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THE IMPACT OF BASEL III CAPITAL REQUIREMENTS ON THE PERFORMANCE OF EUROPEAN BANKS

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Contents

List of abbreviations

CAPM	Capital Asset Pricing Model
CET1	Common Equity Tier 1
CRD IV	Capital Requirements Directive IV
ECB	European Central Bank
EU	European Union
EVA	Economic Value Added
GDP	Gross Domestic Product
G-SII	Global Systemically Important Institutions
LCR	Liquidity Coverage Ratio
NSFR	Net Stable Funding Ratio
OECD	Organisation for Economic Co-operation and Development
O-SII	Other Systemically Important Institutions
P/B	Price-To-Book Ratio
P/E	Price-To-Earnings Ratio
RAROC	Risk-Adjusted Return on Capital
ROA	Return on Assets
ROE	Return on Equity
RWA	Risk-Weighted Assets
TSR	Total Shareholder Return
VaR	Value at Risk

Introduction

The Basel Committee on Banking Supervision has been created by the central bank governors of the G10 in 1974. It was a response to the high number of disruptions happening in the international financial markets, such as the breakdown of the Bretton Woods system or the closure of the Franklin National bank of New York. The existence of regulation in this sector is justified by the social cost of the faire of the financial institutions. The Committee wanted to improve the supervisory knowhow and the quality of the global supervision, which would lead to a better financial stability. In order to achieve this goal, it introduced the first Basel Capital Accord in 1988 and called for a minimum capital ratio (Jablecki, 2008). A higher proportion of capital should protect the financial institutions from all kinds of unsecured and uninsured risks which may turn into losses. It has two main functions. Firstly, it has a loss-absorbing function, allowing the bank to cover any losses with its own funds. Secondly, it has a confidence function because it convinces the bank creditors and the depositors that their deposits and assets are safe (Svitek, 2001).

The Accord was intended to evolve over time and a new capital adequacy framework was issued in 2004 to replace the 1988 Accord. This new framework, generally known as Basel II, was more adapted to the financial innovation that had appeared during the previous years and aimed at improving the way regulatory capital requirement reflect the underlying risks (Jablecki, 2008). However, Basel II had a certain number of weaknesses that amplified the depth and the severity of the financial and economic crisis of the last decade. Indeed, the banks had an excessive leverage, low-quality and inadequate capital, as well as liquidity buffers that were not sufficient. Moreover, the second capital adequacy framework focused too much on the individual financial institutions, while it ignored the interconnectedness of systemically important banks. Systemic risk is characterized by the multiplication of failures from one institution to another. The Basel Committee had to react to all these weaknesses in order to improve the ability of the banking sector to absorb the shocks coming from economic and financial stress (Bank for International Settlements, 2010)

Between July 2009 and September 2010, the Committee and the Heads of Supervision issued the first version of the Basel III regulatory reform. The two main objectives followed by this third framework were to increase the level of equity in order to deal with potential losses and

to lower the risks at which the institutions operate. These objectives can be reached by making improvements in four different areas, which are the strengthening of capital, the global liquidity standard, the risk coverage and the leverage ratio (Gual, 2011). Even if everyone accepts that the financial system and the banks would be safer with these changes, there is an important disagreement about the other effects that Basel III will have. Indeed, bankers have the following arguments against the issuance of this new framework:

- Equity financing is more expensive than debt financing because the investors require higher returns than the debt holders and the interest payments are tax deductible;
- It will reduce the bank's ability to provide loans to the economy and lead to an increase in lending rates;
- An increase in the equity requirements will hurt the shareholders of the bank because of a reduction in the return on equity (Admati, DeMarzo, Hellwig, & Pfleiderer, 2013).

Various studies have been conducted in order to verify the accuracy of these arguments, especially regarding the impact of the new capital requirements on banks' performance and their ability to generate sustainable profitability. The concept of profitability is very important. Indeed, it is the first element that is able to protect a bank against unexpected losses because it strengthens the position of its capital and gives the possibility to invest the retained earnings to improve the future profitability. The most common measures used to evaluate the performance of a financial institution are the return on assets and the return on equity. The former indicates how efficient management uses the assets to generate earnings, while the latter gives an idea about the profit generated by the bank with the money invested by the shareholders (European Central Bank, 2010).

Different views are held in the literature about the effects of holding higher capital. Some economists and regulators base their hypothesis on the irrelevance theory launched by Modigliani and Miller in 1958. Under the assumption of a frictionless world, this theory suggests that the value of a company is not affected by a higher leverage or a lower proportion of debt. According to this theory, some economists believe that banks have no reason to be against a higher proportion of capital required by Basel III (Berger, Herring, & Szegö, 1995). A second view focuses on the negative effects of holding more equity. The governments launched different policies, such as tax shield, implicit guarantees or deposit insurances, which subsidize debt and indirectly penalize equity. Moreover, managers who finance the

projects through debt make more efficient decisions in order to regularly repay the creditors. The asymmetric information on the market may also favour debt financing (Aboura & Lépinette, 2015). Finally, a third view argues that a higher capital ratio may have a positive impact on the bank's performance because of the moral hazard existing between debt holders and shareholders. Indeed, an increase in the capital requirements results in a lower premium required by debt holders and in bigger margins due to stronger monitoring efforts. These elements involve a higher return on equity (deBandt, Camara, Pessarossi, & Rose, 2014).

Nowadays, the impact that a change in the capital requirements has on the profitability measures of a bank is still unclear. This thesis will complement the empirical findings that have been made in the past by taking into account recent data for banks which are situated in the European Union. The goal of the empirical research is to find an answer for the following questions:

- What is the impact that the higher proportion of equity set by the Basel III framework will have on the return on equity?
- What is the impact that the higher proportion of equity set by the Basel III framework will have on the return on assets?
- What is the impact that the higher proportion of equity set by the Basel III framework will have on the net interest margin?
- Which are the other variables having an impact on the return on equity and the return on assets?
- Does a link exist between the dividend policy applied by the bank and the return on equity?

The new Basel III regulation intends to make the global financial system safer and avoid the repetition of a financial and economic crisis. Thanks to the answers of the previous questions, it will be possible to evaluate whether the operating activities of the European banks will not be too penalized from the new restrictions.

This thesis will be divided into several parts. Firstly, a theoretical part is necessary in order to understand the issues of the research, the key concepts that will be used to answer the questions and the main arguments which can be found in the literature about this topic. The first chapter of this part will focus on a brief analysis of the evolution of the Basel Accord. It

will summarize the evolution of the main rules that the banks have to follow, the advantages and drawbacks of these rules, as well as the differences between the concepts of regulatory and economic capital. The second chapter will develop the measures of performance, which will be very useful in the empirical analysis. A particular attention will be given to the return on equity, which is the most popular and useful measure of profitability and performance. The third chapter concerns the capital structure of the bank, and explains the functions of capital, as well as the main concepts related to the capital structure. This chapter also discusses the arguments and theories which are held in the literature about the impact that an increase of the capital ratio may have on the performance and lending activities of financial institutions. The final chapter of the theoretical part will be focused on the new recommendation published by the European Central Bank regarding the dividend distribution policies that should be adopted by the financial institutions. The link between the dividend policy and the profitability will be considered in this final chapter.

After the definition of the main issues, the key concepts and the theoretical arguments, the second part of this thesis will be based on an empirical analysis in order to give an answer to the questions enumerated previously. This analysis will complement other empirical studies that have been conducted in the past. In order to be able to test the relationship between the level of capital and the measures of performance, a sample of European banks which are considered as systemically important will be taken into account. The banks are classified into three groups according to the degree of the impact that their failure would have on the real economy. This classification has an influence on the systemic buffer that each bank should hold.

For each bank in the sample, the level of capital as well as a certain number of key performance measures will be identified. Thanks to this data, a descriptive statistical analysis can be conducted in order to present the global behaviour and evolution of the variables used in this study. It will be followed by a simple linear regression which will test the relationship between the level of common equity tier 1 capital and the measures of performance. Finally, a regression analysis with multiple variables will be made to identify the other variables having an impact on a bank's performance. The results of the findings will then be discussed and interpreted on the basis of the elements from the theoretical part.

Part I: Theoretical analysis

Chapter 1: The Basel Accord

Basel I

In response to the different financial disruptions happening in the international financial markets during the 1970s, the Basel Committee on Banking Supervision has been created at the end of 1974. It was established by the central bank governors of the G10 countries, who wanted to have a forum for regular cooperation on banking supervisory matters. The main goal of this committee was to improve the quality of banking supervision in the whole world in order to have a better financial stability. This goal may be achieved by setting minimum standards and guidelines, which should be implemented by the individual national authorities (Jablecki, 2008).

The capital adequacy rapidly became the main issue of the Committee's activities. In the beginning of the 1980s, it noticed that the capital ratios of the main international banks were decreasing while the international risks were growing. The members of the Committee agreed on an accord to strengthen the stability of the international banking system and to reduce the inequality coming from differences in national capital requirements. This accord was approved by the governors of the G10 in 1988 and was called the Basel Capital Accord (Jablecki, 2008).

Every country with active international banks was asked to keep a minimum fixed relation between the capital level and the assets. This relation, called Basel capital ratio, is determined by using the following formula:

$$Basel\ capital\ ratio = \frac{Capital}{Risk - weighted\ assets} = \frac{Capital\ (tier\ 1\ and\ 2)}{Assets\ (weighted\ by\ credit\ type) + credit\ risk\ equivalents}$$

The institutions were required to hold an amount of capital equal to at least 8% of risk-weighted assets. Moreover, 4% must be made of core capital, also called tier 1. Not all capital is equally able of protecting a bank, several tiers exist. Firstly, Tier 1 capital is made of issued and fully paid common stock, non-cumulative perpetual preferred stock and disclosed reserves. Secondly, Tier 2 capital comprises subordinated debt, non-qualifying hybrid securities and qualifying allowance for loan losses. The total capital is made of Tier 1 capital and Tier 2 capital (pwc, 2011).

The capital requirement is expressed as a percentage of risk-weighted assets, meaning that the riskier the assets, the more capital an institution has to set aside. Safe assets, such as cash and government securities, are given a low risk-weight, while riskier assets, such as subprime mortgages, are attributed a higher risk –weight (Jablecki, 2008). The following rules are used to weight the assets:

- Cash, gold and bonds issued by OECD governments are considered as being not risky and have a 0% weight ;
- Claims on agencies of OECD governments and local public sector entities have a weight of 20% ;
- Mortgage loans have a weight of 50% ;
- Claims on the private sector, non-OECD governments, investments, real estate and other assets have a weight of 100% (Jablecki, 2008).

The Accord was intended to be improved over time, especially in 1996 with the Market Risk Amendment. The 1988 Accord only focused on credit risk, which arises whenever the borrower is unable to pay back a loan or meet a contractual obligation. The second kind of risk, the market risk, has only been added to the Basel Accord in 1996. The goal was to incorporate within the capital requirement the "risks arising from bank's exposures to foreign exchange, traded debt securities, equities, commodities and options" (Bank for International Settlements, 2009).

Moreover, the banks were authorized to use internal models based on the value-at-risk (VaR) to measure their market risk capital requirements. This concept measures the potential loss on a portfolio resulting from relatively large movements in the price. It requires the revaluation of a portfolio with the use of a set of given price shifts, which are selected with the help of statistical techniques. Two parameters have to be specified to quantify the potential loss. Firstly, the holding period corresponds to the time frame over which the changes in the value of the portfolio are measured. The Basel standards require banks to apply a price movement of ten days on their portfolio. Secondly, the confidence level is represented by the proportion of losses that the VaR amount covers (Cassidy & Gizycki, 1997).

Basel II

Even if Basel I was revolutionary at the beginning, the development of the financial markets was too quick and the first accord was not sufficient anymore. A new capital adequacy

framework had to be developed and was called Basel II. It was published in 2004 and was built on three different pillars.

First pillar

The first pillar concerns the minimum capital requirements. A new kind of risk has been added: the operational risk. It is associated with the losses deriving from internal factors such as the employees, the procedures and fraud as well as external factors such as the economic environment. It was considered as a new risk because of the increase of outsourcing, globalization and use of technology (Raman, 2015). Now, the minimum capital requirements are based on the credit, market and operational risk. The following formula is used to determine the capital adequacy ratio:

$$\frac{Total\ Capital}{Credit\ risk + Market\ risk + Operational\ risk} = Capital\ adequacy\ ratio\ (minimum\ 8\%)$$

The key element of the Basel I Settlement is conserved, the minimum of 8% capital adequacy. However, the evaluation of each risk category is determined separately and the banks are free to choose the methods they want to use for the risk evaluation, so that the accord can have a more flexible character. These are the methods used for each kind of risk:

Credit Risk

The *standardised approach* allocates different risk weights to the types of exposure to companies, banks or public entities. These weights are determined by an international rating agency (figure 1).

The *internal rating approach* provides the following formula to compute the credit risk RWA:

$$RWA = 12.5 * EAD * LGD * (WCDR - PD) * MA$$

PD is the probability that an obligor defaults on its contractual obligations within one year. LGD estimates the loss that the bank will incur if there is a default of the obligor. EAD is the amount owed by the obligor at the time of default. M is the remaining economic maturity of an exposure. Finally, WCDR represents the worst case default rate and MA is the maturity adjustment, which is a function of M (Allen & Overy , 2008).

This approach gives the bank the opportunity to make its own predictions on the probability of default related to each customer. The supervision authorities set the other risk factors, which are the Loss given default and Exposure at Default.

The *advanced internal rating approach* enables the institution to estimate the risks internally, and is used by banks which want to adhere to the most rigorous market authorities standards (Danila, 2012).

Figure 1: Risk-weights for credit risk in Basel II (standardised approach)[1]

Table 1: Risk-weights for credit risk in Basel II (standardised approach) and in Basel I

			Basel II (standardised approach)							Basel I	
Portfolio			AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to BB-	B+ to B-	Below B-	Not rated	OECD	Non-OECD
Corporate			20%	50%	100%	100%	150%	150%	100%	100%	100%
Bank*	Option 1		20%	50%	100%	100%	100%	150%	100%	20%	LT 100%
	Option 2	LT	20%	50%	50%	100%	100%	150%	50%		ST
		ST	20%	20%	20%	50%	50%	150%	20%	20%	20%
Sovereign			0%	20%	50%	100%	100%	150%	100%	0%	100%

Note: * The distinction between Option 1 (risk-weight one category below that of the sovereign) and Option 2 (risk-weight based on the rating of the bank) applies only in Basel II

Market Risk

The *standardised model* and the internal *Value at Risk models*, which were set by the Basel I amendment of 1996, are still used during Basel II (Danila, 2012).

Operational risk

In the *Basic indicator approach*, a basic indicator such as revenues is chosen and the supervision authority indicates a percentage that should be applied.

The *Standardised approach* divides the activity of the bank into different business segments. A basic indicator is chosen for every segment and the supervision authority indicates a percentage that should be applied.

With the *Advanced measurement approaches*, the banks can use their internal risk prediction models, which must be validated by the supervision authority (Danila, 2012)

Second pillar

The second pillar is based on the prudential supervision process. On the one hand, the banks are directly responsible to maintain a capital level in accordance with their risk profile. On the other hand, the authorities have to create a good regulation environment and supervise it. Several principles have to be respected:

- The banks should have internal processes to measure their capital, which are linked to their risk profile;

[1] (Roy, 2005)

- These processes should be evaluated by the supervision authorities together with the capacity of each bank for compliance and monitoring;
- The authorities have to make sure that the minimum capital levels are respected across the banking sector. Levels which are above the minimum may be required by the authorities;
- The supervision authorities should be able to take actions early in the case of a negative development of the capital requirement (Danila, 2012).

Third pillar

The third pillar is related to the market discipline and the transparency principle. Some periodic reporting requirements about a bank's activity are needed in order to provide information on the different risks and the financial performance. This information should be given to all bank counterparties (Danila, 2012).

Limits of Basel II

Basel II added a real value to the prudential regulations, increasing the safety of the financial sector. However, the financial crisis showed that this second accord had several negative impacts as well as limitations. Even if it was more sensitive to risk than Basel I, it did not take into consideration some important kinds of risk, such as the reputation risk, the systemic risk and the liquidity risk. Moreover, the bigger banks that chose to use the advanced capital adequacy approach had greater benefits than smaller banks, which were obliged to use the standard approach. In order to reinforce a bank's capital and strengthen the regulation, a new leverage ratio should also be added. It would be a protection against unexpected losses and an underestimation of risk (Danila, 2012).

Basel III

Thanks to the experience of the financial crisis in 2008, it was clear that the Basel II Accord required some modification in order to prevent the same problem from reappearing (Raman, 2015).

Regarding the capital requirements, the aim of the Basel III philosophy is to take on the same principle as Basel II, meaning that the banks need more capital for the activities generating a higher risk. Two main objectives are pursued. Firstly, the institutions have to possess a higher level of equity in order to deal with potential losses. Secondly, these institutions should operate at lower risk levels (Gual, 2011). In order to achieve these goals, several

improvements are made in four different sections, which are the strengthening of capital, the global liquidity standard, the risk coverage and the leverage ratio (Raman, 2015).

Strengthening the capital

In order to be solvent in a future crisis, the banks are required to set aside an amount of capital depending on the risk attached to their assets. They are required to hold an amount of capital equal to at least 8% of risk-weighted assets. Moreover, 4.5% of the risk weighted assets should be of common equity tier 1, the highest quality (European Council, 2015). In the Basel III Accord, the definition of Tier 1 capital has been changed. Indeed, it has been split into two components. Firstly, there is the Tier 1 Common Capital, which consists of common shareholder's equity, minus goodwill and intangibles. Secondly, there is the additional going concern capital made of qualifying hybrid securities and noncontrolling interests. The total of these two parts mades the Tier 1 capital, which must be at least equal to 6% of the risk weighted assets (Bank for International Settlements, 2010).

Conservation and countercyclical buffers

A capital conservation buffer and a countercyclical capital buffer are needed in addition to the 4.5% of common equity tier 1. The goal is to make sure that banks have accumulated enough capital in the best periods in order to be able to absorb losses in the case of a future crisis.

Firstly, banks are obliged to hold a capital conservation buffer of 2.5% of their total risk exposure. This conservation buffer, whose purpose is to conserve the capital of the bank, has to be made of common equity tier 1 capital.

Secondly, banks have to hold a countercyclical capital buffer in order to avoid the negative effects of the economic cycle on the lending activities. The banking institutions are asked to accumulate a certain amount of common equity tier 1 capital during good times, when the growth of credit is strong. When the economic activity slows down, this buffer can be used in order to keep lending to the real economy.

If an institution does not respect one of these rules, it will have to stop the payment of the dividends and bonuses (European Council, 2015).

Systemic risk buffer

Systemic risk is defined as a risk which "happens when developments in the financial system cause a breakdown of the system of such magnitude that it negatively affects the real economy" (Pais & Stork, 2013, p. 430).The most crucial element of this kind of risk is the

multiplication of failures from one institution to another. The states have the possibility to require the banks to hold a buffer of common equity tier capital 1 for the systemic risk, without a prior approval from the European Commission. The long-term non-cyclical systemic or macro-prudential risks may have a high number of negative consequences for the real economy. The systemic risk buffer is a way to reduce these risks. A buffer situated between 1% and 3% may be applied for all exposures and up to 5% for domestic and third country exposures (European Council, 2015).

Global systemically important institutions buffer

Banks are classified into three groups according to their systemic importance: The global systemically important institutions, the other systemically important institutions and the banks which are not recognized as systemically important. They will have to hold a different level of capital based on their classification.

The G-20 agreed on five groups of indicators , which determine the systemic importance of a financial institution. These indicators are based on the size, the interconnectedness with other banks, the lack of substitutes for the services, the global activity and the complexity. An equal weight of 20% is given to each category. Figure 2 gives a detailed view of the indicators used to measure the systemic importance of a bank (Bank for International Settlements, 2011).

Banks which are identified as Global systemically important institutions, also called G-SIIs, will have to hold a mandatory surcharge because they pose a higher risk to the global financial system and their failure would have an important impact on the real economy. This buffer, depending on the systemic importance of the bank, will be included between 1% and 3.5%. It should also be of a high quality, meaning that it should be composed of common equity tier 1 capital (European Council, 2015).

Figure 2: Indicator-based measurement approach[2]

Table 1

Indicator-based measurement approach

Category (and weighting)	Individual Indicator	Indicator Weighting
Cross-jurisdictional activity (20%)	Cross-jurisdictional claims	10%
	Cross-jurisdictional liabilities	10%
Size (20%)	Total exposures as defined for use in the Basel III leverage ratio	20%
Interconnectedness (20%)	Intra-financial system assets	6.67%
	Intra-financial system liabilities	6.67%
	Wholesale funding ratio	6.67%
Substitutability (20%)	Assets under custody	6.67%
	Payments cleared and settled through payment systems	6.67%
	Values of underwritten transactions in debt and equity markets	6.67%
Complexity (20%)	OTC derivatives notional value	6.67%
	Level 3 assets	6.67%
	Trading book value and Available for Sale value	6.67%

Domestic systemically important institutions buffer

The domestic systemically important institutions are designated in the EU legislation as other systemically important institutions, or O-SIIs. These banks also have to hold additional capital requirements in order to reduce the negative impact on the financial system that their failure would generate.

