higher. Thus, it is suspected an endogenous relation between these variables.

[31]A valid instrument should be exogenous, Cov (Z_i,U_i)=0 and relevant. Relevant means that each instrument Z_i must be correlated with the endogenous regressors X_k, conditional on all exogenous variables in the model (i.e. X_2… X_k).

Also, as there is more than one valid instrument for our regression, the coefficients can be estimated by two-stage least squares (hereafter 2SLS). It is crucial for this method to clarify endogenous and exogenous variables. Therefore, we follow below steps:

- Firstly, we remove the unobserved effects from the equations of interest using the fixed effects transformation.[32]

-Secondly, we find instrumental variables for the endogenous variables in the transformed equation.[33]

Wooldridge (2002) asserts that 2SLS estimator is the most efficient IV estimator. The 2SLS estimator is obtained by using all the instruments simultaneously in the first stage regression. Considering our equation 1, the reduced form for each of our instruments is as follows:

$$X_{Size}=\delta_z Z_{L1\_Size} + \delta_1 + \delta_2 X_2 + \ldots \delta_{k-1} X_{k-1} + u \quad (4.7)$$

$$X_{MSh}=\delta_z Z_{L1\_MSh} + \delta_1 + \delta_2 X_2 + \ldots \delta_{k-1} X_{k-1} + u \quad (4.8)$$

$$X_{ROAE}= \delta_z Z_{L1\_ROAE} + \delta_1 + \delta_2 X_2 + \ldots \delta_{k-1} X_{k-1} + u \quad (4.9)$$

Where: X_{size} represents the endogenous variable Size, Z is the instrument used for this variable (our case is lag of Size),δ_z represent the coefficient of the instrument, X_2,X_{k-1}depicts all exogenous variables with corresponding estimators δ_2,δ_{k-1}while $u$is the error term.[34]

From the first stage we predict the values of $\hat{x}$ defined as

[32]Step number 1 from the 2SLS.

[33]Step number 2 from 2SLS.

[34]X_{MSH} stays for instrument of variable Market Share and X_{ROAE} is the instrument for Return on Average Equity.

$$\hat{x} = \hat{\delta}Z = Z(Z'Z)^{-1}Z'X \qquad (4.10)$$

To avoid endogeneity these predicted values are used in the second stage instead of variable X.

$$Y = \beta\hat{x} + \mathrm{u} \qquad (4.11)$$

Where Y is an endogenous variable and u is a random error. Therefore, the instrumental variable estimates take the following form:

$$\beta_{2SLS} = (X'Z(Z'Z)^{-1}Z'X)^{-1}X'Z(Z'Z)^{-1}Z'y \qquad (4.12)$$

The results of 2SLS estimation are in Appendix B, Table 9.

To check if regression is over-identified we perform Sargan-Hansen test of over-identifying restrictions. The results of this test indicate that equation is exactly identified and therefore our instruments are valid instruments. In addition, Table 7 shows the correlation results of instruments with our control variables. The level of correlation is low and instruments are unrelated to most of variables.

To make sure that our model is robust, multicollinearity, stationary and normality assumption are tested. Therefore, Variance Inflation Factor (hereafter VIF) on lagged values of variables is estimated.[35]The results of VIF are entirely satisfactory, and it shows that there is no presence of multicollinearity in our estimation.

The results of unit root test confirm that our model is stationary and there is no presence of unit root. To test for normality two tests are conducted. First is Skewness and Kurtosis and second is a Cameron and Trivedi test. Both tests show that normality is not present in our model. Despite these results, the consistency of the estimators is not necessarily affected.

The forth hypothesis of our research is tested by creating a structural break for crisis period. To catch the relationship between CAD and liquidity creation, we construct a dummy variable. It equals one for the period of 2008-2012 and zeroes outside of such period.[36] Considering the procedure developed by Chow (1960), we add the dummy variable to answer for deviations of the crisis intercept relative to the baseline intercept[37].Subsequently we multiply the same variables by the corresponding dummy variable to explain the deviations of the crisis coefficients from the baseline slopes.

[36]We consider the crisis period to be 2008-2012. This mainly due to developments of CAD and Liquidity creation in GIIPS counties represented in Appendix A, Figure 4 but also from suggestions of literature.

[37]Note: Our baseline is Equation 4.2.

5 Conclusion and Remarks

5.1 Empirical Results

This chapter will reveal the main findings from empirical analysis. Table 5 in Appendix B shows the descriptive statistics of main variables used in the model, while the Pearson Correlation Matrix is represented in Table 6. Liquidity creation results to have a positive relationship with market share, earnings volatility, and inflation rate, while it is negatively correlated with capital adequacy ratio, size of the bank, spread between long-term and short-term interbank interest rates, Herfindahl index and unemployment rate.

