AMERICAN UNIVERSITY OF BEIRUT

# BASEL III, THE NECESSITY OF REGULATIONS AND THE FEAR OF REPERCUSSIONS

by
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# AN ABSTRACT OF THE THESIS OF

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The latest financial turmoil of 2007 revealed the vulnerability of the banking system to absorb financial shocks and to manage credit disturbances. The crisis exposed some characteristics of the market: the banking system is extremely leveraged, the growth of credit is risky and the financial innovations surpass Basel II framework. The new situation drove the Basel committee to review Basel II capital requirements and develop a new framework- Basel III.

The new Basel accord requires the banks to increase the proportion of equity in their capital structure to absorb all shocks and risks that the banks would face in order to avoid any disturbance in the market. But these requirements caused conflict of interests between regulators and the banks. For regulators, equity absorbs loss of financing and reduces the strictness of risks. Whereas banks claim that the increase in capital requirements has negative effects on banks' profits and lending ability which can cause credit crisis. For them debt is less costly than equity.

In this thesis I will study the importance of banking industry in the economy, the risks that arise and thus the importance of regulations. Then, I will introduce the previous accords with their limitations and failure to cover the financial innovations that cause the latest financial crisis. Moreover, I will study Basel III accord, its strengths and weaknesses. Then I will end up with the empirical study to reveal the pitfalls of implementing this accord in a recessionary environment and the weaknesses of this accord to cover the continuous financial and banking innovations.

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# CHAPTER I

# INTRODUCTION

The banking system plays an important role in the economy by channeling funds from economic agents in surplus to economic agents in shortage. It allocates funds to all sectors, hence induces economic growth. In the last decades, banks have developed their activities to include financial innovations and instruments trade. This complicated new function generates high returns but at the same time makes the banking system vulnerable and unstable since that banks are now interconnected in their assets and liabilities so any shock to one of these institutions can be transmitted easily to other parties and economies.

Lately, banks have been criticized for being highly leveraged and risk taking. Thus the banking regulations are important to ensure the stability of the financial system by imposing leverage and liquidity measures that all banks must work in compliance with. Basel II framework has not covered all risks that banks are exposed to. Consequently, the world economy has witnessed an economic distress that extended to all sectors and economies.

Basel III has been designed to fill the gaps of the previous framework and will be gradually implemented starting in 2015 until 2019. Before the Basel accords, banks regulations have been conducted at domestic level where the domestic regulators and central banks decide the requirements for each bank subjectively based on traditional ratios of leverage and liquidity. However banks have grown internationally and have developed hundreds of financial instruments to compete on international level and maximize profits. Facing the new conditions, domestic regulations have become less effective as they failed to cover all risks banks are exposed to. This fact is explained by the consecutive crises during the pre-Basel phase.

Another aspect of the problem is large banks and the “Too Big to Fail” concept where governments play a role in creating moral hazard problems since large banks know that they are not allowed to fail because of the catastrophic impacts of their failure on the economy. Consequently, they act less prudently in their risk taking activities. Finally, banks have designed a lot of financial instruments to escape Basel I and II rules. The most important concept of arbitrage is the rise of the shadow banking which is considered the trigger of the recent systemic crisis. Therefore the question is whether excess regulations are healthy to the market or they induce arbitrage and securitization and consequently worsen the situation.

Different types of banks characterize the banking sector: corporate, retail and investment banking. This thesis has not differentiated between the different types but it has taken the banking sector as a whole and concentrated on the traditional activities that Basel accords have covered.

The new framework is going to be introduced gradually. Throughout the phases, many financial innovations may be issued to outweigh the repercussions of increasing equity in the banks’ balance sheets. However the analysis is based on the actual situation without taking into consideration the financial innovations growth. The thesis analyzes the different Basel accords after studying the importance of banks and regulations in terms of maintaining stability and safety in the market. However, the weaknesses of the previous accords raise the question about the ability of the new accord to prevent any systemic crisis especially that the world economy has not yet recovered from the repercussions of the recent crisis.

The purpose of this thesis is to answer the question whether Basel III framework is appropriate to be implemented in a recessionary environment in addition to its ability to protect against any banking failure.

This thesis is composed of three chapters. The first chapter talks about the banking system and its importance in the economy. The overview starts with the trends that influence the flourishing of the banking industry. It continues with the importance of banks in the money growth and economic development. In addition, risks and market instabilities are mentioned to understand the importance of regulations. The second chapter covers the three Basel accords- Background, Framework, Techniques and weaknesses. The last chapter covers the empirical analysis. The data of the US banks is used in the following tests: unit root test, Co-integration test, Granger Causality test in addition to the least square regression. The conclusion is devoted to discuss beyond Basel III.

# CHAPTER II

# OVERVIEW OF THE BANKING SECTOR

In the financial system, money flows from economic agents who are in surplus (savers) to economic agents who are in shortage (borrowers), either by market based finance (direct finance) or by bank based finance (indirect finance). This process is very important to the economy so that William Gladstone, the former British prime minister, said in 1858: “finance is, as it were, the stomach of the country, from which all the other organs take their tone.”

Both market based finance and bank based finance have their particular comparative advantages. Industries with continuous technological advances and with little or no consensus on how business should be managed should finance from the stock and money markets. On the other hand, some industries face strong asymmetric information. Therefore, financing through financial intermediaries such as banks is optimal for them to limit the adverse selection and the moral hazard issues that arise between lenders and borrowers (Duisenberg, 2001; Mishkin, 2010). In this matter, banks have developed the expertise to differentiate between good and bad borrowers.

## A. Trends in the banking sector

According to Danthine et Al. (1999) and Jeucken (2001), the development of the banking sector is related to many trends that the global economy has witnessed. The major ones are: globalization, technological advances, deregulation, conglomeration, concentration and off balance sheet activities. The extent of these trends varies from one region to another though it influences the global banking system. Further, some specific incidents characterize particular countries but they influenced the international banking sector such as the introduction of the single currency in the Euro zone and the financial crises in Japan. (OECD. 1995)

The major trend is deregulation that led to conglomeration and consolidation in the early 80s, where mergers and acquisitions were firstly concentrated between banks themselves. Mergers and acquisitions then became cross sector between banks, insurers, investment banks, mortgage banks and all financial institutions (Citigroup in USA).

Globalization and the liberalization of capital markets led to cross border consolidation. In the economic literature, “Global Banking” arose as a result of globalization and capital markets liberalization where banks have the desire to be present in all regions of the world in the retail or corporate banking activities (Goldman Sachs).

All in all, several senior banks in the world emerged benefiting from the technological advances that led to increasing scale and low costs which in return led larger financial conglomerates to rise.

### B. Role of the Banks in the Economic and Money Growth

Banks play an important role in the economic activities since that banks can distinguish profitable and successful activities, extend corporate governance, manage risk, enhance the mobility of resources, and make transactions easier and less costly by decreasing transaction costs. Levine and Zervos (1998) consider the good performance of the banking industry and the liquidity of the financial markets to be necessary for long term economic growth (GDP growth) and hence improve productivity (technological advance and efficient resource allocation), increase capital accumulation(physical capital), and boost private savings.

In the money/credit creation banks affect the total money supply in an economy through loans. They receive money from depositors, deposit part of it at the central bank as required reserves to ensure the stability of the banking system and to control the money supply (monetary policy instrument), hold part of it in the asset side of their balance sheet such as cash, bonds and bills in order to be safe against any unpredicted circumstances and risks and then lend out the rest as loans. This process when repeated in the economy creates money more than initially deposited. (Mishkin, 2010)

Monetary policies have direct impact on the supply of loanable funds as they can influence deposits that constitute the driving force of lending. According to Bernanke and Blinder (1988), tight monetary policy adopted by the financial regulations can drain deposits from the banking system and consequently reduces lending. In this case, many productive investments will not have access to funds causing a decrease in GDP. Moreover, banks allocate money across different sectors of the industry. They decide the share of each sector from the loans they offer. Consequently, banks influence indirectly the nature of growth in the economy.

Friction in capital markets explains the vitality of this sector in any economy (Hubbard, 1994; Saunders, 2000), where the lack of information exposes lenders and borrowers to different kinds of risks. This asymmetric information disturbs the credit market and its good functioning. In this case, banks play an intermediary role by “matching lenders to borrowers”.

According to Jeucken (2001) and Casu et Al. (2006), banks play four key roles in term of intermediation. At first, banks are engaged in denomination intermediation or size transformation. Usually the amount of money deposited by savers is less than the amount of money borrowers need. Banks can pool all these deposits together and make loans to meet the demand of borrowers. Likewise, banks can transform money by term (maturity transformation). Generally, depositors have short term surpluses whereas borrowers have long term capital requirements. In this case, banks transform the short term maturity funds to longer term maturity funds. Moreover, banks are engaged in place and time transformation, where they can allocate the money of a creditor in USA to a borrower in UK. When loans are made, there is a risk that the borrower will not abide by the agreement and do not pay the loan. In this case, banks ensure that the risks are transformed through diversification and asset transformation especially that they are in a better position to estimate the risks of different investments than are the individual savers which have money to invest.

The importance of the banking sector comes from the intermediation role it plays between lenders and borrowers. As a result, as long as the credit channel is well developed and organized the long term rates of economic growth are positive (King, Levine.1993). Similarly, a cross country analysis conducted by (Kunt, Maksimovic.1996) suggests that firms of all industries in countries with well-functioning and developed banks grow faster than firms of the same industries in countries with less developed banking sector.

## C. Financial intermediation

The theory of financial intermediation indicates that banks exist in order to perform two roles in the economy: liquidity creation and risk transformation.

The purpose of liquidity creation and its relationship with the economic growth dates back to Adam Smith (1776) when he mentioned in his second book-chapter two, the contribution of liquidity created by banks in the prosperity of commerce in Scotland at that time.

Liquidity creation comes from two main sources. Diamond and Dybvig (1983) argue that banks create liquidity by financing illiquid assets with liquid liabilities. Whereas Tirole, Holmstrom (1998) and stein (2002) added that banks create liquidity from their off balance sheet activities as well such as instruments' trade and loans sales. In the economic literature, risk transformation stands to the fact that banks adopt prudential regulation, control risk-taking attitude and enhance supervision while transforming non risky deposits into risky loans. (Boyd, Prescott.1986)

Some opinions argued that since 90s, the banking sector is losing liquidity creation feature favor the capital markets. In fact, in 2003 the US banking sector created 2.843 trillion USD in liquidity which constitutes 4.56 times the whole level of banks' capital. In other words, the banks created 4.56 USD liquidity per 1 USD capital (Oxford University Press. 2009). Adding to that the fact that between 1993-2003, the creation of liquidity has doubled in the United States.

The intermediation role offers banks a competitive advantage over other financial markets. For this reason banks cannot be substituted and hold some important features listed below:

- Credit Provision

Credit provision pushes the economy to its optimum functionality by reallocating funds from less productive to more productive economic agents. Credits boost the economic activity by allowing the economic participants and especially the private sector to invest beyond their available cash on hand which will lead to a positive economic growth and job creation. Moreover, the banking sector allows households to purchase homes, lands and other real properties without saving the entire sum of money. This fact fuels the real estate market development (Kiyotaki and Moore, 1995). As banks allocate additional money to finance the real estate new projects and provide money to households, the market value of the property will raise so do the collaterals on the outstanding loans. This fact has positive effects on the economy in terms of growth and on the whole financial markets in terms of increase in the asset values.

- Liquidity Provision

Cash is the most important type of money that banks can provide to households and businesses against unexpected needs of liquidity by offering demand deposits that can be withdrawn at any time or through different lines of credits that the banks offer. In addition, banks play an important role in the financial markets through the process of buying and selling large volumes of securities and other financial instruments with moderate transaction costs.

- Risk management services

Commodity and financial markets are complicated enough to expose businesses and households to all types of risks. Banks has a role in risks pooling. They enable businesses and households to interact in the global financial and commodity markets in an indirect way. Further, savers are safe when they deposit their money in the banks because they are protected from all risks that could arise when loans are offered to risky borrowers.

- Remittance of money

Almost all countries in the world are engaged in trade between each other as a result of globalization and open economies. Consequently, cash can be transferred easily from one country to another to settle the sums of trade.

- Economic development and growth

Private sector plays an important role in the economic growth through investments. In this approach, banks provide loans at reasonable interest rate to firms - mainly small and medium sized businesses- that do not have access to financial markets. Hence, banks support the participation of the private sector in the economic growth and development.

## D. Bank's Management

Mishkin (2010) defines the four primary principles of assets and liabilities management that banks use in order to make the highest possible returns at low risks. These principles can safeguard the position of banks when they face unpredicted circumstances such as deposit outflows or instability in the financial markets.

### *1. Asset Management*

The main purpose of banks is maximizing profits by seeking the highest possible returns on securities and loans at low risk while holding adequate provisions of liquid assets. To do so, Mishkin (2010) states that banks search for borrowers who are unlikely to default on their loans and are ready to pay high interest rates.