The methodology used to identify the O-SIIs is very similar to the one used to determine the G-SIIs. Indeed, the first step is based on the calculation of scores using a certain number of indicators in the categories of size, complexity, interconnectedness and substitutability. A bank which has a score that lies above a given level is directly designated as an O-SII. In the second step, the authorities may use other indicators, such as the bank's shares of deposits in the country, or give different weights to the mandatory indicators. It is a way to designate additional financial institutions as O-SIIs. Each of these banks will have to hold a capital surcharge. The amount of the surcharge will be based on several criteria, such as the systemic importance measured by the O-SII score, the historical losses in the banking sector of the

[2] (Bank for International Settlements, 2011)

country, the results of stress tests, and the levels of the O-SII buffer in the countries of the European Union (National Bank of Belgium, 2016).

Leverage

"Leverage allows a financial institution to increase the potential gains or losses on a position or investment beyond what would be possible through a direct investment of its own fund" (D'Hulster, 2009). It can be seen as the relationship between the capital of a bank and its total assets. Whenever its assets are higher than the equity base, it is said that the balance sheet is leveraged. The financial institutions want to increase their return on equity. To do so, they usually engage in leverage by borrowing money in order to get more assets. Many people believe that the excessive leverage used by banks is one reason of the global financial crisis. In order to avoid the repetition of the problem, the international community has proposed the leverage ratio measure, which is a complement to the minimum capital requirements. It is a tool which can reduce the risk that financial institutions build up an excessive leverage, because it could have negative consequences on their solvency (D'Hulster, 2009).

The following formula is used to calculate the leverage ratio:

$$\frac{Equity + Reserves - Intangible\ assets}{Total\ assets - Intangible\ assets} = \frac{Tier\ 1\ capital}{Adjusted\ assets} = Leverage\ ratio$$

Banks have to disclose this measure. It informs of how well the financial institutions are prepared to achieve their long-term obligations (D'Hulster, 2009).

Global liquidity standards

The LCR, liquid coverage ratio, is one of the tools used by the Basel Committee in order to promote a more resilient banking sector. It is focused on the short term liquidity risk profile of a bank. The goal is to make sure that the institution has enough high-quality liquid assets that can be easily converted into cash. These assets should meet the liquidity needs for a 30 day stress scenario, improving the ability of the sector to absorb shocks caused by economic and financial stress. The minimum requirement of this ratio in normal times is 100%. The following formula is used :

$$LCR = \frac{Stock\ of\ high - quality\ liquid\ assets}{Total\ net\ cash\ outflows\ over\ the\ next\ 30\ calendar\ days} > 100\%$$

The NSFR, net stable funding ratio, is another liquidity measure which is used to ensure the medium and long-term liquidity of a bank. According to this measure, the long-term assets

should be funded with a certain amount of liabilities in relation to their liquidity risk profiles. Stable funding means that long-term and reliable equities or liabilities are used to finance the assets. The NSFR is defined in the following way :

$$NSFR = \frac{Available\ amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} > 100\%$$

The liquidity coverage ratio and the net stable funding ratio are the tools used by the Basel Committee regarding the liquidity risk of banks (Buckova & Reuse, 2011).

Risk coverage

In addition to the increase in the level and quality of the capital base, it is important to make sure that every material risk has been captured in the capital framework. During the crisis, a lot of different risks were not covered in the risk-based regime in an appropriate way. Indeed, high volumes of illiquid and complex credit products were held in the trading books of banks without a sufficient amount of capital to support the risk. Moreover, the failure to capture significant derivative exposures, as well as on- and off-balance sheet risks, was an element which amplified the crisis.

In 2009, the Basel Committee launched a set of enhancements in order to correct the previous problems. Higher risks weights were given for resecuritisation[3] exposures and higher capital requirements were demanded for certain exposures to off-balance sheet vehicles. Financial institutions were also required to conduct a more rigorous credit analysis of externally rated securitisation exposures. Moreover, another important element of the reform programme was the increase in regulatory capital for the trading book. Finally, a significant source of credit-related loss was linked to the deterioration in the credit quality of counterparties. To solve this problem, the Committee has increased the regulatory capital requirements and improved the risk management concerning counterparty risk (Bank for International Settlements, 2010).

Regulatory and Economic capital: What is the difference?

Elizalde and Repullo (2007) focus on the distinction which is made between two frequently used concepts: The regulatory capital and the economic capital. The former is defined as the minimum capital that the regulator requires. The latter represents the capital level which is needed to cover the losses of a bank with a given confidence level or probability. It should be derived from an objective function such as the maximization of the value of the financial

[3] Securitization can be defined as the process through which a certain number of non-financial and financial assets are "packaged " into securities. The securities can then be sold to investors (Sandback, 2003).

institution. In other words, the economic capital can be seen as the level of equity that the shareholders would take at the beginning of each period in a world without capital regulation. These shareholders take into consideration the fact that the bank will be closed if the initial level of capital is not enough to support the losses of the period (Elizalde & Repullo, 2007). The exceptional risk taken into account in the internal computation of the economic capital is larger than the risks considered for the regulatory capital. Moreover, the losses are not necessarily covered by an increase in equity. Indeed, other elements, such as the management quality, may be considered as a cover against unexpected losses (Siapartners, 2007).

The computation method between these two concepts is different. The economic capital integrates the correlation between the micro-economic risk of the counterparty and the macro-economic risks that may affect it. For example, the economic sector of the counterparty and its geographic location are taken into account in the risk measure. While the regulatory capital only focuses on the theoretical definition of the counterparty risk, the economic capital includes the economic conditions in its model.

This vision of risk focuses on a more prudent approach, as well as a more efficient management of the activities. Three main objectives are followed by the economic capital:

- The evaluation of the risk-adjusted profitability, thanks to the computation of RaRoc (see chapter 2);
- The management of the portfolio: once the RaRoc is computed, it is possible to compare the real performance of the different activities of the bank;
- The strategic running of the activities: economic capital enables the bank to realize an arbitrage between the different activities in order to optimize the use of equity (Siapartners, 2007).

The economic capital is calculated by taking into account the financial strength and the expected losses of the bank. The financial strength corresponds to the probability of the financial institution not becoming insolvent during a certain period and is represented by the confidence level in the statistical calculation. The expected loss of the bank is the anticipated average loss during this period. They correspond to the cost of doing the main activities and are generally absorbed by operating profits (Elizalde & Repullo, 2007).

To conclude, the two types of capital have very different interests. On the one hand, the goal of the regulatory capital is to maintain the solvency of the whole financial system in order to

avoid systemic risk and to guarantee the rights of the debtholders. On the other hand, the main purpose of economic capital is to maximize the profitability of the activities of the financial institution (Siapartners, 2007).

Chapter 2: The performance measurement

The performance of a bank can be defined as its ability to generate sustainable profitability. Profitability is the first element that can protect a bank against unexpected losses, because it strengthens the position of its capital and enables it to invest the retained earnings in order to improve the future profitability (European Central Bank, 2010).

The bank's performance is driven by four key elements. Firstly, it is important to take into account the *earnings* generated, as well as their composition and volatility. Secondly, there is the *efficiency*, which refers to the ability to make profit given a certain source of income or generate revenue from a certain amount of assets. Thirdly, the *risk-taking* factor considers the adjustments made to earnings in relation to risks the bank takes to generate them. Finally, the *leverage* works as a multiplier and may improve the results in the upswing. It may also be a factor of the failure of a bank, because of unexpected losses. There are a lot of different measures which are used in order to assess the performance of a financial institution. They are classified into traditional, economic and market based measures (European Central Bank, 2010).

Measures of performance

Traditional measures of performance

These performance measures are also applied in other industries. Firstly, the *return on assets* (ROA) indicates how efficient management uses the assets to generate earnings. It is defined in the following way:

$$Return\ on\ assets = \frac{Net\ income}{(Average)\ total\ assets}$$

The *return on equity* (ROE), which is the most popular measure of performance, is an indication of the profit generated by the bank with the money invested by the shareholders. The following formula is used to define this concept:

$$Return\ on\ equity = \frac{Net\ income}{(Average)\ total\ equity}$$

Thirdly, *the cost-to-income* ratio indicates the relationship between a bank's costs and income. It gives a view of how efficiently the institution is being run.

$$Cost - to - income\ ratio = \frac{operating\ expenses}{operating\ revenues}$$

Moreover, the *net interest margin* gives an idea about the ability of income generation of the intermediation function of the institution.

$$Net\ interest\ margin = \frac{Net\ interest\ income}{Assets\ (or\ interest - bearing\ assets)}$$

Finally, the *earnings per share* give an indication about the portion of the bank's profit which is allocated to each outstanding share of common stock (European Central Bank, 2010).

$$Earnings\ per\ share = \frac{Net\ income - Dividends\ on\ preferred\ stock}{Average\ outstanding\ shares}$$

Economic measures of performance

The development of shareholder value creation is considered in the economic measures of performance. It assesses the economic results that the bank generates from its economic assets and is focused on efficiency. One of the most popular economic measures is the *Economic value added* (EVA), which is defined in the following way:

$$EVA = Return\ on\ invested\ funds - (weighted\ average\ cost\ of\ capital * invested\ capital) - (weighted\ average\ cost\ of\ debt * Net\ debt)$$

It enables the bank to measure if it generates an economic rate of return which is higher than its cost of invested capital (European Central Bank, 2010).

Another economic measure of performance which is often used is the *Risk-adjusted return on capital* (RAROC). This concept is defined by the following formula:

$$RAROC = \frac{Expected\ profit}{Economic\ capital} = \frac{Return - Expected\ loss - Expenses}{Economic\ capital}$$

It is an expression of the expected profit as a proportion of the economic capital, which focuses on the effect of risk when the bank compares the performance and profitability between its different businesses. It is a tool that enables the decision makers to compare the returns on a certain number of projects with different risk levels (Baer, Mehta, & Samandari, 2011).

Market-based measures of performance

According to the European Central Bank (2010), the most common market-based measures are:

- The *total share return* (TSR): $\frac{(Ending\ stock\ price - Initial\ stock\ price) + Dividends}{Initial\ stock\ price}$
- The *price-to-earnings ratio* (P/E): $\frac{Market\ value\ per\ share}{Earnings\ per\ share}$
- The *price-to-book value* (P/B): $\frac{Stock\ price}{Total\ assets - Intangible\ assets\ and\ liabilities}$

Decomposition of the ROE: The DuPont Ratio

The return on Equity is the most popular performance ratio, because it shows at which rate the wealth of the owners is increasing. The DuPont ratio is one method which is usually used to compute the Return on equity. It is computed in the following way:

$$ROE = \frac{Net\ income}{Operating\ income} * \frac{Operating\ income}{Average\ assets} * \frac{Average\ assets}{Average\ equity}$$

A good analysis of the financial statement of a bank provides information about its performance in the areas of liquidity, leverage, operating efficiency and profitability. The DuPont ratio conducts an analysis in three of the four measures, which implies that only the analysis of the liquidity should be made separately. The meaning of each component of the return on equity will be examined.

Profitability: Net Profit Margin

The net profit margin is the ratio of the net income on the total sales. It measures the rate at which the sales are converted into profit at the net income level of the operation. Other common profitability ratios are the gross margin and the net margin, which describe performance at other activity levels.

Operating efficiency or Asset utilization: Total asset turnover

The total asset turnover is the ratio of the total sales on the average of the assets. It indicates how well the assets of the bank are used to generate sales.

Leverage: The leverage multiplier

The leverage multiplier is the ratio of the average assets on the average equity. It is a measure

that gives an idea of the extent to which the banking institution relies on debt in order to finance its capital structure. The return on equity is "leveraged up" if the proceeds of debt are invested in projects which have a higher return than the cost of debt (Isberg, 2008). It is important to remember that a higher financial leverage increases the solvency risk, even if it enables the institution to have a higher return on equity (European Central Bank, 2010).

Limitations of ROE as a measure of performance

The return on equity is the most popular measure of performance, because it enables the bank to rapidly provide a global analysis in the areas of leverage, operating efficiency and profitability. However, some criticism can be made about this indicator.

Firstly, this measure of performance lacks attachment to risk. Indeed, a high number of risk elements are missing, such as the cost of risk, the solvency situation, the quality of the assets and the risk concentration. Moreover, a risk component represented by leverage may boost the return on equity in a considerable manner.

Secondly, it is a short-term measure, which does not take into account the long-term strategy or the long-term events that have an impact on the health of the bank. During the crisis, the institutions with the highest ROE could be those which were hit the most. It means that this indicator is not sufficient to identify the banks with the best performance in terms of sustainability of their results.

Thirdly, because of a lack of transparency, data may not always be reliable. The return on equity may be swollen because of unrecognised losses, meaning that banks which have high unrecognised losses can be considered as being the best performers. It can also be added that the accounting standards are different from one country to another. The same financial instrument can be accounted in a different way in two institutions. These are examples of situations in which the use of the return on equity as a measure of performance is commonly criticized (European Central Bank, 2010).

Chapter 3: The capital structure of the bank

The bank can decide to finance its projects with common stock, preferred stock or debt. These elements are components of its capital structure. On the one hand, the financial institution raises equity in the form of common and preferred stock, which is hold by the owners of the bank. A long-term relationship exists with these equity holders, who hope that the firm will have a high growth in the future and who expect regular dividend payments. On the other hand, debt can be made of loans payable, bonds, notes payable, debentures, etc. The people who hold debt, the creditors, do not have any long-term commitment to the bank, because they are mainly interested in the repayment of the principal amount and the interest. The decisions that the managers take about the capital structure may play a vital role on the health of the financial institution (Chadha & Sharma, 2015).

Functions of capital

The main role of capital is to protect the financial institutions from all kinds of unsecured and uninsured risks that may turn into losses. It has four different functions.

Firstly, it has a loss-absorbing function, allowing the bank to cover any losses with its own funds. Any losses that occur decrease the capital of the bank. It means that the assets can fully cover the liabilities as long as the aggregate losses do not exhaust the capital. Banks do not usually need equity to cover operating losses coming from their normal business activities. Indeed, the interest margins and other spreads they set are sufficient to cover their ordinary expenses. The most important risk for which the financial institutions need equity concerns the borrower default, making some assets partly or entirely irrecoverable. Secondly, capital has a confidence function, because it convinces the bank's creditors and the depositors that their deposits and assets are safe. The ability of banks to absorb losses indicates that they are able to use their assets to cover the liabilities, which builds and sustains their credibility.

Moreover, capital has two secondary roles. It has a financing function, meaning that it provides funds to finance fixed investments. This function is very important for financial institutions that start up, when the money brought by the equity holders is used to buy equipment, land and buildings. Banks should always have permanent capital coverage for fixed assets, meaning that any additional investment in these assets should be compensated with a capital rise. Finally, equity has a restrictive function, which puts some limits on various banking transactions or types of assets. It prevents banks from taking a too large number of

chances. In this restrictive function context, capital is a good base for limitations on the credit exposure and foreign exchange positions that are not well secured (Svitek, 2001).

Cost of Equity

The cost of equity of a bank is defined as the expected return on its common stock in capital markets. The shareholders take some risks by waiting for the return of the capital they provided and they require a compensation for this risk. In other words, the cost of equity reflects the opportunity cost of an investment in a stock of the bank instead of another investment which could have an equivalent risk. It requires a risk premium that is linked to the uncertainty of the return. Indeed, the investor decides to hold a risky equity security instead of a risk-free asset. The following method, called the dividend capitalization model, is generally used to estimate the cost of equity:

$$Cost\ of\ Equity = \frac{Dividend\ per\ share\ (for\ next\ year)}{Current\ Market\ value\ of\ stock} + Growth\ rate\ of\ dividends$$

The CAPM, Capital Asset Pricing Model, is another method which is employed to compute the cost of equity:

$$Cost\ of\ Equity = r_f + \beta\ (r_m - r_f)$$

Where r_f represents the rate of return of risk-free securities, β is the beta of the investment and r_m corresponds to the overall expected rate of return in the market (Witmer & Zorn, 2007).

Cost of debt

The cost of debt can be defined as the return the financial institution has to offer investors in order to hold the debt. It represents the yield to maturity of its bonds in the market. Two factors have to be taken into account to compute this cost. Firstly, it increases with the floatation costs, which are the costs of issuing debt. They usually have a very low impact on the computation. Secondly, interest is tax deductible, meaning that using debt would shield some earnings of the company from taxation. This factor is the most interesting benefit of using debt to finance the activities. The following formula is used to define the cost of debt:

$$Cost\ of\ debt = k_d\ (1 - T)$$

Where k_d represents the return to debt and T is defined as the tax rate (Dow, 2009).

Is Equity much more expensive than debt?

The Modigliani-Miller Theory

Modigliani and Miller (1958) launched one of the most important theories about the capital structure, which is the irrelevance theory. A company can finance its operations by using equity or debt or a combination of these sources. The theory suggests that the value of a firm is not affected by a high leverage or a low proportion of debt, meaning that the valuation of a company is irrelevant to its capital structure. The arbitrage arguments used by Modigliani and Miller demonstrate that the market prices will be a compensation for any decision a firm takes about its leverage. The risks to shareholders increases with a higher leverage, which increases the cost of equity just enough to keep a constant weighted average cost of financing. The same conclusion can be given with risky debt. The costs of both risky debt and equity respond so that the cost of financing does not depend on the leverage chosen by the company. This irrelevance theory works only under a certain number of assumptions. It requires a frictionless world, without taxes, where everybody would have access to the same information and where investors would have a rational behaviour. Moreover, the transaction costs for buying and selling securities are equal to zero and the cost of borrowing is the same for everyone. (Berger, Herring & Szegö, 1995).

Based on this irrelevance theory, some economists and regulators argue that there should not be any reason for the financial institutions to be against the higher proportion of equity capital required by the Basel III Accord (Berger, Herring & Szegö, 1995). They believe that banks have an excessive leverage and that an increase in the equity proportion would not have a high impact on the cost of bank funding. Indeed, they think that the financial institutions do not need a high leverage to perform their socially valuable functions, such as lending, taking deposits and issuing money-like securities. Moreover, banks which have an important level of debt may have higher costs regarding the governance and risk taking (Aboura & Lépinette, 2015).

Do banks satisfy the Modigliani-Miller theorem?

However, the Modigliani-Miller model is challenged by a high number of inefficiencies and frictions which exist in real capital markets. This is the reason why many managers of banks are worried about the effect of the new capital requirements on the lending rates and the cost of capital. They actually prefer to have a lower proportion of equity, because of a higher cost

compared to debt and a restriction to provide loans to firms or other actors in the economy (Aboura & Lépinette, 2015).

Aboura and Lépinette (2015) write that the Modigliani-Miller theorem cannot be applied to banks, because they do not share the same characteristics as firms. Indeed, the policies launched by the government reward leverage, by subsidizing debt and indirectly penalizing equity. There are a lot of different examples of interventions creating distortions to the theorem such as tax shield, implicit guarantees or deposit insurances.

Regarding the corporate taxation, substituting debt with equity results in a loss of tax deductions because the firms could have passed this free money on their shareholders with higher returns. It can also be added that debt provides a discipline on management. Managers who use debt to finance their projects are obliged to make efficient decisions in order to regularly repay the creditors. This decreases the marginal cost of debt in relation to the marginal cost of equity. The cost of equity may also be more important with asymmetric information, and favour debt financing. The managers may have information on investment opportunities or the evolution of firm yields. Finally, banks can be seen as companies which produce liquid financial claims. One reason why the theorem of Modigliani and Miller is not applicable to banks is that the debt-equity neutrality gives a zero weight to the social value of liquidity while the liquidity production is rewarded by a market premium (Aboura & Lépinette, 2015).

There are also advantages of having a high leverage regarding the safety net, which is defined as "all government actions designed to enhance the safety and soundness of the banking system other than the regulation and enforcement of capital requirement" (Berger, Herring, & Szegö, 1995, p. 11). It is made of deposit insurance and implicit government guarantee. The explicit deposit insurance made by the government enables the bank to have deposit liabilities close to riskless rate, which may be an incentive to replace equity by deposit. Moreover, the implicit government guarantee plays an important role. The central banks together with the governments provide the service of a guarantor of last resort for banks. In the course of the crisis, the financial institutions changed their financing strategy by taking advantage of their status of companies which benefit from implicit guarantees. In all these cases of government

interventions, the capital structure can have an effect on the value of the bank (Aboura & Lépinette, 2015).

A certain number of contradictions can be noticed between the interventions of the government and the Basel regulator requirements. For example, the former creates different incentives to debt while the latter asks for more equity to banks. Governments are also willing to decrease the risk-taking in the financial sector, while offering an implicit guarantee to financial institutions. This creates an incentive to excessive leverage. A comprehensive policy has to be found in order to reconcile the ideas of both actors (Aboura & Lépinette, 2015).

It is also important to add that the propositions of Modigliani and Miller are concerned with having equity, not with raising it. Indeed, raising equity is generally costly in the short-term. It imposes issuance costs for the bank and creates dilution costs for existing capital holders. Moreover, it is possible that the new shares will be sold at a discount, if the people interpret the issuance as a bad signal of the prospects of the financial institution. These arguments show that raising new equity might be costly (Aboura & Lépinette, 2015).