The box plot in Appendix A, Figure 2 depicts the distribution of main variables, liquidity creation measurement, and CAD grouped for each country. The data are not normally distributed, there is an existence of few outliers[38], and they are mainly skewed to the right. Also, in Figure 5 there is a visual representation of our two main variables. It shows that CAD is increased significantly through years. From 2006 until 2012 there is a smooth increase of this ratio, while after 2012 the increase is significant. It comes as a result of the new regulation buffers introduced after the 2008 crisis. The values range from 0.1 to 0.36. Moreover, liquidity creation shows a breakdown during the financial distress 2008-2011 to the ratio 0.1. Hackethal et al. (2010) conclude that amount of liquidity created shows that rather than inducing liquidity to the economy, banks preserve liquidity as a buffer to support shocks. The reason is associated with regulatory pressure, rather than holding a strong balance sheet structure.

Table 8 in Appendix depicts regression output of pooled OLS, fixed effect, and random effect estimation by considering the gross loan liquidity measure. For more consistent results, robust standard error is applied. The results of Hausman test implies that fixed effect estimation is the most preferred one. It is a consistent and efficient model regarding explanatory capacity. Our results are predisposed to confirm that our main independent variable CAD sustains a moderate strength in fixed effect model at

[38] Note: The graphical representation of Box plot in Appendix A excludes outliers.

10 %. The coefficients of other estimators are not significant, but this does not affect the consistency of the estimation.

From the result of our fixed effect within-estimation, F-test rejects the null hypothesis with extremely high confidence as p-value equals 0.027. Therefore, we admit that our coefficients of independent variables are not equal to zero and our model has predictive power. The model characterizes by a considerably high R-squared, which equals to 0.505. This indicates that our estimation does not have big variances from the fitted linear model.

Table 9 depicts the results from 2SLS estimation. We included three instruments in our regression (lag of Size, Market Share and Return on Average Equity) to omit the presence of endogeneity. The results suggest that Capital Adequacy ratio is correlated negatively and significantly with our dependent variable Liquidity ratio. The scale of the coefficient of regulatory capital ratio, -0.276, suggests that an increase of 1% in the regulatory capital ratio yields a reduction on liquidity creation which represents approximately 0.28% of the bank's gross total assets. The outcome is consistent with the "financial fragility-crowding out" hypothesis, which predicts that higher capital ratios reduce liquidity creation.

As also discussed in section 3.1, financial fragility-crowding out favors liquidity creation as banks benefit from their informational advantage to extort rents from depositors and to gain their confidence, thus allowing the collection of more deposits and the grating of more loans. Additionally, higher capital ratios shift investors from liquid deposits towards the illiquid capital. A similar conclusion had already been obtained by Fungácová et al. (2010) in their study based on a sample of Russian banks, where they acknowledge that high capital requirements may impede liquidity creation and hence cause economic harm, especially in emerging countries.

The first hypothesis is proved, which by default cancels out the second hypothesis. Therefore, we can accept that higher capital does not influence higher liquidity creation for economies of GIIPS.

Size of the bank is significant at 10% level, and it negatively impacts liquidity creation. Therefore 1% change in the size of the bank is associated with 0.313% changes in liquidity creation. Usually it is expected that the bigger the bank is, the less

liquidity it holds and more relies and obtains it from the financial markets. It is connected with notion of "too big to fail", where big banks know that they are big enough to be supported by state or central bank. Bank size was showed with a negative relationship (e.g. studies of Aspachs et al., 2005; Bunda and Desquilbet, 2008; Hackethal et al., 2010; Vodová, 2011b, 2012, 2013; Horvath et al., 2012; Cucinelli, 2013; Lei and Song, 2013), and this relationship is explained as the reliance of larger banks on authorities in case of their problems. Another study identified a positive relationship (see Lakštutiene and Krušinskas, 2010; Pana et al., 2010; Vodová, 2011a; Bonfim and Kim, 2012), where a potential explanation can again be banks' strategy for managing liquidity risk – banks, or a sector on which data have been applied – are considered as small and with growth of the total size they increase the value of liquid assets adequately. The last group of studies did not determine the variable as statistically significant (see e.g. Bunda and Desquilbet, 2008; Hackethal et al., 2010; Ahmed et al., 2011; Trenca et al., 2012).

These differences in result could come due to different measurements used to calculate liquidity creation but also the region taken into study.

All other explanatory variables except of Herfindahl Index are not statistically significant. Even though the sign of some coefficients is not coherent with the initial expectations, we should not give too much to this fact. These variables are inserted into study mainly from the economic reasoning of literature, and they only work as control variables.

Regarding the estimation of structural breaks, the inclusion of dummy variable in regression shows statistical significance in the model. The results are depicted in Table 8 Appendix B. Consequently, we can conclude that deviations of regulatory capital's coefficient from the baseline coefficient are present. It indicates that there is a relationship between regulatory capital and liquidity creation changes during the crisis. Nevertheless, the sign of the regulatory capital's coefficient remains negative but slightly smaller than the one provided by the baseline estimated model (-0.163). It suggests that during crisis an increase of 1% in capital buffers may indicate a reduction in liquidity creation about 0.163%. The effect that crisis has on this relationship does not seem to have huge in magnitude, but it appears to be significant.