Further, banks should diversify their asset portfolios by holding a wide range of assets at low risks and high returns (short and long term bonds, TBs, and loans to different sectors). This diversification is important for banks to protect themselves from any crisis that would emerge in the financial markets or in the economy. For example, some banks have concentrated their loans to energy companies to profit from the boom in this sector. Unfortunately, this sector faced a slump in the 80s which drove some banks to bankruptcy especially in Texas, Louisiana and Oklahoma. (NYT.2015) and (FDIC.2000). Similarly, some banks have concentrated their lending to the real estate sector which led to the financial crisis of 2007-2008. (IMF.2012)

### *2. Liquidity Management*

Banks in general keep a sufficient cushion of liquid reserves in order to be safe and solvent especially that the majority of their assets are illiquid loans with long term maturity. Whereas liabilities are liquid deposits redeemable on demand. This situation becomes a big issue if a big number of depositors demand their money at one time no matter is the level of solvency of the bank.

Bank runs have contagious effect on other banks in the economy because depositors with the information they have cannot distinct solvent and insolvent banks. Therefore they consider any bank to be in difficulty and insolvency so they rush to withdraw their money from both solvent and insolvent banks. To be protected against these deposits outflows, Mishkin (2010) states that banks must keep enough liquid assets and cash on hands to meet the obligations toward depositors and Central Bank (required reserves).

### *3. Liability Management*

In order to compete with each other, banks must acquire funds at low costs in order to transform them into assets that generate high returns.

Before 1960, banks did not have an easy liability management because they used to take liabilities as fixed (deposits) and spent time trying to make an optimal combination of assets. For this reason, asset management has been the major emphasis of the banks.

According to Mishkin (2010) and Choudhry (2007), at that time 60% of the banks liabilities came from checkable deposits (demand deposits) with no paid interest as stated by the law. Therefore, banks couldn't compete with each other. Similarly, the markets of overnight loans between banks were not well developed, therefore banks seldom borrowed from each other to meet their needs of reserves. Starting in the 60s, the money center banks (large banks) of Chicago, New York, and San Francisco explored ways in which their liabilities provide them with liquidity and reserves. They did so by expanding the overnight loan markets (Federal Fund Market) and introducing new financial instruments such as CDs (1961). In this case, banks could manage the new liabilities to meet their asset growth target.

### *4. Capital Adequacy*

The amount of capital banks must hold in their balance sheet is controversial and raise conflict of interest between the financial regulators and the banks' owners. Small capital puts banks at risk of failure when they face unpredicted circumstances whereas excess capital has negative impacts on the banks profitability. For this reason, banks must hold an adequate capital to compromise between the risk of failure and the return on equity.

a. Bank Failure

When banks find themselves not able to meet the obligations of depositors and other creditors, they go out of business because they are insolvent. For this reason banks keep enough cushion of capital to absorb losses.

b. Returns to Equity Holders

Although higher capital may prevent bank failure, it influences negatively the owners' interests. Owners prefer low capital account to generate higher returns on equity (ROE).

$$\mathrm{ROE} = \frac{(\text{Net Profit})}{\text{Equity Capital}} = \mathrm{ROA} \times \text{Equity Multiplier}$$

From this equation, we can notice that banks that hold less capital in their balance sheets perform well in terms of profitability to owners.

c. Capital Requirements

Banks are required to hold a minimum of capital as decided by the regulatory authorities in order to protect the banking sector from any inconvenience that would arise. This capital requirement might be different from the ones imposed by Basel frameworks.

### E. Importance of Financial Regulations

In the last two decades considerable concerns have been raised about the safety and stability of the financial systems on the national and international scale. These concerns emphasize on the crisis that happened in Russia, East Asia, Brazil and lately the subprime mortgage crisis which has been the trigger of Basel III accord.

The major concern for economists is not only finding solutions for financial instabilities but also working on preventing them because such happenings are becoming frequent and easy to spread to other economies due to the liberalization of financial markets and the presence of “Free international capital markets”.

In the economic literature, financial instability comes as a result of systemic risk. According to De Bandt and Hartmann (2000), systemic risk is the basic concept to study any financial instability and response to it. Bank runs are not in the core of systemic risk analysis, but the main concern is the contagion effect of any failure. Contagion effect means the strong circulation of failures from one entity, system, or market to another. At the present time the fluctuations of asset prices in the financial markets due to its sensitivity and the large value payments in free capital markets can play a role in the propagation of shocks and crisis through the financial system. Similarly, Kauffman and Scott (2003) define systemic risk as the risk of collapse of a whole system. Hence, systemic risk in the banking system is characterized by many banking failures in a given country, in many countries or in the world. Bartholomew and Whalen (1995) state that systemic risk is an event that affects the whole banking and financial system in a way it spills over from one system to another.

From this short literature review, systemic risk can be explained more by the contagion effect of a shock (bank runs) and not by the shock itself. Banks in any country are connected to each other by assets and liabilities. In addition banks are interconnected across countries through the same procedures. Due to this heavy connection, only one bank needs to face the initial shock so via the transmission chain other banks will fail too causing a banking crisis.

A cross country empirical study done by Hoggarth, Reis and Saporta (2001) found that banking crisis in any country contributed to a loss of 15% to 20% of GDP depending on the development of the banking sector.

Contrarily to previous researches done on the same topic, they found that losses in output are higher in developed markets with developed financial markets and banking system than in emergent markets. They also found that banking crisis is severe in emergent markets when it comes together with currency crisis especially the countries with fixed exchange rate regime.

In emergent markets, GDP losses are larger in the case of twin crisis- banking and currency crisis- than if banking crisis solely. The same study concluded that crises in developed markets last on average longer than in emergent markets. For this reason, losses in GDP are found to be larger in developed economies.

Banking crisis affects the whole economy or part of it. The first affected parties or “direct losers” in the case of banking failures are:

- Shareholders lose their equity holdings
- Depositors lose their savings
- Different creditors to the banks like other banks or creditors in the securities markets
- Businesses who are dependent on banks funds to finance their potential projects and find difficulties to reach other sources
- Tax payers who will suffer from future tax increase as a result of government intervention to rescue the financial markets

Friedman and Schwartz (1963) said that banking crisis can contribute to a sharp and unpredicted contraction in the stock of money leading to a recession. If some banks witness bank failure while others are in capital constraint, the supply of credit to the economic forces may contract affecting both firms and households. Firms will not find available sources of credit to finance their productive projects especially that firms that are not rated or big enough cannot have access to credit from the securities markets. This situation would restrain investments and demand for labor so it would affect negatively the economic growth.

In addition, credit rationing imposes on households to adjust their spending at the time of crisis and hence consumption decreases. Banking crisis in this case affects both the demand and the supply side of the economy which intuitively means a big output drop in the short run that would be aggravated if the banking crisis lasts for a longer period leading to banking failure spread.

Moreover, the decline in investment is the main reason of negative capital accumulation thus negative economic development. This situation is reached when the banking crisis lasts for a longer period of time. (Bernanke, 1983)

Theoretically this scenario sounds to be extreme because Benanke (1983) alleviated the importance of other credit channels in credit supply for both firms and households. To solve this dilemma, Fama (1985) confirmed that the bank credit channel in both developed and emergent markets cannot be substituted by other channels because of the type of borrowers and the intermediation role of banks. Borrowers like households and small to medium sized companies are the least able to access the securities markets as an alternative source of funds and they are not even reliable to issue commercial notes to finance their projects. As for the intermediation role, banks have the expertise to set the creditworthiness of their actual and potential borrowers. They have accumulated enough information to differentiate between “good and bad borrowers”.

On the other hand, Diamond and Dybvig (1983) focused on the depositors’ side. Customers deposit their money in banks because they have confidence to leave their money in the form of demand deposits in order to use them when they are in liquidity pressure. This mechanism if interrupted because of the soundness of the banks, depositors will not feel safe to leave their funds at the bank. Therefore, the whole system will be in panic especially that trade, transactions, and available loanable funds would be impaired. (Freixas et al, 2000)

An empirical study done using the data of loans in the United States showed that tight banking credit slows output growth. (Lown, Morgan and Rohatgi, 2000) Similarly, Hall (2000) mentioned that a shift in the credit supply by banks affected investments in the United Kingdom in the recession of 90s.

One opposing opinion questioned about the causality between output reduction and banking crisis. Hoggarth and Thomas (1999) evoked the crisis of Japan to give an opinion about the coincidence of banking crisis and recession. The shift in bank lending reflects either a shift in the demand of loanable funds or a shift in the supply of funds. Although the causality is important in the economic analysis, I will not stress on this idea because regardless of the direction of causality, this will not affect the impact of banking crises on any economy.

On the micro level, the banking crises would alter the welfare of the society. Referring to a cross country analysis, banking crisis leads to a negative output growth which means a decrease in income. Consequently, the real purchasing power of individuals will be impaired affecting the individuals' utility and causing a welfare loss to the economy. (Bank of England, 2001)

From this short literature review, theories and empirical studies recognize the vital function of banks in the economy. When this function is threatened for any reason, the entire economy would be affected. For this reason regulators and governments take big concern regarding the soundness of the banking sector.

## 1. *Source of Instabilities in the Banking System*

Several circumstances could make the banking sector vulnerable and unstable. This instability could affect the entire economy if the concept of systemic risk is present.

Asymmetric information: this term describes when one of the market participants has access to more valuable and relevant information than the other counterparty. This can create a problem in the demand and supply of loans since it affects negatively the good functioning of the markets. Asymmetric information conducts to two major problems in the credit cycle, adverse selection and moral hazard. The first one takes place before the transaction while the second one occurs after. For instance when the lender is unable to differentiate between the "good and bad borrower" because of lack of relevant information, they tend to treat the two kinds of borrowers in the same manner by imposing high interest rate to cover the assumed risk of the investment. This adverse selection takes away the good borrowers who are not willing to pay the high interest rate and keeps the bad borrowers. Moral hazard arises once the loan is settled because bad borrowers are intended to use the money in risky investments with high yield in order to cover the high interest rate imposed by the bank.

Since banks do not have control over the borrowers' activities, bad borrowers may default.

In addition, asymmetric information may affect the entire banking system by causing banking panic. If one bank faces difficulties of any kind they will reduce the credit supply and increase the equity in order to ensure their solvency. This fact can be perceived as a bad sign because economic agents do not have access to significant information and will consider the case of one bank as a general situation. This confidence crisis may lead to a real liquidity crisis once depositors rush to withdraw their money. Liquidity shortage causes credit crunch and many productive investments would not be financed causing a growth slowdown.

Financial liberalization: state control and regulations over the financial system can restrict the market participants to determine the pricing mechanism through supply and demand. This control can raise externalities that prevent the market to run at its optimal level. Many dimensions of financial regulations exist. The first is reserve requirements and credit control, the second is new entrants' barriers, the third is interest rate control, the fourth is restrictions on capital accounts and global capital flow, the fifth is prudential regulations and domestic supervision, the sixth is state ownership of banks and finally the policies of the securities markets (Abiad et al. 2005). Financial liberalization has positive effect on the long run economic growth by enforcing the development of the financial markets. However many academics considers that financial liberalization makes the financial markets more risky and vulnerable and consequently raise the systemic risk and its catastrophic concerns since market participants would engage in excessive risk taking activities in the absence of state control.

According to a research conducted by Detragiache (1998), the results show a relatively strong correlation between financial liberalization and banking crisis. Nevertheless if the financial liberalization is accompanied with a resilient institutional environment, the adverse consequences will be weak on the banking system. Similarly, Dell Aricia and Marquez (2004) see that financial liberalization motivates the credit and liquidity demand and hence increase investments and economic growth.

Spillover effect (contagion effect): banks are interconnected to each other and with other economic participants. When one bank faces financial difficulties or losses, the negative effect would be transferred to other banks or to the entire system. Contagion effect when happened creates a confidence crisis and panic so people will rush to withdraw their deposits. The consequences of this situation are grave because it affects the soundness of the entire banking system and decrease the credit capacity in the economy.

Procyclicality: It happens when the economic trends are magnified during an expansion or recession. When banks’ behavior is inefficient it can amplify the economic trends. During economic expansion, banks are driven by their willingness to maximize profits without taking into concern the real credit risk. They will wider the credit cycle by exploiting all lending opportunities without assessing that wide proportion of their financed investments are bad. This excess lending gives a falsified economic status since it causes liquidity surplus and credit bubble, so that the asset and real property prices increases so do the mortgage loans. Banks thereby hold risky assets in their portfolios that might cause a real crisis and recession once borrowers default and lending ability is narrowed.

Government intervention: The intervention of governments in the banking sector is the cause of moral hazard and many banking crises. Government usually intervenes in order to rescue the banking system from collapse. Large banks are the most benefiters of government intervention since they are aware that they are “too big not to be allowed to fail” and depositors are backed with deposit insurance. Therefore they engage in risky activities and thus increase the scope of systemic risk.

