

# The Financial Crisis, Basel Accords and Bank Regulations: A Conceptual Framework

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## Abstract

This theoretical study presents the different phases for the evolution of Basel Accords since 1988, and the continual efforts of Basel Committee on banking supervision to set out an effective framework to improve the banking sector governance and performance. In literature, compliance with Basel requirements concerning minimum capital requirements, powerful supervision and effective market discipline through information transparency and disclosure have attracted many researchers to study its impact on bank performance and cost of capital. In spite of the risk-based capital adequacy, regulatory and supervisory requirements set by Basel Accords, the financial crisis 2007, which causes instability and turmoil in the whole banking sector, was induced mainly by weak risk management measures, such as stress testing and other risk management tools that were unable to forecast the losses and the adverse unexpected outcomes and determine the size of capital needed to overcome severe shocks.

**Keywords:** corporate governance, Basel accords, bank regulations, cost of capital, bank performance, financial crisis

## 1. Introduction

Banks play very critical and important role in any economy by providing several services that aim to enhance the economic growth. In general terms, banks provide access to payment systems, generate liquidity and facilitate different transactions by reducing the transaction costs and information asymmetries and offer different financial products that help investors to reduce their risk and overcome uncertainties by packaging, hedging, pricing and sharing risks

(Note 1). Therefore, banks have an important role in providing credit to nonfinancial firms, transmitting the effects of monetary policy, and in providing stability to the economy as a whole (Berger and Di Patti, 2006).

The financial intermediaries are the main source of funding and when they efficiently mobilize and allocate funds, this will enhance productivity and growth. Banks' safety and soundness are very important to boost and support the economic development. Improving banks' performance and allocating funds efficiently will lead to improvement in the performance of firms, and hence, prosperity of the whole economy.

Given the importance of banks, ensuring safety and stability of banks by maintaining strong capital base which serves as a cushion against different kinds of banks risks and absorb losses is a critical and central role. Furthermore, effective bank regulations and powerful supervisions are able to create sound and profitable banking sector in order to withstand negative shocks and maintain the financial system stability.

Bank failures in the early 1980s and inability of the simple ratio of capital to assets in assessing bank capital led U.S. Bank regulatory agencies with representatives from central banks and supervisory authorities to set up minimum capital adequacy requirements. The idea of imposing minimum levels of capital on all banks began in December 1981, prior to that date, the regulatory authorities used a subjective approach using capital ratios to measure capital adequacy such as total capital to total deposits, total capital to total assets, and total capital to total risk assets.

To review the related literature, this study is structured as follows; the next section is an overview of Basel Accords and their requirements, section 3 discusses the causes and effects of the recent financial crisis 2007, section 4 provides a review of the empirical literature on Basel Accord's impact on bank performance, section 5 presents an overview on the impact of Basel Accords on banks' cost of capital.

## **2. Overview of Basel Accords**

Basel Committee on Banking Supervision (Note 2) is one of the committees established by the Bank for International Settlements (BIS) (Note 3) and it aims to improve the quality of banking supervision all over the world. It has continual efforts to improve the banking sector regulations and supervision.

### *2.1 Basel Accord I (1988)*

In 1988, Basel Accord was announced to confront bank failures and cure the weakness of the simple capital to assets ratio. The Bank for International Settlements (BIS) is an international organization which fosters international monetary and financial cooperation. One of the committees located at BIS in Basel, Switzerland is the Basel Committee on Banking Supervision, which aims to promote monetary and financial stability. In 1988, the Committee which comprises representatives of the central banks and supervisory authorities of Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, United Kingdom, United States and Luxembourg, announced the Basel agreement known as Basel Accord or

(Basel I) which requires imposing risk-based capital ratios on banks. It aims to achieve two objectives; first, to strengthen the soundness and stability of the international banking system, second, to reduce the competitive inequality among international banks which arise from differences among national bank-capital regulations.

The Committee sets the framework for measuring capital adequacy and the minimum levels of capital for internationally active banks and it was focusing only on the credit risk of assets (the risk of counterparty failure), furthermore, the Accord provides a common international definition of bank capital that divides capital into two Tiers and it assigns various weights to broad categories of credit risk in a bank's asset portfolio (0, 10, 20, 50, and 100%). Low credit risk assets, such as cash, claims on central governments and central banks denominated in national currency, and claims on OECD central governments, have a 0% risk-based capital requirement. The claims on multilateral development banks, banks incorporated in the OECD, and banks incorporated outside the OECD with maturity one year will have 20% risk-based capital requirement. While the loans fully secured by mortgage on residential property will have risk weight of 50%. Finally, the Accord gives high weights, for example, to claims for private sector, long term claims on banks incorporated outside the OECD, claims on central governments outside the OECD, fixed assets and real estate investments and will be weighted at 100%. The Committee confirms that the target standard ratio of capital to weighted risk assets should be set at 8% (of which the core capital element will be at least 4%). The (BIS) demanded the international banks in member countries to implement the minimum capital standards by the end of year 1992 (Basel Committee on Banking Supervision, 1988). The following table defines the capital included in the capital base to apply at end 1992 based on Basel Committee on Banking Supervision (1988):

Table 1. Definitions of bank capital elements

Capital elements	Definition of capital elements	Limits and restrictions
<b>Tier 1: (Core Capital)</b>		
(a) Paid-up share capital/ common stock	Consists of <i>permanent shareholders' equity</i> (issued and fully paid ordinary shares / common stock and perpetual non-cumulative preference shares) and <i>disclosed reserves</i> (retained earnings, e.g. share premiums, retained profit, general reserves and legal reserves).	At least 50% of bank capital base.
(b) Disclosed reserves		
Deductions from Tier 1: Goodwill		
<b>Tier 2: (Supplementary Capital)</b>		
(a) Undisclosed reserves	Consists of less permanent forms of capital. Unpublished reserves consist of accumulated after tax surplus of retained profits, free to meet unforeseen future losses.	The total of Tier 2 (supplementary) elements will be limited to a maximum of 100% of the total of Tier 1 elements.

(b) Asset revaluation reserves	Reserves arise from revaluation of banks fixed assets (premises), or long term holdings of equity securities.	Discount of 55% will be applied on latent gains on unrealised securities.
(c) General Provisions/ general loan loss reserves	Reserves created against future, unidentified losses and not identified impaired assets.	Maximum of 1.25 %, or exceptionally 2% of risk assets.
(d) Hybrid (debt/equity) capital instruments	Instruments which combine characteristics of equity capital and of debt.	
(e) Subordinated debt	Instruments have fixed maturity, with minimum maturity of five years. During the last five years to maturity, a cumulative discount of 20% per year will be applied to reflect the diminishing of its value.	Maximum of 50% of Tier 1 elements.

Deductions from total capital base: Investments in unconsolidated banking and financial subsidiary companies.

Source: compiled by the researcher with information based on Basel Committee on Banking Supervision (1988)

Although the 1988 Basel Accord provides an effective framework that assists banks all around the world in assessing their capital adequacy in order to ensure their safety, it has got some limitations; first, it comprises the credit risk only, while banks confront many other kinds of risks resulting from their trading activities and off-balance-sheet activities. Second, Basel I set out a fixed percentage to meet the minimum capital requirements which is 8%, this percentage is unchanged although risk is not constant all the time and in some conditions banks have to hold more than this percentage to meet high risk.

### 2.2 Amendment to 1988 Accord

In 1996, Basel Committee releases the amendment to the 1988 Accord to incorporate the market risk into the risk-based capital requirements and add new capital requirement called “Tier 3 capital” by issuing short-term subordinated debt, at national discretion, to meet a part of market risks. The amendment to Capital Accord focuses on trading risks and allows some banks for the first time to use their own systems to measure their market risks, it aims to set out a framework that accounts for the market risk, that is, “the risk of losses in the on-and off-balance sheet positions resulting from movements in market prices” (Basel Committee on Banking Supervision, 1996, p.1), and provides a strong capital cushion against interest rate risk, equity risk in the trading portfolios (i.e. price risks in the trading book), foreign exchange risk and commodities risk.

After this amendment to Basel Accord 1988, the bank capital will consist of shareholders' equity and retained earnings (Tier 1 capital), supplementary capital (Tier 2 capital) as defined in the 1988 Accord, and short-term subordinated debt with maturity at least two years (Tier 3 capital) which can be used to support and cover the market risks only. Furthermore, the

amendment allows banks to use their own internal models, as an alternative for the standardized measurement, to measure the market risk using the value-at-risk models which will be computed daily to assess the riskiness of the bank trading portfolio. Therefore, it provides two approaches to measure the market risk; the Standardized approach, which specifies indicators to measure the market risk, and the Internal Models approach, which depends on using the internal data in estimating the required capital to meet the market risk. The amendment to capital Accord was formalized in 1998 (Basel Committee on Banking Supervision, 1996).

### *2.3 Basel Capital Accord (Basel II)*

In 2001, the Basel committee on Banking Supervision developed Basel II (the new Basel Capital Accord) to expand Basel I (Capital Accord 1988) which focuses only on credit risk, and its amendment in 1996 which incorporates the market risk.

Basel II goes beyond Basel I and sets out a framework, which consists of three pillars; the minimum capital requirements, the supervisory review, and market discipline. It incorporates the operational risk to the credit risk and market risk, in order to calculate and assess the minimum capital requirements, that is, bank's minimum capital ratio will be calculated on the sum of the bank's credit, market, and operational risks. Operational risk is defined in Basel Committee paper (September, 1998) as "the risk of loss arising from various types of human or technical error" and "it is the breakdown in internal controls and corporate governance, such as error, fraud, or failure in performance. Other aspects of operational risk include major failure of information technology systems or events such as major fires or other disasters". In addition, Basel Committee (January, 2001) defined operational risk: "the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events."

The new Basel Capital Accord (Basel II) overcomes the limitations of the 1988 Basel Accord as follows: First, operational risk is incorporated to assess the minimum capital requirements ratio, and it offers different approaches to calculate the credit and operational risk. Therefore, the focus on the credit risk has been widened to include the market and operational risks. Second, banks are allowed to use their own internal models to assess market risk in order to set capital requirements, such as the value-at-risk models (VAR) that is computed on a daily basis, assuming that risk is not constant throughout the business cycle. Third, the new Accord requires supervisors to ensure that banks are effectively assessing their capital adequacy needs relative to their risks, and maintaining the minimum regulatory capital ratio, and intervene to prevent banks from operating below the minimum requirements. Fourth, strengthen banks disclosure standards needed to ensure the effective operation of market discipline. Disclosure requirements include the disclosure of capital structure, the way the bank calculates its capital adequacy and its risk exposure and risk assessment methods. Increasing bank disclosure standards in terms of bank capital and risk exposure will strengthen the position of market participants in encouraging banks to hold more capital.

Furthermore, the New Basel Capital Accord provides approaches and methods for calculating the credit and operational risk. The credit risk measurement approaches are as follows ((Basel

Committee on Banking Supervision, 2001): First, the standardized approach, is the same as the 1988 Accord, but is more risk sensitive. Under the new Accord, the bank allocates a risk-weight, which is assessed by an external credit assessment institution such as a rating agency, to each of its assets and off-balance-sheet positions and produces a sum of risk-weighted asset values (Note 4). Second, the Internal Rating Based approach (IRB), banks will be allowed to use their internal estimates of borrower creditworthiness to assess credit risk in their portfolios, a bank estimates each borrower's creditworthiness, and the results are translated into estimates of a potential future loss amount, which form the basis of minimum capital requirements. Third, the Advanced Internal Rating Based approach (AIRB) depends on determining the credit risk more accurately which results in greater risk sensitivity and more capital requirements to meet potential future loss.

Regarding the operational risk, the new Accord represents three approaches; the basic indicator, the standardized, and the internal measurement. The basic indicator approach focuses on the operational risk for a bank's total activity. The standardized approach specifies different indicators for different business lines. The internal measurement approach requires banks to use their internal loss data in the estimation of required capital.

#### *2.4 The Third Basel Accord (Basel III)*

In response to the financial crisis 2007 – 2008, Basel Committee on Banking Supervision (BCBS) published two important documents in attempt to diagnose the effect of the financial crisis on the banking sector and the financial system as a whole. The causes and consequences of the financial crisis are discussed in details in the next section.

According to Basel (2010a), the main reasons behind the economic and financial crisis in 2007 were the on and off-balance sheet leverage, weak capital ratios and insufficient liquidity, therefore the banking system was unable to absorb the systematic risk and credit losses. During the crisis, banks were forced to decrease their leverage which leads to decrease in the assets prices causing losses for banks and fall in bank capital and credit (Basel, 2014). Further, market participants lost confidence in bank solvency which by turn was transmitted to the rest of the financial system and the whole economy causing massive losses. To cure the failures resulted from the crisis, Basel Committee for Banking Supervision introduces some reforms in different areas described in details in its published papers in 2010, and known as Basel III. The main objective of Basel Committee is to strengthen the global bank capital, enhance liquidity position, and develop a strong framework for resilient banking systems. That is, Basel III aims to strengthen banking capital, liquidity and risk assessment by developing two liquidity ratios and one leverage ratio.