Our result is consistent with one of the studies conducted by Berger and Bowman (2008). In their research on bank liquidity creation during the financial crisis, they found out that financial crisis of 1990-1992 and the recent subprime lending crisis were preceded by positive abnormal liquidity creation. These results emphasize that liquidity creation is profoundly influenced by financial crises.

5.2 Conclusions

This research aims to study the impact of regulatory capital on liquidity creation among GIIPS countries banks. Bearing in mind the importance of liquidity for banks and reaching the Basel III new requirements, appeared to be essential to study the relationship and the degree of impact that new rules will have in the banking sector.

Fixed Effect estimation, preceded by Two-Stage Least Square is used to identify our three main hypotheses: (i) Do higher capital requirements impact liquidity creation? (ii) Does size of the bank impact liquidity? (iii) Does the relationship between capital requirements and liquidity creation differ during crises?

The main results show that banks create less liquidity when Capital Adequacy Ratio increases for banks operating in GIIPS countries. Therefore, there is indication that higher capital requirements impact liquidity creation and that the sign of the relationship is negative, suggesting that the "financial fragility crowding out" hypothesis holds. The higher capital requirements posed by the Basel III will result in lower liquidity creation, which may result in lower profitability for the banks. An increase of 1% in the regulatory capital ratio yields a reduction in liquidity creation which represents approximately 0.28% of the bank's gross total assets.

Keeping in mind that higher capital requirements indicate lower liquidity creation in the market, gives space for regulators to counterbalance new capital requirements with liquidity requirements so that to avoid any potential disturbance. It shows that Basel III/CRD IV, which introduced new capital and liquidity requirements to create more financial stability, can have a chance to cause economic turmoil if regulators are not attentive.

Size of the bank results to have an impact on liquidity creation. It is significant at 10% level, and it negatively impacts liquidity creation. Therefore 1% change in the size of the bank is associated with 0.313 % changes in liquidity creation.

When we test for the presence of a structural break during the recent global financial crisis, we find that the relationship between regulatory capital and liquidity creation changes during turmoil periods. Results suggest that during crisis an increase of 1% in capital buffers may indicate a reduction in liquidity creation about 0.163 %. The effect that crisis has on this relationship does not seem to be huge in magnitude, but it appears to be significant. Therefore, big support is given to the idea that GIIPS countries policymakers should put in place different regulatory capital measures during crises to avoid contributing to the worsening of the economic environment.

Overall, our conclusions are of interest to the regulatory authorities, especially in what concerns the negative impact that higher regulatory capital requirements tend to have on liquidity creation and consequently on economic growth. It can eventually elicit an increase of the "shadow banking" activities, where other sources of funding such as pension funds and investment banking may benefit from less strict capital adequacy rules. If, on the one hand, regulatory authorities should promote consistency of requirements across the financial system to ensure a level playing field, on the other hand, these alternative sources of funding can be a good solution for economic agents looking for funding at competitive prices.

As recent financial crises showed, regulators need to recognize the limitations and weaknesses of liquidity provisioning. The proposals at an international level to supplement Basel III liquidity risk measures have been welcomed and could lead to adoption by a wide range of countries in the future. The LCR and NSFR cannot do the job alone; it needs to be complemented by other prudential tools or measures to ensure a comprehensive picture of liquidity in banks as well as the financial system.

Several limitations accompany this paper. There is a lack of data in Bankscope database for the banks selected. It is quite difficult to gather data, and detailed information was missing for many of them. The database did not provide the information on the categorization of the balance sheet items. It resulted impossible in getting to know the correct structure of assets and liabilities due to missing data. This

study could be extended further by considering more banks into the scope. Medium-sized banks and small banks which are not found in this research should be considered as liquidity creator as well. Furthermore, during the financial crisis, many of the banks failed to operate alone in the market. The most powerful ones acquired many of those who went into huge distress and some other merged. It could bring some added value for future researchers if the merger and acquisitions cases are considered in the dataset scope.

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Appendix A

Table 3: List of Banks

Code	Bank
GR	National Bank of Greece SA
GR	Piraeus Bank SA
GR	Eurobank Ergasias SA
GR	Alpha Bank AE
GR	Attica Bank SA-Bank of Attica SA
GR	Aegean Baltic Bank
IR	AIB Mortgage Bank
IR	Allied Irish Banks plc
IR	Bank of Ireland-Governor and Company of the Bank of Ireland
IR	Depfa Bank Plc
IR	Permanent TSB Plc
IR	DePfa ACS Bank
IT	UniCreditSpA
IT	Intesa Sanpaolo
IT	Banca Monte deiPaschi di Siena SpA-Gruppo Monte deiPaschi di Siena
IT	Unione di BancheItalianeScpa-UBI Banca
IT	Banca Nazionale del LavoroSpA-BNL
IT	MediobancaSpA-MEDIOBANCA