Equity requirements and the lending activities

Lending activities and the balance sheet

One of the main goals of the Basel III Accord is to increase the stability of financial institutions. Some people argue that a higher proportion of equity would reduce their ability to provide loans to the economy, which would have a negative impact on growth and on the whole economy. The banks would also be less able to create liquidity by taking deposits. In other words, the increase of the capital requirements would restrict the lending and deposit activities of the bank.

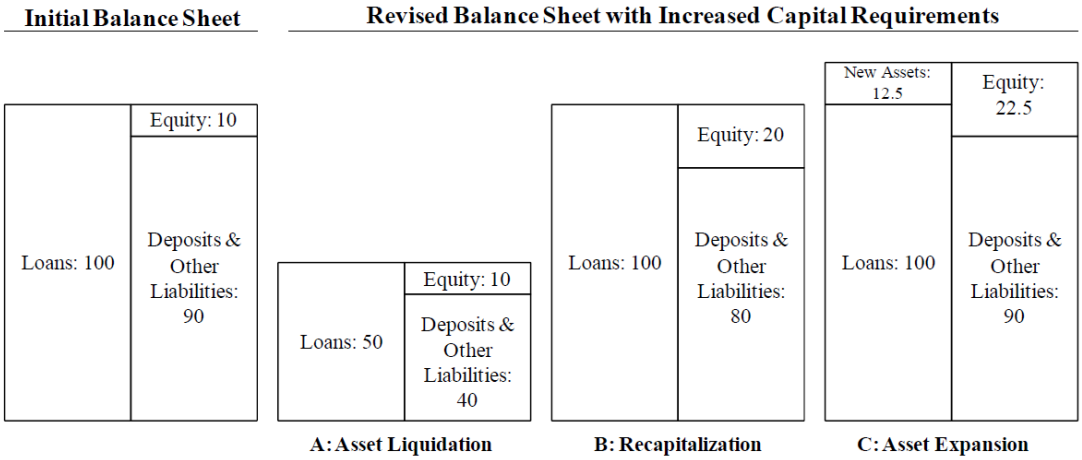
Admati, De Marzo, Hellwig and Pfleiderer (2013) do not agree with the previous ideas and believe that banks are able to react to a change in the capital requirements without having a negative impact on their profitable activities and without limiting their ability to lend. The financial institutions can react in three different ways to an increase of the capital requirements:

- They can scale back the size of their balance sheet in a significant way. They would liquidate a certain proportion of their assets and reduce the liabilities by using the proceeds;

- They can recapitalize, by issuing an amount of additional equity and removing the same amount of liabilities;
- They can raise additional equity capital in order to expand the balance sheet and use the proceeds to acquire new assets.

The first case is the only one in which the bank will have to reduce the amount of loans that it can undertake. It might be thought that the second situation also forces the bank to decrease the level of its deposits. However, deposits are not the only form of liabilities in practice. For example, the financial institutions can use long-term debt to finance their assets. If they decide to replace a certain amount of this long-term debt with equity, the capital would increase without any reduction in their lending and deposit-taking activities. In the last situation, the bank meets the higher capital requirements without touching the original assets and liabilities of the balance sheet. It would enable the company to acquire new assets, which will be a way to provide a pool of liquidity in order to expand the lending activity. These three cases illustrate the fact that it is a mistake to think that a higher level of equity requirements would necessarily force the banks to reduce their deposits or lending activities, regarding the balance sheet mechanics (Admati, DeMarzo, Hellwig, & Pfleiderer, 2013).

Figure 3: Alternative responses to increased equity requirements[4]



Capital requirements and lending spreads

Banks worry about the fact that the higher capital requirements may reduce the ROE because debt is substituted with equity, which is more expensive. One solution to this problem would be to raise the lending spreads in order to prevent the return on equity from falling. The

[4] (Admati, DeMarzo, Hellwig, & Pfleiderer, 2013)

lending spread can simply be defined as the difference between the lending rate and the deposit rate. Chun, Kim and Ko (2012) observed that three major factors affect the lending spreads: the ratio of risk-weighted assets to total assets, the size of loans to total assets as well as the long term interest rate on debt. Their findings also showed that European banks do not have an important increase in their lending spreads after an increase in the capital ratios.

Equity requirements and performance

Relationship between ROE and ROA

The following relationship can be made between the return on asset and return on equity:

$$ROE = \frac{(ROA * A - r * D)}{E} = ROA + \frac{D}{E} * (ROA - r)$$

Where ROA = return on assets before interest expenses

A = total value of the bank's assets

E = Equity

D = Debt

r = after-tax interest rate on debt.

Based on this relationship, it can be observed that an increase in the capital requirements will have a negative impact on the return on equity. This is the reason why many authors believe that Basel III will hurt the shareholders of banks. However, other authors think that a decrease in ROE does not result in a reduction on the value added. An increase in capital requirements can lower ROE in good times while it will reduce shareholder's risk in bad times, by raising ROE (Admati, DeMarzo, Hellwig, & Pfleiderer, 2013).

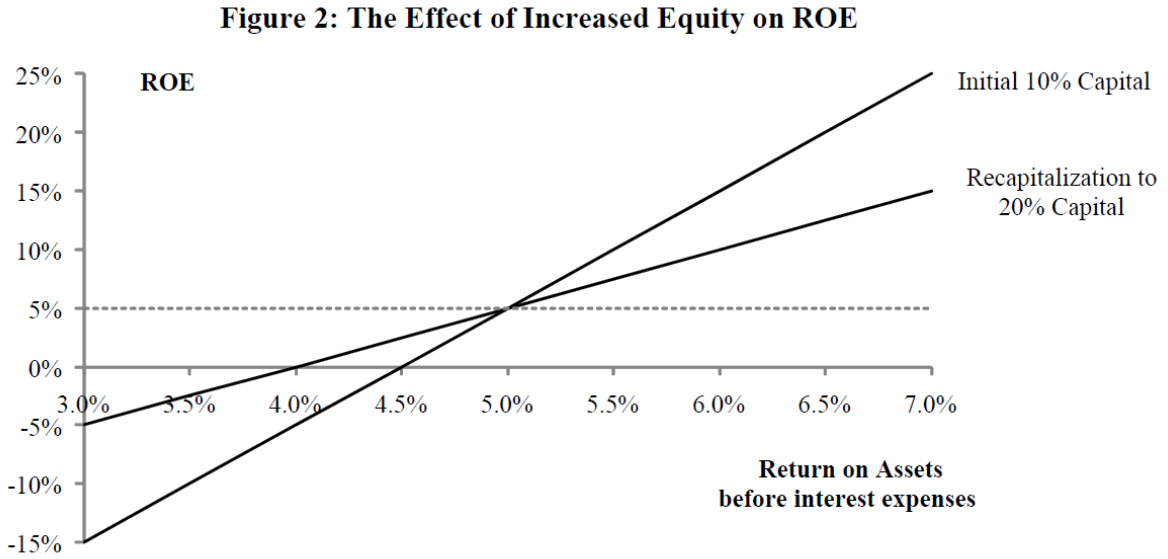
The consequences of an increase in equity on ROE are illustrated in figure 4. It shows the link which exists between the return on assets and the return on equity. The relationship between these measures of performance is represented by a straight line. The slope of this straight line is higher when the proportion of equity in the balance sheet of the bank is lower. The two lines cross when ROE equals ROA, which is also the rate of interest on debt. Above this level, it is true that a higher capital may induce a lower ROE. Below this level, however, the cushioning effect of higher capital provides a downside protection for equity holders by reducing their risk. In this case, ROE is more important with a higher proportion of capital (Admati, DeMarzo, Hellwig, & Pfleiderer, 2013).

The following key points are illustrated by the figure:

- The return on equity is a reflection of the realized profitability of the assets of the bank for a given capital structure. It may not be an excellent measure to compare the underlying profitability for financial institutions with different capital structures.
- An increase in capital requirements can lower ROE in good times when ROA is high. It will increase the ROE in bad times, when ROA is low.

On average, banks typically earn a return on equity in excess of the return on their debt, which means that higher equity requirements would have a negative effect on the ROE. However, because the shareholders will face a lower risk in a bank which is better capitalized, they will demand a lower expected return. In other words, the return required by the equity investors falls when the capital of the bank increases. It means that there is not any cost associated with the increase in equity, because the shareholders continue to receive their required return (Admati, DeMarzo, Hellwig, & Pfleiderer, 2013).

Figure 4: The effect of increased equity on ROE[5]



Impact of capital requirements on ROE

Nowadays, there is not any consensus about the effect of capital on the performance of bank. An important number of divergent theories exist. According to the irrelevance theory of Modigliani and Miller presented in a previous section, a change in the capital structure does

[5] (Admati, DeMarzo, Hellwig, & Pfleiderer, 2013)

not have any impact on the net profit. Thus, an increase in the equity requirements will have a negative accounting effect on the return on equity, because the same result is divided by a higher capital base (deBandt, Camara, Pessarossi, & Rose, 2014).

Banks usually argue that higher capital requirements will have negative consequences on their performance. Several arguments are used to support this hypothesis. A higher proportion of capital reduces the risk on equity and lowers the expected return on equity that the investors require. An increase in the capital ratio also lowers the after-tax earnings because it reduces the tax shield that the deductibility of interest payments provides. Moreover, because of the reduction of the risk induced by a higher capital proportion, the earnings may depress by a decrease of the value of access to federal deposit insurance (Berger, 1994). However, some authors believe that an increase in the capital requirements will result in a higher return on equity. This effect is explained by two channels which are based on the moral hazard between debt holders and shareholders.

The risk premium that is required by the debt holders is the first channel. The limited liability of shares involves a floor in the potential losses of capital holders. However, gains are usually higher with risk-taking. This creates an incentive to take more risks by penalizing the other stakeholders in the bank. Debt holders demand a premium when they finance banks because they anticipate this behaviour. Therefore, market discipline from debtors obliges the financial institutions to hold a positive amount of capital. It decreases the willingness of the capital holders to take excessive risks. In turn, a better capitalized bank involves a lower required premium by the debt holders, which implies lower debt costs and a higher return on equity (deBandt, Camara, Pessarossi, & Rose, 2014).

The monitoring activity exerted by the bank is the second channel. Because higher capital internalizes the potential losses coming from a lack of monitoring, financial institutions have bigger incentives to monitor with an increase of their capital ratio. The direct gain from higher capital ratios is the important payment that is extracted from the borrowers because of the stronger monitoring effort. This implies bigger margins. Banks which have a higher leverage are usually subject to distortions in their lending decisions. Because of these distortions, they may make worse lending decisions than they would do if they had more capital. Moreover, banks have a higher probability to survive when their capital ratio increases, which results in a supplementary incentive to increase monitoring. It enhances their ability to collect the return

of their investments in the future. Thus, increasing capital ratios is consistent with the maximization of profits (deBandt, Camara, Pessarossi, & Rose, 2014).

Berger (1994) adds that the level of capital may also affect the return on equity through the operating costs. Indeed, if financial institutions do not fully control their costs, a change in the proportion of capital could affect the pressure on the managers to be more cost efficient. If the marginal cost of funding with the use of capital is more important than that of debt funding because of the imperfections existing in the market, then an increase in the capital requirements demanded by the regulators may put some pressure on the managers of banks to decrease the operating costs. This will help offset the higher financing costs.

It is possible that the causation runs from the return on equity to the capital ratios. Indeed, if the managers decide to retain a high proportion of earnings instead of distributing them to the shareholders, earnings may have a positive influence on capital. Some Granger causality tests have been conducted in order to demonstrate whether the causation runs from the return on equity to the capital ratios. It is said that a variable x granger-causes another variable y if, given the past values of y, it is useful to take the past values of x in order to predict y (Berger, 1994). On the one hand, some authors concluded that lagged values of the return on equity never Granger-cause the capitalization measures of the bank (deBandt, Camara, Pessarossi, & Rose, 2014). On the other hand, Berger (1994) found that each variable positively Granger-causes the other. In other words, an increase in the capital requirements is generally followed by higher earnings and vice versa.

Determinants of Return on Equity

The previous section analysed the relationship that exists between the level of capital and the return on equity. However, the ROE may depend on other factors which will be exposed in this section.

Firstly, the liquidity factor plays an important role. Indeed, if a bank does not have sufficient liquidity and funding to meet its obligations, it can rapidly fail or become technically insolvent. The link between performance and liquidity management can be measured through the ratio of loans to deposits, showing the relationship between illiquid assets and stable funding sources. A positive relationship can be expected between this variable and the return on equity, as lower rates of return are associated with liquid assets. Rouissi, Sassi and Bouzgarrou (2011) add that a bank which finances its activities with a large part of deposits is less profitable. Indeed, several studies have shown that deposits have a negative impact on the

profitability of financial institutions because they require a certain number of branches and other expenses (Bouzgarrou, Rouissi, & Sassi, 2011). However, the empirical study of Kosmidou, Tanna and Pasiouras (2012) showed that a positive relationship may exist between the banks' liquidity and their performance.

Secondly, the efficiency in the management of the expenses of the financial institution can be measured through the cost to income ratio. This ratio gives information about the costs of running a bank and is expected to have a negative link with the performance measures.

The size of the bank may also be a determinant of the performance. Indeed, financial institutions that have a bigger size may benefit from economies of scale, reducing the cost of processing and gathering information. The amount of total assets can be used to determine the size of a bank.

Moreover, the bank's performance can be influenced by external factors such as the gross domestic product growth. It measures the total economic activity in an economy and is expected to have a positive influence on the performance measure of a financial institution (Pasiouras & Kosmidou, 2007).

Chapter 4: Dividend policy and performance

Dividends and dividend policies

The concept of dividend can be defined in many different ways. It is an approximation of the profits of the bank to shareholders after a deduction of tax and fixed interest obligations on debt capital. It is also a distribution to the shareholders in order to compensate for the time and investment risks they undertook. Moreover, it is defined as a part of the net earnings of the financial institution which are distributed to the investors in proportion to their shareholding in the company. It is expressed as a percentage of the nominal value of the ordinary share capital of the company or as a fixed amount per share. Dividends are usually paid in cash and out the profit of the current year (Enekwe, Nweze, & Agu, 2015).

Through its dividend policy, the financial institution makes a decision about the dividend payout, which is the amount of cash that it gives to its shareholders in the forms of dividends. Several decisions can be taken by the company. For example, it can choose to send all the profits back to its investors, or it can keep a certain percentage as retained earnings. On the one hand, banks or companies with a policy based on a high dividend payout pay more current dividends, which may result in a slower growth and a lower market price per share. On the other hand, a policy based on a low payout means less current dividends, more retained earnings and more important capital gains. The investors may have a preference for one or the other policy regarding their interest in the number of payments or the capital gains. Most firms decide to send stable and regular dividends, which is also the policy favoured by the shareholders. Indeed, they value stable dividends more than the fluctuating ones (Enekwe, Nweze, & Agu, 2015).

Dividend policies and performance

The directional effect of dividend policies on the performance of banks is still unclear and divergent opinions exist.

Miller and Modigliani (1961) demonstrated that, under the assumptions of perfect market conditions and a rational behaviour, the dividend policy that a bank or a firm chooses does not have any impact on its value or performance. In their opinion, the value of a firm is influenced by the investments made in productive assets and not by the proportion of the income which is distributed to the shareholders. Thus, the dividend policy is irrelevant and a rational investor does not have any preference between capital gains and dividends. This theory has been criticized by a high number of authors. As for the relationship between capital and

performance, they argue that the market is not perfect and that elements such as asymmetric information, taxes and transaction costs should be taken into account to test whether dividends have any impact on the performance.

The research conducted by Amidu (2007) showed that there is a significant and positive relationship between the dividend policy, the return on assets and the return on equity. It indicates that the profitability is affected by the decisions a firm takes regarding its dividend policy. He also observed a significant and negative relationship between the payout ratio and the profitability. It could mean that the company reduces its retained earnings by paying dividends, which affects its internally generated financing (Amidu, 2007). The payout ratio is measured in the following way:

$$Dividend\ payout\ ratio = \frac{Dividend\ per\ share}{Earnings\ per\ share}$$

Agyei and Yiadom (2011) have a different opinion. Indeed, they concluded that the dividend payout ratio has a positive relationship with the performance. This means that banks that pay a larger amount of dividends increase their profitability. The authors use several reasons to explain this positive link:

- Managers paying out dividends attract more customers by sending out good signals about the performance of the bank.
- The dividend payout policy may also force the managers to have a more efficient behaviour in the utilization of scarce resources.
- The reduction of the financial resources of the bank because of the dividend payment may cause an increase of its leverage level, which can be considered as an agent for a higher performance.
- The agency costs between the managers and the owners may be reduced because of the payment of dividends (Agyei & Yiadom, 2011). Agency costs arise when there is a conflict of interest between the shareholders and the managers of a bank or a company. While shareholders want the managers to make a certain number of decisions that will increase the share value, managers make self-interested decisions, by expanding the business or increasing the salaries, which may reduce shareholder wealth (Ang, Cole, & Lin, 2000).

Dividend policies and Basel III

On 28th January 2015, the European Central Bank published a recommendation regarding the dividend distribution policies of the financial institutions. In order to satisfy the capital requirements set by Basel III, banks are required to establish dividend policies with conservative and prudent assumptions. The ECB classifies the credit institutions into three categories based on a risk-based approach. Different recommendations are made for each category:

- The banks which satisfy the capital requirements and which have already reached all their fully loaded ratios[6] should distribute their net profits to the shareholders in a conservative manner. This should be a way to continue to meet all the requirements in future bad economic or financial conditions.
- The banks which satisfy the capital requirements but which have not reached their fully loaded ratios should also distribute their dividends in a conservative way, but only to the extent that the path towards the required fully loaded ratios is secured.
- The banks which have a capital shortfall and which do not satisfy the capital requirements should in principle not distribute any dividend (European Central Bank, 2015).

The financial institutions which use dividend policies that are not in line with the recommendations of the European Central Bank have to provide additional information and explain the reasons. They also have to provide plans showing how they will reach the required "fully loaded" ratios. The ECB will assess all this information and take individual decisions (European Central Bank, 2015).

[6] The computation rules of Common Equity Tier 1 capital are not harmonized yet. They will only be "fully loaded" in 2019. In the meantime, computation rules with less restrictions are accepted during this transition phase, also called "phase-in". However, an important number of banks have already published their financial results in "fully loaded", in order to enable the investors to make comparisons between banks (European Central Bank, 2015).

Part II: Empirical analysis

Previous empirical studies

With the implementation of the Basel III framework, an important debate has emerged about the effect of the new capital requirements on the costs for banks and their performance measures. On the one hand, bankers and a certain number of scientists believe that a higher proportion of equity will be too expensive, lower the return on equity and reduce the ability of the financial institutions to provide loans to the economy. On the other hand, some theories suggest that the increased capital requirements may have a positive or neutral impact on bank's performance. In this case, banks should not worry about an increase of the capital ratios. Various empirical studies have been conducted in order to verify the accuracy of the different arguments that are proposed.

Recently, deBandt, Camara, Pessarossi and Rose (2014) analysed the effect of different capitalization measures on the return on equity. They based their analysis on a sample of large French banks before and after the financial crisis. This research has shown that an increase in the capital proportion results in an important increase in ROE. The result is not impacted by the method that the bank chooses to raise equity. This positive relationship appears to be driven by the operating efficiency factor. Similar results were found for the return on assets. Indeed, the capital measures have a positive and significant impact on ROA.

Berger (1994) conducted a similar research in the past and used data of US banks between 1983 and 1989 to prove that a higher capital results in a higher after-tax return on equity. The results showed that the book values of capital adequacy ratios and return on equity are positively related, and that this relationship is economically and statistically significant. Moreover, his study showed that increased earnings will have a positive influence on capital over time, because the managers of banks prefer retaining the marginal changes in earnings instead of distributing them to the shareholders. It means that a proportion of earnings changes will accumulate into a change in the capital level.

Finally, some authors studied the internal factors having an impact on the performance measures. Demigüs-Kunt and Huizinga (1999) concluded that well-capitalized banks are more profitable and have higher net interest margins. This is explained by the fact that banks which have a high capital level have a less important cost of funding than other banks because of

lower prospective bankruptcy costs. Abreu and Mendes (2002) concluded that the more deposits a bank transforms into loans, the higher the profits. They also claimed that financial institutions which have higher operating costs will have a lower ROE and ROA, because of a lower pre-tax profit. Pasiouras and Kosmidou (2007) found that the most important determinants of performance are the total assets, the cost-to-income ratio, the capital ratio and the loans to assets ratio.

The results of these different studies contradict the main opinions of bank managers who claim that the new capital requirements will hurt the shareholders by reducing the return on equity. Indeed, the research conducted by the previous authors show that a higher capital proportion may result in a significant increase in the performance measures. Moreover, it is also important to look at the other factors having an impact on the performance measures. The previous empirical studies did not necessarily use recent data or took only one country into account. A lot of changes have appeared in the financial system with the implementation of the Basel III requirements.

This paper will study the link between the Basel III capital requirements and the performance measures by using recent data of banks situated in the European Union. The goal of this empirical research is to test the following hypotheses:

- H1: A higher equity proportion set by the Basel III framework will have a positive impact on the return on equity
- H2: A higher equity proportion set by the Basel III framework will have a positive impact on the return on assets
- H3: A higher equity proportion set by the Basel III framework will have a positive impact on the net interest margin
- H4: A dividend policy based on higher dividend payouts will have a positive impact on the performance measures.