The reform of the banking sector introduced in Basel III presents improvement in three areas; bank capital, liquidity and bank leverage ratios. First, Basel committee (2010b) focuses on bank capital reform and emphasizes raising the quality, quantity and transparency of the regulatory capital base and introduces some macro-prudential elements in bank capital framework to help in absorbing the systematic risk. Second, Basel III aims to improve bank liquidity framework and introduces two liquidity ratios to ensure that banks have sufficient liquid assets to meet the short (one month) and long terms. According to Basel III this will be



achieved by holding two liquidity ratios; the first ratio is liquidity coverage ratio (LCR) for the short term, defined as high-quality liquid assets should be at least equal to bank cash outflows for the next 30 days, and the second ratio is the net stable funding ratio (NSFR) for the longer term to ensure that banks have stable sources of funding for long time horizon. Third, Basel III introduces leverage ratio of Tier 1 capital to total assets instead of risk weighted assets that should be at least 3 percent, that is, equity capital should be at least 3% of the bank total assets.

### **3. The Global Financial Crisis 2007**

The financial market turmoil 2007 that has emerged in the United States led to severe financial crisis that spread across different financial instruments and financial markets to disseminate worldwide. Several mechanisms cause the mortgage loan crisis to propagate and result in a liquidity shock due to uncertainty about the value of financial products and this creates systematic risk.

The financial crisis has revealed that most risk management models used by banks, including the stress tests, aren't effective enough to rely upon and failed to forecast and predict the severe shock because, first, they use historical data to assess risks assuming that historical relationships are good in forecasting future risks. Second, the risk models rely on historical data and ignore the reactions within the system by market participants, such as, the interrelationships between the lack of market liquidity and funding liquidity pressures (Basel Committee on Banking Supervision, January 2009).

The literature shows that the main causes for the current financial turbulence are due to problems in banks' risk management, mainly, credit risk and liquidity risk. The credit risk resulted from the low lending standards and cheap credit provided by banks to borrowers with low creditworthiness, and the liquidity risk driven by uncertainty that led banks to hoard liquid assets causing market illiquidity. The causes and consequences of the current financial crisis are discussed below.

#### *3.1 Causes of the Financial Crisis*

The global economy suffers from the severe financial crisis caused by bank trends which led to market illiquidity. The high liquidity in the United States banks encouraged banks to provide loans to subprime borrowers, who have a history of not paying loans back or have limited debt experience, and thus are not eligible for these loans. Huge amount of these loans were provided to borrowers, who want to buy houses, without effective screening and monitoring their credit worthiness. Therefore, lending boom led to the housing bubble (rapid and sharp increase in house prices).

##### **3.1.1 Securitization and the Financial Innovation**

The "originate and distribute" banking model allows banks to pool their assets, tranche them and resold these products via securitization (Brunnermeier, 2008). The structured finance activities enable banks to create structured products (referred to as Collateralized Debt Obligations (CDOs)) by pooling the economic assets, such as loans, corporate bonds, bonds,

credit card receivables and mortgages, in a diversified portfolio, and then the next step is to issue claims against these collateral pool with different credit ratings, known as tranches, and sold them to investors.

Each tranche or bond has a specific risk rating, ranging from the safest tranche, known as “super senior tranche”, which offers low interest rate and it receives AAA rating, to the riskier one known as “equity tranche” or “toxic waste” which will be paid only after all other tranches are paid, and the “mezzanine tranche” which is between these two extremes. Investors can choose from these investments according to their risk tolerance and preferences. Moreover, to ensure safety and low risk, buyers of these tranches or regular bonds can buy credit default swaps, in order to be paid in case of default and to act as insurance against default of bond or tranche.

Structured finance was able to repackage risks and create safer assets from risky collaterals with high credit ratings provided by the rating agencies, (Coval et al., 2008) argue that tranches issued against the portfolio of pooled risky assets were much safer than the assets in the underlying pool, as a result securitization and the structured products grow sharply. They determine two features for securitization, first, the fragility of their ratings, second, their exposure to systematic risk, as they substitute the individual risks which could be diversified by risks that are highly systematic.

Furthermore, (Keys et al., 2008) argue that securitization, which is converting illiquid assets to liquid assets, lead to reduction in screening standards and incentives of the financial intermediaries to carefully screen and monitor their borrowers, this is due to the transformation of the role of the financial intermediaries from “buying and holding” to “originate and distribute” or “buying and selling” and possibility to sell loans to investors which adversely affects the screening incentives of these lenders.

### 3.1.2 Maturity Mismatching in Banks Off-Balance Sheet Vehicles

The diversified portfolios of mortgages and credit sensitive assets were transferred from their originators (the issuing banks) to a shadow banking system consists of off-balance sheet vehicles, known as special purpose vehicles such as conduits and Structured Investment Vehicles (SIVs) to isolate the credit risk of these tranches from the balance sheet of their originators (Coval et al., 2008).

These off-balance sheet entities raise funds by issuing and selling short term Asset-Backed Commercial Papers (ABCP) to invest in long illiquid risky assets, these short term securities are backed by pool of mortgages and other types of loans as collateral (Brunnermeier, 2008). This strategy of borrowing short term funds and lending long term assets allow banks to get benefit from yield differentials resulting from maturity mismatch (Frank et al., 2008), however it exposes it to funding liquidity risk.

### 3.1.3 Rating of the Structured Financial Products

The structured products were rated by the credit rating agencies and the risk of the tranches or bonds was assessed. The credit rating measures the ability of the issuing entity to meet their



future obligations, that is, a measure for the expected cash flow of the issued security. (Coval et al., 2008) argue that structured finance allows originators to manufacture AAA-rated securities by tailoring the cash-flow risk of these securities to satisfy the guidelines set by the credit rating agencies. This is done by pooling risky assets in portfolios and issue claims tranches against them. Structured finance allows using a “larger number of securities to be pooled, larger fraction of the issued tranches can end up with higher credit ratings than the average rating of the underlying pool of assets” (Coval et al., 2008), that is, pooling risky assets and repackaging it into claims that are less risky than these underlying assets.

In addition, Brunnermeier (2008) argues that structured products may have received more favorable ratings compared to corporate bonds because rating agencies collected higher fees for structured products.

#### 3.1.4 Rapid Growth in the Securitized Products

This rapid growth in the securitized products was due to the following reasons mentioned by Brunnermeier (2008) and Coval et al. (2008): First, these products allow investors to obtain mortgage loans and other types of loans with low mortgage rates and interest rates. Second, they allow some institutions such as pension funds to engage in activities and hold assets which regulators prevented them from holding it before. Third, allow banks to outmaneuver the Basel accords by issuing a shadow banking system and transferring their assets to off-balance sheet vehicles. Therefore, banks were able to reduce the amount of capital needed to conform with Basel regulations and guidelines by moving the pool of loans into these vehicles and granting a credit line to that pool that need much low capital requirement. Reducing the minimum capital requirement demanded from banks is one of the main factors that help in emerging the structured finance market. Fourth, credit rating agencies were optimistic and they granted the structured finance products high ratings and considered them as safe assets as they rely on historical data in their forecasting, moreover, the United States didn't experience such a nationwide deterioration in the housing prices, but it was only regional cases. The high credit ratings for these products and the strong economic growth make investors believe in the robustness of these products.

#### 3.2 Consequences and Effects of the Financial Turmoil

As a result, for the popularity of the securitized products, the financial institutions increased their issuance dramatically, and this causes increase and boom in cheap lending. The subprime mortgages, “which are a financial innovation intended to allow poorer people and riskier borrowers access to mortgage finance in order to own homes” (Gorton, 2008), allow many borrowers who are below the credit standards to buy houses which exceed their credit worthiness. The demand on the houses increases, thus, causes housing prices to increase sharply, which results in housing bubble (i.e. rapid increase in house prices, trading prices vary than its intrinsic value) (Brunnermeier, 2008). He argues that the factors led to the housing bubble are the low interest rates environment, and the securitized products.

As the housing bubble bursts and the housing prices decline, many borrowers suffer from the deterioration in the houses value and were unable to repay their loans. As a result, to this

decline in house price, the default rates on these mortgages increase significantly and many borrowers found themselves holding mortgages in excess of the market value of their homes (Coval et al., 2008).

The consequences of the financial turbulence are credit crisis caused by defaults in the subprime mortgage markets which causes asymmetric information and uncertainty about the value of the financial products, and liquidity crisis driven by market illiquidity and funding illiquidity. The consequences are discussed below in more details.

### 3.2.1 Credit Crisis: Subprime Mortgage Defaults

The financial crisis was initially triggered by defaults in subprime mortgages caused by housing bubble followed by housing crash which causes the property value to be less than the mortgage value, hence, led to mortgage default shocks. The delinquencies on the subprime mortgages increased because of the increase in interest rates and decline in the houses prices (Frank et al., 2008).

The propagation of the U.S subprime mortgage crisis across different financial assets and through many financial markets is due to asymmetric information (as mentioned in Frank et al. 2008, Caballero and Krishnamurthy, 2008, and Gorton, 2008). This asymmetric information is driven by the complexity of the structured mortgage products, that is, the information is lost due to complexity of securitization, and therefore investors couldn't access the off-balance sheet vehicles to determine the size and location of risks.

Uncertainty about the value of the structured credit products caused the rating agencies to downgrade these structured products and announce the change in their methodology in evaluating and rating these products (Frank et al. 2008). Furthermore, the introduction of the indices of subprime risk, ABS indices (ABX), that is used to measure the structured credit mortgage-backed instruments, revealed for the first time the information about the subprime risks and value, and provide a transparent price of subprime risk (Gorton, 2008).

Investors scaled down their trading in the structured products as a result of the losses and delinquencies on subprime mortgages, downgrades done by rating agencies, and the introduction of the subprime indices which show the true value of structured products. Increasing uncertainty about the exposure to and value of the mortgage-backed securities led investors to be unwilling to roll over the short term asset backed commercial paper causing deep liquidity problem to the off-balance sheet entities (such as (SIVs) and conduits). As the funding liquidity pressures increases with the structured investment vehicles, their sponsored banks had to step in and rescue them either by providing liquidity or by reabsorbing their assets back into the banks' balance sheets. This causes the banks' balance sheets to become strained because of: first; re-absorption of their off balance-sheet vehicles, second, decline of the asset values, third, warehousing risk, where banks warehouse large amounts of mortgage securities and leveraged loans (Frank et al., 2008).

### 3.2.2 Liquidity Crisis: Market Illiquidity and Funding Illiquidity

Caballero and Krishnamurthy (2008) argue that uncertainty is at the heart of the liquidity

crisis due to the complexity of the financial structures and lack of history for those credit products such as the collateralized debt obligations (CDOs) and how they behave in time of stress. They compare the situation by which the economy turned from excess liquidity to a liquidity crunch due to hoarding liquidity in order to ensure themselves against unexpected contingent liabilities by the musical chairs game.

The losses in the financial markets led investors to pull themselves back from the credit structured products and refuse to roll over the asset backed commercial paper. This makes hedge funds and other financial institutions to suffer from dryness of liquidity. Frank et al. (2008) show that the interbank lending and the money markets declined due to hoarding liquidity driven by uncertainty about the exposure of counterparties to the securitized mortgages and to ensure themselves against future obligations. This led to an increase in funding costs and pressures, therefore, margin requirements and collaterals increased which cause extensive write-downs and rapid deleveraging and this lead to sharp decline in assets.

Basel Committee on Banking Supervision (January 2009) criticizes the risk management tools used by banks because they depend on historical statistical relationships that are known and constant, ignoring the reactions within the system, and underestimating the interaction between market liquidity and funding liquidity.

Market liquidity is defined in the literature (for example, Frank et al., 2008 and Brunnermeier, 2008) as the ease with which assets can be traded without significant affect in their prices, that is, low (bid-ask) spread. Funding liquidity is the availability of funds that an agent can obtain borrowings to meet their obligations.

The relationship between market liquidity and funding liquidity has been tested by Brunnermeier and Pedersen (2008) and they find that they are mutually reinforcing and lead to liquidity spirals. This reinforcing liquidity spirals is discussed by Frank et al., (2008) and they argue that market illiquidity can turn to funding illiquidity and vice versa. On one hand, market illiquidity can be converted into funding illiquidity when mortgages losses and lost confidence in the ratings of the structured finance lead to infrequent trading and limited prices and hence, cause increased volatility. Therefore, margins and collaterals demanded from financial institutions will raise, and this will reduce leverage and funding possibility. On the other hand, funding illiquidity can turn into market illiquidity when funding illiquidity pressures forces the financial institutions to sell their assets at fire-sale prices, causing the prices of the assets to decline sharply and therefore, these institutions are forced to further deleveraging.

Brunnermeier and Pedersen (2008) and Brunnermeier (2008) differentiate between two liquidity spirals, the margin spiral and loss spiral. First, the margin spiral happens when market illiquidity and increased volatility causes margins to increase and this lead to funding problems and pressures, which in turn decrease market liquidity and increasing the margins that results in funding problems and so on. The evidence is that the subprime mortgages crisis led to increase in assets margins. Second, the loss spiral happens if the financial institutions hold a large initial position, then funding pressures cause increases in market illiquidity which lead to losses in their initial position and force them to sell more assets resulting in

further price decline and so on. Finally, after presenting the causes and effects of the current crisis 2007, there is consensus in the literature that the consequences of the financial crisis are not completely revealed, and that the effects are widely spread across different financial markets all over the world, and the losses couldn't be finally determined.

In brief, it is obvious that low lending standards and lax screening of borrowers led to the credit crisis and subprime mortgage defaults. Besides, this financial turmoil revealed the weaknesses of banks' risk management tools that couldn't predict the financial crisis. Although these subprime losses were relatively small in comparison to the overall stock market, these financial innovations and securitization led to a liquidity crisis resulting from asymmetric information and increasing uncertainty which causes market illiquidity and funding illiquidity that are mutually reinforcing.