IT	Iccrea Holding SpA
IT	Monte deiPaschi di Siena Capital Services Banca per le ImpreseSpA-MPS Capital Services Banca per le ImpreseSpA
IT	Banca Popolare di Sondrio SocietaCooperativa per Azioni
IT	Banca Popolare di Vicenza Societa per azioni
IT	Veneto Banca scpa
IT	Banca CarigeSpA
IT	Banca Popolare di Milano Spa
PT	Caixa Geral de Depositos
PT	Banco ComercialPortuguês, SA-Millennium bcp
PT	Banco Santander Totta SA
PT	Caixa EconomicaMontepioGeral
PT	Banco Popular Portugal SA
PT	Credito Agricola Financial Group-Caixa Central de Credito Agricola Mutuo
PT	Banco Finantia SA
SP	Banco Santander SA
SP	Banco Bilbao Vizcaya Argentaria SA
SP	Banco de Sabadell SA
SP	Banco Popular Espanol SA
SP	Caja de Ahorros y Monte de Piedad de Zaragoza, Aragon y Rioja-Ibercaja

Note: This table shows the full list of banks, which are taken into study. The selection of banks is done through the top ranks from Bankscope. Central Banks and Investment banks are excluded from the list.

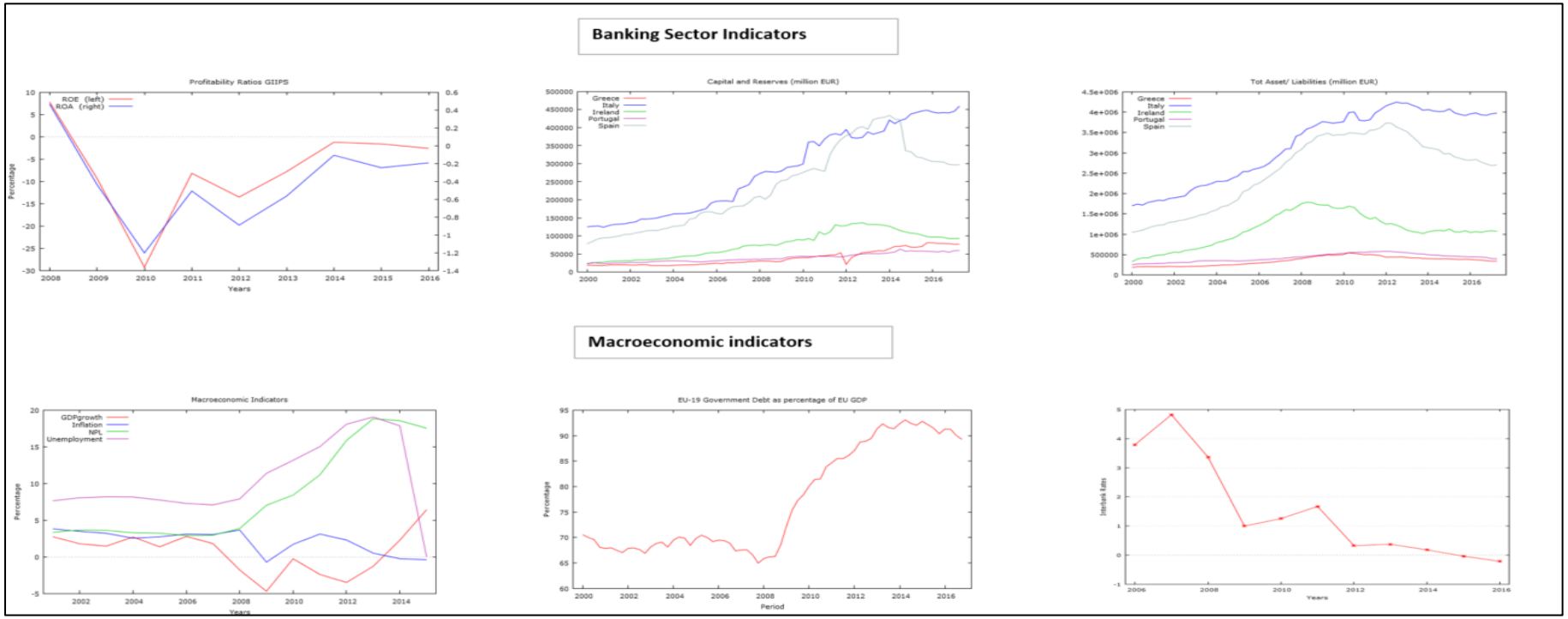
Table 4 : Liquidity Ratio and Capital Adequacy Ratio