## 2. *Types of Risks in the Market*

Mishkin (2010) defines risk as uncertainty that affects the normal running of an activity. Banks are exposed to many types of risks that make these institutions vulnerable and unstable if they do not engage in an adequate risk management. Many types of risk exist in the market but the ones related to Basel III framework are defined as follow:

Market risk: the fluctuation of market prices can cause gain and losses to different counterparties. This market risk can affect banks if they hold in their portfolios a set of assets exposed to price fluctuations such as securities, shares, bonds, currencies and commodities.

Credit risk: the default of borrowers or securities issuers to honor their obligations toward banks defines the credit risk. This risk has been the major concern of Basel Committee so capital requirements have been mainly based on credit risk due to its grave impact on the credit channel.

Interest rate risk: interest rate risk is defined as the negative change in interest rate that may lead to potential losses for banks. When the change in the rate is favorable, banks will enjoy an increase in their profitability and their market equity. However if the change is unfavorable, banks will suffer a decrease in their interest income as well as a decrease in the returns on their investments in the securities markets.

Systemic risk: systemic risk has its own particularities among all market risks since it can cause a systemic crisis as experienced in the last financial crisis. Systemic Risk is defined as the likelihood that the whole system fails or collapses. This risk is associated with the contagion effect. For instance, as all banks and institutions are financially interconnected the difficulty that one party encounters may be spread among the system to other institutions causing a domino effect so failure will affect the entire system.

Liquidity risk: banks play an important intermediary role in the economy since they channel funds from lenders to borrowers. This process is characterized by the time gap between short term deposits and long term loans. In other words, banks can have liquidity problems because they hold in their balance sheets long term assets and short term liabilities. For this reason banks should adopt an adequate liquidity management in order to prevent any liquidity pressure that may affect the normal flow of their operations.

## 3. *Financial Innovations*

Market crisis are linked to financial innovations. Minsky (1986) relates financial innovations to instability in the market which justifies the intervention of governments and regulators in the financial system.

Redmond (2013) agrees with this notion but he differentiates between the types of innovations in a manner that not all new instruments have adverse effects on the market. On the contrary, researchers must include the quality of instruments, the function of intermediaries and the scope of externalities in any economic research.

In the financial literature, innovations are not limited to the release of new financial instruments, but they can be inventive combination or redesign of existing ones in order to increase the welfare and the social benefits of the economic participants (Redmond. 2013).

In any market, the release of a new product follows two mechanisms: Adoption or Diffusion. In this regard, Rogers (2003) defines adoption of a new release as the fact of observing, testing, experiencing and waiting for good results. Consequently, when the market is pleased with the results they would adopt the new release. On the other hand, he describes diffusion as the widespread of the new release as a result of competition and profit oriented market participants.

The latter mechanism justifies the series of financial crisis that happened in the mid-60s when the banking system witnessed a rapid growth of new financial instruments (Minsky.1986). In this approach, Mishkin (2010) considers that the release of CDs and other financial instruments after 1961 was a type of liability management that large banks adopted in order to increase liquidity and thus the ability to compete with each other and maximize profits.

Redmond (2013) defines three main factors that make the spread of financial innovations a trigger to financial crisis: intermediaries, deterioration of instruments' quality and externalities.

Intermediaries: The financial innovators are in most cases the bank themselves (investment banks). When they play the role of innovators and intermediaries at the same time, the knowledge and information about the new instruments would not be shared with customers leading to a loss in quality control checking.

In the late subprime mortgage crisis, investment banks play a central role in creating mortgage securities and in connecting mortgage brokers (supply side) with investors (demand side). Investors considered the securities to be low risky with high yields. In fact, they were highly risky and heavily complicated (FCIC.2011).

In this type of securities, the shadow banking system replaced the traditional banks (Lerner and Tufano.2011). This part will be mentioned later in the thesis. Morganson and Rosner (2011) and Bair (2012) see that in the late crisis, investment banks lost the feature of independent check on the innovations favor a new role “push securities” to generate high profits. They substituted quality for quantity to answer the great demand on these securities.

In addition, the lack of intermediaries coincides with the negative role of credit rating agencies. Investors relied on the rating agencies for risk assessment at a time where these agencies were getting paid by innovators. Consequently, investors had no independent source of quality assessment.

Deterioration of instruments’ quality: Allen and Gale (1994) evoke the fact that a lot of financial innovations are a result of existing securities reconfiguration. Hence, the quality of new securities depends mostly on the quality of the existing ones that may diminish over time and become risky. In most cases, new securities are introduced to investors with high yield to raise demand. Therefore on the demand side, investors perceive the yield but not the risk (Frankel. 1991).

In the recent crisis, quality has been deteriorated as a result of high demand of mortgage securities. To answer the high demand, investment banks lowered lending standards on the subprime mortgages. They supplied funds to borrowers who may default (FCIC.2011).

Externalities: All economic participants are linked in a way to each other. When financial innovations fail, harm also spreads to parties that are not engaged in these transactions because the financial system is linked to almost all businesses and financial firms are largely interconnected (Allen and Gale.1994) and (Lerner and Tufano.2001). Therefore shocks would spread causing extensive externalities.

In the latest crisis, the collapse of mortgage securities impacted not only the involved parties, but it spread all over the economies. The international economies witnessed unemployment increase, bank failure, wealth disappearance, equities markets crash and firms bankruptcies. Therefore the impacts of financial innovations come mostly in the form of externalities that affect welfare and social benefits (Lerner and Tufano. 2011).

## **4.** ***"Too Big to Fail" and Systemic Risk***

The 2007 crisis revealed the weight of systemic risk in the propagation of the crisis outside the American borders. Since that, economists and regulators have been focusing on the development of systems that are able to avoid and perceive systemic risk. (Pais and Stork .2013)

"Too Big To Fail- TBTF" concept is a trigger for systemic risks and later systemic crises when spillover effect take place. Large banks create moral hazard problem. They take risky projects and act less prudently as they know they are not allowed to fail because the cost of their failure is heavy on the economy that no government can allow. (Stern and Feldman.2004)

On the other hand, creditors of large banks do not have the incentive to check on banks' behavior because they are expecting the government to back their loans under deposit insurance which Stern and Feldman named it "TBTF Protection". Therefore, governments are indirectly raising the moral hazard problem and the exposure to systemic risk.

As they process a large number of the nation's financial transactions, large banks have effectively a big influence on the nation's financial system. A lot of institutions and banks are financially connected to them. They constitute one financial circle that connects all players together. Once one of these large banks fails, the shock will be therefore transmitted to other institutions creating a domino effect. (Stern and Feldman.2004)

Jovian (2009) claims that large banks in the last crisis were heavily risk taking and highly leveraged in order to achieve high returns especially that risky projects are more profitable in case of success but in case of failure banks are not allowed to fail, they will be automatically bailed out to avoid any financial instability.

Bailing out large banks creates externalities that would affect the society in the short and long run. First, regulations would be no longer effective since large banks are aware that they will be rescued. In addition, when banks are bailed out governments are misallocating money to rescue failed institutions while money when allocated to the productive sectors will induce economic growth. Furthermore, tax payers shoulder the burden of banks' insolvency since that the government uses the taxpayers money. Consequently, national savings decrease hence affecting both growth and future generations. (Moosa.2010) and (Stern and Feldman.2004)

Pais and Stork (2013), Stern and Feldman (2004) state that systemic risk can be diminished if the financial institutions are decreased by size whether by restricting them from some activities or by splitting some banks. In this case, banks are no longer “too big to fail”, bailouts to preserve confidence in the financial markets are no longer costly, and the effect of a single bank failure would not be transmitted to the system.

# CHAPTER III

# BACKGROUND-BASEL

In the 1980s, the international banking system faced many banking crises and disruptions in the financial markets that drove the central banks of G10 countries to meet in Basel, Switzerland to set an international benchmark for banks' regulations. The main goal of Basel committee is to set some standard rules of bank's supervision in order to strengthen the sector and ensure the stability of the financial system throughout the world.

Balthazar (2006) considers that even if some banking crises have their own characteristics and particularities, some elements are found to be common among all crises and that what the Basel accords were trying to solve. He states that these commonalities are witnessed in almost all countries: deregulation of the financial markets which led to asymmetric information, entry of new banking players which set pressure on returns, asset prices fluctuations and tight monetary policy that cause pressure on the liquidity of banks.

Before Basel accords, the domestic regulators and central banks decide the capital requirements of each bank subjectively in order to guarantee their solvency. The first accord (Basel capital accord) or Basel I was introduced in 1988 and implemented in 1992. This accord emphasizes on credit risk by setting a minimum capital requirements to guarantee the soundness of the international banking system and to reduce the competitive inequalities among banks.(Balthazar.2006) and (Eun and Resnick.2008)

The minimum capital adequacy guarantees the solvency of the bank and work as a cushion against losses and failure. In 1996, the Basel committee perceived to introduce an amendment to the accord to cover the market risks. In 2004, the committee released the Basel II accord to include the operational risk and was implemented in 2006. The mortgage crisis of 2007-2008 revealed the vulnerability of Basel II to prevent any crisis especially that the last crisis was systemic. As a result, the Basel committee introduced the Basel III accord in 2010.

## A. Basel I

### *1. Minimal Capital Requirement*

The first framework of regulations was set in 1988 under Basel I. Under this accord, the minimum capital requirement assures the solvency of the bank by assuming the risk of on balance and off balance sheet elements then requires a capital amount of 8% of those risk weighted assets. The main characteristic of this ratio is treating each type of assets according to their assumed risk. Further, off balance sheet elements are considered in this accord especially that the derivatives grew rapidly in the 1980s.
As per the accord, capital is divided by function of quality into two classes: Tier I and Tier II.

Tier I capital is considered as the core of bank’s capital. Tier I includes:
Paid up capital: represents the shareholders equity of fully paid common stock and non-cumulative perpetual preferred stock (Basel I. 1988)

Disclosed reserves: represents all retained profits that are not paid in the form of dividends and other surpluses such as share premiums, and general and legal reserves (Basel I.1988)

Goodwill and investments in subsidiaries have to be deducted from tier I capital. Goodwill is considered as a subjective element that has a small value in case of bank's liquidation. As for investment in subsidiaries, they are deducted from the capital base in order to avoid the "double gearing effect". (Balthazar .2006) and (Casu et al. 2006)

Tier II capital - known as supplementary capital - was restricted not to exceed 100% of tier I capital. It includes:

Revaluation reserves: the revaluation of securities to take into consideration the change in their value (increase). The Basel committee sets a discount of 55% on the difference between the two values (old and new).

General provisions: they are set to hedge against unperceived future losses.

Undisclosed reserves: they are not included in the balance sheet, but they must be qualified as the disclosed reserves.

Subordinated debt: must not exceed 50% of tier I with a minimum of five years maturity.

As for the asset side, Balthazar (2006), Eun and Resnick (2008) divide the risk weighted assets into four categories with different assumed risk. Cash and OECD bonds are weighted at 0% because they are riskless assets. Short term claim on OECD banks and public sector or non OECD banks with maturity less than one year are perceived as low risky assets. So the Basel committee assigned a risk of 20% on this type of assets. Mortgage loans are assumed to be risky assets at rate of 50% weighted risk. The last category-considered the riskiest one- includes corporate loans, fixed assets, and claims on non OECD banks with maturity greater than one year and is assumed to be 100% risk weight.

### 2. *Risk Asset Ratio*

Risk Asset Ratio is used to calculate the minimum capital required. For instance, assume a bank with total assets of USD 1,000,000 and divided into 4 categories: US government bonds, short term securities, mortgage loans and commercial loans. The table below summarizes the capital required to these assets under Basel I.

**Table 1- Risk weights for different categories of assets**

| Assets | Value in USD | Risk Weight | Risk Weighted |
|---|---|---|---|
| US government bonds | 200,000 | 0% | 0 USD |
| short term securities | 300,000 | 20% | 60,000 USD |
| mortgage loans | 100,000 | 50% | 50,000 USD |
| commercial loans | 400,000 | 100% | 400,000 USD |
| TOTAL | 1,000,000 | | 510,000 USD |

The risk associated to these assets is USD 510,000 which requires a capital of USD 40,800 (510,000 x 8%) to cover the risk.

The risk asset ratio limits the bank exposure to credit risk since each bank has to abide by these capital requirements in order to be considered solvent. Therefore the solvency equation can be written as follow:

$$\frac{\text{Tier I } + \text{Tier II}}{\text{Risk Weighted Assets}} \geq 8\%$$

### 3. *The Amendment of 1996*

The Basel committee introduced in 1996 an amendment to cover the market risk associated with the banks' operations. Commercial banks channel funds from depositors to borrowers, therefore they hold a set of illiquid assets since that loans have long term maturity whereas deposits can be withdrawn at sight. In addition, investment banks are exposed to different types of market risks since that they are active in the securities markets.