### *3.3 The Financial Crisis and Governance in Financial Institutions*

From the above discussion, the 2007- 2008 financial crisis was initially triggered by defaults in subprime mortgages caused by a collapse of housing bubble, many banks were left holding illiquid mortgage securities, the healthy institutions were not known from unhealthy ones due to information asymmetry, and thus consumer confidence was lost. Consequently, the supply of private capital in the market to the financial sector dried up, credit markets frozen, and stock markets dropped. To avoid more deterioration in the market the government intervenes to stabilize the financial sector (Faulkender et al., 2009).

The impact of corporate governance on bank performance in the 2007- 2008 financial crisis, and the role of governance in the crisis are investigated in many studies. Erkens, Hung, and Matos (2009) find in a sample of 306 financial firms in 31 countries that institutional ownership and board independence, as governance measures, are positively related to losses during the financial crisis. Moreover, Elbannan and Elbannan (2014b) argue that there is highly significant relation between bank governance disclosures and cost of capital, that is banks with large board size and more executive board directors are able to obtain finance from cheaper resources.

Also Beltratti and Stulz (2009) examine the impact of governance and bank regulation on bank performance during the crisis using a sample of 98 banks from 20 countries, and find that banks with more Tier 1 capital, stronger capital supervision, more deposits financing, and more loans have better performance. Similarly, Elbannan and Elbannan (2014a) argue that governance has positive impact on bank performance, in particular, more executive directors on board enhances employee's productivity. Moreover, Adams (2009) compares a sample of non-financial and financial firms for the period 1996-2007, and finds that on average the governance of financial firms is not worse than the governance in non-financial firms. Bank directors earned significantly less compensation than their counterparts in non-financial firms, and banks receiving bailouts have more independent boards, larger boards, and greater incentive pay for CEOs which may lead executives of banks to take on too much risk. This suggests that board independence may not necessarily be beneficial for banks, as they may not always have the expertise necessary to oversee complex banking firms.

#### 4. Basel Accords and Banks' Performance

A sound and profitable bank is able to face negative shocks and the banking system will contribute to stability of the financial system, and hence, accelerate the country's economic growth. Therefore, many academic researches study the impact of Basel Accord and bank regulations on bank profitability and performance, furthermore, the determinants of bank profitability have attracted many researchers and there are many attempts to identify the effect of many internal and external determinants on bank profitability.

##### *4.1 Determinants of Banks' Performance*

The banking sector represents the nerve of any economy; therefore, determining the performance of banks attracted many researchers. Bank managers are concerned about analyzing their costs and revenues, that is, ensure their efficiency and profitability.

In the literature, bank profitability is usually considered as a dependent variable on a group of internal and external determinants. The internal determinants are the bank-specific determinants of profitability; they are bank characteristics related to bank management that may affect bank profitability. The external determinants of profitability do not relate to bank management and they are number of variables that are classified into macroeconomic determinants and market or industry-specific determinants which are related to the economic and legal environment and may affect the performance of the banking system.

Furthermore, profitability analysis is classified in the literature either as a cross-country analysis for profitability of the banking system, or individual country analysis that study the determinants of banks profitability in a certain country.

##### *4.1.1 Cross-Country Profitability Analysis*

The first group of studies focuses on the cross-country analysis in order to test the effect of various bank-specific indicators, macroeconomic and environmental determinants on the banking system profitability across countries. They used a comprehensive set of profitability determinants such as bank-specific characteristics (for example: bank's assets size, bank capital, bank reserves, ownership type), Country-specific factors or the macroeconomic variables (such as inflation, real interest rate, real GDP growth, and unemployment), taxation variables (including implicit taxation as reserves and liquidity requirements, and explicit taxes), regulatory variables (such as deposit insurance), financial structure variables as competition, concentration and stock market capitalization, and finally, legal and institutional indicators such as indices of efficiency of the legal system and lack of corruption. These cross-country studies include Demirguc-Kunt and Huizinga (1998), Goddard et al. (2004) that identify bank capital as one of the crucial determinants of bank profitability, Bikker and Hu (2002) examine the business cycle effect on bank profitability, while Altunbas et al. (2007) examine the relationship between bank capital and efficiency.

Demirguc-Kunt and Huizinga (1998) examine the determinants of bank efficiency and profitability in 80 countries during the period from 1988 to 1995, measured by net interest margin ratio and banks before tax profits to total assets ratio respectively. The cross country



analysis allows them to compare between their results in the developed and developing countries. They find a positive relationship between capitalization and profitability showing that well capitalized banks have high net interest margin ratio, while a negative relationship between reserves and profitability especially in developing countries more than in developed countries reflecting the relatively high opportunity cost of holding reserves in poorer and more inflationary countries. Foreign ownership is associated with higher interest margins and bank profitability, especially in developing countries. Finally, the institutional and legal factors, and differences in financial structure, have high effects on interest margins and bank profitability in developing countries than in developed countries.

By conducting a cross-sectional and time series and dynamic estimation technique, Goddard et al. (2004) study the determinants of bank profitability in European countries; they find a significant persistence of profit from one year to the next, and a positive relationship between capital to asset ratio, that proxy for risk, and bank profitability. They refer this positive relationship to the low expected bankruptcy costs and signaling quality costs for a bank maintaining high capital to assets ratio, as it is less costly for managers of low risk banks to signal quality by maintaining a high capital to asset ratio than for managers of high risk banks. They find little evidence for the relationship between bank performance and assets size and also the ownership type.

Another cross country analysis for Bikker and Hu (2002) studies bank profitability by focusing on the effect of business cycle, as a macroeconomic factor measured by real GDP growth and other cyclical variables, on banks' profits, provisioning and lending activities in 26 OECD countries. They argue that the implementation of Basel II may lead to procyclical bank behavior, thus, banks will require more capital when companies are downgraded causing macroeconomic instability. This refers to the change in the borrower's creditworthiness during the ups and downs of the business cycle which is reflected in the firms' credit ratings and risk weights and thus in the capital requirements. They find that business cycle has a significant effect on bank profits, causing it to move up and down with the business cycle, and therefore, allowing the accumulation of capital and reserves from these profits after deduction of taxes and dividends, showing a procyclical behavior of banking. Again, the business cycle affects strongly the provisioning for future credit losses, whereas banks will lower provisions during an economic boom and increase them during the cycle downturn. However, banks tend to raise credit loss provisions in years of relatively high net profits to meet the minimum capital requirements when business cycle deteriorates, which reduces procyclicality. Finally, they find that banks' lending activities depend on the business cycle too, but due to demand factors rather than supply factors such as shortage of capital, and reported that lending is not affected by capital and reserves.

Altunbas et al. (2007) examine the relationship between risk, capital and efficiency in European banking, and whether this relationship will vary with different ownership structures or not. They find an inverse relationship between capital and efficiency for the full sample, that is, inefficient European banks appear to hold more capital and take on less risk. However, these results vary across different types of ownership. For commercial banks they find no relationship between capital and efficiency, while there is a positive relationship for



savings banks and inverse relationship for cooperative banks. The financial strength of the corporate sector (tested by variable that account for solvency in European banking sector, and measured by current assets to current liabilities) has a positive influence in reducing bank risk-taking and capital levels.

#### 4.1.2 Individual-Country Profitability Analysis

In literature, the effect of bank-specific indicators, industry-specific and macroeconomic determinants on individual bank profitability are examined (Note 5). The second group of studies that test the determinants of bank performance are individual country analysis, focusing on profitability of a certain country, such as, Athanasoglou et al. (2008) test the determinants of profitability in Greek banks, Lin and Zhang (2008) examine bank performance in China, Murthy (2008) focus on the Gulf countries, Barajas et al. (1999) study the determinants of intermediation spreads in Colombia, and the banks' cost efficiency in Italian banks is investigated by Girardone et al. (2004).

##### 4.1.2.1 Bank Capital

One of the main determinants of bank performance is capital strength, measured by capital to assets ratio. Capital is positively related to bank profitability, as strong capital position enables banks to pursue profitable business opportunities and to have more time and flexibility in dealing with problems arising from unexpected losses, thus achieving increased profitability (Athanasoglou et al., 2008). Moreover, bank capital has a significant effect on bank cost efficiencies, that is, efficiency is positively related to capital strength (Girardone et al., 2004). Girardone et al. (2004) examine the determinants of Italian banks' cost efficiency over the period 1993-96, they concluded that inefficiencies appear to be inversely correlated with capital strength and positively related to the level of non-performing loans in the balance sheet, they suggest that efficient banks have low level of non-performing loans as they are assigning more attention and resources to loan origination, monitoring and other credit judgment activities. They find that inefficient banks also tended to have (on average) a greater retail banking orientation, higher interest margins and more branches compared with their efficient counterparts.

On the other hand, Murthy (2008) develops a model to identify the critical factors influencing bank profitability in the GCC region (Gulf Cooperation Council Countries: UAE, Bahrain, Kuwait, Saudi Arabia, Oman and Qatar). He argues that leverage (measured by equity to total assets and representing capital management) is not a key determinant of profitability in GCC banks. He arrived to four key determinants of profitability of banks in GCC countries during the period 2002 to 2006; the cost to income ratio (representing cost management), net interest margin (representing interest rate risk management), loan loss provisions (representing credit risk management) and liquidity to deposits ratio (representing liquidity management).

##### 4.1.2.2 Bank Ownership

Bank ownership is studied in the literature as a determinant of banks' profitability, however, disparate results are found. Lin and Zhang (2008) study the effect of bank ownership on performance of Chinese banks, and they arrive to an important conclusion that the state

ownership is negatively related to bank performance, whereas, empirical evidence show that the big four state-owned banks are less profitable, less efficient, and have worse asset quality, attaining the worst performance comparing with other types of ownership. On the other side, Athanasoglou et al. (2008), find that the ownership status of the banks is insignificant in explaining profitability.

#### 4.1.2.3 Business Cycle

Another determinant of bank profitability is the business cycle. Macroeconomics variables, such as cyclical output and inflation, indicate that bank profitability is procyclical. Business cycle is found to be positively correlated to bank profitability, since lending activities decrease during a downward cycle due to increase in risk level and consequently provisions held by banks will increase due to decrease in loans' quality, and also bank capital has a procyclical behavior and tends to follow the business cycle (Athanasoglou et al., 2008 and Bikker and Hu, 2002).

#### 4.1.2.4 Intermediation Spread

A key variable that affects banks' profitability is the intermediation spread, measured by net interest margin ratio. Barajas et al. (1999) argue that when the spread between lending and deposit interest rate is large this may signal bank inefficiency and lack of competition in the banking system, or banks are increasing spreads to protect themselves against the increase in credit risk. Maintaining high intermediation spreads will lead banks to have less incentive to improve their operating efficiency or quality of their loans. Barajas et al. (1999) aim to examine the impact of the economic reform program and financial liberalization in Colombia on the intermediation spreads and whether liberalization narrow spreads or not. This is done by decomposing the intermediation spreads into their key factors; bank costs, market power (competitiveness), loan quality (non-performing loans). They find that the average spread did not change between the preliberalization (1974–88) and postliberalization (1991–96) periods, but its composition changed showing that market power is significantly decreased and the loan quality increased. They concluded that Colombia's progress in reducing operational costs and financial taxation and improving loan quality will determine whether it can narrow the spread.

#### 4.1.2.5 Bank Size

Finally, the literature also shows that bank assets size does not provide evidence of economies of scale in banking. There is no clear relationship between assets size and bank efficiency (Girardone et al, 2004 and Athanasoglou et al., 2008). However, Pasiouras (2008) finds that higher size and lower loan activity results in higher efficiency.

### *4.2 Impact of Bank Regulations and Basel Requirements on Banking Sector Profitability*

An extensive literature has studied the impact of Basel requirements on banks' profitability since new Basel Accord (Basel II) sets out a framework for bank regulation and supervision which consists of three pillars; minimum capital requirement, supervisory oversight and monitoring through powerful supervisory agencies and market discipline through better

information disclosure.

On the macro level, a vast literature has focused on the cross country analysis to test the impact of bank regulations represented by the three pillars of Basel II Accord and the banks' performance. The first effort done in this area was by Barth, Caprio and Levine who propose a chain of cross country studies started with a preliminary investigation for banks regulation & supervision on a sample of forty five countries (Barth, Caprio and Levine, 1999), then they extend the sample to more than 60 countries (Barth, Caprio and Levine, 2001a) to update and improve the data collected in their study, and test whether tighter regulatory restrictions have favorable effects on the financial systems.

Barth, Caprio and Levine (2001b) assembled a new and comprehensive cross country database collected from a survey of bank supervisors in 107 countries on the characteristics of regulation and supervision of banks around the world. The database discusses many regulatory and supervisory features, such as capital requirements, bank activity restrictions, bank entry requirements, disclosure requirements, actions and quality of supervisions, provisions and liquidity requirements, ownership restrictions and deposit insurance schemes. They aim to present detailed information about bank practices and provide data that covers various aspects of banking, including the regulations, supervision, and ownership structures existing in different countries and clarify the differences in the banking systems across these countries, therefore, enabling authorities to identify the best practices of regulation and supervision to help them in their banking system reforms, improve banking performance and therefore, promote economic growth.