Methodology

In order to verify the previous hypotheses, a quantitative analysis will be conducted. The sample used in this analysis will take into account banks which are situated in the European Union. They are classified into three groups according to their systemic risk. Each category has to hold a different mandatory surcharge based on the impact that a failure would have on the financial system and the real economy.

The first group includes the European global systemically important banks, which are defined by the Financial Stability Board and the Basel Committee on Banking Supervision. The second group will contain the domestic systemically important banks which have to hold an O-SII surcharge situated between 1.5% and 2%. The banks in the third group are domestic systemically important banks whose failure would be less significant for the financial system. They have to hold an O-SII surcharge situated between 0% and 1%. The competent authorities of each country in the European Union had to identify the financial institutions that are systemically important either at Union or country level by using the criteria implemented by the European Banking Authority. Each member state had to publish the list of the domestic systemically important banks as well as their respective buffer on the website of the European Banking Authority for the beginning of 2016.

Some restrictions are made to identify the banks that are used in the sample. Only the countries which had already published the list of domestic systemically important banks on the European Banking Authority website are taken into account. Moreover, a certain number of banks have missing, incomplete or confusing data for one or several years or do not base their calculations on the CRD IV framework for 2013.In order to have comparable data, they cannot be used in this analysis. Once all these restrictions are taken into account, the first group includes 12 banks, the second group 22 banks and the third group 24 banks, for a total of 58 banks.

The period between 2013 and 2015 will be used in the quantitative analysis in order to be able to make a comparison between several years. By taking this three-year period, all the data will be based on the CRD IV framework. The years before 2013 could not be taken into account because the computations of the capital ratios were based on different rules. The following variables will be researched in the annual reports of each bank which is included in the sample:

- The Common Equity Tier 1 ratio, according to the CRD IV framework, on a phase-in basis;
- The Solvency ratio, according to the CRD IV framework, on a phase-in basis;
- The amount of total assets in euros, representing the size of the bank;
- The return on assets, which corresponds to the net income divided by the total assets;
- The return on equity, which corresponds to the net income divided by the total equity capital;
- The net profit margin, the total asset turnover and the leverage multiplier, which are used in the DuPont method to analyse the return on equity. These ratios give an indication about the profitability, the operating efficiency and the leverage of the bank;
- The loans-to-deposits ratio, corresponding to the customers' loans divided by the customers' deposits and giving an assessment of the bank's liquidity;
- The cost-to-income ratio, corresponding to the operating expenses divided by the operating revenues and informing about the efficiency in the management of the expenses;
- The net interest margin, corresponding to the net interest income divided by the total assets and informing about the ability of income generation of the intermediation function;
- The earnings per share in euros and the dividend payout ratio, which give an indication about the dividend policy used by the bank.
- The GDP growth rate, which is the most important indicator of the economic health in a given country, measuring how fast the economy is growing.

Firstly, a global analysis will be conducted to compare the evolution of the variables between the different groups. The analysis is based on the following descriptive statistic tools: the mean, the median, the standard deviation, the standard error, the minimum and the maximum values. This approach gives a global idea about the behaviour of the variables in each group over time.

After the data is preliminary analysed, the hypotheses made in the previous section can be tested. A linear regression analysis will be used to show the relationship between the level of Common Equity Tier 1 capital and the different performance measures. These measures of performance include the return on equity, the return on assets, the net interest margin, the cost-to-income ratio and the loans-to-deposits ratio. Moreover, a second linear regression

analysis will be conducted. It will be focused on the determinants of the return on equity, return on assets and net interest margin. It will test the impact that other variables may have on these measures of performance. The results of these empirical tests will then be discussed and interpreted. This part aims at explaining the findings by applying the theoretical elements developed in the first part of the thesis.

Data analysis

The following analysis will use the main descriptive statistic tools to present the global behaviour of the variables used in the study. Appendix 5 presents the results of the data analysis. It is logical that the average CET1 ratio and solvency ratio become more important over time for each group. Banks progressively have to adapt their capital level to the new rules implemented by the CRD IV framework. During the three years of the analysis, the G-SII's have the lowest average CET1 ratio, followed by the important O-SII's. Similar conclusions can be made for the total solvency, where the G-SII's also have the lowest ratios. The financial institutions in this group stay close to the minimum capital requirements, while the ratios can take very different values in the other groups, especially for less important O-SII's. The groups react in different ways to the change in capital requirements. Indeed, the G-SII's, which have the highest level of assets, globally scale back the size of their balance sheet, while the important and less important O-SII's expand the balance sheet by increasing the amount of assets.

Globally, the average return on equity increases in each group between 2013 and 2015. So, while the capital ratios increase each year, the return on equity seems to increase too. The only exception is the decrease in ROE for G-SII's between 2014 and 2015, mainly due to an important decrease in the performance of one isolated case. Between groups, the G-SII's have the lowest ratios, while the important O-SII's generate the best profit with the money invested by the shareholders.

What explains the global increase of the return on equity over years? Regarding the DuPont analysis ratios, it can be noticed that there is a global decrease of the leverage ratio in each group. This evolution can be explained by the leverage restrictions implemented by the Basel III framework. Indeed, because many people believe that the use of an excessive leverage is one reason explaining the global financial crisis, banks have to reduce the level of money they borrow in order to have more assets. This decrease in leverage is compensated by an increase of the average net profit margin, meaning that the banks have a better control of the rate at which the operating income is converted into profit at the net income level of the operation. However, the standard deviation is important for this variable, showing that some banks have more difficulties to control the profitability factor than others. Finally, the total asset turnover

does not vary a lot. It globally decreases for the G-SII's and the important O-SII's, while it increases for the less important O-SII's.

The return on assets has a behaviour which is similar to the return on equity. The average ROA increases between 2013 and 2015 in each group. It means that the banks make a more efficient use of their assets to generate earnings. The analysis between groups also shows the same results as for the ROE. The G-SII's generally have the lowest ROA, while the important O-SII's have the largest values. These results are not surprising because of the link which exists between the two performance measures. Indeed, the return on equity is simply equal to the return on assets multiplied by the leverage ratio. A higher ROA would automatically result in a higher ROE if the negative impact of the leverage ratio is not too important.

It can also be interesting to analyse a few other performance measures, such as the cost-to-income ratio. This ratio globally decreases between 2013 and 2015. The decrease is very small for the G-SII's, while the change is very significant for the less important O-SII's. Indeed, the ratio decreases from 63.21% to 55.83%. Some banks defined as G-SII's also have big difficulties to control their operating costs compared to their operating income. In 2015, the average ratio of this group is high compared to the other groups (65.87%) and the standard deviation is close to 20%. Regarding the loans-to-deposits ratio, it decreases in every group, meaning that the banks have less liquidity to cover unforeseen fund requirements. The measure is very important for G-SII's and the important O-SII's, while less important O-SII's grant a lower level of loans compared to the deposits.

Between 2013 and 2015, the net interest margin globally decreases for the G-SII's and the important O-SII's. The managers of banks may be right that the higher capital requirements could have a negative effect on the lending and deposit activities. However, the less important O-SII's improve their ability to generate income thanks to their intermediation function.

Finally, an analysis of the dividend policies of the banks can be made. The average dividend payout ratio decreases for the G-SII's while it increases for the two groups of O-SII's. A lot of banks only started to distribute dividends in 2014 or 2015 because they had to adapt their capital to the new requirements implemented by the CRD IV, which can explain the increase of the average ratio. This phenomenon can especially be observed for important and less important O-SII's. During the next years, the financial institutions will probably adopt a more conservative dividend policy, because of the recommendation published by the European

Central Bank in 2015. This will enable them to meet their requirements in bad economic or financial conditions.

To summarize the main results of this part, the CET 1 ratio becomes more important between 2013 and 2015 because of the new rules implemented by the CRD IV framework. The G-SII's have the lowest solvency ratio, which stays close to the minimum capital requirements. In contradiction to the arguments claimed by the bankers against Basel III, the return on equity increases during the period of the study. This is mainly due to a better control of the net profit margin, which compensates the decrease in leverage. The G-SII's, which have the lowest CET 1 ratio, also have the lowest return on equity. The net interest margin decreases for some groups between 2013 and 2015, meaning that higher capital requirements may have a negative effect on the lending and deposit activities of the bank. Finally, the G-SII's adopt a more conservative dividend policy than before, in order to respect the new recommendation of the ECB. They still distribute a high proportion of dividends compared to the important O-SII's.

Linear regression analysis

The previous analysis based on the main descriptive statistic tools presented the global evolution of the variables used in the sample. One of the main observations is that the performance measures increase, while the proportion of capital increases too. This is in contradiction with the arguments used by the bank managers. As a matter of fact, they claim that higher capital proportions would hurt the shareholders by reducing the return on equity. The following part will empirically test the relationship between the level of capital and the performance of the financial institutions in order to see if a link really exists between the variables. This empirical study will be conducted through a linear regression analysis. A first regression will test the relationship between the level of CET1 capital and different measures of performance. A second linear regression will be focused on the impact of other variables on the return on equity, the return on assets and the net interest margin.

The regression model with multiple predictor variables can be stated in the following way:

$$y_j = \beta_0 + \beta_i * \sum_{i=1}^{n} x_i + e_i$$

Where:

y_j represents the dependent variables, which are the performance measures;

β_0 and β_i are parameter vectors of regression coefficients;

x_i represents the vector of regressors;

e_i is the error term;

i = 1,…, n represents the independent variables.

Capital requirements and performance measures

The following part analyses the relationship between the common equity tier 1 ratio and the different performance measures obtained from the linear regression with a panel data set. It follows the sample of financial institutions over time, and provides several observations on every bank in the sample. In other words, the time series and cross-sectional data are combined. The advantage of using panel data is that it enables to take a larger number of data points, decreases the collinearity between the explanatory variables and improves the efficiency of the econometric estimates (Hsiao, Analysis of Panel Data, 2003). The panel regression is conducted thanks to the "SAS for Academics" software. The Hausman test for

random effects is used in order to choose between a regression model with fixed or random effects. In this case, a model with fixed effects is the most appropriate. The assumption which is made for random effects is that they are randomly distributed, have a common mean and are not dependent of fixed explanatory variables.

Random effects have several advantages:

- The number of parameters does not change when the size of the sample increases;
- It allows the derivation of efficient estimators which make use of both between and within variation;
- It is possible to estimate the impact of time-invariant variables.

Fixed effects have the following advantages:

- The individual and time specific effects can be correlated with the explanatory variables;
- An investigator is not required to model their correlation pattern (Hsiao, 2007).

The results of the linear regression (Appendix 6) show that there is a positive relationship between the level of capital that the bank holds and the ROE. Indeed, financial institutions that have a higher proportion of capital seem to generate more profit with the money invested by the shareholders. This positive relationship is also significant. Indeed, the t-stats and the P-values reject the hypothesis that no link exists between the two variables. In other words, changes in the proportion of CET1 capital are related to changes in the response variable, which is the return on equity in this case. Finally, the results show that the R^2 value of the model is not very high and does not exceed 9%. It means that other factors have an influence on the changes in the return on equity. A more sophisticated regression model with multiple variables will be used in order to identify the other determinants of this measure of performance.

Regarding the other measures of performance, the level of common equity tier 1 capital also has a positive and significant impact on the return on assets. Banks which have a higher CET1 ratio make a more efficient use of their assets to generate earnings. As for the return on equity, another regression will be made in the following section in order to identify the other determinants of the return on assets.

There is a strong negative and significant relationship between the level of capital and the cost-to-income ratio, which is defined as the operating costs divided by the operating income. The level of CET1 capital is responsible for 9% of the variation of the cost-to-income ratio, while the other statistics prove the existence of a strong link between these variables. Moreover, the relationship between the level of capital and the loans-to-deposits ratio is also positive and significant. The higher the level of CET1 capital, the higher the proportion of loans the bank grants in comparison to its deposits. Finally, the net interest margin does not seem to be impacted at all by the level of capital.

Determinants of performance

A second regression analysis with multiple independent variables will be conducted in this section. The goal of this second regression is to determine the other variables having an impact on the following measures of performance: the return on equity, the return on assets and the net interest margin. A panel data approach will be used. Firstly, all the data will be taken into account in order to have a global view of the variables affecting the performance measures. Secondly, the analysis will be conducted for each of the three groups to identify the differences existing between them. In addition to the level of CET1 capital, the model will include the loans-to-deposits ratio, the cost-to-income ratio, the level of the total assets, the GDP growth rate and the dividend payout ratio.

Figure 5: Determinants of ROE, ROA and net interest margin

ROE

R-Square	0.7063		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.113832	0.72	0.4757
CET1	25.086	3.07	0.0028
Cost-to-income ratio	-0.54504	-3.49	0.0008
Loans-to-deposits ratio	-0.21544	-3.23	0.0018
Assets	1.45E-04	0	-
GDP Growth rate	1.776.024	1.92*	0.0581*
Dividend payout ratio	0.040996	1.25	0.2160

ROA

R-Square	0.6893		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.003219	0.30	0.7672
CET1	0.202565	3.64	0.0005
Cost-to-income ratio	-0.02566	-2.41	0.0180
Loans-to-deposits ratio	-0.01614	-3.54	0.0006
Assets	4.29E-06	0	-
GDP Growth rate	0.12448	1.97*	0.0517*
Dividend payout ratio	0.003212	1.43	0.1559

Net interest margin

R-Square	0.9623		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.043169	14.87	<0.0001
CET1	-0.03512	-2.36	0.0207
Cost-to-income ratio	-0.01013	-3.56	0.0006
Loans-to-deposits ratio	0.00263	2.16	0.0338
Assets	1.20E-05	0	-
GDP Growth rate	-0.00832	-0.49	0.6236
Dividend payout ratio	0.000602	1	0.3192

Statistical significance at the 10% level is indicated by the superscript *

Regarding the analysis of the entire data (figure 5), it can be observed that the level of CET1 capital and the GDP growth rate have a positive and significant impact on the return equity. It can also be noticed that the relationship between the loans-to-deposits ratio and the ROE is

significantly negative, meaning that the amount of liquidity of a bank has a positive influence on its performance. The cost-to-income ratio has a negative and significant effect on the ROE, while the size of the bank, which is defined by the amount of the total assets, does not have any impact on the profitability ratio. Finally, the dividend payout ratio has a positive but not significant effect on the performance measure. The variables used in this model explain approximately 70% of the variations of the return on equity. Similar conclusions can be drawn for the return on assets. The similarity between the two measures of performance seems logical, because the ROE is simply equal to the ROA multiplied by the ratio of total assets to shareholders' equity.

Regarding the analysis of the three groups (Appendix 7), it is difficult to identify a clear pattern. Indeed, only the GDP growth level and the dividend payout ratio seem to have a significant influence on the return on equity of the G-SII's. Similar observations can be made for the return on assets of this group, but the cost-to-income ratio also has a significant and negative influence on the profitability. The ROE of the important O-SII's is significantly impacted by the GDP growth rate, the cost-to-income ratio as well as the level of CET1 capital. The ROA of the important O-SII's follows a similar pattern, but the impact of the CET1 ratio is not significant. Finally, the behaviour of the less important O-SII's is clearly different. Indeed, the level of CET1 capital has a positive and significant influence on the ROE, while the cost-to-income ratio and the loans-to-deposits ratio have a negative and significant impact on this profitability measure. For this group, the other variables do not have a significant impact on the ROE. Regarding the ROA, only the CET1 ratio and the loans-to-deposits ratio seem to have a significant influence on the profitability. It can also be added that none of the performance measures are influenced by the level of the assets, meaning that the size of a bank does not have any impact on its profitability.

It can also be interesting to analyse the determinants of the net interest margin. Regarding the whole data, it can be observed that the level of CET1 capital globally has a negative and significant impact on the net interest margin. This result is different from the observations made by Demigüs-Kunt and Huizinga (1999), who concluded that well-capitalized banks have higher net interest margins. The cost-to-income ratio also has a negative and significant influence on the net interest margin, while the relationship between this measure and the loans-to-deposits ratio is positive and significant. Finally, the size of the bank, the GDP growth rate and the dividend payout ratio do not seem to have a significant impact on the net

interest margin. It is again difficult to identify a clear pattern in the analysis of the three groups. Indeed, none of the independent variables seems to have a significant impact on the net interest margin for the G-SII's. Regarding the important O-SII's, the net interest margin is negatively and significantly impacted by the CET1 ratio and the cost-to-income ratio. The same observation can be made for the less important O-SII's, but there is also a positive and significant relationship between the loans-to-deposits ratio and the net interest margin.

Additional tests

Basel III solvency ratio and performance

In the previous regressions, the level of capital was represented by the CET1 ratio. The same analysis can be conducted by replacing the CET1 ratio by the total solvency ratio in order to see whether the impact is similar.

Figure 6: Solvency ratio and performance

ROE

R-Square	0.6841		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.374642	2.91	0.0046
Solvency ratio	0.836319	1.65	0.1026
Cost-to-income ratio	-0.57021	-3.52	0.0007
Loans-to-deposits ratio	-0.20285	-2.51	0.0138
Assets	1.69E-04	0	-
GDP Growth rate	2118.733	2.23	0.0282
Dividend payout ratio	0.050167	1.48	0.1431

ROA

R-Square	0.6704		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.022158	2.54	0.0130
Solvency ratio	0.094424	2.75	0.0073
Cost-to-income ratio	-0.02669	-2.43	0.0170
Loans-to-deposits ratio	-0.01798	-3.29	0.0015
Assets	5.81E-06	0	-
GDP Growth rate	0.147857	2.30	0.0239
Dividend payout ratio	0.003718	1.62	0.1096

The results of the regression show that the relationship between the solvency ratio and the performance measures is positive, but less significant than with the level of CET1 as capital measure. This observation can especially be made for the return on equity, where the t-stat is only equal to 1.65. Thus, the total regulatory ratio has a lower significant effect on ROE. This can be explained by the fact that the solvency ratio includes other elements of capital such as hybrid instruments or long term subordinated debt. These elements have less influence on the monitoring efforts of the European banks. Indeed, only pure form of equity can capture all the gains from a better monitoring (deBandt, Camara, Pessarossi, & Rose, 2014).

Difference in the level of capital

It could also be interesting to test whether the difference in the capital level between two years has an impact on the performance measures. In other words, the following regression will test whether banks which have a higher increase in their capital between two years have a better profitability than other banks which have a lower increase in their capital. However, the CET1 ratio of 2012 is needed to compute the increase in capital between 2012 and 2013. This ratio is not available because it is not computed with the CRD IV rules and a comparison would thus not be possible. In order to solve this problem, a non risk-weighted measure of capitalization will be used in this model, which is simply the ratio of total equity to total assets.

Figure 7: Difference in the level of capital and performance

ROE

R-Square	0.7031		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.382956	3.18	0.0020
Difference in capital level	2.083.327	2.90	0.0047
Cost-to-income ratio	-0.55059	-3.51	0.0007
Loans-to-deposits ratio	-0.11075	-1.90*	0.0612*
Assets	2.09E-7	0	-
GDP Growth rate	3.084.756	3.21	0.0019
Dividend payout ratio	0.056632	1.74*	0.0862*

ROA

R-Square	0.6851		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.024915	3.03	0.0032
Difference in capital level	0.169507	3.46	0.0009
Cost-to-income ratio	-0.02608	-2.44	0.0169
Loans-to-deposits ratio	-0.00769	-1.93*	0.0572*
Assets	9.46E-9	0	-
GDP Growth rate	0.23067	3.52	0.0007
Dividend payout ratio	0.004474	2.01	0.0478

Statistical significance at the 10% level is indicated by the superscript *

The results of the regression (Figure 7) show that the difference in the level of capital has a positive and significant impact on the return on assets and the return on equity. It means that banks which have a higher increase in their capital ratio between two years have better profitability measures. Aboura and Lépinette (2015) wrote that raising equity could be costly in the short-term. Indeed, it imposes issuance costs for the bank and creates dilution costs for existing capital holders. The results show that, despite the costs of raising equiy, banks with a higher increase in their capital ratios have better performance measures. The other measures of performance have a behaviour which is similar to the previous regressions. The cost-to-income ratio and the loans-to-deposits ratio still have a negative and significant influence on the performance, while the relationship between the GDP growth rate and the profitability is positive and significant. However, unlike the previous results, the relationship between the dividend payout ratio and the performance measures is positive and significant.

Interpretation of the results

For the purpose of this study, only European banks that are considered as systemically important were taken into account. They were classified into different groups according to the degree of the impact that their failure would have on the real economy. The banks that have a higher systemic risk have to hold a higher level of supplementary capital, meaning that the regulatory capital requirements should be more important for these banks. However, the results show that it is not the case in reality. Indeed, the less important O-SII's have the highest level of CET1 capital, while the G-SII's globally hold the lowest proportion of capital. This means that the systemic risk buffer is not the only element influencing the total proportion of CET1 capital. Indeed, specific bank or country factors may also play a role. Moreover, the economic capital computed by the banks may explain the higher proportion of capital hold by the banks. The exceptional risk, which is taken into account in the internal computation of the economic capital, is larger than the risks considered in the computation of the regulatory capital.