As defined earlier, market risk is the risk of losses resulting from market prices fluctuations. To avoid the market risk, the Basel committee introduced in 1996 Tier III capital (short term subordinated debts). Tier III is restricted to be less than 250% of the tier I capital so that 28.5% of market risk is covered by Tier I capital. (Balthazar. 2006) Therefore, the new solvency equation can be written as follow:

$$\frac{\text{Tier I capital} + \text{Tier II capital} + \text{Tier III capital}}{\text{Risk Weighted Assets (credit} + \text{market risk)}} \geq 8\%$$

### 4. *Weaknesses of Basel I*

Despite the critics on this accord, Basel I improved the banking system when compared to the situation before 1988.

First, it created standardized regulations that are adopted by banks in 100 countries. Moreover the international banks are subject to the same set of regulations wherever they are willing to conduct their business. Additionally, competitive banks that have the same target markets are now following the same regulations which enhance equal competition. (Balthazar. 2006)

Although Basel I has contributed to the banking system, it has been considered as vulnerable because it has not been designed in a way to catch up with the growth of financial innovations. Moreover, Balthazar (2006) considers that banks are enough sophisticated to estimate their capital needs known as economic capital. This capital once estimated by the bank itself may differ from the regulatory capital. If the economic capital is above the regulatory capital, banks are not affected. But the problem arises when the economic capital is below the regulatory capital. Thus the bank must maintain a capital level above their estimation which may destroy the shareholder value. In response to this issue, banks used sophisticated techniques to compromise between the economic and required capital in a way they get closer to each other. This manipulation is called “capital arbitrage” and it was facilitated by the growth of financial innovations. The easiest technique is to invest inside a specific risk weighted category in riskier assets. For example, a bank can invest in high yield bonds (speculative grade bonds) that are risky with a similar capital requirement than investment grade bond.

In addition, banks used more innovative techniques by creating financial instruments that lower their required capital but not the risk. Securitization and credit derivatives are a good example. Balthazar (2006) and Saunders (2010)

Securitization can be conducted by transmitting certain illiquid assets from the balance sheet such as loans to another entity entitled the “special purpose vehicle” SPV.

The SPV buys the loans and finance the operation by issuing ABS (Asset Backed Securities). The securities issued by the SPV have different degrees of seniority. Therefore the SPV's debts are made in two tranches:" investor tranche" (senior loans) are paid first and the low quality is "equity tranche" (junior loans) and retained by the bank. Investor tranche is the better quality since they are paid first and the losses are firstly absorbed by the "equity tranche". This whole operation means that the risk is still in the banks' balance sheet but the required capital is now lesser.

Another vulnerability of Basel I is linked to the fact that capital requirements do not involve all risks that the banking system would face. It relies only on credit risk to calculate the risk weighted assets. Even after the amendment of 1996, other types of risk are still unconsidered like the operational risk.

Keiding (2013) criticizes the method of Basel I in weighting the risk of assets of the same category in a similar way. For instance, corporate loans of the rate AAA are still weighted 100% risk whereas OECD banks loans could be rated $A^-$ and weight 20% risk. Moreover, Basel I is based on an arbitrary measure since the 8% required ratio is random and is not constructed on clear solvency targets.

### B. Basel II

Although the first Basel accord was reviewed in 1996, it was not enough to cover all the financial innovations and the risks that arise. Basel II emerged after a discussion for the need to improve the lacunas of Basel I capital requirements. The review of the first Basel accord follows two trends: first, banks witnessed a fast extension in securitization activities. In addition, large banks developed their internal models to assess risk. Therefore, divergences arise between the risk assessments of

Basel I and the advanced practices of banks in a way Basel I was not able to recognize the sophisticated securitization and arbitrage strategies followed by banks. (Tarullo.2004)

The release of the first consultative paper CP1 took place in 1999. It contains a set of adjustments of Basel I. In 2001, a second paper CP2 was released to modify some proposed ideas in CP1. In 2003, CP3 came out and the final proposal Basel II accord was published in 2004.

### *1. The Consultative Papers*

The first consultative paper revised issues concerning Basel I especially that some banks are exposed to interest and operational risk in a substantial way.

The "Three pillar" approach was introduced in the first consultative paper. The first pillar deals with capital rules, the second pillar with supervision and the third with market discipline. This approach permits the regulators to require more capital to some banks. In addition, it emphasizes on transparency so that the regulators can assess the risk status of banks. Moreover, CP1 suggests the possibility to use external risk assessment services from institutions like S&P and Moody's. Their assessment would be a basis to which risk weighted category the asset belongs. The main difference between CP1 and Basel I is the introduction of 150% risk weight category.

CP2 suggested the introduction of IRB-internal ratings based- methods for small and medium sized banks. This implies that banks could use their own methodologies to assess the default of their assets and then convert the calculations into risk weights as required by Basel. (Tarullo.2004)

The IRB approach was controversial because academics questioned about the appropriateness of the new measures. On the banks side, complaints raised because banks have to reveal proprietary information in order to be able to use IRB. In addition, their capital requirements under CP2 proposal were expected to increase.

As a result, Basel committee decided to modify the proposal for the third time. CP3 includes some adjustments on small business lending, asset securitization and credit and operational risks. CP3 was the last consultative paper before the release of Basel II in 2004. (Balthazar.2006) and (Tarullo.2004)

## 2. Structure

The new accord was prepared to be applied to all internationally active banks in order to ensure the steadiness of the international banking system as well as to promote the use of feasible practices in risk assessment. In addition, it aims to save integrity of capital between banks and their subsidiaries so that the “double gearing” problem would be eliminated. (Basel committee.2006) and (Balthazar.2006)

Under Basel II, the capital requirements are defined as a part of the “Three pillar approaches”: one is quantitative and deals with the minimum capital adequacy and the other two are qualitative and regard supervision and market discipline.

The quantitative pillar is based on 8% rate as Basel I, but the major difference is that operational risk is now included in the calculation of capital requirements along with credit risk and market risk. The new equation of the minimum capital requirement becomes:

$$\frac{\text{Tier 1} + \text{Tier 2} + \text{Tier 3}}{(\text{credit} + \text{market} + \text{operational})\text{risks}} \geq 8\%$$

Beside the inclusion of the operational risk in the minimum capital requirements, the “one size fits all” concept that was present in Basel I is no more effective in Basel II. In other words, in Basel I assets are divided into categories for each is assigned a risk weight. On the contrary, in Basel II assets are assessed on individual basis.

Basel II suggests different ways to calculate the required capital for credit risk. It can be computed following the standardized approach (SA) or the internal rating based (IRB). As for the operational risk, the required capital is computed following three approaches: 1- Basic indicator approach (BIA), 2- the standardized approach (SA) and 3- the advanced measurement approach (AMA). Finally, two approaches are suggested to compute the market risk: the standardized approach and the internal model approaches – foundation and advanced. (Balthazar.2006) and (Basel committee.2006)

### a- Pillar 1

#### i. Credit Risk – Standardized Approach

The standardized approach (SA) has the same concept of Basel I in risk weighting but risk weights are no longer based on the categories of the borrowers (Sovereign, corporate, real estate...). The risk assessment of borrowers is now based on the rate estimated by the “External Credit Assessment Institutions” (ECAI) provided that these institutions meet the international standards of transparency, credibility and objectivity. The external rating will then be charted on the international ratings of Standard & Poor’s before converting the rate to risk weights. Table 2 summarizes the risk weights of different ratings.

**Table 2- Risk weights under (SA)**

| Credit Assessment | AAA$^+$ - AA$^-$ | A$^+$ - A$^-$ | BBB$^+$ - BBB$^-$ | BB$^+$ - BB$^-$ | B$^+$ - B$^-$ | Below B$^-$ | Unrated |
|---|---|---|---|---|---|---|---|
| Sovereign(1) | 0% | 20% | 50% | 100% | 100% | 150% | 100% |
| Banks option 1 (2) | 20% | 50% | 100% | 100% | 100% | 150% | 100% |
| Banks option 2 (3) (Short Term) | 20%<br>(20%) | 50%<br>(20%) | 50%<br>(20%) | 100%<br>(50%) | 100%<br>(50%) | 150%<br>(150%) | 50%<br>(20%) |
| Corporate(4) | 20% | 50% | 100% | 100% | 150% | 150% | 100% |
| Retail (5) | | | | 75% | | | |
| Residential property | | | | 35% | | | |
| Commercial Real Estate(6) | | | | 100% | | | |

Source: Balthazar. 2006, "RWA in the Standardized Approach"

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(1) The risk weight is no longer based on OECD membership, but on their rating

(2) Under option 1, banks are weighted "one step less favorable" than the claims on sovereign bonds

(3) Banks are risk weighted as a function of the rating. Concerning the short term claims (≤ three months), assets are treated "one step more favorable" than the claim on sovereign bonds. Securities firms follow the same rules as banks

(4) Insurance companies

(5) Individual and small businesses

(6) The Basel committee suggests not applying a risk weight lower than 100%

### ii. Credit Risk- Internal Rating Based Approach

IRB is a flexible approach that allows banks to calculate the risk weights based on their internal methods for risk assessment. Under the IRB approach, banks are supposed to improve their risk management on a continuous basis so they must develop new methods that cover their growing risk exposures. Risk exposure must be divided among six categories of borrowers: corporate bank, equity, sovereign, retail and purchased receivables. The regulators assigned a complicated formula based on four parameters to calculate the risk weights: 1- Probability of default PD, 2-Maturity M, 3-

the loss given default LGD and 4- the exposure at default EAD. (Balthazar.2006) and (Basel Committee.2006)

iii. Operational Risk - Basic Indicator Approach

This method assumes that operational risk goes in proportion with the activities of the bank. Thus the regulators require the banks to hold a capital equal to 15% of the average gross income of the last three years. Only positive gross income must be included in the computation. (Basel Committee.2006)

iv. Operational Risk - Standardized Approach

Similar to the Basic Indicator Approach, the Standardized Approach computes the operational risk in proportion with the gross income of the last three year but the difference is that (SA) divides the bank's activities into eight categories for each one of them they assigned a percentage BETA that reflects the risk exposure and the size of the category. According to the Basel Committee (2006), the equation of the capital requirements for operational risk is:

$$\mathbf{Required\ Capital} = \frac{\sum_{\mathbf{y=1}}^{\mathbf{3}} \mathbf{max}\left(\sum_{\mathbf{i=1}}^{\mathbf{8}} (\mathbf{gross\ income\ y} \times \boldsymbol{\beta}\mathbf{i}), \mathbf{0}\right)}{\mathbf{3}}$$

- **Y refers for the year and i for the category**

**Table 3- percentage (Beta) for each category**

| Category | Trading & sales | Corporate finance | Payment &Settlement | Agency Services | Commercial Banking | Retail Banking | Asset Management | Retail Brokerage |
|---|---|---|---|---|---|---|---|---|
| % Beta | 18% | 18% | 18% | 15% | 15% | 12% | 12% | 12% |

Source: Basel Committee (2006), "international convergence of capital measurement and capital standards"

### v. Operational Risk - The Advanced Measurement Approach

This approach is a sophisticated one and is based on the bank's own modeling for operational risk. Banks are allowed to use their system after the approval of the regulations authorities. In addition to that, banks must establish a proper assessment and an acceptable capitalization of their operational risks. (Basel Committee.2006)

### vi. Market Risk

The Basel Committee defines the market risk as the risk resulted from the market price fluctuations that may produce losses. Accordingly, two approaches are adopted: the standardized and the Internal Models Approaches.

Under the standardized approach, banks calculate the risk weights for equity, interest, exchange rate and commodity risks and then compute the capital required according to these four categories. As for the Internal Model Approach banks use their own VAR models in compliance with the standards imposed by the Basel committee.

### b. Pillar 2- Supervision

Pillar 2 represents a set of recommendations for both banks and regulators to guarantee that banks can conduct a good management during any financial difficulties. This strategy enhances the soundness of the banks by recommending them to adopt effective internal control and audit so that they hold enough capital to overcome any emergent risks in the financial systems.

### c. Pillar 3- Market Discipline

In order to protect the stability of the financial system, the Basel committee requires a set of information disclosure to the market participants concerning capital, risk assessment and risk exposure. Hence, the market discipline protects the market participants from asymmetric information regarding the institution they deal with. The disclosure of qualitative information supports the intended results of Pillar 1. (Basel Committee. 2006)

### 3. *Weaknesses of Basel II*

Basel I is no longer suitable with the financial innovations and the growth in the banking activities. It encompasses many deficiencies that Basel II has corrected. The major improvement in the new framework is the (IRB) model since this model focuses on the internal risk assessment of banks which makes their risk exposures closer to the risks they actually encounter. Under Basel II, banks are more risk sensitive and able to develop their proper risk models that fit the risky environment they are exposed to. Although this new framework is a shift toward a more adequate capital and risk management, it received many critics from academics and supervisors.

