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Basel III and Beyond: Will the Proposed Standard Have the Desired Effects?

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This literature study examines the new Basel III standard for bank regulations. A careful examination of the sub-prime crisis is put in relation to the new standard and relevant literature on the subject. A critical approach is presented examining various drawbacks and undesired effects that can result from the rules. It remains unclear if more complexity in the new rules will add to systemic risk or if they will help to prevent new crises similar to the one seen in 2007-2008. Recent awareness has been given to the fact that many arguments from the banking sector, concerning social costs for capital requirements, are based on common misconceptions about capital in banks. Before any more conclusions can be drawn, in the light of recent theoretical clarifications, a careful empirical study would need to make better estimations of costs imposed by higher capital requirements, relating them to potential benefits of a safer system, with the purpose of improving policy recommendations.

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1. Introduction

The recent global financial crisis has given reasons for concern about the stability of our financial system. There are few persons that in the aftermath could argue against the need for a review of the regulations. One of the most severely hit and pivotal part of the financial system was the banking sector. This part of the system is regulated under each country's set of laws, but most developed countries adapt their legislation in accordance to a global standard set by the Basel Committee of Banking Supervision (BCBS). Basel III is a new global regulation standard created recently by the committee and it serves as a guideline for bank regulation worldwide. To fully understand the idea behind the Basel regulations and whether they are sufficient or not, one must first understand the role of banks in the economy, what is wrong with them and how they were involved in the recent crisis of 2007-2008. It is, however, important to note that not all countries are regulated under the Basel III, the United States' response to the crisis is the Dodd-Frank Act that covers most of the financial sector including banks. It has many similarities but also some crucial differences and a comparison between the two remains outside the scope of this paper.

The financial crisis has provided us with many important lessons on the particular mechanisms that allow risk to build up in the system. Gorton and Metrick (2010) explain how this build-up happened in the mostly unregulated shadow banking system that has with time started to fulfill the same functions as traditional banks, but without the limitations imposed by the Basel regulations and also without the protection from central banks as lender of last resort. An intricate system of securitizations and complex financial instruments issued often by traditional banks to avoid regulation, helped to build up risk in financial institutions and when the housing bubble burst in 2007, a domino effect of defaults and losses started to spread rapidly throughout the financial system leading to a credit crunch and the deepest recession since the times of The Great Depression.

The new Basel III rules depart from the old standard, still using a risk weighted approach to address risk. However, the regulations will be much more complex with many new requirements apart from the previous ones in Basel II. They include some novelty with a non-risk-weighted leverage ratio as a complement to the risk-weighted. Basel III also includes liquidity requirements in the form of a short-term "Liquidity Coverage Ratio" and a long-term "Net Stable Funding Ratio". The new capital and liquidity requirements from the committee are carefully calculated and set to minimize any potential costs, but adding a high level of complexity to the regulations. The problem is that according to recent research made by Admati and Helwig, (2012 and 2013), and by Admati, DeMarzo, Hellwig and Pfleiderer (2011 and 2012) most of the arguments used by supporters for lower capital ratios are based on common misunderstandings related to the meaning of capital in banks. Heavily detailed and complicated regulation can close down possible loopholes, but it comes with the social cost of

diverting resources to non-productive activities, reducing transparency and increasing regulatory arbitrage opportunities only for big banks with professionals skilled in exploiting these.

This paper examines the relevant literature for the new Basel standard, in order to better understand its effectiveness in preventing a potential future crisis. It is of high importance to sort out the relevant facts in the theoretical framework before further studies can move forward to empirically estimate the consequences of the regulation, especially because of the great divergence in opinions about the rules. The regulations set by the BCBS have actually been criticized for being too tough and costly for the system, mostly by the banking sector (See: Elliot, 2010), while other voices deem them as too conservative (See: Admati and Hellwig, 2013, and others). Admati and Hellwig (2013) provide new insights to the debate that need to be carefully evaluated. A critique provided in a letter by 20 leading academics in the field of economics and finance cannot be taken lightly either, proving that Admati and Hellwig's (2013) view is also shared by others in the field (See: Admati et al.).

Section 2 discusses the basic function of banks and the incentives that managers and bank owners have to build up risk in the system. There is a brief presentation of the Diamond and Dybvig model (1983), how it can explain bank runs and the importance of deposit insurance. It questions why banking crises have been so common during history, why they have not been dealt with better by regulators, and presents some common arguments that bankers use against higher capital requirements. Section 3 presents previous Basel standards that are also the foundation for the new regulations. Section 4 explains the main mechanisms of the financial crisis and how it is relevant to Basel III. Section 5 explains the most important aspects of Basel III. Section 6 is a critical assertion of the rules presenting relevant critique. Finally, the conclusions from the study are presented in section 7.