	GIIPS		Greece		Ireland		Italy		Portugal		Spain	
Years	**Liq.R**	**CAD**	**Liq.R**	**CAD**	**Liq.R**	**CAD**	**Liq.R**	**CAD**	**Liq.R**	**CAD**	**Liq.R**	**CAD**
2006	0.182959	0.128951	0.231038	0.239267	0.187607	0.109504	0.218945	0.105337	0.137877	0.079714	0.139328	0.110935
2007	0.20229	0.12142	0.221646	0.182139	0.221482	0.113936	0.251474	0.097878	0.194175	0.100776	0.122674	0.112373
2008	0.166026	0.118883	0.173132	0.14189	0.221774	0.120106	0.192329	0.103547	0.133116	0.118726	0.109778	0.110148
2009	0.161074	0.129002	0.159167	0.143499	0.228324	0.120188	0.171476	0.099286	0.139643	0.157624	0.10676	0.124416
2010	0.145987	0.145119	0.132679	0.151273	0.248986	0.224141	0.156957	0.099374	0.097152	0.130801	0.094162	0.120005
2011	0.102881	0.150536	0.066824	0.121466	0.09605	0.258878	0.154542	0.114939	0.097911	0.136542	0.099079	0.120858
2012	0.211562	0.157549	0.08595	0.128614	0.086487	0.269429	0.683927	0.118317	0.091998	0.154062	0.109445	0.117321
2013	0.194495	0.179961	0.066771	0.160226	0.073475	0.314626	0.577507	0.124164	0.137244	0.166521	0.117477	0.134268
2014	0.158922	0.360472	0.055153	0.325691	0.081653	0.225093	0.44256	0.121127	0.109756	1.003145	0.105487	0.127302
2015	0.176243	0.306843	0.094713	0.525963	0.076049	0.27268	0.470683	0.127901	0.132435	0.475555	0.107338	0.132117
2016	0.166786	0.292526	0.041401	0.535568	0.081282	0.473732	0.494959	0.128634	0.107389	0.189241	0.108899	0.135456

Source:BankScope database.

Note: The table depicts the trend of mean values of Liquidity Ratio and CAD from 2006 until 2016. These are own calculations of the author from data provided from Bankscope. This trend analysis through time is presented for each country separately (Greece, Ireland, Italy, Portugal, Spain) and the whole region (GIIPS).

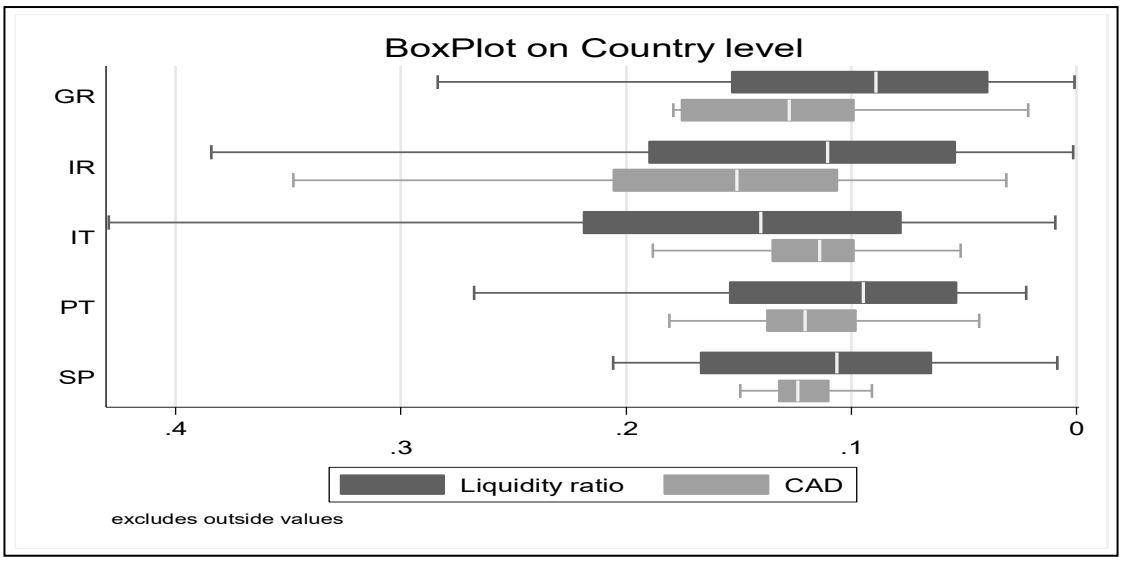
Figure 1:Macroeconomic and Financial Indicators



Source: *ECB database and World Bank database*

Note: The figures depict banking sector indicators and macroeconomic indicators. They are the breakdown of GIIPS countries and each country individually. Banking Sector group of indicators include Profitability Ratios (such as Return on Asset and Return on Equity), Capital and Reserves for each country specifically in gross amount, and the ratio of Total Asset over Total Liabilities in country level. The Macroeconomic group of indicators represents GDP growth, Inflation, Unemployment rate and Non-Performing Loans consolidated in region level of GIIPS. It continues with the Government debt as a percentage of GDP for EU-19 countries and with Interbank Interest Rates for the whole EU countries. The time range of extracted data is:2000-2016 to have a better view of financial events.