According to Tarullo (2004), Basel II puts banks in a better position comparing to regulators. The new framework enhances the risk management decentralization and hence empowers the banking institutions. However if decentralization is amplified it can lead to crisis. This point is well demonstrated in the last financial crisis. Moreover, Carvalho (2005) raises the idea of complex implementation of Basel II and the externalities that would arise since that banks would incur additional costs to abide by the new regulations and consequently increase the cost of capital beyond what is seen reasonable.

Besides, Basel II focuses on credit risks and capital requirements without giving any concern for liquidity risk though the latter had been of greater importance in the prudential regulations. Carvalho (2005) considers that liquidity problems could be a trigger for confidence crisis which leads to banks runs and instability in the banking system.

Basel II sets the minimum capital requirement as defined by pillar 1. Regarding this issue, academics questioned about the limits of Basel II in this affair. First, what if the domestic regulators require higher minimum capital than pillar 1? In this way, Basel II would be ineffective.

Moreover, Standard & Poor's (2003) communicated their skepticism regarding the accuracy and validity of the probability of default set by the banks themselves. For instance, if a bank reduces their minimum capital in compliance with Basel II, S&P would downgrade the bank which will practically affect the capital requirements for a given case.

In addition, assets prices are highly sensitive to any shocks that would occur in the economy. If the economy faces any recession or business downturns the asset prices decreases. Basel II shows weaknesses in this matter as the framework didn't take into consideration economic downturns. For instance if the economy faces any shocks, banks' asset values would decrease because of loans write off or instrument prices drop. In this case, banks are required to increase their capital which is difficult in the short run. Therefore, banks resort to sell their high risk weighted assets in order to reduce their capital charges. Purchasers of these assets may consider them as "lemons" therefore banks incur losses by selling these loans at lower prices. (Peterson Institute.2007)

Another deficiency of Basel II that was clearly witnessed during the last financial crisis is that banks rely on credit rating agencies to estimate the risk weights.

These agencies led to negative consequences for two reasons: first, they failed to estimate the risks of complicated instruments. Therefore they overestimated the creditworthiness of market participants. Second, investment banks selling securities were putting pressure on the rating agencies to upgrade their instruments. (Atik.2011) Similarly to Basel I, the new framework caused conflict of interest. Banks aim to maximize their profits while regulators aim to apply the new framework. For this reason, banks tend to transfer the risk to a third party not subject to Basel regulations by pooling many kinds of loans and selling them to intermediaries. Consequently, Basel II caused moral hazard problem as a result of securitization. (Atik.2011)

### C. Financial Crisis-2007

In 2007, the world economy faced a period of financial instability and distress not witnessed since the great depression. The crisis began when the Subprime Mortgage Market collapsed in the United States and spilled outside the borders to reach international markets exposed to mortgage assets and US derivatives. This subprime crisis had a domino effect causing the collapse of many banks around the world.
Keys et Al (2010) and Taylor (2009) mentioned the trends that preceded the crisis. The United States and the developed economies experienced a boom in the property markets caused by the growth of asset securitization, expansionary monetary policies and governments’ policies to encourage home ownership.

In addition, Basel II framework caused an indirect increase in the asset prices including real estate prices. First, as banks find themselves committed to increase leverage to comply with the capital requirements they tended to exploit all gaps and loopholes in the capital framework. they transferred some risky assets which require higher capital charges into a special purpose vehicles that are not subject to capital standards as banks do. These SPVs were funded through short term asset backed securities. Gorton (2008) and Brunnermeir (2009) consider the growth in this shadow banking operations and the lack of regulations contributed to the price bubble.

For instance, when the asset prices rise, “the value at risk” decreases at banks creating a spare capacity in the balance sheets to supply credit. Adrian and Shin (2008) define this situation as a leverage cycle that raises real estate values and consequently increases debt.

Similarly on the household side, the increase in house values increases the household wealth leading to an increase in their leverage. A study conducted by Mian and Sufi (2009) estimated that for each one dollar increase in home values, household takes off 25-30 cents to be used in real spending.

The first mark of difficulties showed up in early 2007 at the Subprime Mortgage market in the United States when institutions incurred losses from the Subprime Mortgage securities and derivatives. Later in 2007, the spillover effect took place and made it a global phenomenon affecting the European banks exposed to US securities. The systemic risk of this distress turned into a systemic crisis by the collapse of Lehman Brothers and the Government bailouts of “Freddie Mac and Fannie Mae”. Consequently, the financial crisis moved to many economies and led to a collapse in global trading and drop in GDP. Thus, the boom of asset securitization which followed the period of financial liberalization was the reason of this risks spillover among the financial institutions and mainly banks. As banks decreased their reliance on deposits favor the short term wholesale funding, they resort to unstable sources of funds that are not subject to prudential regulations. (Valencia.2012)

Following the crisis, policy makers turned to crisis management to absorb the liquidity pressure in the first place and to ensure banks liabilities in the second place. They started by banks recapitalization and reconstruction. Liquidity pressures were absorbed by financial assistance from the governments through bailouts and asset purchases. In addition, deposit freezing was used on individual basis like Parex Bank. The 2007 crisis and the collapse of the shadow banking show the deficiencies of Basel II framework. The IRB approach is considered one of these deficiencies in addition to the omission of liquidity risk so that the Basel committee gathered again to set a new framework called Basel III.

### D. Basel III

The negative impact of the recent crisis on the world economy pushed the Basel committee to address the deficiencies of Basel II by introducing a set of reforms to the banking regulations and releasing in 2010 the Basel III accord. The new framework was scheduled to be implemented starting from20103-2015. However the modifications that took place in 2013 and 2014 extended the period until 2019.

Unalike the previous framework that concentrates on credit risk and capital that banks must hold, Basel III focus on the liquidity and leverage of banks alongside with other risks that are covered in the previous framework. The new framework builds on the “three pillars” of Basel II. However, some modifications are made to improve the quality of capital in addition to the introduction of the new liquidity requirements and risk coverage.

### 1. *Improving the quality of the capital base*

Prior the crisis, banks were highly leveraged. They relied extensively on short term wholesale funds. This situation was accompanied by low regulations regarding risk coverage so that banks were not prepared to overcome any financial stress. Consequently, The Basel Committee paid attention to the imperfections of their previous framework concerning the quality of capital, liquidity pressure and risk coverage.

Under Basel III, the new capital is redefined in this form: tier 3 Capital is removed and tier 1 capital must now involve high quality capital such as common equity and retained earnings.

Similarly to Basel II, the minimum capital requirement has not been changed (8% at least). Though the share of Tier 1 capital becomes 6% of which 4.5% must be common equity tier 1 (CET1) whereas under Basel II tier 1 capital was 4% and CET1 2%. (Basel Committee.2010)

#### a. Capital Buffers

The Basel committee recognized the growing factors of procyclicality during the recent crisis. So they introduced two “capital Buffers” that banks can use during stress periods.

The first additional capital is the “capital conservation buffer” that has to be 2.5% of common equity tier 1 capital. This capital must be hold by banks above the traditional required capital of 8%. As a result, banks are now required to hold 7% of CET1 capital. (Basel Committee.2010) In case the capital levels reach the conservation range, banks must reduce dividends, share buybacks and bonus payouts.

Another decision is taken by the Basel committee to decrease procyclicality is the introduction of the “discretionary countercyclical buffer”. This capital buffer allows domestic regulators to impose 2.5% extra capital charges during high growth credit periods. According to the Basel committee, when the economy faces downturn after a period of credit growth banks would incur huge losses that may affect their financial stability. For this reason, domestic regulators must watch the credit growth and decide when the excess period starts in order to require a countercyclical buffer ranging from 0-2.5 % of CET1.

### b. Risk Coverage

In the recent crisis, some on- and off-balance sheet risks were not covered. The Basel committee introduced some new measures that limit the procyclicality effect in the industry as well as reduce systemic risk. The risk coverage captures the risk emerged from securitization. Banks are required to conduct a deep credit analysis for complex securitizations in order to assess the real risk they are exposed to. In this regard, the new framework has introduced a stressed “Value-at-Risk” approach which requires a certain capital buffer to reduce the negative effects of procyclicality.

Landau (2009) defines procyclicality as the fact that economic variables intensify the economic cycle trends. For instance in a period of boom, trends go higher in the presence of procyclicality and in the period of recession procyclicality makes it deeper. Banks also have activities in the inter-financial markets such as OTC market where no regulations or third party guarantee are present. Consequently, the probability of default will be higher. (Casu et al.2006)

In this approach, the Basel Committee introduced the counterparty credit risk framework which incentivize banks to central counterparties (CCPs) instead of OTC market since that the capital requirement for CCPs is lower than OTC market.

### c. Leverage Ratio

"Containing Leverage" is the term used by the Basel Committee to reduce the leverage of the banks since that the last financial crisis showed that banks were highly leveraged and were forced to reduce the level of their leverage which has amplified the downward trends by putting pressure on asset prices. The "non-risk-based leverage ratio" is now included in pillar 1 and covers the risks that are not covered in the risk weighted assets. It is defined to be 3% at least of CET1 to total exposures.

### d. Systemically Important Banks-SIB

In order to secure the stability of SIBs and absorb the shock transmission between the large interconnected banks, the Basel Committee imposes a capital requirement of 1%-2.5% of CET1 in accordance with the systemic importance of banks. This capital charge may limit the adverse consequences of banking failure on the entire economy. The Basel Committee also added a 1% "loss absorbing capacity" to disincentive banks to grow globally important.

## ***2. Liquidity Risk Standards***

The major change in the new framework is the adoption of liquidity standards for the first time especially that the previous accords omitted the liquidity risk which has caused a huge liquidity pressures during the recent crisis. Effectively, credit risk causes potential losses that capital can absorb. But to be able to absorb losses, capital must be liquid enough. In the recent crisis, capital could not absorb losses because it was not able to be liquidated easily. The Basel Committee sets two liquidity standards: The Liquidity Coverage Ratio (LCR) is designed for short term period and The Net Stable Funding Ration (NSFR) for long term period.

a. The Liquidity Coverage Ratio –LCR

The major objective of LCR is to ensure that banks hold enough liquid assets to absorb cash outflows in 30 days pressure scenario defined as one of the following cases: deposit partial loss, credit rating downgrade, unsecured whole sale funding loss, and derivatives calls.

The ratio is composed of two elements, high quality liquid assets and net cash flows over thirty days. The value of the ratio must be at least 100% in the period of financial stability. The equation is written as follow:

$$\frac{(\text{Stock of High Quality Liquid Assets})}{(\text{Total Net Cash Outflows over the next 30 days})} \geq 100\%$$

b. Net Stable Funding Ratio (NSFR)

NSFR covers the entire balance sheet and is designed to ensure the liquidity of banks for a period of one year. (Basel Committee.2010)

NSFR is built as follow:

$$\frac{(\text{Available Amount of Stable Funding})}{(\text{Required Amount of Stable Funding})} > 100\%$$

The stable funding gathers capital, preferred stocks of one year maturity, liabilities of at least one year maturity, checkable deposits, term deposits, in addition to wholesale funding of one year or less maturity. As for the required funding, regulators assume the liquidity risk to which banks are exposed and then require a rate for each type of assets. (Basel Committee.2010)

### 3. *Evaluation of Basel III*

The final phase of Basel III implementation is set in 2019. Analysts estimate that banks will arrange their balance sheet and their ratios prior to that date in order to ensure a favorable rating assessment from external rating agencies.

Numerous opinions arise concerning the increasing required capital. Some voices disagree because the new framework changes the capital structure of banks. In Basel II, the share of equity has been set to be 2% of assets whereas in Basel III the share has increased to 4.5% plus an additional buffer of 2.5%. Consequently, the amount of equity required as a percentage of assets is 7% under Basel III which will raise the cost of capital in the future and decrease the bank’s profit. However some opinions agree with the new framework because it ensures the stability of the banking system. So when banks are observed to be stable and safer, risks will automatically decrease and banks will have the ability to issue debt at low cost. Moreover, banks with riskless capital structure will enjoy a higher price per equity ratio (P/E).

Went (2010) considers that to comply with the higher liquidity required by Basel III, banks must have low yielding assets so that their high yielding assets would decrease generating less earning. As for the new capital requirement rules, banks would cut dividends or at least reduce payouts in order to raise capital.

In addition, Went (2010) considers the long period implementation to be positive in a way it decreases the cost of capital that may arise due to the new rules. Basel III is able to ensure a stable banking industry causing a risk premium reduction. In this way, banks are not in need of governments Bailouts. (Went.2010)

He also criticizes the new accord of missing a major point, the shadow banking. These hedge funds that are credit providers are not included in the capital requirements although they can have procyclical effects on the banking system as the last crisis has revealed.