2. The role of banks and what's wrong with them.

Commercial banks are based on a system of fractional reserves, i.e. they borrow money short and while they keep a fraction of it as reserve, they lend out the rest to actors that are in need of liquidity for funding. This is called maturity transformation: Banks lend long and borrow short and in principle they profit from the difference in the borrowing and the lending rate. Since the money lent by the bank is on long term it becomes a non-liquid asset in the bank's balance sheet. The fraction kept as a reserve must therefore be large enough to cover for costumers' short demand of money. However, there is also an opportunity cost for holding money as reserve because that money could be lent out generating income for the bank. The alternative to borrowing money from a bank for an investment would be issuing bonds or shares directly to private investors. Borrowing or issuing shares directly to private investors is done in those cases where private investors have the competence or the information

required to make a correct and unbiased valuation of what they are investing in, but this is not always the case for many private bank depositors and small companies, so there exists a need for an intermediary. Small companies also don't have the same possibility as large companies to issue stock to the market so they are much more dependent of loan funding from banks.

The actors involved in the trade face two important problems: The first one being the adverse selection problem. Asymmetric information creates a situation where bad loans are more likely to be selected, as was made famous by Akerlof's (1970) paper on the market of "lemons". Banks are supposed to solve this problem by constantly providing themselves with information and by evaluating the risks involved in their lending activities. The second issue that banks are supposed to solve is the one of moral hazard. Borrowers could use the borrowed money to get involved in activities with higher risk than what lenders would want to expose themselves to. Banks would solve this problem by constantly monitoring the borrowers' activities, something that many private investors cannot do with the same quality or efficiency. However, if we stop for a moment to look back in time we force ourselves to question these theoretical truths and ask ourselves: Do they really apply to what has happened historically? Have banks really managed their risk properly or has the risk merely shifted and concentrated elsewhere? The problem of risk management is not easy to deal with because there are many factors that need to be accounted for; one of the important aspects is the allocation of risk. If banks and their owners had been the only ones forced to pay for bad risk management it would have been acceptable by the general public. However, a history of large bailouts in the financial sector has proven that the contrary occurs and very often tax-payers get the final bill. Also looking at this from a bank's perspective, if the risk merely shifts, then why should they bother to spend money for good risk management? We must not forget that a bank as any other company tries to maximize their own and not society's profit.

Banks face primarily two types of risk in their activities: The risk that their counterparties default on the loans and the risk that depositors choose to withdraw their deposits faster than the bank can liquidate its assets. This second phenomenon is called a bank run and it can have a huge and sudden negative impact on the economy, especially if it happens to large and systemically important banks. A bank run occurs when a large amount of depositors believe that a bank will default. This, in turn, leads to a higher probability of default for the bank and therefore further encourages other depositors to also withdraw their deposits. Bank runs are widespread in times of financial crises and when the system faces distress because uncertainty triggers them. Expectations can change fast with shocks in the economy and these shocks are often completely impossible or very hard to predict. It is important to note that a bank-default, as a result of a run can cause serious harm to people; the savings account from a particular bank could contain a person's savings from a lifetime of hard work and dedication. Bank-runs can also lead to deep recessions because other parts of the economy become affected if they

happen on systemically important banks. The best known example with bank runs is the financial crisis of 1929 when a crash in the stock market caused distress in the financial system. A large number of banks defaulted during this period because of runs; eventually this chain of events led up to the Great Depression, characterized by a deep recession with very high unemployment rates and deep poverty. In the end, bank-runs and financial crises seriously affect peoples' living standards.

The subject of bank-runs has been carefully studied in economic literature (See: Diamond and Dybvig (1983), Cooper and Ross (1998), Bryant (1980), Ennis (2003) and others). Diamond and Dybvig's (1983) model explaining bank-runs, has been well-accepted. It provides explanation to their development, presenting a mathematical statement of the instability in banks and other institutions that fulfill the same purpose; the model has multiple equilibriums, good and bad, that depend on expectations. Sudden shocks can then change those expectations and quickly move the market to the bad equilibrium i.e. the sudden withdrawal of deposits. The important lesson for us is the conclusions and policy implications that come naturally from the model and according to the authors there are two main ways to prevent a run: Firstly, the bank could temporarily suspend all withdrawals. Secondly, the government could step in and secure the bank's deposits, with the latter being the most effective of the alternatives. Deposit insurance returns expectations to the depositors. If depositors expect to get paid back on eventual losses they don't have any more reasons to suddenly withdraw their deposits from the bank. Governments can also bail out banks by buying newly issued stock, thus providing the insolvent bank with equity funding which it needs to absorb its losses.