Regarding the performance measures, the results of the data analysis show that the return on equity and the return on assets of each group become higher with an increase of the regulatory capital. The simple linear regression analysis and the multiple linear regression analysis confirm that a significant and positive relationship exists between the level of CET1 capital and the return on equity. This is true for the entire data as well as for almost each individual group, except the G-SII's. The results of the regression show that this positive and significant link is also true for the return on assets. This is in contradiction with the opinion of the bank managers and other people who claim that the higher regulatory requirements set by the CRD IV framework would hurt the shareholders by reducing the return on equity. They use several arguments to support their opinion:

- Firstly, Modigliani and Miller claim that a change in the capital structure does not have any impact on the net profit. Increasing the equity requirements would thus have a negative accounting effect on the return on equity, because the same net profit is divided by a higher capital base. However, a certain number of theorists believe that this theorem does not apply to banks, because they do not share the same characteristics as firms.

- Secondly, the cost of equity is higher than the cost of debt. Indeed, using debt to finance the activities is more interesting because it would shield some earnings of the bank from taxation.
- Thirdly, increasing the regulatory requirements would restrict the loan and deposit activities of the financial institutions.
- Finally, banks which finance their activities through debt can benefit from deposit insurance and implicit government guarantees from the central banks and the government.

However, the results of the linear regression analysis are similar to other empirical findings made by Berger (1994), deBandt, Camara, Passaroni and Rose (2014), as well as Demigüs-Kunt and Huizinga (1999). These authors concluded that banks which are well-capitalized are more profitable. The following arguments can be used to justify the positive relationship between the level of capital and the ROE:

- Firstly, banks with a higher level of capital face lower expected bankruptcy costs for their customers and for themselves, meaning that their cost of funding is reduced. In other words, well-capitalized banks can have an access to funds at more interesting conditions because they are considered as being less risky (Demigüs-Kunt & Huizinga, 1999).
- The cost-to-income ratio, which is a measure of the efficiency of the financial institution, is one of the determinants of the return on equity. The linear regression analysis showed that an increase in the level of capital has a significant and negative impact on the cost-to-income ratio. It is an indication that higher regulatory requirements are associated with a more efficient behaviour from the European banks because the operating income increases more than the operating expenses. Unlike the opinion of Modigliani and Miller, a change in the capital structure has an impact on the net profit and increases the return on equity.

  It should be added that the results of this research confirm the findings of previous studies that have been conducted. Indeed, the relationship between the cost-to-income ratio and the measures of performance is negative and significant. Thus, it is very important for a bank to control its operating expenses in order to optimise its profitability.

- Finally, deBandt, Camara, Pessarossi and Rose (2014) claim that banks which have more capital make stronger monitoring efforts. They make better lending decisions than they would do if they were less capitalized and they can extract higher payments from the borrowers. Monitoring increases the probability that a company repays its loan, which increases the return to the bank. Thus, increasing the capital ratio is consistent with the maximization of the profits.

The relationship between the total solvency ratio and the performance measures is also positive, but less significant than with the level of CET1 capital. It can be explained by the fact that other elements of capital are included in the solvency ratio, while only pure form of equity can capture all the gains from a better monitoring (deBandt, Camara, Pessarossi, & Rose, 2014). Moreover, the regression showed that the positive effect of higher capital ratios is not penalized by an important capital increase between two years. However, an increase in the capital requirements does not have a positive impact on every performance measure. Indeed, the relationship between the CET1 ratio and the net interest margin is significantly negative.

European banks have reacted in different ways in order to overcome the impact of tighter capital requirements. They took several steps to improve their operational efficiency. Indeed, they focus less on their high-risk and non-core businesses and pay more attention to their core competencies. They also reduce the level of their risk-weighted assets, merge with other banks in order to benefit from economies of scale and outsource a certain number of operations (Capgemini, 2014).

Moreover, the overall cost of funding for financial institutions has increased because of the higher capital buffers. In order to face a rising cost of credit, banks are charging a more important interest rate on lending, while they reduce the interest rates they offer on deposits. This may have a positive impact on the net interest margin. However, the data analysis showed that the net interest margin has decreased between 2013 and 2015 for the G-SII's and the important O-SII's. This decrease may be due to a reduction in the lending volumes (Capgemini, 2014).

Banks are also using a risk-based pricing approach that depends on the profile of the creditors and their usage history. Based on this pricing approach, the financial institutions have the possibility to charge a higher interest rate for loans that are considered as being risky. They can also change the terms and conditions of existing lending contracts. The goal of this strategy is to reflect the higher cost of funds and to decrease the probability of a credit default related to tougher norms (Capgemini, 2014).

Regarding the lending activities of the financial institutions, the results of the linear regression show a positive and significant relationship between the level of CET1 capital and the loans-to-deposits ratio in the panel data analysis. It means that banks which hold a higher proportion of capital grant a higher level of loans compared to their deposits and thus have less liquidity to cover their unforeseen fund requirements. However, the data analysis showed that the loans-to-deposits ratio clearly decreased in each group between 2013 and 2015. This may be due to the reactions of the banks to the stricter capital requirements. As it has been explained, the financial institutions are charging a more important interest rate on their loans in order to face the rising cost of credit. This increase in the interest rate should normally lead to a decrease in the demand for loans. Moreover, banks may be interested in reducing their risk-weighted assets in order to lower the mandatory capital level they have to hold. They can achieve this objective by cutting the overall size of the loan portfolios and focusing on less risky assets (Sutorova & Teply, 2013). These reactions of the financial institutions may explain the decreasing loans-to-deposits ratio that has been observed in the data analysis, even if a positive and significant relationship exists between this ratio and the level of capital.

It can be observed that a negative relationship exists between the loans-to-deposits ratio, the return on assets and the return on equity. It means that the amount of liquidity of a bank has a positive influence on its profitability. These findings are counterintuitive and different from the observations made by Abreu and Mendes (2002). It is expected that illiquid assets have a more important liquidity premium as well as higher returns. However, some authors such as Kosmidou, Tanna and Pasiouras (2012) found that the loans-to-deposits ratio has a negative impact on the return on equity and the return on assets, while the relationship is positive for the net interest margin. The results observed in Figure 5 are similar.

Some authors believe that the size of the bank may be an important determinant of its performance. Indeed, bigger banks may benefit from economies of scale, reducing the cost of processing and gathering information. However, the results of the regression show that the performance is not impacted at all by the size of the bank. While there is no agreement in the literature on the optimal size of financial institutions, a certain number of authors observed that beyond a relatively low level of assets, it is not interesting to reach a larger size (Gropper, Ivey, & Rutherford, 2005).

Moreover, it is not a surprise that the GDP growth level has a positive influence on banks' performance. When a recession is observed in an economy, the demand for various intermediation activities decreases. The investment activities and the demand for loans decrease, while defaults on existing loans increase (Gropper, Ivey, & Rutherford, 2005).

Finally, it may be interesting to analyse the link between the return on equity and the dividend policy chosen by the bank. The data analysis showed that the average dividend payout ratio decreased for the G-SII's, while it increased for the two groups of O-SII's. A high number of banks, especially the less important O-SII's, only decided to restart the distribution of their dividends in 2014 and 2015, because they had to adapt their capital to the new requirements. Because of the recent recommendation published by the European Central Bank, the financial institutions will probably adopt a more conservative dividend policy during the following years, in order to facilitate the respect of the requirements.

The regression analysis showed that a positive relationship exists between the dividend payout ratio and the performance measures. However, this relationship is not significant, except for G-SII's. These results may be explained by the very restrictive dividend policy chosen by the important and less important O-SII's during the period of the study. Indeed, a lot of them decided to have a payout ratio close to zero while most O-SII's paid a high proportion of dividends between 2013 and 2015. By paying only a small proportion of dividends, banks are more eased to adapt their capital level to the new regulatory requirements. The results of the regression may have been different in normal times. Because some tests (figure 5) do not show any significant relationship and other tests (figure 7) show a significant impact, different interpretations can be made. Miller and Modigliani (1961) argued that the dividend policy applied by a company does not have any impact on its performance.

In their opinion, the value of a firm is influenced by the investments made in productive assets and not by the proportion of the income which is distributed to the shareholders. However, other authors, such as Agyei and Yiadom (2011) observed a positive relationship between the dividend payout and performance. In their opinion, a higher payout ratio is a positive sign about the health of the bank, attracting more customers. Moreover, the dividend policy has an influence on the efficient behaviour of the managers as well as on the agency cost between owners and managers.

Conclusion

The financial and economic crisis of the last decade has revealed that the regulatory rules set by the Basel II framework were not sufficient to protect the financial institutions from a failure. Indeed, an excessive leverage, an inadequate amount of capital and insufficient liquidity are examples of weaknesses that amplified the severity of the crisis. Moreover, Basel II focused too much on the individual financial institutions, while it nearly ignored the interconnectedness of systemically important banks.

In order to correct these problems and avoid a similar crisis, the Basel III regulatory reform has been launched. New improvements have been made about the liquidity standards, the risk coverage, the leverage and especially the strengthening of capital. However, several authors and bankers argue that the higher proportion of capital will penalize the financial institutions by reducing their ability to provide loans to the economy and decreasing their performance.

Despite the number of studies that have been conducted during the previous years, the impact that the capital level of a bank has on its ability to generate sustainable profitability is still unclear. The goal of this thesis is to test empirically the relationship between the new regulatory capital requirements and the performance of European banks. The purpose of the results obtained by this research is to clarify whether bankers should indeed worry about the new regulations they have to adhere to. In order to test the link between the capital requirements and the performance, a sample of European banks was selected. They were classified into three groups according to their systemic risk, which is characterized by the multiplication of failures from one institution to another. A delimitation of the period between 2013 and 2015 was made in order to compare a specific space of time. By taking this three-year period into account, all the data was based on the CRD IV framework. For each bank in the sample, the level of capital and various performance indicators were identified. A first data analysis was made to determine the behaviour and evolution of the variables during the period of observation. Then, a regression analysis was conducted to test the relationship between the level of capital and the performance measures. The main determinants of profitability were also identified.

The results of the empirical study have shown that the return on assets and the return on equity have globally increased between 2013 and 2015, while the capital ratios have also increased. A positive relationship has been demonstrated between the level of capital and the

profitability measures. In other words, a financial institution which holds a higher level of capital seems to generate more profitability. This confirms previous empirical studies which have been conducted by authors such as Berger (1994) or Demigüs-Kunt and Huizinga (1999).

The positive relationship can be explained by several reasons. Banks which are well-capitalized are considered as being less risky and can have an access to funds at better conditions. Moreover, banks which have a higher capital ratio have a more efficient behaviour because their operating income increases more than their operating expenses. It can also be added that well-capitalized banks make stronger monitoring efforts and make better lending decisions. Thus, despite the high cost of equity and the deposit insurance or government guarantees which favour debt financing, the new requirements imposed by the CRD IV framework should not necessarily penalize the profitability of banks. The managers of financial institutions often claim that Basel III will hurt the shareholders. If they take good decisions and correctly adapt the core activities to the new rules, the net effect will not be negative.

However, some elements might penalize the profitability of the financial institutions in the future. Firstly, because of the higher capital buffers that are required, the overall cost of credit has increased. Banks react by charging a more important interest rate on their loans, which may decrease the lending volumes as well as the number of customers. Secondly, the results of the linear regression analysis demonstrated that a higher dividend payout ratio has a positive impact on the return on equity and the return on assets, but this impact is not significant. This may be due to the fact that a certain number of banks do not want to pay too high dividends because they need some time to adapt their capital to the new requirements. Thus, the impact may be significant in normal times. Nevertheless, banks are required to adopt a more conservative dividend policy during the next years, meaning that their profitability may be penalized.

The empirical study also highlighted another important point in the comparison between the different groups. Banks with a higher systemic importance are expected to pose greater threats to the global economy in the case of a failure. This is the reason why G-SII's are expected to hold higher CET1 ratios than less important O-SII's. The data shows that it is not the case in reality. Indeed, the G-SII's have the lowest average capital ratios for each year of the study. Moreover, it is interesting to notice that nearly all banks in the sample, especially the less

important O-SII's, hold a capital proportion that is well above the minimum requirements. However, the capital ratios are computed on the basis of the phase-in rules and are not fully loaded.

On the basis of the previous observations, several recommendations can be made for the regulators as well as for the managers of banks. A bank can decide to finance its projects through equity or debt. The main role of equity capital is to protect the financial institution from unsecured risks that may turn into losses. It is because of this loss-absorbing function that regulators ask banks to hold a certain proportion of equity. In spite of everything, equity is considered too expensive because of all the advantages that debt financing provides to banks. Indeed, using debt to finance the activities shields some earnings of the bank from taxation. Moreover, the deposit insurance and the implicit government guarantee are other examples of advantages of having a higher level of debt. Thus, contradictions between the Basel regulator requirements and the interventions of the government can be noticed. While the former requires more capital, the latter creates a certain number of incentives to debt. A solution has yet to be found in order to reconcile the ideas of both actors and reduce the disadvantages of equity financing. Governments could for instance modify their implicit guarantee policy and put more restrictions. In this case, banks would take less risks and the difference between the benefits of debt and the disadvantages of equity would be reduced. Because banks would invest less money in risky assets, their mandatory capital requirements would also decrease.

Banks can react in different ways in order to overcome the impact of the new rules. The results of the empirical study have highlighted that the operating efficiency has an important influence on the profitability measures and banks should take some actions to optimize their operating costs. A lot of them have already improved their operational efficiency by outsourcing a certain number of operations, reducing the level of risk-weighted assets in their portfolio or merging with other banks. The financial institutions also adapt their pricing approach to the profile of the customers and their usage history. Thus, customers who are considered as being risky have to pay higher interest rates. Because the cost of credit has increased, banks reduce the interest rates they offer on deposits, while they charge a higher interest rate on loans.

This thesis gives a good idea about the effects that Basel III has on the performance of European banks. However, the framework is still new and all the rules and constraints have

not been implemented yet (Appendix 1), meaning that the observations may evolve in another direction during the following years. The research was also limited by the fact that only the period between 2013 and 2015 could be taken into account. Before this period, the regulatory capital ratios were computed on the basis of old rules, making the comparison between the years difficult. Moreover, each country in the European Union was required to publish the list of the other systemically important institutions for the beginning of 2016. Some countries did not meet this deadline, meaning that a certain number of banks could not be included in the sample.

It could be interesting to conduct a similar research in the future, when all the constraints will have been implemented. By doing this, a higher number of years can be taken into account in the sample. The banks will have had the time to react to the new requirements and find solutions against the negative sides of the CRD IV framework. Maybe the performance measures will evolve in another direction in the future. The banks that were considered in the sample are situated in the European Union. It could also be interesting to conduct the same research for financial institutions situated in the United States or Asia. It would be an opportunity to test whether the conclusions of this study also apply to other regions in the world.

Appendix

Appendix 1: The Basel III Timeline

Basel Committee on Banking Supervision

BANK FOR INTERNATIONAL SETTLEMENTS

Basel III phase-in arrangements

(All dates are as of 1 January)

	Phases	2013	2014	2015	2016	2017	2018	2019
Capital	Leverage Ratio		Parallel run 1 Jan 2013 – 1 Jan 2017 Disclosure starts 1 Jan 2015				Migration to Pillar 1	
	Minimum Common Equity Capital Ratio	3.5%	4.0%	4.5%				**4.5%**
	Capital Conservation Buffer				0.625%	1.25%	1.875%	**2.5%**
	Minimum common equity plus capital conservation buffer	3.5%	4.0%	4.5%	5.125%	5.75%	6.375%	**7.0%**
	Phase-in of deductions from CET1*		20%	40%	60%	80%	100%	**100%**
	Minimum Tier 1 Capital	4.5%	5.5%	6.0%				**6.0%**
	Minimum Total Capital		8.0%					**8.0%**
	Minimum Total Capital plus conservation buffer		8.0%		8.625%	9.25%	9.875%	**10.5%**
	Capital instruments that no longer qualify as non-core Tier 1 capital or Tier 2 capital		Phased out over 10 year horizon beginning 2013					
Liquidity	Liquidity coverage ratio – minimum requirement			60%	70%	80%	90%	**100%**
	Net stable funding ratio						Introduce minimum standard	

* Including amounts exceeding the limit for deferred tax assets (DTAs), mortgage servicing rights (MSRs) and financials.

– – transition periods

Appendix 2: Data 2013

G-SII's							
	Country	Systemic buffer	GDP	ROA	ROE	CET1	Solvency ratio
HSBC	UK	2,50%	2,20%	0,61%	8,91%	10,80%	14,90%
Barclays	UK	2%	2,20%	0,10%	2,03%	9,10%	15,00%
BNP Paribas	FR	2%	0,66%	0,30%	6,35%	10,70%	12,50%
Deutsche Bank	GER	2%	0,41%	0,04%	1,24%	12,80%	18,50%
Groupe BPCE	FR	1%	0,66%	0,24%	5,20%	10,30%	13,10%
Groupe Crédit Agricole	FR	1%	0,66%	0,16%	5,92%	10%	15,80%
ING Bank	NE	1%	-1,06%	0,30%	7,03%	11,70%	16,50%
Nordea	SU	1%	1,24%	0,49%	10,67%	15%	18,10%
Santander	SP	1%	-1,67%	0,36%	5,42%	11,71%	14,59%
Société Générale	FR	1%	0,66%	0,18%	4,26%	10,00%	13,30%
Standard Chartered	UK	1%	2,20%	0,61%	8,84%	10,90%	17%
Unicredit Group	IT	1%	-1,75%	-1,65%	-29,81%	10,57%	13,61%
O-SII's (important)							
ABN Amro Bank	NE	2,00%	-1,06%	0,31%	8,57%	13,90%	19,00%
Cooperatieve Centrale Raiffeisen- Boerenleenbank	NE	2,00%	-1,06%	0,30%	5,03%	12,80%	18,80%
Svenska Handelsbanken AB	SU	2,00%	1,24%	0,57%	12,84%	18,90%	21,60%
Swedbank AB	SU	2,00%	1,24%	0,71%	11,78%	18,30%	20,60%
Skandinavska Enskilda Banken AB	SU	2,00%	1,24%	0,59%	12,03%	15%	18,10%
Nordea Bank Finaland Plc	FIN	2,00%	-0,76%	0,27%	8,71%	16%	16,80%
Bank of Valletta Group (BOV)	MALTA	2,00%	2,90%	1,09%	13,72%	11,70%	16,50%
AB DNB bankas	LITU	2,00%	3,55%	0,38%	3,18%	16,66%	16,67%
VUB	SLOVAK	2,00%	1,43%	1,17%	9,79%	15,93%	16,76%
Raiffeisen Zentralbank AU	AUSTRIA	2,00%	0,32%	0,29%	3,58%	9,80%	13,10%
Raiffeisen Bank International	AUSTRIA	2,00%	0,32%	0,43%	5,37%	10,70%	15,90%
Unicredit Bank Austria	AUSTRIA	2,00%	0,32%	-0,87%	-10,25%	11,30%	13,50%
Bank of Cyprus Plc	CH	2,00%	-5,94%	-6,77%	-77,21%	10,40%	10,60%
BNP Paribas Fortis	BE	1,50%	0,02%	0,24%	3,42%	14,80%	17,40%
KBC Group	BE	1,50%	0,02%	0,42%	6,99%	12,80%	17,80%
ING Belgique	BE	1,50%	0,02%	0,68%	9,67%	17,70%	20,86%
Belfius	BE	1,50%	0,02%	0,24%	6,74%	11,50%	12,50%
Bank of Ireland	IRL	1,50%	1,43%	-0,49%	-6,59%	12,30%	14,10%
Allied Irish Bank Plc	IRL	1,50%	1,43%	0,85%	7,91%	16,40%	18,10%
Tatra Bank	SLOVAK	1,50%	1,43%	1,03%	9,59%	15,44%	16,60%
Hellenic Bank Plc	CH	1,50%	-5,94%	-2,97%	-48,14%	7,30%	14,30%
Commerzbank AG	GER	1,50%	0,41%	0,01%	0,31%	13,06%	13,50%
O-SII's (less important)							
SNS Bank	NE	1,00%	-1,06%	-1,81%	-52,36%	15%	15,10%
Alpha Bank	GR	1,00%	-3,20%	3,96%	34,92%	16,10%	16,40%
Caixa Geral de Depositos	PORT	1,00%	-1,13%	-1,16%	-22,15%	10,90%	12,40%
Banca Commercial Português	PORT	0,75%	-1,13%	-0,90%	-28,66%	11,90%	12,60%
BBVA	SP	0,50%	-1,67%	0,36%	4,53%	11,60%	14,90%
Banque et Caisse d'Epargne d l'Etat Luxembourg	LU	0,50%	4,35%	0,51%	6,30%	16,60%	24,80%
BGL BNP Paribas SA	LU	0,50%	4,35%	0,84%	5,91%	25,70%	25,70%
Banque Internationale à Luxembourg SA	LU	0,50%	4,35%	0,58%	9,83%	14,93%	20,77%
Danske Bank Plc	FIN	0,50%	-0,76%	0,54%	6,10%	15,30%	16,70%
Munifin	FIN	0,50%	-0,76%	0,48%	26,52%	28,30%	32,52%
Unicredit Banka	SL	0,50%	-1,06%	-1,58%	-17,21%	15,60%	16,90%
AB Siauliu Bankas	LITU	0,50%	3,55%	0,35%	5,69%	9,49%	11,60%
Groupe Crédit Mutuel	FR	0,50%	0,66%	0,40%	6,58%	14,00%	16,90%
Banco BPI	PORT	0,50%	-1,13%	0,16%	3,49%	15,60%	15,60%
La Banque Postale	FR	0,25%	0,66%	0,29%	8,03%	10,10%	12,90%
Caixabank	SP	0,25%	-1,67%	0,19%	2,86%	11,80%	14,60%
Bankia	SP	0,25%	-1,67%	0,03%	0,63%	10,40%	10,80%
SKB	SL	0,25%	-1,06%	-1,21%	-11,33%	13,49%	13,49%
Banca Koper	SL	0,25%	-1,06%	0,11%	0,95%	14,64%	14,64%
Intesa Sanpaolo	IT	0,00%	-1,75%	-0,73%	-10,22%	11,30%	14,80%
Monte dei Paschi di Siena Bank	IT	0,00%	-1,75%	-0,72%	-23,33%	10,40%	14,70%
Banco Popular	SP	0,00%	-1,67%	0,17%	2,20%	11,18%	11,61%
Lloyds Banking Group Plc	UK	0,00%	2,20%	-0,10%	-2,15%	10,30%	18,80%
Santander UK Plc	UK	0,00%	2,20%	0,33%	7,07%	11,60%	17,10%