Contrarily, Blundell-Wignall and Atkinson (2010) see that the introduction of the shadow banking system has not contributed to the recent crisis. But high leveraged banks have been the main cause of damage. Consequently, Basel III would make positive achievements to the banking system. In addition, they consider that banks don’t need pillar 1 rules because when banks are aware that they will not be bailed-out by governments they will automatically build a capital buffer to cover all potential losses. For instance, Basel I and II have showed that capital requirements have worsen the case because banks have resorted to asset manipulation and on- and off- balance sheet redesign to escape the capital charges.

Blundell-Wignall and Atkinson (2010) suggest that a well-designed leveraged ratio should replace the capital requirements. In addition, they think that diversification should be rewarded to prevent the concentration of portfolios similar to what happened in the recent crisis where portfolios have been concentrated on Subprime Mortgage securities. At the same time, the lack of diversification should be penalized by capital charges.

In the economic literature, the provision of credit is among the most important drivers of economic growth. For this reason regulations designed to take off the credit provision will affect output growth negatively. This opinion is raised by banks to criticize the new capital charges because excess capital dilutes profits.

Admati et al. (2010) considers asset liquidation as one of the ways banks can follow to comply with the new capital rules. Asset liquidation reduces the bank's ability to make loans by decreasing the deposit base. This operation not only affects the lending cycle but it also has adverse repercussions on other market participants. Liquidating assets affects the financial markets by causing asset prices drop. Therefore investors who have these assets in their portfolios will incur losses.

Moreover, banks could meet the capital requirements by issuing equities. This operation is considered costly not only to banks but for the whole system. To attract investors while maintaining a stable income banks must offer them high returns, reduce interest rate on saving and increase interest rate on borrowing. In this case depositors and borrowers will be discouraged to deal with banks. They will rely on the financial market in their credit activities since that these markets are not subject to these capital regulations. As a result, the economic growth will be affected. (Admati et al.2010)

# CHAPTER IV

# EMPIRICAL ANALYSIS

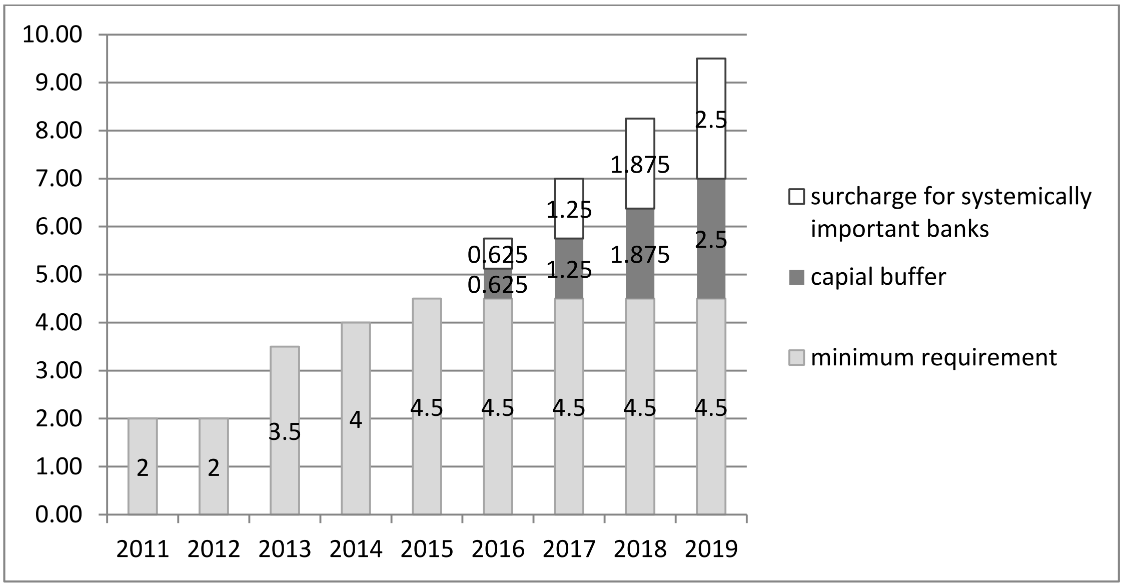
According to Herve Hannoun, Deputy General Manager of BIS, the new capital rules require banks to hold seven times more capital than the actual regulations which may lead to adverse consequences on the entire economy.

Basel III framework will empower the banking system by making it more stable and safer; however it is not perceived to be free of costs. For instance the substantial increase in equity requirements affects both borrowers and depositors since borrowers would not have easy access to loanable funds and depositors would earn lower interest rates on their deposits. As for the issuance of additional equity to meet the capital requirements, it can dilute the market price of the existing stocks.

In this chapter, I define the ways banks can use to increase their capital in addition to a small literature review about the repercussions of the new rules on the economy of the United States, Europe and Japan to end with my empirical study using the actual data of the United States.

The new rules are implemented starting from 2013 until 2019. This long period can alleviate the costs of quick implementation on banks. Figure 1 shows the phases CET1 follows to reach 9.5% in 2019 instead of 2% in the pre-Basel III phase, which means an increase of 7% of quality capital.

**Figure1- Phases of Implementation of CET1**



**Source: Basel Committee. "Basel III: A Global Regulatory Framework and GHOS"**

To comply with the new rules, banks have to restructure their balance sheets. Admati et al. (2010) explains three ways banks can adopt to meet the required capital. First they can engage in asset liquidation, asset expansion and recapitalization.

Asset liquidation stands for taking off some assets and mainly those that are perceived to be risky. This operation releases banks from higher capital charges since risky assets have higher risk weights and automatically higher capital requirements. However, the positive side of this operation is offset by the negative results on the credit channel. First, it shrinks the credit capacity on the banks' balance sheet by reducing the banks' ability to lend and accept deposits causing a reduction in banks' profitability. Moreover, Asset liquidation puts pressure on the financial markets since the increase in the supply of assets causes a drop in the asset prices. This situation affects all market participants and especially those who have those assets in their portfolios. The following T accounts of an assumed bank describe in a simple manner the asset liquidation procedure.

**Original Balance Sheet**

| | |
|---|---|
| **Loans: 200** | **Liabilities:180** |
| | **Equity :20** |

**B/S after Asset liquidation**

| | |
|---|---|
| **Loans: 100** | **Liabilities:80** |
| | **Equity :20** |

Asset expansion is another way banks can use in order to meet their capital requirements by increasing their assets and equity while keeping liabilities unchanged. Admati et al. (2010) think that this way enables banks to generate more returns by widening their credit cycle and their lending capacity. However, increasing equity reduces the market value of existing stocks and affects the position of old investors as their stock value becomes diluted. Admati et al. (2010) considers that the long duration to fully implement the new framework allows banks to issue new equity at the market price since the CET1 percentage is introduced gradually. Asset expansion is more favorable for large banks because they can easily attract new investors whereas small banks cannot do that unless they offer high yield returns which are costly to them. In this approach, capital expansion can offset one of the objectives of Basel III accord. Large banks, issuing new equity, are expanding their credit opportunities in a direct way therefore they are growing locally and internationally important which could increase their credit risk exposure. The following T-accounts of an assumed bank describe in a simple manner the asset expansion process.

| **Original Balance Sheet** | |
|---|---|
| **Loans: 200** | **Liabilities:180** |
| | **Equity :20** |

| **B/S after Asset Expansion** | |
|---|---|
| **Loans: 200** | **Liabilities: 180** |
| **New Assets: 50** | **Equity :70** |

The last way is recapitalization. This process is defined by replacing liabilities with equity while maintaining the original level of assets. Banks can choose to replace deposits with equity. In this way, they would lose their lending capacity and thus they narrow the credit cycle. On the other hand, banks can replace their long term liabilities with equity while maintaining the asset side unchanged. They do so by reducing dividends and bonuses payouts in order to increase their retained earnings or else they can issue new shares to increase their common stock. (Admati et al. 2010)

This process of deleveraging has adverse effects on shareholders for many reasons. At first, decreasing or cutting dividends payouts is perceived to be a dangerous move by shareholders because it raises questions about the liquidity and the well performance of the institution. In addition, increasing equity by issuing new shares affects the share prices since banks are issuing new shares at lower price to attract potential investors. Finally, the increase in the capital base and mainly equity lower the return on equity ROE which can be analyzed by investors as a poor investment. The following T-accounts of an assumed bank describe in a simple manner the recapitalization process.

**Original Balance Sheet**

| | |
|---|---|
| **Loans: 200** | **Liabilities:180** |
| | **Equity :20** |

**B/S after Recapitalization**

| | |
|---|---|
| **Loans: 200** | **Liabilities: 150** |
| | **Equity :50** |

In addition to the balance sheet restructuring, banks can compensate the increase in capital requirements by increasing their lending revenues through lending rate increase. (Sutorova and Teply.2013)

The new capital requirements affect negatively the GDP level by 0.15% and 0.22% if the liquidity requirements are included in the study during the transitional period. This study is conducted by the “Macroeconomic assessment group” founded by the Basel committee in order to estimate the macroeconomic repercussions of the new rules during the transitional period. According to them each 1% increase in the capital ratio raises the lending rate by 15.5 basis points and consequently causes a decrease in the loanable funds demand. The results of MAG show that the costs of the transitional period are minimal.

Similarly, Aosaki (2013) considers that in the long run the benefits of the capital requirements will exceed the costs as the new rules reduce the probability of a crisis to occur and thus prevent its long-lasting adverse impacts on GDP growth and the economy. He relies on the fact that 75% of the entire financial intermediation is conducted by the non-banking sector.

Likewise, Gambacorta (2011) considers that the positive consequences of Basel III outweigh its negative impacts on output. By means of the vector error correction model, he studied the relationship between several macro variables by using the data of the United States between 1994 and 2008. The results show that higher capital requirements have adverse effects on GDP level as well as on banks profitability. He concluded that for any 1% increase in capital, GDP drops by 0.1%.

On the other hand, a study conducted by the Institute of International Finance IIF shows that a 2% increase in Tier 1 capital increases the lending rate by 32basis points and consequently decreases the GDP level by 2.7% in the United States, 1.5% in Japan and 4.4% in Europe. The impacts in Europe are considerably significant since the role of the banking system is highly significant to the economy.

## A. Data description

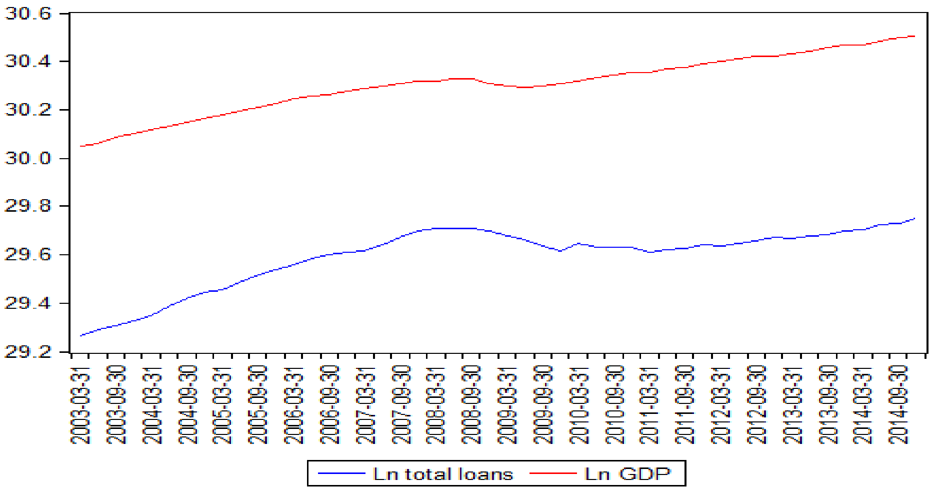
The study is composed of two parts. The first part deals with the aggregate data of the United States (all banks data are summed together and ratios are weighted average). The second part focuses on four banks: Citigroup, JPMorgan Chase & Co., HSBC Holdings PLC and Bank of America Corporation.  These banks constitute about 30-35% of all US banks' assets, deposits, loans, Tier1 capital and risk weighted assets (based on the data of 2014).

The analysis is based on quarterly data between 2003: q1 and 2014: q4. The choice of the date covers the period of implementing Basel II and ends one year before the gradual introduction of additional capital charges as required by Basel III (Figure 1). The number of observations is 48. The relationship between the banks credit capacity, the economic growth and the banks' profitability is studied using the following variables: 1- Ln deposits, 2- Ln loans, 3- Ln GDP, 4-Lending rate, 5- Ln Tier 1 capital, 6- Inflation rate, 7- Ln total assets, 8- Tier 1/RWA ratio, 9- ROE, 10- Deposit interest rate, 11- Loans provision rate, 12- ROA, 13- Net income and 13- interest charges.

The study aims to show the impacts of the increasing capital requirements on the lending rate and hence on loans, output and banks profitability.