Bank authorities of many countries around the world started to reform their banking systems by implementing bank regulations and supervisions in order to comply with Basel II Accord requirements. By examining the regulatory environment in the banking systems of 142 countries Barth, Caprio and Levine (2008) test whether the changes in the regulatory reforms in order to comply with the regulatory framework of Basel Committee improve development, efficiency and corruption in lending. They argued that generally, they don't find that banking systems in many countries around the world have been improved and reformed to the better. However, Podpiera (2004) examines the relationship between compliance with Basel core principles for effective banking supervision, introduced in 1997 by Basel Committee on Banking Supervision, and performance of banking sector, and finds that compliance with Basel Core Principles has positive impact on banking sector performance; whereas, higher compliance is associated with lower non-performing loans & lower net interest margin. Basel Core Principles aim to strengthen quality of banks' regulation and supervision by setting twenty-five principles for effective supervision system, capital adequacy requirements, information requirements and accounting standards. Basel II promotes the adoption of minimum capital adequacy standards, empowering supervisory agencies, and strengthening market discipline mechanisms. Many studies test the significance of each of these three pillars of Basel II in relation to bank performance.

#### 4.2.1 Bank Capital Requirements and Other Bank Regulations

Capital requirements, the first pillar of Basel II, enhance banks to hold the minimum capital

adequacy ratio in order to act against different bank risks. In a cross country study, Barth et al. (2004) find that more stringent capital requirements are associated with fewer non-performing loans, however capital stringency is not closely associated with banking crisis or bank development or efficiency (measured with overhead costs & net interest margin ratios) when controlling for other supervisory-regulatory policies.

On the micro-level, individual country analyses (for example, Lin, Penm, Garg and Chang, 2005, on Taiwan banks and Naceur and Kandil, 2009, on Egyptian banks) are conducted to test the relationship between bank capital adequacy requirements and bank performance. Lin, Penm, Garg and Chang (2005) focus on the pre- and post-implementation stages of capital adequacy in Taiwan's banking industry to study the effect of implementing the minimum capital requirements and capital adequacy on the financial performance, bank insolvency risk index, and the relationship between the insolvency risk of banks and financial performance. By using static estimation approach which does not account for persistence in dependent variable, they empirically show that there is a significant positive relationship between capital adequacy and financial performance, thus, after the implementation of the new regulatory measures, banks' financial performance has improved. Moreover, there is a significant positive relationship between capital adequacy and insolvency risk index, and they argue that in context of capital management, when capital adequacy management tends to be strict this will lead banks to take greater risk. And finally, the relationship between insolvency risk index and financial performance is significantly negative relationship.

Analyzing the Egyptian banking industry, Naceur and Kandil (2009) investigate the impact of imposing minimum capital adequacy ratio on banks' performance using two measures of performance: cost of intermediation and profits during the period 1989-2004, while controlling for the effect of bank-specific and macroeconomic variables on cost of intermediation and bank profits in Egypt. To overcome the limitations in the static estimation approach, they use a dynamic estimation technique which takes into consideration persistence in the behavior of dependent variables overtime, in addition to a static model; they find that higher capital requirements have a positive impact on banks' profitability. Furthermore, the factors which cause an increase in the cost of intermediation in the post-capital regulations period are higher capital-to-assets ratio, an increase in management efficiency (measured by ratio of earning assets to total assets), and a reduction in inflation, while factors contributed positively to banks' profitability in the post-regulation period are higher capital requirements, the reduction in implicit cost, and the increase in management efficiency. Concerning the other bank regulations, such as strict restrictions on bank activities, government ownership of banks, regulations on bank entry, and deposit insurance, there are many studies that investigate their effects on banks' performance.

In a preliminary study for Barth et al. (2001a) and other more recent studies (Barth et al., 2004, 2008) examine the effect of bank regulation and supervision on bank development, performance and stability, they find that tight restrictions on bank activities and banks ownership of nonfinancial firms are not beneficial for the banking system and cause inefficiency and high probability of banking crisis. Furthermore, restricting bank activities is found to be negatively associated with bank development and stability, as compared to when

banks can diversify into other financial activities. However, Demirguc-Kunt et al. (2003) argue that bank regulations increases banks' net interest margin ratio.

Greater share of bank assets controlled by state-owned banks, on average, is associated with less financial development of banks, as well as the nonbank sector and the stock market (Barth et al., 2001a). Government ownership of banks does not retain an independent robust association with bank development, efficiency, or stability when controlling for other features of the regulatory and supervisory environment. In other words, greater government ownership is associated with inefficiency and less developed banks (Barth et al., 2004). Moreover, Barth et al. (2004) do not find a strong association between restrictions on bank entry and bank efficiency, while generous deposit insurance schemes are strongly and negatively associated with bank stability.

#### 4.2.2 Supervisory Power

The second pillar of Basel II fosters the supervisory power and aims to empower the supervisory authorities and strengthen their role. The studies, which focus on testing whether powerful supervision could enhance bank performance, indicate that there is no robust significant relationship between empowering the official supervisors and bank efficiency (Barth et al., 2004; Pasiouras, 2008, and Barth et al., 2008).

Barth et al. (2004) highlight various advantages and disadvantages from granting broad powers to supervisors. They mention that, on one hand, strong official supervision can prevent managers from engaging in excessive risk-taking behavior, therefore, enhance bank development, performance and stability. On the other hand, powerful supervision might be related to corruption or impede bank operations. Their empirical results indicate that there is no strong association between bank development and performance and official supervisory power. Moreover, Barth et al. (2005) disagree with Basel requirement which empowers the official supervisory oversight of banks and instead, they provide evidence that strengthening government oversight of banks is ineffective in reducing bank overhead costs & associated with increase in corruption in bank lending, as they find a positive relationship between powerful supervision and bank corruption in lending. They suggest that empowering the private monitoring through accurate information disclosure will improve bank performance.

#### 4.2.3 Private Sector Monitoring and Information Disclosure

Private sector monitoring is representing market discipline, the third pillar of Basel II. It is measured by the effectiveness of accounting practices, external audits and auditing standards, information disclosure and transparency of the financial statements, independent evaluations for banks by rating agencies, that is, information disclosure, external audit and credit rating (Bertus et al., 2007).

Many studies when examined the relationship of the three pillars of Basel II and bank performance, they find that there is significant positive relationship between accounting and auditing systems, that is, private monitoring has positive effect on bank performance and desirable outcome in the banking sector (such as, Barth et al., 2004, 2007 and 2008, Fernandez and Gonzalez, 2005; Bertus, 2007; Pasiouras, 2008; and Demirguc, 2008). These



studies agreed that the best regulatory and supervision practices are those encouraging accurate information disclosure, obtain external auditing and empower the private sector monitoring. Therefore, in order to improve banking regulation and supervision, countries should give priority to information disclosure and transparency and record the financial data according to accounting standards accurately and on a regular basis, and disclose to the public comprehensive and misleading information about their activities and financial position.

Bertus (2007) focus on the economic performance of 153 countries and test if banks' regulations and policies for domestic banking system affect the national wealth. By using the average GDP and average GDP growth, as measures for economic performance, Bertus (2007) finds that capital regulations and supervisory oversight have no relation to economic measures, that is, they have no influence on nation's wealth. However, countries with greater monitoring, as measured by accounting and auditing practices, financial transparency, and credit rating efficacy, are associated with greater wealth and less risk. Furthermore, Demircuc-Kunt et al. (2008) test the impact of compliance with the twenty-five principles of Basel core principles for effective banks supervision introduced in 1997 on bank soundness, using Moody's ratings for bank soundness, and they find a robust significant positive relationship between information requirements and provision and bank soundness, thus, countries with effective private monitoring and information transparency have more highly rated banks. They suggest that countries should give priority to information provision and require their banks to accurately record their financial data according to accounting standards and on a regular basis, and disclose to the public comprehensive and misleading information about their activities and financial position, in order to improve banking regulation and supervision.

Barth et al. (2004) use the new cross country database introduced by Barth et al. (2001b) and find that regulations which encourage and facilitate private monitoring of banks are associated with better banking-sector outcomes, that is, greater bank development, lower net interest margins, and small non-performing loans. Similarly, Pasiouras (2008) examines the impact of regulations and supervision approaches on bank efficiency across countries by constructing indices, based on data from Barth et al. (2004), for capital adequacy requirements, power of supervisory authorities and private monitoring, they find that only private monitoring is significant and has positive robust effect on efficiency than other regulations. However, Barth et al. (2004) and Pasiouras (2008) don't use time series procedures and consequently they cannot examine the relation of regulations and bank efficiency over time. Fernandez and Gonzalez (2005) provide further evidence indicating that accounting and auditing systems (private monitoring) are complements for minimum capital requirements and substitutes for restrictions on bank activities and official discipline suggesting that such systems can be effective devices to counteract tendencies for firm risk-taking associated with bank safety nets.

#### 4.2.4 Basel III and Bank Performance

To recall, Basel III was introduced by Basel committee in 2010 to address the failures and



losses revealed by the financial crisis 2007 – 2008. Basel III focuses mainly on three areas; regulatory capital framework, liquidity and bank leverage, and develops two liquidity ratios for the short and long term and one leverage ratio.

The impact of the regulatory framework, introduced by Basel III, is investigated in many studies in attempt to assess the effect of implementing the regulatory framework of Basel III on bank performance, and two divergent views are developed. One strand of literature supports the notion that high capital requirements has favorable effect on banks and capital regulation could be an effective tool to enhance bank performance and role in the economy. For example, Admati et al. (2010) argue that bank equity is not socially expensive and high leverage may not be optimal for banks, however, better capitalized banks will be less exposed to poor lending decisions and thus probability of bankruptcy and will have better performance. The other strand of literature argues that the regulatory capital would be costly and have an adverse effect on banks, in particular, Angelini et al. (2011) find evidence that the increase in the capital ratio leads to welfare loss and 0.09 percent loss in the level of steady state output.

Ample studies have examined the impact of the new regulatory framework of Basel III on bank lending rates and loan growth. For instance, Cosimano and Hakura (2011) report higher lending rates because higher capital requirements lead to higher cost of funding. Their empirical evidence suggests that when banks increase their equity-to-asset ratio by 1.3 percentage points, they will increase their lending rates by 16 basis points and their loan growth in the long run will decrease by 1.3 percent. Moreover, their results vary across countries, e.g. the decrease in the loan growth will be higher in Japan and Denmark and lower in U.S. To address the impact of an increase in the capital ratio, Kashyab et al. (2010) report an increase in lending spread in the U.S. banks.

Similarly, in a large cross country sample, Angelini et al. (2011) argue that banks will increase lending spreads to compensate for the higher cost of funding. Likewise, Slovik and Courneade (2011) argue that banks will increase their lending spreads by about 15 basis points. They argue that the economic output will be affected by the increase in capital requirements reflected in high funding cost (lending rates) and provide evidence that annual GDP growth is in the range of  $-0.05$  to  $-0.15$  percentage point, however this impact on economic output could be offset by decrease in monetary policy rates by about 30 to 80 basis points.

Regarding the influence of higher capital requirements on volume of loans across countries, Gavalas and Syriopoulos (2014) suggest that the results vary from one country to another due to differences in loan demand elasticity and argue that increase of 1.3 percentage point in the capital ratio implies decrease in the volume of loans by 4.97 percent for banks in countries that experienced a crisis and by 18.67 percent for banks in countries not experiencing a crisis. Using simultaneous equations model in a sample of 594 banks in the European Union during the period from 2006 – 2011, Sátorová and Teplý (2013) provide empirical evidence that level of loans is decreased by 2% only because first, lending rates are increased by only 18.8 basis points for one percentage point increase in the capital ratio, second, most of the

European banks are already complying with the capital requirements, and third the elasticity of demand for loans is low in the EU.

Finally, Wagster (2012) compares Basel III capital requirements to capital holdings of Canadian banks during the Great Depression, and finds that Basel III does not require banks to hold high capital as Canadian banks are required to hold during the 1930s. Petitjean (2013) argues that bank regulations should not only focus on lowering the probability of bank failures but reduce the cost of failures when they happen, moreover, there must be coordination and effective implementation for the regulations.

## **5. Basel Accords and Banks' Cost of Capital**

Basel Committee provides continual effort in order to support the international banking system. This section will discuss the impact of Basel I and II Accords, which are built on three pillars; maintaining minimum regulatory capital, supervisory review, and strengthening market discipline, on the banks' cost of capital, that is, the weighted average of its cost of raising debt financing and the cost of issuing equity to shareholders.

The cost of capital, as defined in the literature, is the rate of return that the suppliers of capital require in return for the provision of their funds. Firms have to achieve high returns (i.e. the required rate of return by investors) in order to be able to attract new funding to establish new projects or investments. This required return is determined within the equilibrium in the economy and differs from one investment to another according to their risk class, the higher the level of risk the higher is the required rate of return by investors. Thus, for a given risk of the firm, the cost of capital will be the opportunity cost of funds invested in that business. Thus an increase in the cost of capital is analogous to an increase in the risk of a firm (Ngo, 2006). In other words, the cost of capital for a firm is the expected return that capital suppliers require on the firm's uncertain future cash flows. If capital markets are in equilibrium, this should be equal to the return that could be earned by investing in alternative set of cash flows with the same riskiness (Maccario et al., 2002).