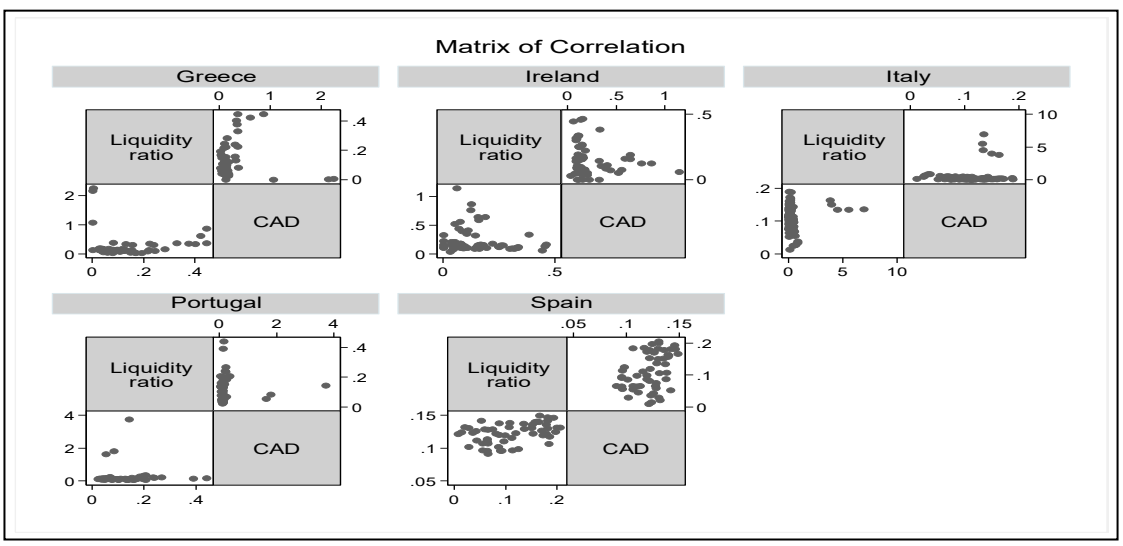
Figure 2: Box Plot



Source: Author's own calculation.

Note: The figure represents the BoxPlot for each country group GIIPS. It shows the five-number summary of Liquidity Ratio and Capital Adequacy Ratio. Summary comprises the minimum, first quartile, median, third quartile, and maximum for these proxies.

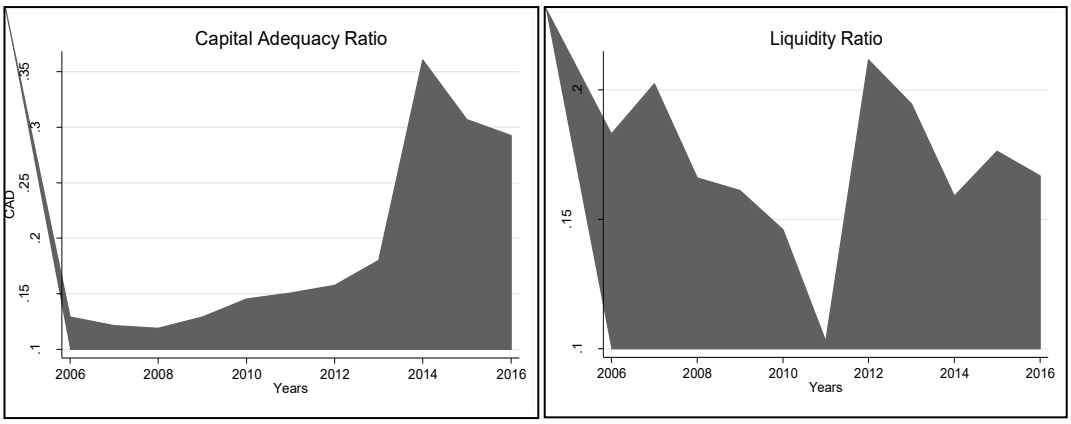
Figure 3 : Matrix of Correlation



Source: Author's own calculation, based on data of Bankscope.

Note: The figure depicts the correlation matrix between two variables Liquidity Ratio and Capital Adequacy Ratio. The correlation between two indicators is split per each country individually: Greece, Ireland, Italy and Spain. It measures the strength and direction of the relationship between two variables.

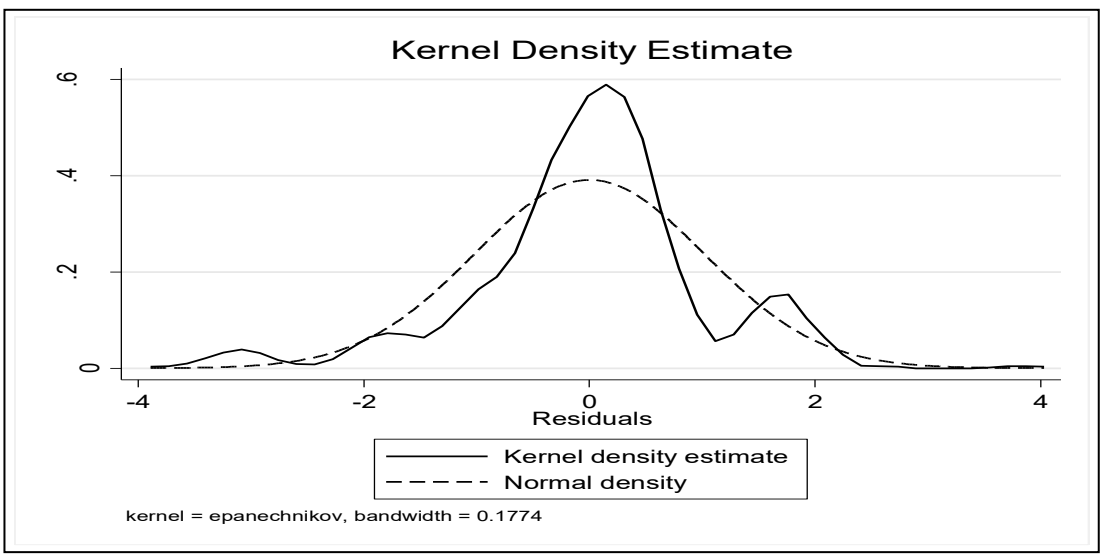
Figure 4 : Capital Adequacy Ratio and Liquidity ratio