The following graphical representation shows a strong correlation between the annual percentage change in output and the annual percentage change in loans except at the beginning of 2008 until 2009. It may be attributed to the recession of this period. These two variables are non-stationary over time based on the ADF and Phillips Perron tests (at 1%, 5% and 10% significance level). In addition, the Johansen co-integration test shows a long run relationship between them leading us to conclude that they move together in the long run. For instance, economic expansion or good economic conditions make investments and projects more profitable, hence the demand for loanable funds increases.

**Figure 2- Annual Variation of GDP and Loans**



Lown, Morgan and Rohatgi (2000) consider that the decrease in loans affects the output growth because productive investments would not be financed and consequently affects the output level. Similarly, Cosimano and Hakura (2011) consider that a negative credit growth in an economy affects the output level. In other words, they all consider that loans growth has a direct impact on GDP growth. We run a Granger Causality test to check the direction of causality of these two variables: percentage change in GDP and percentage change in loans to all sectors. The results indicate that GDP growth granger causes loan growth however the inverse is rejected. Hence we conclude that during any economic expansion, the credit growth is positive to reflect the profitability of all investment opportunities.

The following table summarizes the findings at 5% significance level for Unit Root Test and Co-Integration test. (Note: In the Unit Root Test, the Durbin-Watson Stat in all findings is around 2 meaning there is no autocorrelation problem).

**Table4- Unit Root, Co-Integration and Granger Causality Tests**

| Test | ADF | Phillips Perron | Johansen co-integration | Granger Causality |
|---|---|---|---|---|
| Ln GDP | -2.585828 | -2.279825 | 22.61081<br>(20.26184) | - |
| | (-3.510740) | (-3.508508) | | |
| Ln Loans | -2.533315 | -2.131986 | | |
| | (-3.513075) | (-3.508508) | | |
| d(Ln GDP) | **-3.859688** | **-3.894134** | d(Ln Loans) does not granger cause d(Ln GDP) | Prob: 0.8033 |
| | **(-3.510740)** | **(-3.510740)** | | |
| d(Ln Loans) | **-4.532568** | **-4.052883** | d(Ln GDP) does not granger cause d(Ln Loans) | **Prob: 0.0048** |
| | **(-3.520830)** | **(-3.510740)** | | |

**Note: The tests are run on EViews 8 software. Values reported into brackets indicate the 5% critical values. Values in bold indicate the rejection of Null Hypothesis**

Cosimano and Hakura (2011), Admati et al. (2010) and Mishkin (2010) study the effect of the new capital requirements on the banking profitability. They consider that higher capital requirements ruin the investors' profitability by affecting their return on equity (ROE). However Basel committee thinks that the increase in the capital charges to cover all risks exposure benefits banks at the first place because capital requirements ensure the stability of the financial system and hence decrease their risk premiums and all other risk rates.

In this approach, we will stress our study on the effect of the new capital requirements on banks' profitability reflected by ROE ratio and the lending rate in addition to the effect of the new capital requirements on the loans level.

The models of the study will be based on the following assumptions:

1-The additional capital requirements increase the lending rate and hence lead to a decrease in the loans level. The assumed models will be conducted using the Aggregate data of all US banks and are as follow:

- Loans growth= β0 + β 1 Lending rate (to include the elasticity of demand for loans) + β2 GDP growth (to include the scope of economic activity) + β3 tier 1 capital growth + β4 inflation rate (to include the cost of inflation) + β5 Assets growth (to include the size of US banks) + error
- Lending rate= β0 + β1 Tier 1% (tier1 capital/Risk Weighted Assets) + β2 Deposit rate (to include the cost of deposit liabilities) + β3 ROE (to include the capital cost) + β4 GDP growth + β5 Inflation rate + β6 loans provision rate + error

2-The additional capital requirements ruin the investors' profitability by affecting their return on equity (ROE). The assumed model will be conducted using the data of four US banks and is as follow:

- ROE= β0 + β1 Assets growth (to include the size of each bank) + β2 Tier 1 % + β3 ROA + β4 GDP growth (to include the economic activity) + β5 deposit growth (to include the cost of short term liabilities) + β6 Loans growth + β7 interest charges+ β8 Net Income + error

## B. Analysis

Before running the regressions, unit root will be tested for all variables to ensure stationary series. In case variables are not stationary, their first derivative will be used (the tables are found in the appendix).

Model 1 is used to analyze the growth of loanable funds in the entire US market in response to changes in some variables. The equation includes variables that reflect the supply side influences on the bank's decisions and the demand side is reflected through the elasticity of loans' demand which is the lending rate.

Loans growth = β0 + β 1 Lending rate + β2 GDP growth + β3 tier 1 capital growth+ β4 inflation rate + β5 Assets growth + error

We expect these parameters to act in this way. The increase in the lending rate leads to a decrease in the demand for loanable funds where β1 is the elasticity of demands for loans. β2 is expected to be positively related to the supply of loans since economic growth increases the profitable projects in the market. β4 is expected to be negative since inflation increases the nominal interest rate and makes investments more costly. Finally, β3 is controversial; Basel Committee estimates the impact of the new capital requirements on the loans amount to be minimal whereas some academics estimate it to be huge. The results are reported in table 5.

**Table 5- Response of loans to changes in some variables**

| Least Square/ dependent: Loans Growth | | |
|---|---|---|
| Variable | Parameter | Coefficient |
| constant | β0 | -0.002235 |
| lending rate | β1 | -0.005295** |
| GDP growth | β2 | 0.477879** |
| Tier1 growth | β3 | -0.13812* |
| inflation rate | β4 | -0.000175 |
| asset growth | β5 | 0.697315** |
| $R^2$ | | 0.7126 |
| F-statistic | | 19.0243 |
| Durbin Watson stat | | 2.2601 |

**(**) indicates 95% significance level. (*) indicates 90% significance level.**

F-statistic indicates that this model is significant. In addition, the series do not have autocorrelation problem as revealed by Durbin-Watson Stat = 2.26. Finally $R^2$ = 0.71256 which indicates that 71.2% of the variability in the loans growth is explained by the model.

The demand for loans seems inelastic, although it is negative as estimated but it is very minimal (-0.0053) which indicates that other factors affect the demand of loans by the private sector and households. As for the GDP growth, a 1% increase in GDP raises the demand for loans by 47 basis point which is in accordance with our initial estimation. Tier1 capital has a negative impact on the loans level since the loans volume would decrease by 14 basis point for any 1% increase in the capital requirements.

At the beginning of this chapter, we mentioned that banks have many ways to increase their capital to meet the new capital rules. Theoretically, the balance sheet restructuring as analyzed by Admati et al.(2010) seems to be very costly to both banks and financial markets. Whereas the increase in the lending rate as suggested by

Sutorova and Teply (2013) seems to be less costly at least for the US market because the demand for loanable funds is inelastic to the lending rate. However, the increase in the lending rate must be within the range that keeps banks' loans not substitutable.

Model 2 is studied in order to test the effect of the additional capital charges on the lending rate because if the effect is substantial, the demand for loanable funds is no more inelastic because other financial intermediaries are present in the market.

Lending rate= $\beta0$ + $\beta1$ Tier 1% + $\beta2$ Deposit rate + $\beta3$ ROE + $\beta4$ GDP growth + $\beta5$ Inflation rate + $\beta6$ loans provision rate + error

The parameters are expected to act as follow: when inflation rate increases, lending rate would increase too in order to reflect the cost of inflation. Similarly when ROE increases, lending rate increases too because ROE can be seen as the cost of equity the banks incur toward investors. However the most significant variable in this model is Tier 1 capital because equity financing is more costly to banks than debt financing. Therefore any increase in equity would cause an increase in the lending rate to reflect the cost of equity on the banks' activities and profitability. The results are reported in table 6.

**Table 6- Response of lending rate to changes in some variables**

| Least Square/ dependent: Lending Rate | | |
|---|---|---|
| Variable | Parameter | Coefficient |
| constant | β0 | -0.011597 |
| Tier 1% | β1 | 0.055168** |
| Deposit rate | β2 | 0.958465** |
| ROE | β3 | 0.011308* |
| GDP Growth | β4 | 0.185626 |
| Inflation rate | β5 | 0.00475 |
| Loans provision rate | β6 | 0.12174** |

| | |
|---|---|
| $R^2$ | 0.835537 |
| F-statistic | 33.86928 |
| Durbin Watson stat | 1.96316 |

**(**) indicates 95% significance level. (*) indicates 90% significance level**

From the results above, a 1% increase in Tier 1 capital leads to an increase in the lending rate by 5.5 basis point.

These two models show that the additional imposed capital has minimal impact on the loans in the United States if banks increase their lending rate instead of following the balance sheet restructuring.

Since large banks are the key of systemic risk in the economy and their instability would alter the entire financial system in addition to their capital arbitrage and securitizations activities, we will proceed by studying the effects of the new capital requirements on the banks' profitability by analyzing the data of four US banks that constitute together about 30 to 35% of all assets, deposits, Tier 1 capital and loans in the US banking sector.

ROE= $\beta0$ + $\beta1$ Assets growth + $\beta2$ Tier 1 % + $\beta3$ ROA + $\beta4$ GDP growth+ $\beta5$ deposit growth + $\beta6$ Loans growth+ $\beta7$ interest charges+ $\beta8$ Net Income + error

We expect these parameters to act this this way:

Asset growth is a controversial parameter because it depends on the asset management of the bank. Tier 1 capital is assumed to be negatively correlated to ROE as studies show. ROE and ROA are positively correlated from the equation of ROE. GDP growth is expected to be positively correlated to ROE because as GDP increase, income increases too so does the net profit. Deposit and loans growth are expected to have positive relationship with ROE except if deposits grow faster than loans.

**Table7- Response of ROE to the changes in some variables**

| Least Square/ dependent: ROE | | | | | |
|---|---|---|---|---|---|
| Variable | Parameter | JPMorgan Chase & Co. | Bank of America Corporation | Citigroup | HSBC Holdings PLC |
| constant | β0 | 1.090136 | 0.136854 | 37.09679 | 31.58925 |
| asset growth | β1 | -15.91501** | 6.003262* | -3.9833328* | -1.239796 |
| Tier1 % | β2 | -0.683073** | -0.291062 | -0.118667* | -0.359774* |
| ROA | β3 | 18.378** | 5.488236** | 5.706724 | 6.056442** |
| GDP growth | β4 | -64.11537** | -2.3759 | -2.955102 | 41.5533* |
| deposit growth | β5 | 8.61671 | -6.753882 | 2.690214 | -4.85259 |
| loans growth | β6 | 6.177304** | -12.20733** | 6.598323** | 3.49395* |
| interest charges | β7 | -4.37E-10 | 1.33E-10 | -7.11E-10 | 2.88E-09 |
| net income | β8 | 1.28E-09** | 8.00E-10** | 1.7E-09* | 1.17E-08* |
| $R^2$ | | 0.9722 | 0.986386 | 0.983864 | 0.987701 |
| F-statistic | | 166 | 344.1523 | 289.6299 | 381.4 |
| Durbin Watson stat | | 1.85 | 1.9152 | 2.16 | 1.764265 |

**(**) indicates 95% significance level. (*) indicates 90% significance level.**

In three large banks out of four, ROE and Asset growth are negatively correlated which indicates the presence of diminishing law. Banks that are largely expanded witness inefficiency in their activities and operations if they do not adopt an adequate asset management. The results of ROE and ROA are as expected. As for the GDP growth, the results are different from the expected one. It may be due to the equity expansion during any economic boom where banks raise equity in order to finance their expanded activities and investors are attracted to the new issued equities expecting increase in their prices. Consequently the equity growth surpasses the profit growth leading to a decrease in ROE. As for the deposit growth and interest charges they are highly insignificant in this model. Finally, in these four banks ROE and tier capital move in an opposite direction. As the results indicate for each 1% increase in tier 1 capital the return on equity decreases by 68 basis point, 29 basis point, 11 basis point and 36 basis point.

# CHAPTER V

# CONCLUSION

The Basel committee aims to make the bank supervision of high quality by imposing a set of regulations that are able to ensure the stability of the banking system. In 2007, the world economy faced a severe crisis that left its repercussions until the present time. The crisis revealed the shape of the banks at the pre-crisis time; banks were highly leveraged with low capital base and illiquid assets. This situation prevented the banking system from absorbing the shocks in the economy. The crisis, characterized by being systemic, extended to other economies and sectors due to the interference of balance sheets between different institutions since banks are interconnected to each other and to other economies.