The introduction of deposit insurance was one of several countermeasures taken in the U.S. with the creation of the Federal Deposits Insurance Corporation and the Glass-Seagall Act in 1933, as a direct consequence of the Wall Street crash and the resulting bank-runs some years earlier. There exist however, two direct problems with insuring bank deposits. First of all, the moment that governments commit to cover for banks they create moral hazard. Secondly, bailing out banks can prove to be very expensive so deposit insurances by governments do normally have a limit and larger investors can still lose money above that limit. Governments can have good reasons to bail out financial institutions if they happen to be of great systemic importance to the market, and the knowledge about this importance can be another source for moral hazard. The collapse of Lehman Brothers in 2008 made these consequences very visible for the world. With this in mind the U.S. government took the decision to bail out a number of large and systemically important institutions, including AIG, Bear Sterns, Citigroup, Goldman Sachs, etc. but the U.S. wasn't the only country that needed to step in and save banks during the crisis. The British government was forced to create a bank rescue package in order to save many large banks from defaulting due to liquidity problems, and so were many other European banks forced to do.

It is not hard to understand that the banking system is highly vulnerable especially if we put it in a historical context. From the start of modern banking the system has suffered from a series of crises. Citing some examples: We've had the credit crisis of 1772-1773 caused by the collapse of the banking house Neal, James, Fordyce and Down. We've had the panic of 1791 in New York. In the 19th century and early 20th century we had the panics of 1819, 1825, 1837, 1847, 1857 and 1866. We can also look back at the panic of 1873 followed by a 4-year recession and the panic of 1893 that triggered another recession. In 1907 we had the Knickerboxer Crisis with a substantial amount of bank-runs. The last one of the early bank crises and also the largest crisis of the 20th century was the one that occurred during the Great Depression in the 1930s. (Reinhart and Rogoff, 2009)

The deposit insurance schemes from governments managed to reduce the number of bank crises but not eliminate them. A number of modern banking crises have occurred since the times of the Great Depression. Some examples from the 20th century are: The banking crisis of 1973-1975 in the U.K., The Savings and Loan Crisis of the 80s and 90s in the U.S., The Swedish Banking Crisis of the early 90s, The Asian and Argentine crisis in the late 90s and now recently the 2007-2008 financial crisis (Reinhart and Rogoff, 2009). In the light of recent events in the euro zone, it seems that despite the important lessons from the sub-prime crisis in 2007-2008, banks are still very unstable and there are strong reasons to believe that they will continue to be until regulators make some significant changes.

Many corporations rely heavily on banks for their funding and that's why a functional banking system is crucial. So the obvious question is: What's wrong with banks and what makes them so unstable? Admati and Hellwig (2013) have a simple answer to that question and that is: Excess leverage. Equity to total assets-ratios in banks has on average made a considerable decline over the last century thus raising risk of defaults in the system. Bank leverage multiplies risk. Even a small decline in value of the firm's assets can wipe away the equity of a too highly leveraged firm, the same loss that easily would have been absorbed by a less leveraged firm. Admati and Hellwig (2013) actually describe well known truths. There is nothing revolutionary in their study, but what is however remarkable is that they manage to present it in a way that is fully understandable to the general public and not only by professionals in the subject, thus helping to put pressure on regulators. Solow (2009) had already taken up the problem in an article for the New York review of books citing financial institutions that had more than 30-to-1 leverage before the crisis e.g. Bear and Sterns, Lehman Brothers, and others.

Admati and Hellwig (2013) point out the fact that bank managers often have personal incentives to take excessive risk. Their own personal earnings and bonuses are often tied up with the banks return on equity (ROE) or some other performance measured calculated from the value of the balance sheet or the books. ROE doesn't always reflect the true value of the company and managers have also been much better at hiding losses temporarily. This doesn't happen only in banks and a known example is

the Enron scandal that involved the audit firm Arthur Andersen and ultimately led to both their downfall.

A common misconception is that high leverage in banks is necessary to keep low prices on loans. This is not necessarily true. Admati, DeMarzo, Hellwig and Pfleiderer (2011) summarize the arguments which they deem as fallacious or irrelevant to the discussion of capital regulation: A capital ratio, they posit, is not the same as a reserve or liquidity ratio. The word capital, when relating to banks, is nothing more than the equity or the owner's part of the balance-sheet's right hand side. Equity, as in any company, is loss absorbing while debt isn't. This is the reason why equity, or capital, is able to lower the risk of default in the bank.