According to the asset pricing model, the cost of capital for any firm is equal to the risk-free rate of return, i.e. the required rate of return on a risk-free asset, plus risk premium. The latter includes the market risk premium, which represents the premium investor will receive for taking risk and holding market portfolio, multiplied by "beta" coefficient, the non-diversifiable risk or the systematic risk. Osborne (1996) defined "beta", as the standard measure of relative stock price volatility, it is a measure of market risk, i.e., the sensitivity of a stock price to market movements. Osborne (1996) argues that increased bank betas, thus increased cost of bank capital will cause decrease in bank stock prices because this means higher required rate of return for investments (that is, higher hurdle rate or minimum acceptable rate of return on a project). Osborne (1996) analyses the determinants of bank betas and what affects the bank's cost of capital, and concludes that bank betas are affected by economic factors and financial factors. Regarding the economic factors, bank betas are affected by the economic conditions and move in response to those conditions, bank beta is affected by the GDP growth, inflation, and the spread between long and short-term interest rates.

Banks' capital is different than the manufacturing firms' capital that it is regulated. Banks have to achieve a capital adequacy ratio and maintain a minimum capital ratio of 8% determined by Basel Accords. Since banks represent the nerve of any economy, it must hold strong capital base to be a cushion against banks' losses and to be able to absorb many of banks' risks. "More capital relative to assets provides a greater cushion to absorb any given loss and minimizes the spillover to the deposit insurance fund" (Keeley, 1989). Since maintaining sufficient capital is crucial, many papers attempt to examine whether the regulatory capital requirements cause banks to hold higher capital ratios than before the regulations (Note 6).

In order to increase the capital to assets ratio to meet the stringent capital to assets requirements, the banks will either sell assets and/ or increase the capital of the bank. Increasing bank capital may be done using internal sources, i.e. retained earnings, or external sources through the sale of common stocks, preferred stocks, convertible debt, or long term subordinated debt. Deciding to increase the capital through external or internal sources and choosing the best external source to use depend on the cost of the source of funding (Furfine et al., 1999) and also on the regulatory pressure to adopt one approach than the other (Keeley, 1989).

Ngo (2006) argue that uniform increases in banks' capital requirement lead to an increase in the banks' cost of capital. This raises the question on whether Basel Accords, which aim to decrease banks' systematic risk through capital regulation, achieved its target by forcing banks to hold minimum capital requirement.

The next section will discuss the role of the regulatory capital after defining the difference between the regulatory capital and the economic capital, and then explain how banks seek regulatory capital arbitrage to reduce their minimum capital requirements. Furthermore, the impact of capital regulations on the bank risk-taking behavior, and the impact of Basel Accords on the cost of bank capital will be reviewed.

### *5.1 The Regulatory Capital and the Economic Capital in Banking Industry*

In order to determine the role of the regulatory capital and the motivations behind regulating the bank capital by requiring banks to hold certain capital ratios, the difference between the economic capital and the regulatory capital (Note 7) will be illustrated.

On one hand, the economic capital or the "bank's market capital requirement" as defined by Berger, Herring and Szegö (1995) is "the capital ratio that maximizes the value of the bank, thus, maximizes the sum of market values of equity and debt in absence of the regulatory capital requirements, but in presence of the rest of the regulatory structure that protects the safety and soundness of banks". Therefore, it is the capital chosen by shareholders in order to maximize the market value of the bank without regulation, that is, the ratio which the bank tends to maintain in the long run in absence of regulatory capital requirements (Berger et al., 1995). Furthermore, the economic capital as is the level of capital needed to cover the bank's losses with a certain probability of confidence level to keep the bank solvent (Elizalde and Repullo, 2007).

In order to determine the optimal capital structure (optimal economic capital) or the bank market capital requirement, Berger et al. (1995) introduced the market imperfections such as taxes and cost of financial distress (Note 8), asymmetric information (Note 9) and transaction costs, and the safety net (which is an imperfection exclusive to banks, defined to be all the government actions that enhance safety and soundness of the banking system other than the regulation of capital requirements, it includes, for example, the deposit insurance and the discount window) into the framework of Modigliani and Miller (1958) (M & M) (Note 10). They concluded that taxes tend to reduce market capital requirements, while financial distress tends to raise these requirements. Asymmetric information and transaction costs will either increase or decrease the market capital requirements, and thus shareholders must tradeoff between the two conflicts, one conflict is between the shareholders and creditors, and the other conflict is between shareholders and managers, the higher capital will reduce the conflict between shareholders and creditors but increase conflict of interests between shareholders and managers, however, the opposite will happen in case of reducing the capital. Finally, the safety net will tend to reduce those requirements as it protects the bank creditors from the consequences of the risk-taking behavior of banks.

Berger et al. (1995) provide evidence that bank book capital to assets ratios have been falling steadily in the United States from 1840 to 1993. Bank capital ratios were decreasing during this period due to improvement in the efficiency of the U.S. financial system, and the introduction of various governmental initiatives which strengthened the safety net causing decline in the probability of bank failure. Therefore, the market capital requirements decrease because less capital is needed to protect the bank against the risk of financial distress (Berger et al., 1995).

On the other hand, the regulatory capital is the minimum capital required by the regulator, it is the mandatory capital which regulators require banks to hold in order to absorb many of the banks' risks due to their unique role in the economy, hence; the regulatory capital requirement is motivated by the systemic risk (Note 11). Basel Committee on Banking Supervision (June, 2006) (Note 12) presents the calculation of the total minimum capital requirements for credit, market and operational risk. The capital ratio is calculated by using the ratio of regulatory capital and risk-weighted assets, which mustn't be lower than 8%. Thus, the capital adequacy ratio (minimum capital ratio) is calculated by using the ratio of regulatory capital (Tier 1 + Tier 2 + Tier 3) to Risk-weighted bank assets. Furthermore, the Basel Committee on Banking supervision (June, 2006) determines the constituents of bank capital, i.e. the regulatory capital, in a framework covering credit risk, operational risk and market risk, including core capital (Tier1), supplementary capital (Tier 2), and short-term subordinated debt to cover market risk (Tier 3). The Core capital (Tier 1) consists of equity capital and disclosed reserves (published reserves from post-tax retained earnings).

The accord requires that at least 50% of a bank's capital base to consist of a core element comprised of equity capital and disclosed reserves. The supplementary capital (Tier 2) consists of undisclosed reserves, revaluation reserves, general provisions/general loan-loss reserves, hybrid debt capital instruments, subordinated term debt with maturity of over five years. (Tier 3) consists of short-term subordinated debt issued at the discretion of the banks'

national authority to cover market risk only. The elements of the bank capital in each Tier are discussed in details in the following table:

Table 1. Definitions of bank capital elements

<b>Regulatory capital</b>	<b>Elements of regulatory capital</b>	<b>Percentage required</b>
Tier 1 (Core capital)	<ol style="list-style-type: none"> <li>1. Equity capital (Issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock, but excluding cumulative preferred stock).</li> <li>2. Disclosed reserves (Published reserves from post-tax retained earnings)</li> </ol>	50% of a bank's capital base to consist of a core element.
Tier 2 (Supplementary capital)	<ol style="list-style-type: none"> <li>1. Undisclosed reserves (Unpublished or hidden reserves although passed through profit and loss account and accepted by the bank's supervisory authorities)</li> <li>2. Revaluation reserves (Revalue assets to reflect their current value rather than historic cost)</li> <li>3. General provisions/general loan-loss reserves (not created against identified losses)</li> <li>4. Hybrid debt capital instruments (combine certain characteristics of equity and certain characteristics of debt, they will be included in capital if they have similarities with equity and are able to support losses)</li> <li>5. Subordinated term debt (minimum original term to maturity of over five years may be included)</li> </ol>	Tier 2 is limited to 100% of Tier 1.
Tier 3	Short-term subordinated debt covering market risk (have an original maturity of at least two years)	At the discretion of their national authority and is used to support only market risk. It is limited to 250% of a bank's Tier 1 capital that is required to support market risks.
Deductions from capital	<ol style="list-style-type: none"> <li>1. Goodwill, deducted from Tier 1 capital elements.</li> <li>2. Increase in equity capital resulting from a securitization exposure, deducted from Tier 1 capital elements.</li> <li>3. Investments in subsidiaries engaged in banking and financial activities which are not consolidated in national systems, deducted from total capital.</li> </ol>	

Source: compiled by the researcher using information from Basel Committee on Banking Supervision (June, 2006)

Berger et al. (1995) argue that the capital adequacy regulations play a crucial role in aligning the incentives of bank owners with depositors and other creditors. The ideal regulatory capital, as determined by Berger et al. (1995), is the one that tradeoff between social cost and social benefit, thus, the marginal social benefit of reducing the risk of bank failures is greater than the marginal social cost which results from increasing the equity beyond the market requirement which reduces the value of the bank and increases the weighted average cost of financing and thus reduce banks intermediation.

Elizalde and Repullo (2007) illustrate and analyze the difference between the economic capital and regulatory capital, and they define the variables affecting both; the economic capital depends on the intermediation margin and the cost of bank capital while the regulatory capital depends on the confidence level set by the regulator. Moreover, there is a common variable that affects both of them which is the loans' probability of default and loss, although they are not affected in the same manner and don't have the same respond. They concluded that the cost of bank capital is negatively related to economic capital, that is, the economic capital is higher (lower) than regulatory capital when the cost of capital is low (high). Thus, when the cost of capital is low, the economic capital will be above and higher than the regulatory capital, and on the contrary, when the cost of bank capital increases, the economic capital will quickly fall below the regulatory capital.

Regarding the intermediation margin and its effect on the economic capital, they argue that higher margin has two opposite effects; the first effect is that it increases the bank's franchise value and consequently shareholders' incentives to contribute capital (positive effect), while the second effect is increasing bank revenues and therefore reduces the role of capital as a buffer to absorb future losses, acting as a substitute of economic capital (negative effect). They concluded that the net effect of the intermediation margin on economic capital is positive in very competitive loan markets and negative otherwise. They also show that the effect of increasing market discipline on economic capital is positive, although with small magnitude, except in very competitive markets for high risk loans.

Concerning the loans' probability of default and loss, the variable that affects both economic and regulatory capital, they find that when it increases, the regulatory capital increases, while the economic capital increases only for the value of this variable. Thus, it has a positive impact on both capital levels for reasonable values of these variables, but when they reach certain critical values their effect on economic capital becomes negative, increasing the gap with regulatory capital.

### *5.2 The Role of Regulatory Capital*

New Basel Accord (Basel II) is built on three pillars; maintaining new capital requirements, creating guidelines for supervision of bank risk management systems, and encouraging market discipline through greater transparency. The literature on the rationale for capital regulation in financial institutions is extensive and many studies focus on examining the motivations behind holding regulatory capital which may differ than the economic capital (for example, Keeley, 1989, Berger, Herring and Szegö (1995), Besanko and Kanatas (1996), Calem and Rob (1999), Furfine et al. (1999), Diamond and Rajan (2000), Santos (2001),



Calem and LaCour-Little (2004)). Furfine et al. (1999) argue that the main objectives behind the adoption of minimum capital requirements are to strengthen the soundness and stability of the international banking system, and reduce the competitive inequalities. “Increased capital reduces bank’s incentives to increase asset risk and thus to risk bankruptcy. Thus, an increase in banking organization’s capital-to-assets ratios over time should reduce the risk of bank failures and reduce the risk exposure of the deposit insurance fund” (Keeley, 1989). Berger et al. (1995) examine the role of the regulatory capital and they determine two reasons for which regulators require capital; first, the safety net which reduces the market discipline, regulators require capital to protect themselves against the safety net, financial distress, and the agency problems. Second, the systemic risk, which is the negative externalities caused by bank failures, where the failure of small or large number of banks could lead to a chain of reactions due to imperfect public information about the conditions of the bank that threaten the stability of the financial system. Therefore, in order to protect the economy from negative externalities caused by bank failures, regulators require banks to maintain a regulatory capital that shield against the systemic risk, the costs of financial distress, agency costs, and reduction in market discipline caused by the safety net.

Calem and LaCour-Little (2004) determine the purposes for the regulatory minimum capital requirements. First, it reduces the risk-taking behavior which results from the deposit insurance and moral hazard, since the option value of deposit insurance increases as leverage or asset risk increases (Keeley and Furlong, 1990). The capital standards are set to deal with the asset-substitution incentives resulting from the risk-insensitive deposit insurance pricing, relying on bank capital in funding and reducing deposits funding reduce the risk-taking behavior of banks (Besanko and Kanatas, 1996). Second, it protects the taxpayers against bank losses which occur due to fraud or mismanagement, and these losses are not covered by the government safety net, therefore capital regulation reduce the taxpayers’ exposure to banking system losses. Third, capital standard may signal information about the quality of its assets and management. The bank's ability to comply with the Basel capital requirements reflects the good quality of its assets. In addition, Calem and LaCour-Little (2004) mention that the regulatory capital serve as a legal tool which facilitates the supervisory intervention at financially weak institutions. Furthermore, they state that the banking system’s exposure to systemic risk is behind the capital regulation.

Uncertainty and fragility of deposits raise the need for bank capital as Diamond and Rajan (2000) suggested. They show that in a world of certainty, the bank maximizes the amount of credit it can offer by financing with deposit. However, in case of increased uncertainty, deposits are excessively fragile, creating a role for outside bank capital. Deposits are fragile because the deposit contract allows the investor to withdraw at any time, and if bank doesn’t pay, the depositor has the right to seize bank assets (cash and loans), depositors seizing loans means that they demand cash and the bank is forced to sell loans at their market value to third parties to meet cash demands. Diamond and Rajan (2000) argue that greater bank capital reduces the probability of financial distress and enables banks to survive, but also reduces liquidity creation. Banks should trade off credit and liquidity creation against the cost of bank runs and finance itself with a claim, equity and long term debt capital, that can’t be

renegotiated in bad times.