The third framework of Basel system has the objective of filling the gaps of Basel II that were behind the recent crisis. The main difference with Basel II is the introduction of new ratios that are considered necessary to avoid any future crisis. The leverage ratio is introduced for the first time alongside with the liquidity coverage ratio. But the most important improvement is the increase in the capital requirement which is the other word of imposing a new level of equity transformed into capital ratios by the rating agencies. While regulators consider it as a cushion to absorb risks and shocks, banks consider it negative to the economic growth and banks returns. Another opinion sees that similar to the previous accords, Basel III will incentivize banks to rely on financial innovations and instrument trade to a third party in order to reduce the risk weights and consequently the burden of equity especially that this accord has not given attention to securitization and shadow banking system. As a result, the new accord can increase the systemic risk in the market instead of fighting it. The new framework is expected to have several costs according to all researchers and to Basel Committee itself. Lending rates are expected to increase leading to a decrease in the loans demand and consequently causes a drop in output growth.

My empirical results are in accordance with those of Basel Committee where the adverse impacts of Basel III are minimal comparing to the cost of any future crisis. However, these results in any economy other than US may drive up the lending rate in a substantial way causing a deep decrease in loans demand.

Regulations are very important to maintain a healthy banking system that induces economic growth and development. However, when the set of regulations are the cause of risks and a trigger for arbitrage and risk manipulation then the entire system of supervision must be reconsidered.

The new framework aims to address the pitfalls of the previous accord after the recent crisis but it just took into consideration the results of imprudent behavior of banks but not the causes. For instance, the objective of the new rules is to ensure liquidity, quality capital and low leverage, but the causes behind liquidity shortage, low capital base and high leverage are still neglected. The shadow banking system and securitization are not under regulations. In other words, this gap could form a basis for another potential crisis that would be more severe than the previous one because additional rules with same circumstances lead to additional securitization more than before.

Moreover, all types of banks with different sizes are treated in the same manner in terms of risk weights and rules although investment banks and large banks are the direct cause of increasing systemic risk more than small banks and corporate or retail banks.

At the time where governments aim to stimulate the economies, regulators are imposing strict inefficient regulations on the financial markets and banking system. Theoretically, excess regulations seem to be counter-productive as they affect both, the supply side and the demand side of the credit cycle. On the supply side, raising the required capital increases the cost of financing productive projects or writing loans to households. Accordingly, banks would transfer this cost to the counterparty. On the demand side, households and private sector would bear the burden of the increased costs in two ways, either by finding another source of finance or by transmitting the additional costs to the economy by raising the prices of their products. In any case, small to medium sized companies that rely on the banking finance are the indirect affected parties of the increase cost of capital. First, these institutions are in majority unrated therefore they do not have easy access to the financial markets and it is costly for them too. Furthermore, in the Basel risk assessment, the private sector loans are rated as risky assets with 75-100% risk weights. In this case, banks would reduce this type of assets in order to avoid the additional charges on risky assets. As a result, the supply of loanable funds would shrink affecting the contribution of loans in the money supply in the first place and affecting the growth of investments in the second place. Similarly, the infrastructure finance is BBB- rated (75%-100% risk weights). Therefore the impact on the level of infrastructure projects will be similar to that of the private sector.

To conclude, the Basel system with its actual deficiencies is not able to protect the banking system and the economies especially that it uses random rates that do not reflect the real situation. This capital requirement can be considered too low comparing to the excessive risk found in the Global economy. However, imposing a higher capital charges is not healthy to the actual situation since the world economy has not fully recovered from the repercussions of the recent crisis alongside with the fluctuations in the commodity and oil prices and the financial instability in the Euro zone due to its huge sovereign debt and recently the ECB bonds buying.

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# APPENDIX

**Aggregate Data (All US Banks)**

| Variable | ADF | Phillips Perron | First Derivative | ADF | Phillips Perron |
|---|---|---|---|---|---|
| Deposit Rate | -2.152889 | -0.892399 | d(Deposit Rate) | -2.437599 | -2.373215 |
| | (-2.929734) | (-2.925169) | | (-1.948140) | (-1.948140) |
| Lending Rate | -0.701088 | -0.660394 | d(Lending Rate) | -3.769053 | -3.900068 |
| | (-1.948313) | (-1.947975) | | (-1.948140) | (-2.926622) |
| GDP Growth | -2.585828 | -2.279825 | d(GDP Growth) | -3.859688 | -3.894135 |
| | (-3,510740) | (-3.508508) | | (-3.510740) | (-3.510740) |
| Inflation Rate | -6.368011 | -7.26022 | - | - | - |
| | (-2.931404) | (-2.926622) | | - | - |
| Tier 1 capital | -2.2364484 | -3.1707 | d(Tier1 Capital) | -6.715061 | -6.000879 |
| | (-3.508508) | (-3.508508) | | (-3.510740) | (-3.513075) |
| Assets Growth | -1.656029 | -1.950938 | d(Assets Growth) | -5.026702 | -5.082239 |
| | (-3.510740) | (-3.508508) | | (-3.510740) | (-3.510740) |
| Loans Growth | -2.533315 | -2.131986 | d(Loans Growth) | -4.17564 | -4.052883 |
| | (-3.513075) | (-3.508508) | | (-3.513075) | (-3.510740) |
| ROE | -2.293709 | -2.026037 | d(ROE) | -2.15216 | -10.46671 |
| | (-3.518090) | (-3.508508) | | (-1.948686) | (-2.616203) |
| Tier1 % | -1.267175 | -1.244853 | d(Tier 1%) | -4.403911 | -4.413891 |
| | (-1.948140) | (-1.947975) | | (-1.948140) | (-1.948140) |
| Loans Provision Rate | -1.413196 | -1.44849 | d(Provision Rate) | -3.305442 | -5.821533 |
| | (-2.935001) | (-2.925169) | | (-2.935001) | (-2.926622) |

**Bank of America Corporation**

| Variable | ADF | Phillips Perron | First Derivative | ADF | Phillips Perron |
|---|---|---|---|---|---|
| Interest Charges | -3.107006 | -1.710728 | d(Interest Charges) | -3.515523 | -4.742996 |
| | (-3.515523) | (-3.508508) | | (-1.979392) | (-3.510740 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | ) |
| Net income | -2.58035 | -2.547357 | d(Net Income) | -6.247981 | -7.951833 |
| | (-3.508508) | (-3.508508) | | (-3.513075) | (-3.510740) |
| GDP Growth | -2.585828 | -2.279825 | d(GDP Growth) | -3.859688 | -3.894135 |
| | (-3,510740) | (-3.508508) | | (-3.510740) | (-3.510740) |
| Deposit Growth | -1.533595 | -1.236966 | d(Deposit Growth) | -6.220358 | -6.59952 |
| | (-3.508508) | (-3.508508) | | (-3.510740) | (-3.510740) |
| ROA | -2.227889 | -2.154373 | d(ROA) | -5.917036 | -6.25083 |
| | (-2.925169) | (-2.925169) | | (-2.928142) | (-2.926622) |
| Assets Growth | -1.982601 | -4.333085 | d(Assets Growth) | -6.141587 | -7.421666 |
| | (-3.508508) | (-3.508508) | | (-3.510740) | (-3.510740) |
| Loans Growth | -1.32954 | -1.34501 | d(Loans Growth) | -6.953079 | -7.57446 |
| | (-3.508508) | (-3.508508) | | (-3.510740) | (-3.510740) |
| ROE | -2.194331 | -2.116061 | d(ROE) | -6.104075 | -6.278884 |
| | (-2.925169) | (-2.925169) | | (-2.928142) | (-2.926622) |
| Tier1 % | -0.31091 | -0.354638 | d(Tier 1%) | -6.071839 | -6.074431 |
| | (-2.925169) | (-2.925169) | | (-2.926622) | (-2.926622) |

**Critical Values are reported inside brackets**

| **HSBC Holdings PLC** | | | | | |
|---|---|---|---|---|---|
| Variable | ADF | Phillips Perron | First Derivative | ADF | Phillips Perron |
| Interest Charges | -1.712876 | -1.294598 | d(Interest Charges) | -4.171307 | -4.367428 |
| | (-2.928142) | (-2.925169) | | (-2.926622) | (-2.926624) |
| Net income | -4.239953 | -4.22289 | - | - | - |
| | (-2.925169) | (-2.925169) | | - | - |
| GDP Growth | -2.585828 | -2.279825 | d(GDP Growth) | -3.859688 | -3.894135 |
| | (-3,510740) | (-3.508508) | | (-3.510740) | (-3.510740) |
| Deposit Growth | -2.596165 | -2.832721 | d(Deposit Growth) | -7.077984 | -7.091107 |
| | (-2.925169) | (-2.925169) | | (-2.926622) | (-2.926622) |
| ROA | -3.46204 | -3.324262 | - | - | - |
| | (-2.925169) | (-2.925169) | | - | - |
| Assets Growth | -3.619678 | -3.804562 | - | - | - |
| | (-2.925169) | (-2.925169) | | - | - |
| Loans Growth | -2.59151 | -2.563968 | d(Loans Growth) | -6.149361 | -6.256877 |
| | (-2.925169) | (-2.925169) | | (-2.926622) | (-2.926622) |
| ROE | -3.561035 | -3.451999 | - | - | - |
| | (-2.925169) | (-2.925169) | | - | - |
| Tier1 % | -1.010847 | -0.982565 | d(Tier 1%) | -3.936946 | -8.12259 |
| | (-2.925169) | (-2.925169) | | (-2.928142) | (-2.926622) |

***Critical Values are reported inside brackets**

| **Citigroup** | | | | | |
|---|---|---|---|---|---|
| Variable | ADF | Phillips Perron | First Derivative | ADF | Phillips Perron |
| Interest Charges | -1.295731 | -1.303767 | d(Interest Charges) | -3.70868 | -3.802913 |
| | (-2.926622) | (-2.925169) | | (-2.926622) | (-2.926622) |
| Net income | -1.971097 | -2.925169 | d(Net Income) | -12.54377 | -13.48077 |
| | (-2.926622) | (-3.549517) | | (-2.921622) | (-2.926622) |
| GDP Growth | -2.585828 | -2.279825 | d(GDP Growth) | -3.859688 | -3.894135 |
| | (-3,510740) | (-3.508508) | | (-3.510740) | (-3.510740) |
| Deposit Growth | -3.426248 | -2.932883 | - | - | - |
| | (-2.925169) | (-2.925169) | | - | - |
| ROA | -1.786689 | -2.806791 | d(ROA) | -12.25045 | -12.86094 |
| | (-2.926622) | (-2.925169) | | (-2.926622) | (-2.926622) |
| Assets Growth | -3.3474438 | -3.347438 | - | - | - |
| | (-2.925169) | (-2.925169) | | - | - |
| Loans Growth | -2.525345 | -2.523164 | d(Loans Growth) | -7.386432 | -7.359334 |
| | (-2.925169) | (-2.925169) | | (-2.926622) | (-2.926622) |
| ROE | -1.877784 | -2.925169 | d(ROE) | -3.016917 | -13.96567 |
| | (-2.931404) | (-2.949515) | | (-2.931404) | (-2.926622) |
| Tier1 % | -0.94482 | -1.091132 | d(Tier 1%) | -5.754952 | -5.698532 |
| | (-2.925169) | (-2.925169) | | (-2.926622) | (-2.926622) |

***Critical Values are reported inside brackets**

| **JPMorgan Chase & Co.** | | | | | |
|---|---|---|---|---|---|
| Variable | ADF | Phillips Perron | First Derivative | ADF | Phillips Perron |
| Interest Charges | -2.234759 | -1.250268 | d(Interest charges) | -4.288306 | -4.52034 |
| | (-2.929734) | (-2.925169) | | (-2.926622) | (-2.926622) |
| Net income | -1.876816 | -3.601012 | d(Net Income) | -7.658564 | -19.78359 |
| | (-2.926622) | (-2.925169) | | (-2.928142) | (-2.926622) |
| GDP Growth | -2.585828 | -2.279825 | d(GDP Growth) | -3.859688 | -3.894135 |
| | (-3,510740) | (-3.508508) | | (-3.510740) | (-3.510740) |
| Deposit Growth | -1.896378 | -1.01259 | d(Deposit Growth) | -3.470807 | -3.599909 |
| | (-2.929734) | (-2.925169) | | (-2.926622) | (-2.926622) |
| ROA | -5.11302 | -5.155567 | - | - | - |
| | (-3.508508) | (-3.508508) | | - | - |
| Assets Growth | -2.014343 | -1.787454 | d(Asset Growth) | -7.673238 | -7.700074 |
| | (-2.925169) | (-3.508508) | | (-2.926622) | (-2.926622) |
| Loans Growth | -2.402998 | -2.06464 | d(Loans Growth) | -7.443487 | -12.30412 |
| | (-3.508508) | (-3.508508) | | (-3.510740) | (-3.510740) |
| ROE | -4.378191 | -4.315141 | - | - | - |
| | (-3.508508) | (-3.508508) | | - | - |
| Tier1 % | -0.9907 | -1.05472 | d(Tier 1%) | -6.597659 | -6.598166 |
| | (-3.508508) | (-3.508508) | | (-3.510740) | (-3.510740) |

***Critical Values are reported inside brackets**