G-SII's						
	Assets (in millions €)	Loans-to-deposits	Cost-to-income	Net interest margin	EPS	Dividend payout ratio
HSBC	1939136,449	72,87%	49,22%	1,33%	0,84	57,10%
Barclays	1579024,636	100,52%	79,00%	0,88%	16,7	38,90%
BNP Paribas	1800139	111,50%	63,25%	1,14%	3,69	40,80%
Deutsche Bank	1611000	71,36%	89,00%	0,92%	0,67	112%
Groupe BPCE	1123500	126,24%	70,69%	2,03%	-19,4	0
Groupe Crédit Agricole	1536900	133,00%	66,25%	0,84%	1,01	35%
ING Bank	1081000	112,09%	84,38%	1,08%	0,71	0
Nordea	630434	170,59%	51,00%	0,88%	0,77	55,84%
Santander	1214199	116,32%	49,92%	2,14%	0,4	150,00%
Société Générale	1235262	93,96%	67,79%	0,82%	2,4	41,67%
Standard Chartered	489539,1858	98,09%	54,28%	1,65%	1,64	52,44%
Unicredit Group	845838	127,99%	74,54%	1,49%	-2,47	0
O-SII's (important)						
ABN Amro Bank	372022	96,42%	78,55%	1,45%	na	na
Cooperatieve Centrale Raiffeisen- Boerenleenbank	674139	139,75%	75,00%	1,35%	na	na
Svenska Handelsbanken AB	281124	205,57%	46,97%	1,07%	22,52	51,07%
Swedbank AB	205587	203,82%	45,07%	1,21%	11,76	85,88%
Skandinavska Enskilda Banken AB	280563	153,34%	53,64%	0,76%	6,74	59,35%
Nordea Bank Finaland Plc	304761	140,63%	47,62%	0,39%	na	na
Bank of Valletta Group (BOV)	7257	58,96%	37,86%	1,81%	0,26	73,08%
AB DNB bankas	11974	142,53%	79,77%	1,78%	7,98	0
VUB	11556	96,63%	49,97%	3,57%	33,12	0,196256039
Raiffeisen Zentralbank AU	147324	119,74%	57,40%	2,67%	62,29	0,577941885
Raiffeisen Bank International	130640	121,37%	58,30%	2,85%	1,83	0,557377049
Unicredit Bank Austria	177503	118,28%	49,90%	1,95%	-6,94	0
Bank of Cyprus Plc	30349	145,37%	56,65%	2,90%	-0,14	0
BNP Paribas Fortis	261463	101,76%	63,45%	1,70%	1,32	0,606060606
KBC Group	241306	74,70%	51,50%	1,71%	1,03	0
ING Belgique	143470	78,89%	55,86%	1,91%	na	na
Belfius	182777	142,35%	77,64%	1,05%	1,24	0
Bank of Ireland	100036	114,41%	62,76%	2,00%	0,023	0
Allied Irish Bank Plc	107455	100,07%	64,69%	1,57%	0,2	0
Tatra Bank	9468	93,86%	55,83%	3,12%	na	na
Hellenic Bank Plc	6383	64,63%	53,63%	2,93%	-10,6	0
Commerzbank AG	549654	88,95%	73,30%	1,12%	0,09	0
O-SII's (less important)						
SNS Bank	74537	121,64%	72,29%	1,28%	na	na
Alpha Bank	73697	88,14%	60,84%	2,25%	0,44	0
Caixa Geral de Depositos	93835	102,45%	95,55%	0,47%	-0,92	0
Banca Commercial Português	82007	116,02%	74,28%	1,03%	-0,02	0
BBVA	582697	107,69%	86,57%	2,39%	0,04	41,00%
Banque et Caisse d'Epargne d l'Etat Luxembourg	40663	67,71%	46,24%	0,96%	na	na
BGL BNP Paribas SA	40225	132,89%	52,19%	2,70%	12,04	43,02%
Banque Internationale à Luxembourg SA	19690	80,52%	67,52%	1,26%	56,56	na
Danske Bank Plc	26680	138,39%	68,31%	1,19%	1371	0,347028999
Munifin	26156	1924,87%	15,07%	0,57%	3,192	0
Unicredit Banka	2488	148,51%	56,70%	1,94%	-8,02	0
AB Siauliu Bankas	1544,4368	16,07%	62,98%	2,05%	0,07	2,07%
Groupe Crédit Mutuel	659959	118,95%	63,28%	1,15%	na	na
Banco BPI	42820	101,31%	62,08%	1,04%	0,048	0,00%
La Banque Postale	201376	35,48%	80,91%	1,64%	19,39	45,28%
Caixabank	324886	118,31%	70,62%	1,03%	0,09	55,56%
Bankia	246352	109,74%	99,99%	0,90%	0,034	0
SKB	2538	119,70%	57,60%	2,54%	-2,43	0
Banca Koper	2299	104,36%	62,93%	1,92%	4,76	na
Intesa Sanpaolo	624179	150,19%	51,07%	1,53%	-0,28	-17,86%
Monte dei Paschi di Siena Bank	198460	153,13%	71,00%	1,07%	-0,12	0,00%
Banco Popular	146709	82,90%	44,28%	1,64%	0,148	21,35%
Lloyds Banking Group Plc	611492,0658	112,17%	40,34%	0,87%	-0,87	0,00%
Santander UK Plc	196203,3103	125,43%	54,48%	1,10%	na	48,00%

G-SII's			
	Net income/ Operating income	Operating income/ Total assets	Total assets/ Total equity
HSBC	20,68%	2,93%	14,68798214
Barclays	4,64%	2,13%	20,52052417
BNP Paribas	14,01%	2,16%	21,01591249
Deutsche Bank	2,13%	1,98%	29,45155393
Groupe BPCE	11,69%	2,03%	21,9005848
Groupe Crédit Agricole	15,64%	1,04%	36,33848773
ING Bank	12,29%	2,43%	23,5000000
Nordea	31,50%	1,57%	21,58355301
Santander	10,99%	3,27%	15,06487754
Société Générale	9,53%	1,85%	24,22082353
Standard Chartered	21,78%	2,78%	14,58245037
Unicredit Group	-57,23%	2,88%	18,05764181
O-SII's (important)			
ABN Amro Bank	15,87%	1,97%	27,44537071
Cooperatieve Centrale Raiffeisen- Boerenleenbank	15,45%	1,93%	16,83789994
Svenska Handelsbanken AB	39,35%	1,46%	22,36238874
Swedbank AB	34,93%	2,03%	16,62230236
Skandinavska Enskilda Banken AB	35,56%	1,67%	20,23249792
Nordea Bank Finaland Plc	37,28%	0,73%	32,03289889
Bank of Valletta Group (BOV)	36,24%	3,01%	12,59310065
AB DNB bankas	12,12%	3,14%	8,358075472
VUB	25,45%	4,59%	8,377928924
Raiffeisen Zentralbank AU	7,01%	4,09%	12,49779437
Raiffeisen Bank International	9,72%	4,39%	12,60517175
Unicredit Bank Austria	-23,71%	3,66%	11,79421927
Bank of Cyprus Plc	-196,75%	3,44%	11,39654525
BNP Paribas Fortis	9,79%	2,49%	14,0119507
KBC Group	13,50%	3,12%	16,62574066
ING Belgique	27,79%	2,44%	14,23737223
Belfius	24,26%	1,00%	27,67252082
Bank of Ireland	-19,33%	2,52%	13,54400217
Allied Irish Bank Plc	36,14%	2,36%	9,285776011
Tatra Bank	20,85%	4,92%	9,347574345
Hellenic Bank Plc	-68,00%	4,37%	16,18286741
Commerzbank AG	11,08%	0,13%	21,15437017
O-SII's (less important)			
SNS Bank	-129,63%	1,40%	28,86793184
Alpha Bank	124,66%	3,18%	8,807002868
Caixa Geral de Depositos	-105,42%	1,10%	19,06440471
Banca Commercial Português	-42,46%	2,13%	31,74621043
BBVA	7,49%	4,77%	12,66044541
Banque et Caisse d'Epargne d l'Etat Luxembourg	34,28%	1,00%	12,29920471
BGL BNP Paribas SA	24,92%	3,36%	7,055073226
Banque Internationale à Luxembourg SA	22,57%	2,56%	16,97413793
Danske Bank Plc	23,37%	2,33%	11,19405052
Munifin	74,97%	0,64%	55,63380857
Unicredit Banka	-52,68%	2,99%	10,92838416
AB Siauliu Bankas	8,97%	3,85%	16,47867848
Groupe Crédit Mutuel	17,45%	2,30%	16,38387826
Banco BPI	6,40%	2,45%	22,29047371
La Banque Postale	10,33%	2,77%	28,07966412
Caixabank	10,81%	1,76%	15,02885862
Bankia	1,83%	1,50%	22,77845558
SKB	-31,14%	3,89%	9,351777215
Banca Koper	3,68%	2,98%	8,618189858
Intesa Sanpaolo	-28,00%	2,60%	14,02019317
Monte dei Paschi di Siena Bank	-36,18%	2,00%	32,28566781
Banco Popular	7,07%	2,42%	12,84217437
Lloyds Banking Group Plc	-2,21%	4,51%	21,60558106
Santander UK Plc	22,09%	1,49%	21,46830818

Appendix 3: Data 2014

G-SII's							
	Country	Systemic buffer	GDP	ROA	ROE	CET1	Solvency ratio (CRD IV)
HSBC	UK	2,50%	2,90%	0,52%	7,19%	11%	16%
Barclays	UK	2%	2,90%	0,06%	1,28%	10,20%	16,50%
BNP Paribas	FR	2%	0,18%	0,02%	0,61%	10,30%	12,60%
Deutsche Bank	GER	2%	1,58%	0,10%	2,47%	15,20%	17,20%
Groupe BPCE	FR	1%	0,18%	0,24%	5,26%	11,90%	15,40%
Groupe Crédit Agricole	FR	1%	0,18%	0,15%	4,67%	10,40%	19,60%
ING Bank	NE	1%	-0,49%	0,13%	2,48%	13,49%	14,58%
Nordea	SU	1%	2,27%	0,50%	11,17%	15,70%	20,70%
Santander	SP	1%	1,36%	0,48%	7,05%	12,20%	13,30%
Société Générale	FR	1%	0,18%	0,21%	4,88%	10,10%	14,30%
Standard Chartered	UK	1%	2,90%	0,36%	5,63%	10,50%	16,70%
Unicredit Group	IT	1%	-0,34%	0,24%	4,07%	10,26%	13,41%
O-SII's (important)							
ABN Amro Bank	NE	2,00%	-0,49%	0,30%	8,37%	14,10%	19,70%
Cooperatieve Centrale Raiffeisen- Boerenleenbank	NE	2,00%	-0,49%	0,27%	4,74%	13,60%	21,30%
Svenska Handelsbanken AB	SU	2,00%	2,27%	0,54%	11,97%	20,40%	25,60%
Swedbank AB	SU	2,00%	2,27%	0,78%	14,03%	21,20%	25,50%
Skandinavska Enskilda Banken AB	SU	2,00%	2,27%	0,73%	14,28%	16,30%	22,20%
Nordea Bank Finland Plc	FIN	2,00%	-0,70%	0,26%	9,38%	14,20%	15,20%
Bank of Valletta Group (BOV)	MALTA	2,00%	3,70%	0,83%	11,24%	11,70%	14,50%
AB DNB bankas	LITU	2,00%	3,03%	0,43%	3,80%	16,70%	16,70%
VUB	SLOVAK	2,00%	2,52%	1,25%	10,21%	16,03%	16,06%
Raiffeisen Zentralbank	AUSTRIA	2,00%	0,35%	-0,28%	-4,33%	10,20%	15,00%
Reiffeisen Bank International	AUSTRIA	2,00%	0,35%	-0,51%	-7,54%	10,80%	16,00%
Unicredit Bank Austria	AUSTRIA	2,00%	0,35%	0,70%	8,90%	10,30%	13,40%
Bank of Cyprus Plc	CH	2,00%	-2,50%	-0,97%	-7,53%	14,00%	14,20%
BNP Paribas Fortis	BE	1,50%	1,35%	0,45%	6,15%	14,50%	16,60%
KBC Group	BE	1,50%	1,35%	0,72%	10,67%	14,40%	18,90%
ING Belgique	BE	1,50%	1,35%	0,70%	10,64%	15,24%	16,72%
Belfius	BE	1,50%	1,35%	0,24%	5,83%	13,20%	14,30%
Bank of Ireland	IRL	1,50%	5,20%	0,61%	8,98%	14,80%	18,30%
Allied Irish Bank Plc	IRL	1,50%	5,20%	0,85%	7,91%	16,40%	18,10%
Tatra Bank	SLOVAK	1,50%	2,52%	1,18%	11,50%	15,21%	19,57%
Hellenic Bank Plc	CH	1,50%	-2,50%	-1,64%	-21,19%	13,40%	18,23%
Commerzbank AG	GER	1,50%	1,58%	0,05%	0,99%	11,70%	14,60%
O-SII's (less important)							
SNS Bank	NE	1,00%	-0,49%	0,22%	5,10%	18,30%	18,40%
Alpha Bank	GR	1,00%	0,65%	-0,45%	-4,31%	14,70%	14,90%
Caixa Geral de Depositos	PORT	1,00%	0,91%	-1,25%	-30,16%	10,93%	12,70%
Banca Commercial Português	PORT	0,75%	0,91%	-0,30%	-5,38%	11,70%	13,40%
BBVA	SP	0,50%	1,36%	0,41%	5,29%	11,90%	15,10%
Banque et Caisse d'Epargne d l'Etat Luxembourg	LU	0,50%	4,07%	0,53%	5,93%	18,30%	19,20%
BGL BNP Paribas SA	LU	0,50%	4,07%	0,83%	5,63%	22,40%	22,80%
Banque Internationale à Luxembourg SA	LU	0,50%	4,07%	0,60%	9,93%	15,28%	19,56%
Danske Bank Plc	FIN	0,50%	-0,70%	0,57%	6,76%	13,90%	14,50%
Munifin	FIN	0,50%	-0,70%	0,38%	19,37%	29,94%	33,53%
Unicredit Banka	SL	0,50%	3,05%	0,02%	0,25%	17,50%	19,70%
AB Siauliu Bankas	LITU	0,50%	3,03%	0,72%	11,04%	9,31%	11,35%
Groupe Crédit Mutuel	FR	0,50%	0,18%	0,42%	6,73%	15,30%	18,30%
Banco BPI	PORT	0,50%	0,91%	-0,38%	-7,77%	10,20%	10,20%
La Banque Postale	FR	0,25%	0,18%	0,32%	8,05%	12,70%	17%
Caixabank	SP	0,25%	1,36%	0,30%	4,18%	13%	16,10%
Bankia	SP	0,25%	1,36%	0,34%	7,16%	11,60%	13,20%
SKB	SL	0,25%	3,05%	1,34%	10,35%	16,39%	16,39%
Banca Koper	SL	0,25%	3,05%	0,29%	2,36%	16,27%	16,27%
Intesa Sanpaolo	IT	0,00%	-0,34%	0,19%	2,80%	13,50%	17,20%
Monte dei Paschi di Siena Bank	IT	0,00%	-0,34%	-2,97%	-92,60%	8,70%	13,00%
Banco Popular	SP	0,00%	1,36%	0,20%	2,61%	11,51%	11,96%
Lloyds Banking Group Plc	UK	0,00%	2,90%	0,17%	2,90%	12,80%	22,00%
Santander UK Plc	UK	0,00%	2,90%	0,40%	7,82%	11,90%	17,90%

G-SII's						
	Assets (in millions €)	Loans-to-deposits	Cost-to-income	Net interest margin	EPS	Dividend payout ratio
HSBC	2176799,787	72,19%	55,30%	1,32%	0,69	71,00%
Barclays	1748018,815	100,01%	80,79%	0,89%	17,3	38,00%
BNP Paribas	2077759	102,47%	63,73%	0,98%	4,7	0,00%
Deutsche Bank	1709000	76,11%	86,70%	0,84%	1,34	55,97%
Groupe BPCE	1223300	129,02%	70,22%	1,90%	36,81	0,152675903
Groupe Crédit Agricole	1589100	139,17%	66,02%	0,71%	0,83	43,00%
ING Bank	993000	106,95%	76,18%	1,24%	0,13	92,31%
Nordea	669342	176,47%	49,00%	0,82%	0,83	74,70%
Santander	1203260	118,70%	47,02%	2,46%	0,479	41,75%
Société Générale	1308200	94,36%	67,98%	1,80%	2,92	41,10%
Standard Chartered	599880,8113	70,23%	60,24%	1,52%	1,46	58,90%
Unicredit Group	844217	114,66%	66,25%	1,43%	0,344	34,70%
O-SII's (important)						
ABN Amro Bank	372022	103,44%	66,27%	1,62%	na	na
Cooperatieve Centrale Raiffeisen- Boerenleenbank	681086	141,53%	62,65%	1,34%	na	na
Svenska Handelsbanken AB	297441	176,85%	45,22%	0,97%	23,89	52,32%
Swedbank AB	224009	207,56%	44,78%	1,07%	14,93	76,02%
Skandinavska Enskilda Banken AB	278916	143,75%	47,18%	0,76%	8,79	63,00%
Nordea Bank Finland Plc	346198	147,96%	47,59%	0,34%	na	na
Bank of Valletta Group (BOV)	8296	54,24%	41,08%	1,52%	0,2	67,50%
AB DNB bankas	13001	130,33%	74,60%	1,75%	9,9	0,00%
VUB	11698	105,38%	50,13%	3,60%	35,74	19,31%
Raiffeisen Zentralbank	144805	116,73%	57,50%	2,78%	-58,84	0,00%
Reiffeisen Bank International	121500	117,90%	56,50%	3,12%	-2,17	0,00%
Unicredit Bank Austria	189118	111,21%	52,40%	1,86%	5,98	na
Bank of Cyprus Plc	26789	143,93%	33,48%	3,61%	0,026	0,00%
BNP Paribas Fortis	275206	99,43%	61,23%	1,84%	2,58	1
KBC Group	245174	76,99%	56,82%	1,76%	3,32	60,24%
ING Belgique	151809	92,94%	52,84%	1,81%	na	na
Belfius	194407	131,04%	69,87%	1,06%	1,28	0,00%
Bank of Ireland	129800	109,73%	57,37%	1,79%	0,02	0,00%
Allied Irish Bank Plc	107455	98,98%	64,69%	1,57%	0,2	0,00%
Tatra Bank	9681	98,15%	49,94%	3,15%	na	124%
Hellenic Bank Plc	7529	50,76%	46,88%	2,71%	-167,1	0,00%
Commerzbank AG	558300	93,62%	79,10%	0,96%	0,23	0,00%
O-SII's (less important)						
SNS Bank	68159	114,34%	77,16%	1,50%	na	na
Alpha Bank	72935	115,52%	65,84%	2,63%	-1,34	0,00%
Caixa Geral de Depositos	90857	89,38%	84,57%	0,61%	-0,97	0,00%
Banca Commercial Português	76360	107,77%	51,99%	1,46%	-0,005	0,00%
BBVA	631942	106,14%	82,97%	2,28%	0,41	16,00%
Banque et Caisse d'Epargne d l'Etat Luxembourg	41156	72,90%	47,76%	0,92%	na	na
BGL BNP Paribas SA	41097	124,22%	47,60%	2,66%	12,23	51,09%
Banque Internationale à Luxembourg SA	20285	80,62%	64,08%	1,31%	60,73	81,61%
Danske Bank Plc	29692	122,04%	61,81%	1,06%	1595	0,901879294
Munifin	30009	2008,00%	15,00%	0,53%	2,945	36,71%
Unicredit Banka	2578	127,41%	52,67%	1,89%	0,12	0,00%
AB Siauliu Bankas	1640	50,88%	52,38%	2,43%	0,04	0,00%
Groupe Crédit Mutuel	706720	119,52%	63,98%	1,02%	na	na
Banco BPI	42628	89,81%	78,30%	1,14%	-0,116	0,00%
La Banque Postale	212833	40,41%	78,73%	1,52%	19,25	44,99%
Caixabank	313177	104,75%	42,17%	1,14%	0,11	45,45%
Bankia	230687	105,51%	69,71%	1,17%	0,067	26,05%
SKB	2640	103,01%	51,65%	2,59%	2,79	49,10%
Banca Koper	2288	88,81%	58,62%	1,98%	12,49	30,42%
Intesa Sanpaolo	646427	146,97%	51,10%	1,52%	0,08	87,50%
Monte dei Paschi di Siena Bank	179917	128,48%	66,40%	1,19%	-1,985	0,00%
Banco Popular	161456	75,81%	44,54%	1,44%	0,159	8,81%
Lloyds Banking Group Plc	706468,9565	107,97%	46,45%	1,25%	1,405	44,12%
Santander UK Plc	228061,8733	122,84%	53,62%	1,24%	na	46,00%