Santos (2001) discusses the reasons for regulatory capital and concludes that risk of systemic crisis and inability of depositors to monitor banks due to asymmetry of information are behind the regulations of banks. Depositors have to monitor bank managers; however, due to asymmetry of information, depositors are unable to monitor bank management, thus, monitoring is very expensive and need access to information. Therefore, asymmetry of information about banks' assets may expose banks to runs (depositors' runs) (Note 13). Santos (2001) argues that a bank run that is due to a release of adverse information about poor performance of the bank is beneficial because this means effective market discipline. While a bank run that is due to asymmetry of information between depositors and bank management about the bank financial position will not be beneficial and results in depositor's panic and they rush to withdraw their funds. He concluded that the asymmetry of information problem is the main reason behind regulating bank capital; small and uninformed depositors need to be protected by a regulator as monitoring bank managers is expensive and difficult for them. In addition to the negative externalities resulting from bank failures (systemic risk), the risk-shifting incentive is another reason for regulating bank capital, where the deposit insurance provides banks with the incentive to increase the risk of their assets. This moral hazard problem (excessive risk-taking) which arises from the government deposit-guarantee allows banks to make riskier loans without paying higher interest rates on deposits (Calem and Rob, 1999). In addition to mitigating the moral hazard problem and reducing the risk-shifting benefits of deposit insurance, the role of regulatory capital is to reduce taxpayer exposure to costs resulting from operational, decrease bank exposure to systemic risk, signal the bank assets' quality and provide positive information about the bank financial position, serve as a legal tool to enable supervisors to control financial institutions with poor financial positions (Calem and Rob, 1999).

To conclude, the previous studies show that the motivations behind regulating the bank capital and requiring minimum capital requirements are the following; first, protect against bank's access to the safety net specially the deposit insurance, since the regulatory capital reduce the banks excessive risk-taking, and thus reducing the moral hazard problem resulting from the deposit insurance as the government deposit-guarantee allows banks to make riskier loans without having to pay higher interest rates on deposits (Berger et al., 1995, Santos, 2001, Calem and Rob, 1999, Keeley and Furlong, 1990). Second, regulatory capital attempts to mitigate the systemic risk, since the goal of the regulators is to ensure the stability of the financial system as a whole, then it is important to reduce the systemic risk resulting from a failure of one bank or more and causing a chain of negative externalities (spillover) to other surviving banks. Furthermore, asymmetry of information and inability of depositors to monitor banks may lead to risk of systemic crisis (Berger et al., 1995, Calem and Rob, 1999, Santos, 2001, Calem and lacour-little, 2004). Third, banks are characterized by its vulnerability to depositors run which exposes them to financial distress; therefore, strong capital buffer will shield banks against shocks and runs. Unlike bank deposits, the regulatory capital provides capital buffers that protect bank assets, thus, relying on bank capital in funding and reducing deposits funding reduce the risk-taking behavior of banks (Diamond

and Rajan, 2000). Fourth, the capital standards set by the Basel Agreement are designed to deal with the asset-substitution incentives, by which banks substitute riskier assets for safer assets. Bank incentives to increase risk-taking are induced by extreme leverage, limited stockholder liability, and risk-insensitive deposit insurance pricing. Requiring a higher capital to assets ratio would reduce bank's deposit funding, for a given asset base, and reduce the incentive for risk-taking (Besanko and Kanatas, 1996, Calem and lacour-little, 2004). Fifth, the regulatory capital signals the quality of bank assets, when banks are able to comply with the Basel requirements and maintain the minimum capital requirement it signals information about the quality of the bank assets (Calem and lacour-little, 2004, Calem and Rob, 1999). Sixth, the regulatory capital protects taxpayers by reducing their exposure to costs arising from fraud, mismanagement, or mistakes made by bankers, that is, the operational risks, and finally, it acts as a legal tool that enables the supervisors to intervene in case of weak financial position for the financial institutions (Calem and lacour-little, 2004, Calem and Rob, 1999).

### *5.3 Regulatory Capital Arbitrage and Basel Capital Requirements*

In spite of the crucial role of the regulatory capital mentioned above, Calem and Rob (1999) argue that there are many banks, particularly the larger ones, tend to avoid the capital standards and outmaneuver Basel capital requirements by exploiting shortcomings in the risk-weighted measure of total assets that forms the denominator of the risk-based capital ratio. Jones (2000) argues that banks seek artificial adjustments when they enhance their capital ratios in order to comply with Basel requirements; this is done by reducing the regulatory measures of risk in the denominator of the regulatory capital ratio. The regulatory capital arbitrage is a process that enables banks to lower their effective capital requirements per dollar of risk through securitization and financial innovations (Jones, 2000), and hence spoil the goals of capital regulation.

To outmaneuver the Basel accords, banks seek to use the regulatory capital arbitrage which involves creating off-balance sheet vehicles called the special-purpose vehicles (SPVs), then channeling and shifting banking risks to those entities that unbundle and repackage the risks and issue the Asset-Backed Securities (ABSs), these securities is characterized by lower risk than the risk of the individual securities. Hence, securitization and these financial innovations enable banks to reduce their assets' risks and decrease the capital required to be held by these banks, therefore, banks are able to restructure their portfolios in a way that decrease the regulatory capital requirements without changing the level of their risk (Jones, 2000). In other words, regulatory capital arbitrage enables banks to reduce the measures of risk in the denominator of their regulatory capital ratio and hence promote the whole ratio by repackaging banks' portfolio of risky assets through securitization, thus decreasing the risk of the assets. Therefore, "the regulatory capital arbitrage exploits the differences between the bank's portfolio economic risks and the measurements of risk implicit in regulatory capital" (Jones, 2000).

Furfine et al. (1999) argue that the broad risk asset classes in the Basel Accord undoubtedly create a gap between the economic capital (which banks feel they should be holding to back

some loans) and the regulatory capital they have to hold, this wide risk categories in the Basel Accords enable banks to arbitrage between their economic assessment of risk, i.e. the actual positive cash flows is less than expected or the negative cash flows will be larger than expected, and the regulatory capital requirements. “Capital arbitrage exploits the large divergences that can arise between a portfolio’s true economic risks and the Accord’s measure of risk (total risk-weighted assets)” (Furfine et al., 1999).

### 5.3.1 Motivations behind the Regulatory Capital Arbitrage

Jones (2000) argues that regulators require banks to hold equity capital to serve as a cushion against many types of risk. This minimum capital requirement assessed by regulators may exceed the banks’ economic capital which is determined by the market discipline alone. Since banks need to raise more equity in order to comply with Basel requirements, and the cost of equity (Note 14) is greater than the cost of debt then banks consider the capital standards as a form of regulatory taxation (Note 15).

The factors affecting the decision of banks to engage in regulatory capital arbitrage depend on the securitization structuring cost they are going to bear and the amount of capital which they can be able to reduce. In addition, the arbitrage process will enable them to decrease the amount of equity needed to be raised, thus decrease their funding costs, and maintain the lower cost of capital (Jones, 2000). Therefore, banks rely on capital arbitrage to reduce bank’s required equity, their decision to engage in such arbitrage practices will depend on cost-benefit analysis (Furfine et al., 1999).

### 5.4 Capital Regulation and Bank Risk-Taking Behavior

An extensive literature has examined the impact of the imposition of Basel accords on the risk-taking behavior of banks. A group of these studies use portfolio management models and test whether the implementation of the risk-based capital requirements affects the bank’s portfolio management by choosing riskier mix of assets and allocate funds to riskier assets (for example, Kahane, 1977; Koehn and Santomero, 1980; Kim and Santomero, 1988; Furlong and Kelley, 1989; Keeley and Furlong, 1990; Jeitschko & Jeung, 2005). Another group of literature studies this impact of capital regulation on bank risk-taking by taking into consideration different bank incentives (such as: Besanko and Katanas, 1996, Blum, 1999, Milne, 2002; Estrella, 2004). However, the papers which focus on studying the relationship between the capital regulation and the bank behavior and risk taking decisions have reported conflicting conclusions regarding whether the Basel capital requirements have positive or negative effect on banks’ risk-taking decisions. In other words, there is no consensus in the literature on whether capital regulations lead to stability of the financial system or increase its risk.

For example, Kahane (1977), Koehn and Santomero (1980), Kim and Santomero (1988), Besanko and Katanas (1996), and Blum (1999) argue that actual capital requirements can lead to an increase in bank risk taking behavior. Another group of studies such as; Furlong and Kelley (1989) and Keeley and Furlong (1990) claim that capital requirements reduce risk taking incentives.

#### 5.4.1 Capital Regulation and Portfolio Management Approach

One approach to study the effect of capital regulation on bank behavior is the portfolio management models (Note 16) which analyzes the effect of the capital requirement on the mix of the assets in the bank portfolio. This portfolio-based approach is adopted by Kahane (1977), Koehn & Santomero (1980), and Kim and Santomero (1988) who analyze the impact of capital regulation on individual bank behavior and risk control by examining the asset portfolio reaction to capital requirements in the banking industry in presence of the fixed rate deposit insurance pricing (Note 17), as the deposit insurance system encourages banks to take more risk, thus, they test the effectiveness of bank capital regulation in mitigating the risk taking behavior of banks. Kahane (1977) suggests that capital regulation in order to be effective, the asset composition of the bank's portfolio must be also regulated in order to reduce the overall bank portfolio risk (Note 18). Thus, the bank's asset portfolio must be related to the capital regulation. Furthermore, Kim and Santomero (1988) attempt to determine theoretically correct risk weights in the capital regulation ratio in order to control risk.

Koehn and Santomero (1980) and Kim and Santomero (1988) suggest that capital requirements will cause banks to increase their risk by changing the mix of their portfolios towards risky assets which ultimately may lead to bank failure. Altering the composition of the portfolio and choosing the optimal portfolio depends on the degree of bank managers risk aversion. The bank that is not risk-averse will choose a risky asset mix in respond to a higher capital requirement, therefore increasing the probability of bankruptcy. Accordingly, if capital is relatively expensive and the reduction in leverage will reduce the bank's returns, then banks' shareholders may choose a higher point on the efficiency frontier, with a higher return and a higher risk, this higher risk may be more than the increase in the bank capital and leads to higher probability of default.

The analysis of Koehn & Santomero (1980) and Kim & Santomero (1988) focuses on utility maximizing banks and shows that capital regulation tends to increase the bank risk due to the asset substitution effect by which banks alter the composition of their portfolios towards the risky assets and conclude that more stringent capital regulation will increase asset risk and bankruptcy risk. However, their analysis is criticized by Furlong and Keeley (1989) and Keeley & Furlong (1990) who claim that for value maximizing banks, capital regulations decrease banks' risk-taking incentives and enhance bank safety.

Keeley and Furlong (1990) argue that the reason behind bank capital regulation is to reduce the risk exposure of the deposit insurance system by reducing leverage. Banks seeking to maximize the value of their stockholder's equity, these value-maximizing banks will attempt to maximize the value of the deposit insurance subsidy by increasing asset risk and leverage (Note 19), because option value of deposit insurance increases as leverage or asset risk increases (Note 20). However, imposition of the stringent capital regulation reduces the incentive of the value-maximizing banks to increase their assets' risk, thus, decreasing the risk exposure of the deposit insurance. In other words, in case of value maximizing banks, the capital regulation will reduce the risk exposure of the deposit insurance system, because



capital requirements can reduce shareholder's moral hazard incentives by absorbing large part of the losses and thus reducing the option value of deposit insurance. Since the option value is affected by the leverage ratio (the option value decreases as the capital to assets ratio increases, i.e. increase in leverage ratio will decrease the option value) then the well-capitalized banks will have less incentives and are not willing to increase their asset risk (Furlong and Keeley, 1989; Keeley and Furlong, 1990).

In conclude, the literature regarding the effects of capital regulation on bank risk taking are classified into two conflicting groups; the first group of literature focuses on utility maximizing banks and analyzes the effects of bank capital regulation on the asset and bankruptcy risk (Kahane, 1977; Koehn and Santomero, 1980; Kim and Santomero, 1988) argue that more stringent capital regulation may increase the probability of bank failure in non-risk averse banks, and conclude that more stringent capital regulation will increase asset risk and bankruptcy risk. Hence, from this view the minimum capital requirements may lead to an increase in the portfolio risk as capital regulation may affect the bank lending, investment opportunities or the marginal return to risk.

In contrast, the second group focus on banks seeking to maximize the value of their stockholder's equity (Furlong and Keeley, 1989 and Keeley and Furlong, 1990) and they claim that capital regulations will lead to decrease in bank-risk behavior, whereas, the minimum capital requirements mitigate the risk-taking incentives arising from deposit insurance.