Source: Author's own calculation, based on data of Bankscope.

Note: This figure is a graphical representation of Capital Adequacy Ratio and Liquidity ratio for GIIPS countries overall. It shows the ratio developments through time (2006-2016).

Figure 5 : Kernel Density Estimate



Source: Author's own calculation from STATA output.

Note: The figure depicts the Kernel distribution of residuals of the main model. The default function is the Epanechnikov kernel with a bandwidth equal to 0.0095.

Appendix B

Table 5: Descriptive Statistics of Main Explanatory Variables

Variable	**Mean**	**Std. Dev**	**Min.**	**Max**
LiqR	0.2017835	0.5599936	0.0011135	6.960358
CAD	0.1728754	0.2806651	0.0130055	3.731159
Siz	1.825055	0.7203296	-0.6497091	3.224055
MSH	0.5405094	0.7670054	0.0007715	5.81799
EV	-0.0001327	0.0153576	-0.1173909	0.0416564
ROE	0.0165496	0.4749354	-2.66625	6.70244
LTST	0.0349118	0.35600.	-0.004694	0.194693
HIIndx	0.0804128	0.0493303	0.22	0.2332
Infl	0.0145272	0.0177391	-0.447994	0.487992
UnemplR	0.1277476	0.0617873	0.04415	0.27466

Source: Author's own calculation.

Note: The table represents the output from STATA of the statistical description of the dataset. For each variable of the regression is calculated the mean, standard deviation, minimum value and maximum value.

Table 6: Pearson Correlation Matrix of Main Variables

	LiqR	*CAD*	*Siz*	*MSH*	*EV*	*ROE*	*LTST*	*HIIndx*	*Infl*	*UnplR*
LiqR	**1.00**									
CAD	-0.025	**1.00**								
Siz	**-0.32****	**-0.206***	**1.00**							
MSH	0.021	-0.095	**0.135***	**1.00**						
EV	0.055	0.028	-0.011	**0.201***	**1.00**					
ROE	-0.0001	0.013	0.014	0.0002	0.042	**1.00**				
LTST	-0.064	0.052	**-0.161***	**-0.1***	-0.013	-001	**1.00**			
HII	**-0.134***	**0.216***	**-0.33****	**-0.224***	-0.013	-0.01	**0.5*****	**1.00**		
Infl	0.003	**-0.177***	0.036	**0.232***	0.025	**0.185***	-0.055	**-0.247***	**1.00**	
Unpl	-0.083	**0.115***	0.027	**-0.168***	0.013	-0.071	**0.54***	**0.6*****	**-0.42****	**1.00**

Source: Author's own calculation. STATA output

Note: The table depicts the Pearson Correlation Matrix of all variables included in the regression. It shows the dependence between each variable at the same time. Thus, correlation coefficient represents the weight and direction of the correlation among variables. The rule confirms that at 5% level of confidence if | p | is between 0.1 and 0.3 there is weak correlation, if 0.3< | p | <0.5 (**) there is moderate correlation and if 0.5 <| p | (***) there exist strong correlation. The (+) of (-) sign of coefficient show the direction of the correlation.

Table 7: Pearson Correlation Matrix of Control Variables and Instruments

	LiqR	*CAD*	*Size*	*MSH*	*EV*	*ROAE*	*LTST*	*HII*	*Infl*	*Unpl*	*L1Size*	*L1MSH*	*L1ROAE*
LiqR	**1.00**												
CAD	-0.025	**1.00**											
Size	**-0.322***	**-0.206***	**1.00**										
MSH	0.021	-0.095	**0.135***	**1.00**									
EV	0.055	0.028	-0.011	**0.201***	**1.00**								
ROAE	-0.001	0.013	0.014	0.001	0.042	**1.00**							
LTST	-0.064	0.022	**-0.161***	**-0.1***	-0.015	0.084	**1.00**						
HII	**-0.134***	**0.216***	**-0.324***	**-0.224***	-0.013	-0.01	**0.499****	**1.00**					
Infl	0.003	**-0.177***	0.036	**0.232***	0.025	**0.185***	0.055	**-0.247***	**1.00**				
Unpl	-0.083	**0.115***	0.027	**-0.168***	0.013	-0.070	**0.539*****	**0.589*****	**-0.414****	**1.00**			
L1Size	**-0.253***	**-0.180***	**0.983*****	**0.141***	-0.0065	-0.0031	**-0.160***	**-0.323***	0.017	0.0483	**1.00**		
L1MSH	0.035	-0.067	**0.14***	-0.003	-0.0939	0.0186	-0.056	**-0.217***	0.028	-0.086	**0.131***	**1.00**	
L1ROAE	-0.017	-0.016	0.036	0.046	-0.0151	**0.1338***	0.053	0.062	0.090	0.009	0.016	-0.026	**1.00**