G-SII's			
	Net income/ Operating income	Operating income/ Total assets	Total assets/ Total equity capital
HSBC	18,35%	2,83%	13,8313494
Barclays	3,28%	1,89%	20,58743443
BNP Paribas	1,29%	1,89%	24,93739723
Deutsche Bank	5,29%	1,87%	24,98538012
Groupe BPCE	12,50%	1,90%	22,12115732
Groupe Crédit Agricole	14,76%	1,00%	31,74200507
ING Bank	8,04%	1,57%	19,69300333
Nordea	32,59%	1,53%	22,43328753
Santander	13,65%	3,54%	14,5770186
Société Générale	11,43%	1,80%	23,69927536
Standard Chartered	14,25%	2,53%	15,63391626
Unicredit Group	9,41%	2,53%	17,09287305
O-SII's (important)			
ABN Amro Bank	14,08%	2,17%	27,44537071
Cooperatieve Centrale Raiffeisen- Boerenleenbank	14,33%	1,89%	17,52169998
Svenska Handelsbanken AB	39,63%	1,36%	22,20880412
Swedbank AB	41,85%	1,85%	18,09934046
Skandinavska Enskilda Banken AB	40,95%	1,78%	19,63124057
Nordea Bank Finland Plc	39,60%	0,66%	35,99480141
Bank of Valletta Group (BOV)	32,86%	2,53%	13,52659003
AB DNB bankas	14,79%	2,94%	8,730285313
VUB	26,81%	4,65%	8,191707991
Raiffeisen Zentralbank	-6,96%	3,96%	15,72770718
Reiffeisen Bank International	-11,53%	4,40%	14,85693324
Unicredit Bank Austria	22,22%	3,16%	12,67122278
Bank of Cyprus Plc	-18,91%	5,15%	7,731313131
BNP Paribas Fortis	17,77%	2,55%	13,58773576
KBC Group	26,22%	2,74%	14,84014285
ING Belgique	30,37%	2,31%	15,18697479
Belfius	22,31%	1,07%	24,53704405
Bank of Ireland	26,45%	2,29%	14,82920142
Allied Irish Bank Plc	36,14%	2,36%	9,285776011
Tatra Bank	23,59%	5,02%	9,708173891
Hellenic Bank Plc	-42,90%	3,82%	12,9464216
Commerzbank AG	38,61%	0,12%	20,67777778
O-SII's (less important)			
SNS Bank	13,74%	1,61%	23,00337496
Alpha Bank	-13,97%	3,24%	9,531779498
Caixa Geral de Depositos	-101,61%	1,23%	24,05533492
Banca Commercial Português	-10,25%	2,90%	18,1270655
BBVA	9,52%	4,35%	12,78044736
Banque et Caisse d'Epargne d l'Etat Luxembourg	36,49%	1,46%	11,16085185
BGL BNP Paribas SA	25,42%	3,28%	6,754787068
Banque Internationale à Luxembourg SA	23,06%	2,61%	16,50528885
Danske Bank Plc	28,02%	2,03%	11,86675193
Munifin	65,59%	0,58%	50,53552646
Unicredit Banka	0,74%	3,14%	10,56853046
AB Siauliu Bankas	15,39%	4,67%	15,38296815
Groupe Crédit Mutuel	19,17%	2,18%	16,08448268
Banco BPI	-19,14%	2,01%	20,2028436
La Banque Postale	11,94%	2,67%	25,29579277
Caixabank	12,56%	2,38%	13,99792331
Bankia	18,23%	1,84%	21,33703938
SKB	33,92%	3,94%	7,742268857
Banca Koper	8,91%	3,25%	8,164386005
Intesa Sanpaolo	7,43%	2,60%	14,46695611
Monte dei Paschi di Siena Bank	-130,07%	2,31%	31,18686081
Banco Popular	8,51%	2,40%	12,76332016
Lloyds Banking Group Plc	4,72%	3,50%	17,55793797
Santander UK Plc	24,83%	1,62%	19,44458536

Appendix 4: Data 2015

G-SII's							
	Country	Systemic buffer	GDP	ROA	ROE	CET1	Solvency ratio
HSBC	UK	2,50%	2,30%	0,56%	7,17%	11,90%	17,20%
Barclays	UK	2%	2,30%	0,33%	6,21%	11,40%	18,60%
BNP Paribas	FR	2%	1,14%	0,34%	6,95%	11%	13,60%
Deutsche Bank	GER	2%	1,45%	-0,42%	-10,84%	13,20%	16,20%
Groupe BPCE	FR	1%	1,14%	0,28%	5,63%	13%	16,80%
Groupe Crédit Agricole	FR	1%	1,14%	0,26%	4,08%	10,80%	20,30%
ING Bank	NE	1%	1,01%	0,48%	8,38%	12,94%	16,92%
Nordea	SU	1%	4,09%	0,57%	11,80%	16,50%	21,60%
Santander	SP	1%	3,21%	0,45%	5,83%	12,55%	14,40%
Société Générale	FR	1%	1,14%	0,09%	3,17%	10,90%	16,30%
Standard Chartered	UK	1%	2,30%	-0,34%	-4,55%	12,60%	19,50%
Unicredit Group	IT	1%	0,76%	0,20%	3,38%	10,68%	14,23%
O-SII's (important)							
ABN Amro Bank	NE	2,00%	1,01%	0,49%	11,58%	15,50%	21,70%
Cooperatieve Centrale Raiffeisen- Boerenleenbank	NE	2,00%	1,01%	0,33%	5,36%	13,50%	23,20%
Svenska Handelsbanken AB	SU	2,00%	4,09%	0,65%	12,74%	21,20%	27,20%
Swedbank AB	SU	2,00%	4,09%	0,73%	12,77%	24,10%	30,30%
Skandinavska Enskilda Banken AB	SU	2,00%	4,09%	0,66%	11,61%	18,80%	23,80%
Nordea Bank Finland Plc	FIN	2,00%	0,43%	0,35%	8,58%	19,30%	20,30%
Bank of Valletta Group (BOV)	MALTA	2,00%	6,30%	0,80%	11,87%	11,30%	13,40%
AB DNB bankas	LITU	2,00%	1,59%	0,49%	4,18%	17,84%	18,12%
VUB	SLOVAK	2,00%	3,60%	1,30%	10,94%	16,13%	16,30%
Raiffeisen Zentralbank	AUSTRIA	2,00%	0,88%	0,17%	2,55%	10,60%	13,90%
Raiffeisen Bank International	AUSTRIA	2,00%	0,88%	0,33%	4,46%	12,10%	17,40%
Unicredit Bank Austria	AUSTRIA	2,00%	0,88%	0,68%	8,61%	11,00%	14,90%
Bank of Cyprus Plc	CH	2,00%	1,59%	-1,88%	-14,34%	14,00%	14,10%
BNP Paribas Fortis	BE	1,50%	1,37%	0,58%	8,40%	14,20%	16,60%
KBC Group	BE	1,50%	1,37%	1,05%	16,69%	15,20%	19,80%
ING Belgique	BE	1,50%	1,37%	0,63%	9,72%	14,50%	16,90%
Belfius	BE	1,50%	1,37%	0,29%	5,84%	14,90%	16,20%
Bank of Ireland	IRL	1,50%	7,81%	0,72%	10,32%	13,30%	18%
Allied Irish Bank Plc	IRL	1,50%	7,81%	1,34%	11,36%	16%	18,90%
Tatra Bank	SLOVAK	1,50%	3,60%	1,07%	12,10%	14%	18,21%
Hellenic Bank Plc	CH	1,50%	1,59%	0,14%	1,67%	14,75%	18,13%
Commerzbank AG	GER	1,50%	1,45%	0,20%	3,49%	13,80%	16,50%
O-SII's (less important)							
SNS Bank	NE	1,00%	1,01%	0,56%	10,54%	25,30%	29,50%
Alpha Bank	GR	1,00%	-0,23%	-1,98%	-15,22%	17%	17,10%
Caixa Geral de Depositos	PORT	1,00%	1,47%	0,01%	0,32%	11%	12,29%
Banca Commercial Português	PORT	0,75%	1,47%	0,31%	5,09%	13,30%	14,30%
BBVA	SP	0,50%	3,21%	0,35%	5,22%	12,10%	15%
Banque et Caisse d'Epargne de l'Etat Luxembourg	LU	0,50%	4,52%	0,54%	6,24%	17,80%	18,50%
BGL BNP Paribas SA	LU	0,50%	4,52%	0,83%	5,70%	22,30%	22,40%
Banque Internationale à Luxembourg SA	LU	0,50%	4,52%	0,62%	11,01%	13,04%	16,07%
Danske Bank Plc	FIN	0,50%	0,43%	0,55%	6,59%	17,50%	18,40%
Munifin	FIN	0,50%	0,43%	0,36%	11,64%	41,49%	64,61%
Unicredit Banka	SL	0,50%	2,88%	0,33%	3,23%	19,50%	21,10%
AB Siauliu Bankas	LITU	0,50%	1,59%	1,41%	17,38%	12,18%	14,24%
Groupe Crédit Mutuel	FR	0,50%	1,14%	0,41%	6,42%	15,70%	18,50%
Banco BPI	PORT	0,50%	1,47%	0,58%	9,81%	10,90%	10,90%
La Banque Postale	FR	0,25%	1,14%	0,32%	7,94%	13,20%	18,70%
Caixabank	SP	0,25%	3,21%	0,20%	2,90%	12,90%	15,90%
Bankia	SP	0,25%	3,21%	0,45%	8,30%	13%	14,20%
SKB	SL	0,25%	2,88%	1,29%	9,46%	16%	16,18%
Banka Koper	SL	0,25%	2,88%	0,52%	4,15%	18%	17,64%
Intesa Sanpaolo	IT	0,00%	0,76%	0,40%	5,73%	13%	16,60%
Monte dei Paschi di Siena Bank	IT	0,00%	0,76%	0,23%	4,04%	12%	16,00%
Banco Popular	SP	0,00%	3,21%	0,07%	0,84%	13%	13,83%
Lloyds Banking Group Plc	UK	0,00%	2,30%	0,11%	1,85%	13%	21,50%
Santander UK Plc	UK	0,00%	2,30%	0,33%	6,05%	12%	18,20%

G-SII's						
	Assets (in millions €)	Loans-to-deposits	Cost-to-income	Net interest margin	EPS	Dividend payout ratio
HSBC	2219149	71,65%	55,94%	1,35%	0,65	76,50%
Barclays	1520080	95,45%	81,23%	1,12%	16,6	39,00%
BNP Paribas	1994193	97,46%	64,28%	1,13%	5,14	44,94%
Deutsche Bank	1629130	75,44%	115,34%	0,97%	-5,06	0,00%
Groupe BPCE	1166500	123,56%	68,07%	2,05%	79,98	0,140535134
Groupe Crédit Agricole	561791	143,55%	38,70%	-0,41%	1,21	49,59%
ING Bank	841769	107,30%	63,36%	1,49%	1,04	62,50%
Nordea	646868	176,33%	48,89%	0,79%	0,91	70,33%
Santander	1340260	118,98%	47,65%	2,40%	0,4	50,00%
Société Générale	1152130	94,30%	61,14%	1,22%	4,49	44,54%
Standard Chartered	589846	73,40%	73,08%	1,47%	-0,06	0,00%
Unicredit Group	860433	105,38%	72,77%	1,35%	0,27	44,44%
O-SII's (important)						
ABN Amro Bank	390317	98,31%	61,83%	1,56%	2,03	39,90%
Cooperatieve Centrale Raiffeisen- Boerenleenbank	670373	135,85%	62,59%	1,36%	na	na
Svenska Handelsbanken AB	275366	247,59%	45,30%	1,10%	8,57	63,01%
Swedbank AB	234612	188,96%	43,41%	1,07%	14,23	75,19%
Skandinavska Enskilda Banken AB	272509	153,14%	50,26%	0,76%	7,57	69,35%
Nordea Bank Finland Plc	301590	163,22%	39,88%	0,35%	na	na
Bank of Valletta Group (BOV)	9901	46,75%	40,65%	1,46%	0,22	56,36%
AB DNB bankas	3909	117,68%	64,29%	1,66%	3,38	0%
VUB	12625	106,70%	47,83%	3,26%	40,19	25%
Raiffeisen Zentralbank	138426	101,77%	59,40%	2,62%	34,95	0%
Raiffeisen Bank International	114427	101,35%	59,10%	2,91%	1,3	0%
Unicredit Bank Austria	193639	105,47%	52,30%	1,75%	5,73	na
Bank of Cyprus Plc	23270	121,23%	41,93%	3,62%	-0,04	0%
BNP Paribas Fortis	273683	100,27%	58,13%	1,98%	4,47	0,928411633
KBC Group	252356	75,38%	54,42%	1,71%	3,8	0,00%
ING Belgique	151989	90,81%	52,10%	1,74%	na	na
Belfius	176962	127,91%	63,94%	1,14%	1,41	14,89%
Bank of Ireland	130960	105,64%	55,36%	1,87%	0,023	0,00%
Allied Irish Bank Plc	103122	99,77%	63,85%	1,87%	0,44	0,00%
Tatra Bank	11215	93,41%	52,79%	2,58%	na	95,17%
Hellenic Bank Plc	7364	50,37%	57,53%	1,97%	5,6	0,00%
Commerzbank AG	532600	84,96%	73,30%	1,09%	0,88	22,73%
O-SII's (less important)						
SNS Bank	62690	103,75%	57,69%	1,59%	82,86	28,74%
Alpha Bank	69296	146,93%	57,53%	2,79%	-3,56	0,00%
Caixa Geral de Depositos	90002	85,84%	53,09%	0,69%	0,01	0,00%
Banca Commercial Português	74884	100,84%	44,08%	1,74%	0,005	0,00%
BBVA	750078	102,75%	79,15%	2,75%	0,39	16,00%
Banque et Caisse d'Epargne de l'Etat Luxembourg	42797	71,25%	49,29%	0,90%	na	na
BGL BNP Paribas SA	43215	121,16%	49,01%	2,59%	12,79	42,29%
Banque Internationale à Luxembourg SA	21473	75,71%	66,85%	1,33%	66,55	52,13%
Danske Bank Plc	30313	109,40%	61,34%	1,00%	1563	0,363242068
Munifin	33888	2125,26%	16,00%	0,51%	3,107	43,80%
Unicredit Banka	2629	96,53%	53,19%	1,78%	1,78	1,106741573
AB Siauliu Bankas	1695	59,26%	53,80%	2,88%	0,08	0,91%
Groupe Crédit Mutuel	739809	117,38%	63,19%	0,96%	na	na
Banco BPI	40673	86,17%	56,73%	1,53%	0,163	0,00%
La Banque Postale	218707	42,86%	77,76%	1,43%	20,09	45,00%
Caixabank	317756	110,25%	53,83%	1,18%	0,14	28,57%
Bankia	208220	101,72%	66,18%	1,26%	0,064	27,34%
SKB	2655	94,62%	53,01%	2,57%	2,71	100,00%
Banka Koper	2272	83,45%	60,73%	1,94%	22,33	44,78%
Intesa Sanpaolo	676496	137,12%	51,40%	1,37%	0,16	87,50%
Monte dei Paschi di Siena Bank	169011	126,83%	50,40%	1,32%	0,223	0,00%
Banco Popular	158649	76,17%	46,74%	1,42%	0,05	32,00%
Lloyds Banking Group Plc	742911,2467	108,81%	66,47%	1,40%	0,737	281,25%
Santander UK Plc	259158,0416	120,70%	52,48%	1,27%	na	51,00%

G-SII's			
	Net income/ Operating income	**Operating income/ Total assets**	**Total assets/Total equity capital**
HSBC	19,02%	2,95%	12,78603417
Barclays	14,59%	2,27%	18,72616619
BNP Paribas	15,59%	2,15%	20,71479916
Deutsche Bank	-20,27%	2,06%	25,99205463
Groupe BPCE	13,58%	2,05%	20,25173611
Groupe Crédit Agricole	76,15%	0,34%	15,85636466
ING Bank	23,81%	2,00%	17,59844874
Nordea	36,11%	1,57%	20,84519206
Santander	13,18%	3,38%	13,08822093
Société Générale	7,55%	1,22%	34,33249896
Standard Chartered	-14,35%	2,39%	13,29051068
Unicredit Group	7,94%	2,48%	17,17876894
O-SII's (important)			
ABN Amro Bank	22,70%	2,17%	23,54853695
Cooperatieve Centrale Raiffeisen- Boerenleenbank	17,01%	1,94%	16,23965601
Svenska Handelsbanken AB	40,51%	1,60%	19,66299467
Swedbank AB	41,80%	1,75%	17,44724471
Skandinavska Enskilda Banken AB	37,56%	1,77%	17,4789843
Nordea Bank Finland Plc	42,45%	0,82%	24,52748861
Bank of Valletta Group (BOV)	32,15%	2,49%	14,80295343
AB DNB bankas	18,35%	2,69%	8,472601137
VUB	29,64%	4,38%	8,427617271
Raiffeisen Zentralbank	4,44%	3,85%	14,89092083
Raiffeisen Bank International	7,69%	4,31%	13,46041642
Unicredit Bank Austria	22,55%	3,03%	12,57886189
Bank of Cyprus Plc	-40%	4,70%	7,61951539
BNP Paribas Fortis	21,77%	2,64%	14,59331343
KBC Group	36,92%	2,83%	15,96078679
ING Belgique	27,17%	2,30%	15,55511207
Belfius	23,17%	1,23%	20,43751463
Bank of Ireland	28,55%	2,51%	14,37225637
Allied Irish Bank Plc	52,51%	2,55%	8,488804742
Tatra Bank	25,12%	4,28%	11,25591871
Hellenic Bank Plc	4,21%	3,38%	11,70607187
Commerzbank AG	55,63%	0,36%	17,51973684
O-SII's (less important)			
SNS Bank	30,93%	1,79%	18,98546336
Alpha Bank	-60,48%	3,27%	7,68667989
Caixa Geral de Depositos	0,63%	2,10%	23,64739884
Banca Commercial Português	9,38%	3,35%	16,19773774
BBVA	8,81%	4,00%	14,81225933
Banque et Caisse d'Epargne de l'Etat Luxembourg	38,13%	1,41%	11,6263961
BGL BNP Paribas SA	26,06%	3,18%	6,884078057
Banque Internationale à Luxembourg SA	24,01%	2,60%	17,64420707
Danske Bank Plc	28,83%	1,90%	12,0514054
Munifin	65,84%	0,54%	32,48858546
Unicredit Banka	10,69%	3,10%	9,726061597
AB Siauliu Bankas	28,05%	5,01%	12,36677756
Groupe Crédit Mutuel	18,51%	2,21%	15,72221868
Banco BPI	19,98%	2,90%	16,90482128
La Banque Postale	12,30%	2,63%	24,55795365
Caixabank	8,92%	2,30%	14,16376072
Bankia	23,77%	1,90%	18,38518101
SKB	32,80%	3,94%	7,321148667
Banka Koper	15,65%	3,33%	7,95453018
Intesa Sanpaolo	15,97%	2,53%	14,15974548
Monte dei Paschi di Siena Bank	7,44%	3,09%	17,6126511
Banco Popular	3,06%	2,16%	12,69395103
Lloyds Banking Group Plc	3,71%	2,87%	17,31498852
Santander UK Plc	20,53%	1,63%	18,12715795