In a recent study, Jeitschko & Jeung (2005) investigate the impact of bank capitalization on the bank's asset risks and portfolio decisions in a theoretical framework. They examine how the incentives and different objectives of the deposit insurer, the shareholder, and the manager are affected by capitalization and interact with each other to determine the bank's risk. The deposit insurer aims to protect the deposit insurance fund by reducing the risk-taking, the shareholder has incentive to increase the risk beyond the optimal level in order to benefit from the deposit insurance subsidy, while the manager is conservative in determining the asset risk in order not to lose his private benefit of control in case of bankruptcy. They argue that these different incentives for the shareholders and the managers may lead to moral hazard problems, the shareholder's moral hazard arises due to the underpriced deposit insurance, the option value increases as asset risk increases; hence there will be an incentive for the shareholder to increase the risk in order to benefit from the option value at the expense of the deposit insurer's expense. The other moral hazard is the manager's moral hazard which is due to agency problem and imperfect control, the managers will act to maximize their own and private benefit rather than maximizing shareholder's interest. Jeitschko & Jeung (2005) concluded that the bank's risk may increase or decrease according to capitalization, thus, the relation between bank capitalization and the risk of their portfolio could be negative or positive depending on the forces of the three agents in determining asset risk and the risk–return characteristics of the bank's asset choice set.

#### 5.4.1.1 Critiques to the Portfolio Management Approach

These previous studies are criticized by Milne (2002) who claims that they are flawed



because they didn't include the cost of breaching the capital regulation and they didn't take into consideration that banks are forward looking optimizers, thus, banks' balance their costs and benefits across the entire balance sheet when subjected to capital regulation. In other words, banks' balance the benefits of their lending decisions against the costs of a regulatory breach.

Furthermore, Calem and Rob (1999) criticize the previous studies and analyze the effects of the capital regulation and examine the impact of bank capital regulation on the risk-taking behavior of banks. They argue that these studies rely on a static framework that doesn't allow for variations in bank's capital position, thus, the bank's ex-ante capital position is fixed and given, these studies such as Kahane (1977), Koehn and Santomero (1980), Kim and Santomero (1988), Furlong and Keeley (1989), Keeley and Furlong (1990) don't link between the bank's capital position and its portfolio choices through allocating investments between risky and safe assets. However, Calem and Rob (1999) allow for the variations in a bank's capital position by considering the dynamics of bank portfolio choices in their model, they assume that a bank's capital position and its choices vary over time as a result of past choices and the realization of past risky investments.

Calem and Rob (1999) take into consideration the two conflicting views in the literature about the impact of capital regulation on bank risk-taking, whereas one view is that capital regulation will induce in an increase in bank risk-taking (Kahane, 1977; Koehn and Santomero, 1980; Kim and Santomero, 1988) while the other view is that capital regulations will induce in decreasing risk-taking behavior (Furlong and Keeley, 1989 and Keeley and Furlong, 1990). Calem and Rob model shows that these two views are consistent and they find U- shaped relationship between capital regulation and risk-taking, showing an increase in risk-taking behavior in both; the undercapitalized and well-capitalized banks, while risk decreases with intermediate bank capital positions. In other words, severely undercapitalized banks take maximum risk which reflects moral hazard problem and exploit the risk shifting benefits of deposit insurance, thus, the deposit insurance premium increases the moral hazard. Then, as a bank's capital rises, it takes less risk. Then, as capital continues to rise, it will take more risk again; showing that well-capitalized banks take more risk because of its higher profitability and small probability of bankruptcy.

#### 5.4.2 Capital Regulation and Bank Incentives

Another approach to analyze the impact of capital regulation on risk-taking behavior is studying the bank incentives. In literature, many studies determine the impact of capital regulation on bank portfolio choice in presence of different bank incentives, for example, bank incentives to reduce ex-post regulator's penalty (Milne, 2002), or incentives to hide information and don't make accurate information disclosure about risk and capital adequacy (Estrella, 2004). In addition, these incentives may lead to banks moral hazard problems, whereas, tightening capital regulation will increase the bank asset-substitution incentives and increases risks (Blum, 1999); capital requirements reduce monitoring incentives, which reduces the quality of bank's portfolio (Besanko and Kanatas, 1993).

In contrast to other studies which view the capital regulation as ex-ante constraints, Milne

(2002) studies the capital regulation as ex-post penalty rather than ex-ante binding capital, and argues that capital regulation generates an incentive effect to avoid the ex-post penalties imposed by the regulators in case that bank violate the capital adequacy standards. He suggests that the threat of punishment by regulators for not complying with the capital regulations leads managers to be risk averse and reduce their risk-taking in order not to be punished through paying high penalties. Therefore, regulators can increase the severity of the penalties if they seek to reduce bank's risk-taking behavior rather than imposing more requirements related to asset risk.

Rime (2001) examines the empirical evidence of the effect of bank incentive to avoid the ex-post penalties and regulator pressure mentioned by Milne (2002). Rime (2001) studies the impact of capital regulation on the Swiss banks by testing whether and how Swiss banks react to capital regulation constraints (Note 21), thus, he study the impact of capital regulation on the Swiss banks' risk taking. His results indicate that regulatory pressure induce Swiss banks to increase their capital, but does not affect the level of risk. The increase in the ratio of capital to risk-weighted assets indicates that Swiss banks adjust their capital ratio to comply with the regulator's requirement and avoid the expected penalty imposed in case of violating and breaching the capital requirements which indicates that the regulatory pressure achieved its objective in Swiss banks and has a positive and significant impact on the ratio of capital to total assets. However, Rime (2001) argues that the regulatory pressure has no significant impact on bank's risk taking, which indicates that the increase in the Swiss bank's capital was attained through retained earnings or equity issues which are less costly than adjustment of their portfolio risk.

However, Estrella (2004) argues that bank incentive to avoid the ex-post penalties, "pre-commitment approach" is not a practical solution for enforcing banks to reduce their risk-taking behavior as mentioned by Milne (2002) because it is difficult to impose an ex-post penalty (charge) on a failed bank, in addition, in case of absence of supervision then information needed by the regulator in order to assess an accurate penalty is not available. Estrella (2004) examines in a game-theoretic model whether banks have an incentive to disclose information about their risk, thus, make accurate information disclosure. He presents four tools by which regulators can mitigate bank incentive not to accurately disclose information: quantitative capital requirements, direct supervision, that may force banks to make truthful disclosure, market discipline and finally the pre-commitment approach. He concluded that to solve the informational problem effectively in banks, the direct supervision is the best tool and an effective solution to the informational problem, but it is very costly, moreover, the quantitative capital requirements are beneficial but to be used beside both the market discipline and the direct supervision as complementary tools. Finally, Estrella suggests that theoretically the pre-commitment to an ex-post penalty can close the gap between the regulator's objectives and the bank's objectives, however practically is limited.

In a dynamic framework consisting of two-period approach, Blum (1999) shows that with bank incentives for asset substitution, the capital adequacy requirements may lead to an increase in risks. He argues that tightening the regulation has two effects: First, a tighter restriction lowers the expected profits of the bank, thus, the reduction in banks profit leads to

an increase in bank risk because in this case the bank has less to lose in case of bankruptcy, and hence, banks have smaller incentive to avoid default. Second, changes in the capital regulation may increase the marginal return on risk and leads to an overall increase in risk. The two period approach of Blum (1999) shows how banks alter their risk by choosing between safe asset (riskless) or risky assets according to their incentives for asset substitution, first, in case of unregulated bank, the higher expected returns in the second period will cause banks to reduce their risk in the first period in order to decrease the probability of default and not receiving the profits in the second period. Second, in case of regulated banks, binding capital requirements in the second period means that the profits that will be realized in the second period will be reduced, and thus, tightening the requirement raises the level of risk and causes banks to increase their risk-taking in the first period. Third, binding capital adequacy requirement in the first period, this increase in the requirements reduce the level of risk. Fourth, binding requirement in both periods will cause a decline in the feasible allocation of funds to risky assets, therefore, reducing risk.

In an interesting framework, Besanko and Kanatas (1996) argue that enforcing capital standards through higher regulatory capital may result in greater risk exposure for the regulator and increase the overall riskiness of bank assets (Note 22). They examine the joint effects of capital requirement and deposit insurance on banks' risk behavior in presence of four agents; bank insiders, bank outsiders, depositors, regulators and potential of agency problem. Assuming that a bank can make loans with positive net present value by funding itself at the risk-free interest rate, in existence of deposit insurance, therefore, this bank will achieve surplus for its shareholders. However, this surplus is realized only if the loans are paid back, which means that bank insiders must exert efforts to achieve successful loan repayment. In their model, they assume that bank insiders have the incentive to supply effort in monitoring the bank loans and successfully maintaining the state of repayment of these loans, thus they are productive in order to realize their portion in the bank's surplus. When the regulator increases the bank capital, this will induce in replacing equity for deposits, and reduce the portion of surplus gained by insiders and dilute their bank shares ownership; this will reduce their incentive in monitoring loans. Therefore, quality of bank portfolio will decrease because the positive net present value of loans will not be realized unless the insiders successfully monitor and recover those loans back. In addition, issuing new equity will signal to the market participants that insiders will now have no incentive to supply effort in monitoring loans and will become less productive, hence causing bank stock price to decline. Moreover, in their model, they relate the extent of price decline to the insider ownership. Finally, they arrive to two important conclusions; first, banks who issue stocks in order to comply with the capital standards will face decline in their stock price. Second, the larger the decline in the stock price, the smaller the ownership of insiders (Note 23).

To conclude, studies such as Besanko and Kanatas (1996), Blum (1999), Milne (2002), and Estrella (2004) present different bank management incentives which affect their risk taking behavior in case of regulated capital. Milne (2002) discusses bank incentive to reduce ex-post regulator's penalty, Estrella (2004) suggests that capital requirements in addition to direct supervision and market discipline as two complementary tools increase bank incentive to

disclose information. Blum (1999) argues that the bank incentives for asset substitution will cause banks to alter their choice of risk level in case of binding capital requirements which may lead to increase banks risks. Finally, Besanko and Kanatas (1996) show that manager incentives for monitoring loans may be decreased due to capital regulations.

### *5.5 Impact of Capital Regulation on Banks' Cost of Capital*

Basel Accords aim mainly to minimize the systemic risk of the international banking system and reduce the competitive advantage and inequality between banks by 'leveling the playing field internationally' and introducing uniform capital standards which reduce the funding cost advantage that banks with less stringent capital standards enjoy while operating with significantly lower capital to asset ratios (Maccario et al., 2002). Basel II Capital Accord requires banks, in its first pillar, to hold minimum capital requirements. In order to comply with Basel requirements, banks with capital less than the regulatory capital will seek to increase their capital ratios. In order to increase their capital to risk-weighted assets ratios, banks may choose to increase the numerator (bank capital) or decrease the denominator (risk-weighted assets), thus banks will choose between the following alternatives (Furfine et al., 1999): increase their capital from retained earnings, increase their capital by increasing Tier 1 capital (equity) or Tier 2 capital (subordinated debt), decrease the total risk-weighted assets by reducing lending (or selling loans), shift to assets that have a relatively lower risk weight, (Note 24) and engage in capital arbitrage practices such as securitization and financial innovation.

Choosing one of the previous alternatives to increase the capital ratio or the factors that affect the decision of banks when complying with capital regulation will depend on the cost of each alternative, the bank financial situation and the business cycle, whereas, banks will be able to raise new capital or depend on their retained earnings during economic boom, while they may sell loans or reduce their lending during economic recessions because the default risk increases and demand on loans decreases. Furthermore, bank's decision to increase Tier 1 capital or Tier 2 capital will depend on the cost of equity versus the cost of debt, thus banks' capital structure decisions are sensitive to higher cost of equity relative to higher cost of debt (Furfine et al., 1999). Furthermore, Ngo (2006) tests the impact of implementing the international capital adequacy requirements introduced by Basel Accord of 1988 (Basel I) on the cost of bank equity capital. His results indicate that uniform increases in capital requirements lead to an increase in the cost of capital. However, when regulatory standards differ across countries, the financial integration leads to positive spillovers from one country to another due to different regulatory practices which reduces the cost of capital for a given increase in bank capital. Accordingly, regulatory risk (defined as the risk that arises when the regulation induces an increase in the ex-ante cost of capital for a regulated bank) may be greater under Basel regulatory agreement. Therefore, by comparing uniform regulatory standards to different regulatory standards across countries, the results suggest that the uniform capital regulation that is standard and similar across countries (centralized solution) such as the Basel Capital Accord may cause a higher cost of capital for banks and thus induce greater regulatory risks relative to the different capital regulation across countries (the decentralized solution).

### 5.5.1 Binding Capital Requirements and the Role of Bank Deposits

Regulatory capital requirements are binding if the capital ratio of the bank under the regulatory capital requirements is higher than its capital ratio in case of bank's market capital requirement (Berger et al., 1995). Regulatory capital will induce banks to confront an increase in their cost of capital due to: first, holding more capital to meet the higher minimum capital requirements imposed by regulators, forces banks to move away their capital structure from its optimal level causing the value of the banks to decrease and accordingly, their cost of capital will increase (Ngo, 2006). Second, the role of bank deposits relative to bank equity, since informational asymmetries cause bank equity to be costly than deposits, then investors need high compensation for holding bank equity, that is, high cost of bank equity capital (Gorton and Pennacchi, 1990; Gorton and Winton, 2000).