Source: *Author's own calculation. STATA output*

Note: The table depicts the PearsonCorrelation Matrix of all exogenous, endogenous and instrumental variables included in the regression. It shows the dependence between each variable at the same time. Thus, correlation coefficient represents the weight and direction of the correlation among variables. The rule confirms that at 5% level of confidence if | p | is between0.1 and 0.3 there is weak correlation, if0.3< | p | <0.5 (**) there is moderate correlation and if 0.5 <| p | (***) there exist strong correlation. The (+) of (-) sign of coefficient show the direction of the correlation.

Table 8:Regression Results

	Pooled OLS	Fixed Effect (Within-Estimators)	Random Effect Within-Estimators	Fixed Effect Structural Break
CAD	-0.132 (0.164)	-0.168* (0.11)	-0.135 (0.099)	-0.174* (0.119)
CAD dummy				0.163 (0.28)
Size	-0.357 (0.00)	-1.144** (0.65)	0.9087 (0.59)	-1.49** (0.66)
MSH	0.015 (0.683)	0.019 (0.018)	0.257 (0.02)	0.0014 (0.013)
EV	1.46 (0.389)	-0.055 (0.874)	-0.1052 (0.53)	-0.432 (0.823)
ROE	0.026 (0.64)	-0.008 (0.017)	-0.005 (0.011)	0.002 (0.013)
LTST	-0.837 (0.361)	0.591 (0.78)	-0.71 (0.523)	-0.716* (0.386)
HIIndex	-3.817 (0.00)	0.972 (1.2)	-2.798 (1.75)	1.665 (1.454)
Infl	-0.688 (0.681)	1.596 (1.24)	0.469 (0.895)	1.47 (1.154)
Unemplr	1.448 (0.021)	-0.177 (0.47)	1.28 (1.12)	0.103 (0.403)
C	1.029 (0.00)	2.747 (1.09)	1.9493 (1.11)	2.75 (1.068)
Sample Size	407	407	407	407
F-statistics	10.14 (0.00)	40.6 (0.0265)		2.68 (0.0127)
R-squared	0.187	0.505	0.469	0.518
Hausman (chi2)			-234.21 (0.00)	

Source: Authors' calculations based on STATA output

*Note: The table depicts the output of estimations performed for Pooled OLS, Fixed Effect and Random Effect.The estimation results are based on robust standart error which are clustered by bank categoryi(In total there are 37 clusters) .p-values associated with t-statistics are in parentheses. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively*.

Table 9: Regression Results IV

	First Stage (Within Regression)	2SLS Regression
CAD	-0.422**	-0.276**
	(0.019)	(0.325)
L1Size	0.854***	
	(0.033)	
L1MSH	0.006	
	(0.008)	
L1ROE	0.022*	
	(0.014)	
EV	-0.067	2.192
	(0.331)	(3.58)
$Size_{instr}$		-0.313**
		(0.068)
MSH_{instr}		-0.095
		(0.506)
ROE_{instr}		0.439
		(0.684)
LTST	-0.382	-2.096
	(0.162)	(6.985)
HIIndex	0.579	-3.07**
	(0.281)	(1.634)
Infl	0.335	2.824
	(0.443)	(4.356)
UnempR	-0.385	0.369
	(0.218)	(2.77)
C	.319	1.926
	(0.083)	(1.416)
Sample Size	370	370
F-statistics	121.11	40.6
	(0.00)	(0.0265)
R-squared	0.70	0.505

Source: Authors' calculations based on STATA output.

*Note: The table depicts the output of 2SLS estimation by splitting into two stages of estimation L1Size , L1MSH and L1ROE represents the lag values of instruments,while $Size_{instr}$ MSH_{instr} ROE_{inst} represent the instrumented variables in the second stage.The estimation results are based on robust standart error which are clustered by bank categoryi(In total there are 37 clusters) .p-values associated with t-statistics are in parentheses. *, ** and *** denote significance at 10%, 5% and 1% levels, respectively.*

Table 10: Results of main tests performed

	Sargan-Hansen Statistics	Wald test	Im-Pesaran-Shin
Chi^2		20.66	
t-stat			-2.1577
p-value	(0.00)	(0.0143)	(0.0007)

Source: Authors' calculations based on STATA output.
Note: The table depicts the results of main tests performed.