Appendix 5: Data analysis

Year	**2013**						
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
G-SII's							
Assets	1257164,356	1224730,5	434876,1913	125537,9431	489539,1858	1939136,449	12
CET1	11,12%	10,75%	0,014630581	0,004223485	9,10%	14,90%	12
Solvency ratio	15,24%	14,95%	0,018909734	0,00545877	12,50%	18,50%	12
ROA	0,14%	0,27%	0,005693878	0,001643681	-1,65%	0,61%	12
ROE	3,01%	5,67%	0,102338586	0,029542605	-29,81%	10,67%	12
Net income/ Operating income	8,14%	11,99%	0,21097695	0,0609038	-57,23%	31,50%	12
Operating income/ Total assets	2,26%	2,14%	0,006099242	0,001760699	1,04%	3,27%	12
Total assets/ Total equity	21,74369929	21,299733	6,075744197	1,753916274	14,58245037	36,33848773	12
Loans-to-deposits	111,21%	111,80%	0,261050832	0,075358884	71,36%	170,59%	12
Cost-to-income	66,61%	67,02%	0,130380347	0,037637564	49,22%	89,00%	12
Net interest margin	1,27%	1,11%	0,004470992	0,001290664	0,82%	2,14%	12
Earnings per share	0,5775	0,805	7,549895281	2,179467036	-19,43	16,7	12
Dividend payout ratio	48,64%	41,23%	0,4272708	0,123342456	0,00%	150,00%	12
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
O-SII's (important)							
Assets	192582,3146	162413,5	171323,1619	36526,22085	6383	674139	22
CET1	13,76%	13,48%	0,029469249	0,006282865	7,30%	18,90%	22
Solvency ratio	16,50%	16,72%	0,0280029	0,005970238	10,60%	21,60%	22
ROA	-0,07%	0,35%	0,016864963	0,003595622	-6,77%	1,17%	22
ROE	-0,13%	6,87%	0,210403472	0,044858171	-77,21%	13,72%	22
Net income/ Operating income	4,75%	15,66%	0,501990219	0,107024674	-196,75%	39,35%	22
Operating income/ Total assets	2,70%	2,50%	0,012760461	0,002720539	0,13%	4,92%	22
Total assets/ Total equity	16,14628949	14,124661	6,408454997	1,366287196	8,358075472	32,03289889	22
Loans-to-deposits	118,27%	116,35%	0,380837083	0,081194739	58,96%	205,57%	22
Cost-to-income	58,88%	56,26%	0,11500383	0,024518899	37,86%	79,77%	22
Net interest margin	1,86%	1,75%	0,008154749	0,001738598	0,39%	3,57%	22
Earnings per share	7,807058824	1,24	16,914546	3,606193325	-10,6	62,29	22
Dividend payout ratio	27,24%	0	0,313742387	0,066890102	0	85,88%	22
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
O-SII's (less important)							
Assets	180062,1755	78272	214096,0331	43702,16976	1544,4368	659959	24
CET1	14,01%	12,70%	0,044855442	0,009156079	9%	28%	24
Solvency ratio	16,51%	15,00%	0,049472238	0,010098478	10,80%	32,52%	24
ROA	0,04%	0,18%	0,010928629	0,002230797	-1,81%	3,96%	24
ROE	-1,49%	3,18%	0,176149266	0,035956318	-52,36%	34,92%	24
Net income/ Operating income	-1,12%	7,28%	0,50333389	0,1027426	-129,63%	124,66%	24
Operating income/ Total assets	2,50%	2,43%	0,010536659	0,002150786	0,64%	4,77%	24
Total assets/ Total equity	19,01927312	16,431278	10,51432268	2,146227129	7,055073226	55,63380857	24
Loans-to-deposits	106,59%	112,17%	0,330317882	0,067425855	16,07%	153,13%	24
Cost-to-income	63,21%	62,95%	0,177190822	0,036168925	15,07%	99,99%	24
Net interest margin	1,44%	1,23%	0,006051605	0,001235279	0,47%	2,70%	24
Earnings per share	72,74501729	0,059	298,0724504	60,84378415	-8,02	1370,75	24
Dividend payout ratio	0,143749703	0	0,21800093	0,044499254	-0,178571429	0,555555556	24

Year	**2014**						
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
G-SII's							
Assets	1345156,451	1265750	500498,97	144481,6075	599880,8113	2176799,787	12
CET1	11,76%	11%	0,019216058	0,005547198	10%	16%	12
Solvency ratio	15,82%	16%	0,023777351	0,00686393	12,60%	21%	12
ROA	0,25%	0,22%	0,001677851	0,000484354	0,02%	0,52%	12
ROE	4,73%	4,78%	0,027902714	0,00805482	0,61%	11,17%	12
Net income/ Operating income	12,07%	11,96%	0,078429035	0,022640512	1,29%	32,59%	12
Operating income/ Total assets	2,07%	1,89%	0,006495902	0,001875205	1,00%	3,54%	12
Total assets/ Total equity	20,94450814	21,35429588	4,9658891	1,433528704	13,8313494	31,74200507	12
Loans-to-deposits	108,36%	104,71%	0,292478669	0,084431319	70,23%	176,47%	12
Cost-to-income	65,78%	66,14%	0,114518613	0,033058676	47,02%	86,70%	12
Net interest margin	1,32%	1,28%	0,005058684	0,001460316	0,71%	2,46%	12
Earnings per share	5,65275	1,085	10,43865128	3,013379063	0,13	36,81	12
Dividend payout ratio	47,22%	42,38%	0,243997841	0,07043611	0,00%	92,31%	12
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
O-SII's (important)							
Assets	199738,1603	170463,5	174564,471	37217,27027	7529	681086	22
CET1	14,47%	14,30%	0,027350846	0,00583122	10,20%	21,20%	22
Solvency ratio	17,76%	16,71%	0,033747951	0,007195087	13,40%	25,60%	22
ROA	0,34%	0,50%	0,00665876	0,001419652	-1,64%	1,25%	22
ROE	5,41%	8,64%	0,084268095	0,017966018	-21,19%	14,28%	22
Net income/ Operating income	19,47%	24,90%	0,213194366	0,045453192	-42,90%	41,85%	22
Operating income/ Total assets	2,67%	2,44%	0,013391626	0,002855104	0,12%	5,15%	22
Total assets/ Total equity	16,26983023	14,84853804	6,695875256	1,427565401	7,731313131	35,99480141	22
Loans-to-deposits	116,02%	110,47%	0,354097603	0,075493863	50,76%	207,56%	22
Cost-to-income	55,37%	54,67%	0,109101939	0,023260612	33,48%	79,10%	22
Net interest margin	1,86%	1,75%	0,009018285	0,001922705	0,34%	3,61%	22
Earnings per share	-7,119058824	1,28	43,94458931	9,36901792	-167,1	35,74	22
Dividend payout ratio	33,08%	0	0,404496469	0,086238937	0	124,00%	22
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
O-SII's (less important)							
Assets	189167,2262	74647,5	232330,4967	47424,26405	1640	706720	24
CET1	14,50%	13,25%	0,045043408	0,009194447	8,70%	29,94%	24
Solvency ratio	16,86%	16,33%	0,047259866	0,00964688	10,20%	33,53%	24
ROA	0,12%	0,31%	0,008072781	0,00164785	-2,97%	1,34%	24
ROE	-0,67%	5,89%	0,211336743	0,043138932	-92,60%	19,37%	24
Net income/ Operating income	3,88%	12,25%	0,401333787	0,081921916	-130,07%	65,59%	24
Operating income/ Total assets	2,57%	2,50%	0,009655345	0,001970889	0,58%	4,67%	24
Total assets/ Total equity	17,43821267	15,73372541	9,114449529	1,860479219	6,754787068	50,53552646	24
Loans-to-deposits	101,96%	106,14%	0,249565843	0,050942414	40,41%	146,97%	24
Cost-to-income	58,71%	56,12%	0,154284159	0,031493122	15,00%	84,57%	24
Net interest margin	1,52%	1,38%	0,006045614	0,001234056	0,53%	2,66%	24
Earnings per share	85,18452678	0,1395	346,711659	70,77222103	-1,985	1595,28	24
Dividend payout ratio	0,313354202	0,304243395	0,295115358	0,06024017	0	0,901879294	24

Year	**2015**						
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
G-SII's							
Assets	1210179	1159315	524963,6452	151543,9509	561791	2219149	12
CET1	12,29%	12,23%	0,015544316	0,004487258	10,68%	16,50%	12
Solvency ratio	17,14%	16,86%	0,023777164	0,006863876	13,60%	21,60%	12
ROA	0,23%	0,30%	0,003055863	0,000882152	-0,42%	0,57%	12
ROE	3,93%	5,73%	0,058031071	0,016752127	-10,84%	11,80%	12
Net income/ Operating income	16,08%	14,09%	0,232389397	0,06708504	-20,27%	76,15%	12
Operating income/ Total assets	2,07%	2,11%	0,007513638	0,002169	0,34%	3,38%	12
Total assets/ Total equity	19,22173294	18,16230747	5,864411788	1,692909862	12,78603417	34,33249896	12
Loans-to-deposits	106,90%	101,42%	0,293299728	0,084668338	71,65%	176,33%	12
Cost-to-income	65,87%	63,82%	0,188764415	0,054491593	38,70%	115,34%	12
Net interest margin	1,25%	1,29%	0,006557386	0,001892954	-0,41%	2,40%	12
Earnings per share	8,7975	0,975	22,02238336	6,35731448	-5,06	79,98	12
Dividend payout ratio	41,32%	44,74%	0,239239504	0,069062496	0,00%	76,50%	12
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
O-SII's (important)							
Assets	194600,7191	164475,5	170547,5309	36360,85575	3909	670373	22
CET1	15,27%	14,63%	0,032323576	0,00689141	10,60%	24,10%	22
Solvency ratio	18,81%	18,06%	0,041555895	0,008859747	13,40%	30,30%	22
ROA	0,51%	0,60%	0,006175845	0,001316694	-1,88%	1,34%	22
ROE	7,75%	9,16%	0,06157617	0,013128084	-14,34%	16,69%	22
Net income/ Operating income	25,08%	26,15%	0,195805023	0,041745771	-40,07%	55,63%	22
Operating income/ Total assets	2,62%	2,53%	0,011464271	0,002444191	0,36%	4,70%	22
Total assets/ Total equity	14,95669578	14,84693713	4,536476843	0,967180113	7,61951539	24,52748861	22
Loans-to-deposits	114,39%	103,62%	0,43256265	0,092222667	46,75%	247,59%	22
Cost-to-income	54,55%	54,89%	0,086878127	0,018522479	39,88%	73,30%	22
Net interest margin	1,79%	1,72%	0,007856288	0,001674966	0,35%	3,62%	22
Earnings per share	7,486111111	3,59	11,25483552	2,399538995	-0,043	40,19	22
Dividend payout ratio	30,80%	18,81%	0,342901724	0,073106893	0,00%	95,17%	22
	Mean	Median	Standard deviation	Standard error	Minimum	Maximum	Observations
O-SII's (less important)							
Assets	198303,2078	72090	251587,9925	51355,18392	1695	750078	24
CET1	16,03%	13,16%	0,064024722	0,013068992	10,87%	41,49%	24
Solvency ratio	19,24%	16,85%	0,101663554	0,020751986	10,90%	64,61%	24
ROA	0,37%	0,38%	0,00585644	0,001195441	-1,98%	1,41%	24
ROE	5,63%	5,89%	0,057457326	0,011728428	-15,22%	17,38%	24
Net income/ Operating income	16,40%	17,24%	0,211335521	0,043138683	-60,48%	65,84%	24
Operating income/ Total assets	2,66%	2,61%	0,009341843	0,001906896	0,54%	5,01%	24
Total assets/ Total equity	15,37646494	15,267239	5,845238497	1,193154312	6,884078057	32,48858546	24
Loans-to-deposits	99,11%	101,72%	0,24112633	0,049219706	42,86%	146,93%	24
Cost-to-income	55,83%	53,81%	0,120229973	0,02454184	16,00%	79,15%	24
Net interest margin	1,59%	1,41%	0,006602393	0,001347708	0,51%	2,88%	24
Earnings per share	84,47056176	0,39	331,3858127	67,64384576	-3,56	1563,2	24
Dividend payout ratio	46,74%	34,16%	0,613297434	0,125188815	0,00%	281,25%	24

Appendix 6: Regression: Capital requirements and performance measures

ROE

R-Square	0.0947		
Variable	Coefficients	t stat	Pr > |t|
Intercept	-0.14516	-3.36	0.0010
CET1	1.242.452	4.24	<0.0001

ROA

R-Square	0.0713		
Variable	Coefficients	t stat	Pr > |t|
Intercept	-0.00787	-2.71	0.0074
CET1	0.071278	3.63	0.0004

Cost-to-income

R-Square	0.0835		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.748945	17.11	<0.0001
CET1	-111.411	-3.96	0.0001

Loans-to-deposits

R-Square	0.0807		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.951007	2.85	0.0050
CET1	322.453	3.89	0.0001

Net interest margin

R-Square	0.0003		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.016074	9.67	<0.0001
CET1	-0.00217	-0.22	0.8249

Appendix 7: Regression: Determinants of performance

All data

ROE

R-Square	0.7063		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.113832	0.72	0.4757
CET1	25.086	3.07	0.0028
Cost-to-income ratio	-0.54504	-3.49	0.0008
Loans-to-deposits ratio	-0.21544	-3.23	0.0018
Assets	1.45E-04	0	-
GDP Growth rate	1.776.024	1.92*	0.0581*
Dividend payout ratio	0.040996	1.25	0.2160

ROA

R-Square	0.6893		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.003219	0.30	0.7672
CET1	0.202565	3.64	0.0005
Cost-to-income ratio	-0.02566	-2.41	0.0180
Loans-to-deposits ratio	-0.01614	-3.54	0.0006
Assets	4.29E-06	0	-
GDP Growth rate	0.12448	1.97*	0.0517*
Dividend payout ratio	0.003212	1.43	0.1559

Net interest margin

R-Square	0.9623		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.043169	14.87	<0.0001
CET1	-0.03512	-2.36	0.0207
Cost-to-income ratio	-0.01013	-3.56	0.0006
Loans-to-deposits ratio	0.00263	2.16	0.0338
Assets	1.20E-05	0	-
GDP Growth rate	-0.00832	-0.49	0.6236
Dividend payout ratio	0.000602	1	0.3192

Statistical significance at the 10% level is indicated by the superscript *

G-SII's

ROE

R-Square	0.3914		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.015713	0.13	0.8967
CET1	-0.10759	-0.13	0.8959
Cost-to-income ratio	-0.13213	-1.32	0.1982
Loans-to-deposits ratio	0.04386	0.80	0.4279
Assets	1.94E-05	0	-
GDP Growth rate	1.767.976	1.89*	0.0688*
Dividend payout ratio	0.065617	1.69*	0.0980*

ROA

R-Square	0.4620		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.002832	0.48	0.6344
CET1	0.003831	0.09	0.9263
Cost-to-income ratio	-0.00916	-1.83*	0.0774*
Loans-to-deposits ratio	0.000605	0.23	0.8233
Assets	1.16E-06	0	-
GDP Growth rate	0.098236	2.07	0.0473
Dividend payout ratio	0.003441	1.67	0.1048

Net interest margin

R-Square	0.1608		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.003132	0.27	0.7890
CET1	0.00236	0.04	0.9681
Cost-to-income ratio	0.002068	0.25	0.8081
Loans-to-deposits ratio	0.001446	0.25	0.8059
Assets	5E-09	0	-
GDP Growth rate	0.008162	0.14	0.8910
Dividend payout ratio	-0.00002	-0.01	0.9931

Statistical significance at the 10% level is indicated by the superscript *

O-SII's (important)

ROE

R-Square	0.8804		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.119313	0.38	0.7040
CET1	23.514	1.98*	0.0591*
Cost-to-income ratio	-0.97376	-2.80	0.0099
Loans-to-deposits ratio	-73	-0.55	0.5843
Assets	-1.88E-6	0	-
GDP Growth rate	4.731.106	4.22	0.0003
Dividend payout ratio	0.000343	0	0.9969

ROA

R-Square	0.8898		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.025136	1.04	0.3086
CET1	0.136724	1.48	0.1519
Cost-to-income ratio	-0.08911	-3.29	0.0031
Loans-to-deposits ratio	-0.00276	-0.27	0.7900
Assets	-1.49E-7	0	-
GDP Growth rate	0.358129	4.11	0.0004
Dividend payout ratio	0.00011	0.02	0.9874

Net interest margin

R-Square	0.4268		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.046329	7.66	<0.0001
CET1	-0.0628	-2.82	0.0073
Cost-to-income ratio	-0.02568	-3.94	0.0003
Loans-to-deposits ratio	0.000889	0.40	0.6881
Assets	-2.84E-8	0	-
GDP Growth rate	0.007526	0.42	0.6748
Dividend payout ratio	-0.00086	-0.49	0.6277

Statistical significance at the 10% level is indicated by the superscript *

O-SII's (less important)

ROE

R-Square	0.6731		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.204119	0.73	0.4691
CET1	2659.149	1.71*	0.0983*
Cost-to-income ratio	-0.75642	-2.42	0.0219
Loans-to-deposits ratio	-0.25046	-2.08	0.0465
Assets	5.31E-04	0	-
GDP Growth rate	-150.833	-0.69	0.4961
Dividend payout ratio	0.051652	0.78	0.4425

ROA

R-Square	0.5652		
Variable	Coefficients	t stat	Pr > |t|
Intercept	-0.00575	-0.33	0.7452
CET1	0.268706	2.74	0.0103
Cost-to-income ratio	-0.03199	-1.62	0.1148
Loans-to-deposits ratio	-0.02263	-2.98	0.0057
Assets	2.33E-05	0	-
GDP Growth rate	-0.14659	-1.06	0.2959
Dividend payout ratio	0.002982	0.71	0.4808

Net interest margin

R-Square	0.9673		
Variable	Coefficients	t stat	Pr > |t|
Intercept	0.027536	7.88	<0.0001
CET1	-0.03508	-1.79*	0.0832*
Cost-to-income ratio	-0.00986	-2.51	0.0177
Loans-to-deposits ratio	0.002555	1.69*	0.0981*
Assets	1.90E-05	0	-
GDP Growth rate	-0.01179	-0.43	0.6711
Dividend payout ratio	0.000779	0.93	0.3574

Statistical significance at the 10% level is indicated by the superscript *

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Résumé

La récente crise économique et financière a révélé que les exigences réglementaires appliquées durant cette période ne suffisaient pas à protéger les institutions financières d'une faillite. Un effet de levier trop important, un niveau de capital inadéquat et une liquidité insuffisante sont des exemples de faiblesses qui ont amplifié la sévérité de la crise. Afin d'éviter une crise similaire, une nouvelle réforme réglementaire, connue sous le nom de Bâle III, a été approuvée. De nouvelles améliorations ont été faites au niveau des standards de liquidité, de la couverture des risques, de l'effet de levier, et spécialement au niveau du renforcement du capital.

Si tout le monde accepte le fait que le système financier sera plus sûr avec ces changements, l'impact qu'une augmentation des exigences de capital peut avoir sur les mesures de profitabilité reste incertain. Un certain nombre d'auteurs pense qu'une proportion de capital plus élevée va pénaliser les activités principales des banques ainsi que leur performance. Ce mémoire a pour but de tester si les managers des banques ont de réelles raisons de s'inquiéter des nouvelles exigences réglementaires. Afin de répondre à cette question, une analyse empirique est menée sur un échantillon de banques européennes présentant un certain niveau de risque systémique. La période comprise entre 2013 et 2015 a été choisie dans cette recherche.

Les résultats de cette étude montrent qu'une relation positive et significative existe entre le niveau de capital, la rentabilité économique et la rentabilité des capitaux propres. Les institutions financières ayant un niveau de capital plus élevé semblent être les plus profitables. Cette relation positive peut être expliquée par le fait que les banques qui sont bien capitalisées sont considérées comme étant moins risquées et peuvent accéder aux fonds à de meilleures conditions. De plus, ces banques sont plus efficaces, fournissent un plus grand effort de contrôle et font de meilleures décisions concernant les prêts. Les résultats démontrent également que le ratio des coûts d'exploitation sur les revenus d'exploitation, le ratio des prêts sur les dépôts, le taux de croissance du PIB ainsi que la politique de dividendes ont un impact sur les mesures de performance.

Mots-clés : Bâle III, exigences réglementaires, performance, profitabilité, fonds propres, rentabilité des fonds propres, rentabilité économique

Executive summary

The financial and economic crisis of the last decade has revealed that the regulatory rules applied at that moment were not sufficient to protect the financial institutions from a failure. An excessive leverage, an inadequate amount of capital and insufficient liquidity are examples of weaknesses that amplified the severity of the crisis. In order to avoid a similar crisis, the Basel III regulatory reform has been launched. New improvements have been made about the liquidity standards, the risk coverage, the leverage and especially the strengthening of capital.

Even if everyone accepts the fact that the financial system will be safer with these changes, the impact that a change in the capital requirements has on the profitability measures is still unclear. A certain number of authors believe that the higher proportion of capital will penalize the lending activities and the performance of the banks. The goal of this thesis is to test whether bank managers really have to worry about the new regulatory requirements. In order to answer this question, an empirical analysis is conducted on a sample of European banks presenting a given level of systemic risk. The period between 2013 and 2015 is chosen in this research.

The results of the study show that a positive relationship exists between the level of capital, the return on assets and the return on equity. Financial institutions which hold a higher level of capital seem to generate more profitability. This positive relationship can be explained by the fact that well-capitalized banks are considered as being less risky and can have an access to funds at better conditions. Moreover, banks which have a higher capital ratio have a more efficient behaviour, make stronger monitoring efforts and make better lending decisions. The results also demonstrated that the cost-to-income ratio, the loans-to-deposits ratio, the GDP growth rate and the dividend payout ratio have an impact on the profitability measures.

Key words: Basel III, regulatory requirements, performance, profitability, capital, return on equity, return on assets