Gorton and Pennacchi (1990) argue that the informational asymmetries cause losses to liquidity traders. Since bank equity is highly sensitive to information, then the informational asymmetries between shareholders and managers will make bank equity costly and bad medium of exchange relative to bank deposits which are good medium of exchange and efficient way of exchange for liquidity traders without losses. Therefore, when regulators force banks to hold more capital by increasing their equity, the investors, who don't prefer bank equity as a medium of exchange because it is illiquid and couldn't be sold immediately to meet consumption due to its high sensitivity to private information, will require a higher expected return on equity as a compensation, that is, a higher cost of capital. Similarly, Gorton and Winton (2000) analyze the impact of a uniform or a system wide increase in capital requirements on the cost of bank equity by examining the role of bank deposits. They argue that bank equity capital is uniquely costly, and this cost comes from the role of demand deposits as a desirable medium of exchange. They concluded that although capital requirements ensure safety and soundness of the banking system and the equity capital hedge banks against the risk of default resulting from their lending activities reducing the chance of bank failure, however bank equity is an information sensitive asset and can't be used to meet immediate liquidity needs.

In other words, Gorton and Winton (2000) focus on bank deposits and bank equity as the main financial assets in the economy, and they show, on one hand, that banks need to increase their equity capital in order to cover any losses resulting from their lending activity. On the other hand, investors who need liquidity to meet their uncertain consumption are reluctant to hold bank equity. As a result, banks in order to increase their bank capital they must compensate investors for the additional costs resulting from having to sell the equity when liquidity needs arise. Therefore, this increases the cost of equity capital, which may cause regulators to refrain from increasing bank capital which expose banks to risk of failure. The work of Gorton and Pennacchi (1990) and Gorton and Winton (2000) are unique in their emphasis of the role of bank deposits which may lead to a high cost of bank equity capital in general equilibrium.

## 6. Summary and Conclusion

This study sheds the light on the major implications of Basel Accords implementation in the



banking system. Basel Accords aim mainly to reduce the banks systemic risk and hence, increase the soundness and safety of the banking system as banks play crucial role in any economy due to its important role in enhancing productivity and economic growth.

Basel Accords established a tight regulatory framework that includes three pillars; the first pillar is strengthening bank capital by determining minimum levels of capital to be able to absorb losses and to confront the systemic risk, second pillar is to support the supervisory role in monitoring banks activities and reviewing their assessment of the capital adequacy, in addition to the third pillar which is encouraging market discipline by requiring banks to provide accurate and timely information in order to enable market participants to assess bank key information. The three pillars are complement for each other, (first pillar) the minimum capital requirements is accompanied by (second pillar) the supervisory review to ensure that banks are assessing and maintaining the capital adequacy, and (third pillar) the information disclosure and market discipline are complements to the first and second pillar. Thus, maintaining the capital adequacy needs supervisory review to ensure that banks are assessing their capital ratios effectively by using measures and approaches provided in the framework, while the market discipline is an important complement to the two other complements. In other words, supervisory oversight and information transparency and disclosure are needed to ensure the presence of minimum capital requirements. In spite of this regulatory framework, banks are able to outmaneuver Basel Accords by creating a shadow banking system that allow them to shift risky assets to an off-balance sheet vehicle through securitization and creating innovative financial securities. Thus isolating the risk of these assets from the banks' balance sheets enables them to reduce their capital ratios needed to cover their risk.

The financial crisis 2007 has revealed that most risk management models used by banks aren't effective enough to rely upon and failed to forecast and predict the severe shock, moreover their capital is not strong enough to confront this crisis as their assets' risk are not effectively assessed due to the presence of the off-balance sheet items. To remedy bank failures revealed by the financial crisis, Basel Committee introduced a framework for banking sector reform including enhancing bank regulatory capital, liquidity and leverage which is known as Basel III. The aim of Basel Committee is to improve bank ability to absorb systematic risk and shocks. Although many studies examine the impact of Basel III on bank performance in different countries, however, the final impact of Basel III and final implementation of capital requirement need to be taken into consideration.

Since Basel Accords have set out its regulatory framework, the researchers focus on examining its effectiveness in achieving the required goals by maintaining the stability and soundness of the banking system. The empirical evidence shows that the first pillar, retaining the minimum capital requirement has significant positive impact on bank's performance, that is, there is a positive relationship between capitalization and profitability showing that well capitalized banks are able to achieve profits. Strong capital position enables banks to pursue profitable business opportunities and to have more time and flexibility in dealing with problems arising from unexpected losses.

The second pillar of Basel II fosters the supervisory power (supervision oversight) and



strengthens their role. The empirical studies which test the relationship between powerful supervision and bank performance indicate that there is no robust significant relationship between empowering supervisors and bank efficiency. While the studies that test the third pillar which emphasize the transparency and information disclosure have positive impact on bank performance. Therefore, these studies recommend banks to give priority to information disclosure, external auditing and empower the private sector monitoring. Banks should record the financial data according to accounting standards accurately and on a regular basis, and disclose to the public misleading information about their activities and financial position.

Therefore, I conclude that the optimal bank regulatory framework that ensure its effectiveness and profitability should depend primarily on strong capital ratio (regulatory capital) that act as a basic building block constructed to reflect banks' actual risk. Banks should measure their asset risk accurately, and reduce their capital arbitrage practices pursued to decrease the gap between bank's economic capital and regulatory capital. Encouraging information disclosure is important for effective market discipline. Disclosure of bank capital and their asset risk is extremely important to ensure that banks maintain the regulatory capital and strong financial position. Supervisory oversight enables supervisors to ensure that bank managers are effectively assessing and implementing the minimum capital requirements. However, restricting banks' activities many hinder their growth, therefore, encouraging market discipline through private monitoring is more important and induce in better bank performance and outcomes.

The relationship between imposing regulatory capital and the cost of bank capital shows that the regulatory capital lead to an increase in bank cost of capital because the regulatory capital is higher than the bank capital required by the market, thus moving the bank away from its optimal capital structure which minimizes its cost of equity and cost of debt in order to maximize the bank value. Since the minimum capital requirements determined by regulators may be greater than the banks' economic capital which is determined by the market discipline alone. Therefore, banks will need to raise equity in order to comply with Basel requirements, and accordingly the cost of bank capital will increase because the cost of equity is greater than the cost of debt.

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## Notes

Note 1. For the literature on the role of banks see, Diamond (1984), Gorton and Pennacchi (1990), Allen and Santomero (1997, 1999), Cechetti (1999), Levine et al. (2000), Thiel (2001), Gorton and Winton (2002).

Note 2. The committee was formed in 1974 by central bank governors of the G-10 countries in addition to Switzerland and Luxembourg. The Committee's members come from Australia, Belgium, Brazil, Canada, China, France, Germany, India, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Spain, Sweden, Switzerland, the United Kingdom and the United States. ([www.bis.org](http://www.bis.org))

Note 3. Bank for International Settlements (BIS) is an international organization located in Basel, Switzerland. It serves as a bank for central banks, supports the international banking systems, and fosters international monetary and financial cooperation. One of the BIS activities is the establishment of Basel-Based committees in order to conduct **researches** and working papers to enhance the monetary and financial stability. ([www.bis.org](http://www.bis.org))

Note 4. For example, for corporate lending, the existing Accord provides only one risk weight category of 100% but the new Accord will provide four categories (20%, 50%, 100% and 150%).

Note 5. For example, Athanoglou et al. (2008) find evidence that the profitability of Greek banks is shaped by bank-specific factors such as bank capital, credit risk, cost management, while industry variables such as ownership status and concentration are not important in explaining bank profitability, and macroeconomics variables indicate that profitability is procyclical.

Note 6. see Peltzman (1970), Mingo (1975), Dietrich and James (1983), Shrieves and Dahl (1992), Keeley (1988), Jacques and Nigro (1997), Aggarwal and Jacques (1997), Hancock and Wilcox (1994), Ediz, Michael and Perraudin (1998), Rime (2001), Wall and Peterson

(1987), Wall and Peterson (1995) they conclude that banks with low capital ratios that fall below the regulatory minimum requirements, increase their capital more than banks with higher capital ratio to comply with capital standards.

Note 7. Laeven and Majnoni, 2002, defined the “regulatory capital” to be Tier 1 and Tier 2 in Basel Capital Accords and the “economic capital” to be the core component of Tier 1. They argue that current minimum solvency regulations refer to a particular notion of capital called “regulatory capital” which differs from “economic capital” resulting from the sum of Tier 1 and Tier 2 capital as mentioned in Berger et al. (1995). Tier 1 capital is represented by paid-in capital and retained earnings, while Tier 2 capital includes general loan loss reserves and a variety of bank liabilities mentioned in Basel Accords. The sum of Tier 1 and Tier 2 capital represents the numerator of the solvency ratio (capital adequacy ratio).

Note 8. Berger et al. (1995) show the advantage of funding with debt and relying entirely on debt funding in the firm capital structure, is that interest payments on debt are tax deductible which enable firms to achieve greater return to shareholders and reducing the taxes granting to the government. On the other hand, the disadvantages of relying entirely on debt financing is that increasing leverage increases the expected costs of financial distress. Thus, the benefit from increasing leverage will be offset by the increase in the expected cost of financial distress.

Note 9. The asymmetric information problems may lead to agency conflict between shareholders and creditors. This conflict arises from moral hazard of asset substitution, where shareholders may exploit creditors by substituting riskier assets for safer assets (Berger et al., 1995). In addition, asymmetric information may lead to another agency cost which arise from conflict of interest between shareholders and managers (see Jensen and Meckling, 1976, Grossman and Hart, 1982, Jensen, 1986)

Note 10. The famous proposition of Modigliani and Miller (1958) (M & M) to determine the firm’s optimal capital structure assuming a world of perfect and frictionless capital markets, full information available and complete markets with no free arbitrage opportunities, no bankruptcy cost, and no taxes. They concluded that capital structure choice is irrelevant to the firm value, that is, a firm’s capital structure cannot affect its value.

Note 11. Acharya (2009) argue that systemic risk arises from a high correlation of returns on the asset side of their balance sheets, and Rampini (1999) defines systemic risk as default correlation. There is no consensus in the literature about the constituents of systemic risk and the extent to which it exists; see Bartholomew and Caprio (1998), Kaufman (1996) and Basing (1993).

Note 12. Basel Committee on Banking supervision (June, 2006) presents its revised and comprehensive framework which compiles the June 2004 Basel II Framework, the 1988 Accord, the 1996 Amendment to the Capital Accord to incorporate market risks, and the 2005 paper on the Application of Basel II to Trading Activities and the Treatment of Double Default Effects. No new elements have been introduced in this compilation.



Note 13. Banks as providers of liquidity service increases their exposure to runs (see Diamond and Dybvig (1983).

Note 14. This is due to tax considerations, asymmetric information, agency costs, and the bank safety net such as, direct access to government deposit insurance, the discount window, and the payments system (Jones, 2000, p.38).

Note 15. Capital standards as a form of regulatory taxation (see Donahoo and Shaffer, 1991). The effect of regulatory taxation, defined to encompass minimum capital requirements, reserve requirements and any deposit insurance premiums on bank behavior, see: Cumming, 1987; Baer and Pavel, 1988; Pavel and Phillis, 1987; Koppenhaver, 1989; Berger and Udell, 1993 and Jagtiani et al., 1995.

Note 16. studies that analyze the impact of capital regulation on the bank-risk behavior by focusing on their portfolio decisions and regard banks primarily as managers of portfolios of assets such as Kahane (1977), Koehn and Santomero (1980), Kim and Santomero (1988), Furlong and Keeley (1989) and Keeley & Furlong (1990), Jeitschko & Jeung (2005).

Note 17. In context of bank risk taking and the role of deposit insurance, the studies of Buser, Chen, and Kane (1981), Kane (1985), and Benston et al. (1986) show how the pricing of the deposit insurance encourages risk taking and reinforce regulating the bank capital. In addition, Berger, Herring and Szego (1995); Kaufman (1991); Furlong and Keeley (1989); Keeley and Furlong (1990) justify the regulation of bank capital as a way to prevent the moral hazard resulted from the deposit insurance.

Note 18. Many Studies link the capital regulation to risk-weighted assets such as; Bradley et al., 1991; Carey, 2002; Gjerde and Semmen, 1995; Cordell and King, 1995; Gordy, 2003; Kupiec, 2004; Cuoco and Liu, 2006.

Note 19. In case of value-maximizing banks with deposit insurance subsidy shareholder tends to take excessive risks in order to exploit this option value at the deposit insurer's expense, therefore capital regulations are required to control their risk, see Sharpe (1978), Kareken and Wallace (1978), and Dothan and Williams (1980).

Note 20. Option value increases as the asset risk increases, see Merton (1977).

Note 21. Similarly, Ediz, Michael & Perraudin (1998) test the impact of capital regulation on UK banks using quarterly data on 94 UK banks over the period from 1989 to 1995.

Note 22. Their results are consistent with those of Gennotte and Pyle (1991) who assume that banks invest in assets with positive net present value and use an option pricing framework.

Note 23. Their findings are consistent with those for Cornett and Tehranian (1994) who report the same findings that the undercapitalized bank stock prices decline when they announce for issuing equity, and also find there is negative relationship between the bank insider's holdings of bank shares and the decline in the stock price, i.e. the higher the insider's holdings, the lower the decline in the bank stock price.

Note 24. Studies such as Berger and Udell (1994), Hancock, Laing and Wilcox (1995), Hall



(1993), Jacques and Nigro (1997), Ediz, Michael and Perraudin (1998), Kim and Moreno (1994), Peek and Rosengren (1997), Ito and Sasaki (1998), Rime (1998), Dahl and Shrieves (1990), Hancock and Wilcox (1994), Haubrich and Wachtel (1993), Aggarwal and Jacques (1997) that study how banks enhance their capital ratios to comply with capital regulation whether by increasing capital or decreasing lending or shifting to low risk weight assets.

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