Banks' will *not* need to set aside more funds that could otherwise be used in the economy because of higher capital ratios. The capital requirement is a requirement about the ownership structure of the bank, requiring less loan-based funding and instead more by common equity funding.

Requiring more equity in relation to loans will *not* increase funding costs for banks as bankers or industry lobbyists would state. If more equity is used then the risk would also go down for holding equity in that bank, thus lowering the risk premium. The required rate of return declines with the leverage because of a change in risk for the owner. This is a basic insight from the Modigliani-Miller theorem (M&M), also called the capital structure irrelevance theorem (Modigliani and Miller, 1958), that is often ignored when arguing for lower capital requirements.

Using the same arguments, increasing the capital requirements will *not* mean a loss in the total value of the firm because the return on equity will be lowered again as compensation to the lower risk faced by the owner. However it is true that tax shields and other subsidies create a situation that makes it favorable for banks to use borrowed money for funding, but this is only true because of distorted policies that encourage companies to take higher risks instead of the opposite.

Managerial discipline will *not* decrease with increased equity requirements, as some argue. There is neither empirical evidence nor theory to support that claim. The recent crisis shows that this didn't happen. Actually, the contrary is more probable because of the safety nets created by governments. In the case of a bailout, stock-owners might have been affected to the point of losing almost all the value of their stock, while bond-owners who face a loss only in the case of a default in the company become protected by the bailouts. With this intuition, it is more likely that stock owners monitor managers, leading to better market discipline, whereas bond owners lack the incentives to do so.

Banks do *not* choose to be highly leveraged because it is socially optimal. They leverage themselves excessively because subsidies created by government policy give bank owners and managers the opportunity to do so and profit from it. On the other hand, the risk involved with leverage is shifted

away from the banks and over to the debt office in the form of deposit insurances, creating a situation where shareholders and managers can receive higher returns while others bear the risk. Banks included in the deposit insurance scheme are normally required to pay a fee to a fund created to cover for the losses. However, that might not be enough and that is when tax-payers have to step in. It is important to bear in mind the importance of M&M. The theoretical results from M&M don't hold in the real world when the basic assumptions are violated. Government subsidies and favorable tax regulations are the reasons here as to why the cost for issuing equity can be higher than funding with debt. But whatever those costs might be, the point Admati and Hellwig (2013) make, is that banking lobbyists grossly overstate them and that the Basel rules are set very conservatively because of unnecessary caution from the committee to avoid excessive costs that can have a negative effect on growth.

Admati, DeMarzo, Hellwig and Pfleiderer (2012) also address the debt-overhang problem as a cause to the unwillingness from banks to lower their leverage. When leverage reaches a certain level, the benefits from a deleveraging would only accrue to the bank's creditors. Since there is no way to make creditors pay for this benefit, shareholders would lose from deleveraging. So bank managers have incentives to remain leveraged because they enjoy the benefits of higher returns while the down-side risk is carried by creditors and tax-payers. The debt-overhang problem makes it actually harder for banks with low capital ratios to raise funds for new loans. Bank lobbyists want us to believe the opposite.

Pecking order theory (Myers and Majluf, 1984) should be considered but it does *not* have the effect that many argue. A higher cost from issuing equity can exist because of a situation of asymmetric information. When companies issue new stock, buyers don't know if the stock they are buying is issued because of a belief from managers that the market is overvaluing their shares. Issuing of stock is favorable when the company's stock is overvalued so this, instead of issuing bonds, can be seen as bad news to the market. The existing information-asymmetry is charged for in the price by the buyers of the stock. However, if a bank is forced to raise new equity because of higher capital requirements, then this effect doesn't exist because all information would be available to the general public.

It is also crucial to include an analysis of the side-effects that crises can have on society and on general welfare in the discussions about bank regulations. Admati and Hellwig (2012) compare systemically important banks and financial institutions to trucks loaded with explosives, speeding on a highway. It would be totally natural to demand speed limits and required sleeping hours for the drivers. No regulator would leave these trucks unregulated, whatever argument the truckers might present about having skilled drivers and good risk models, or that it would lower their earnings and make them lose time on the highway. Systemic risk, i.e. the risk of a melt-down of the whole financial system, is to Admati and Hellwig, just another externality in the system which needs to be regulated, such as pollution, cigarettes, alcohol, or traffic danger due to excessive speed as in the cited example. If higher

capital requirements pose any cost for society, costs that according to Admati and Hellwig (2013) are enormously over-stated, they must be compared to the potential benefits of a safer system.

3. Basel I and II

Financial crises have throughout history forced regulators to create better and stronger regulation to protect the financial system and as it evolves there is a constant need to reevaluate the current regulations and standards. The Basel Committee of Banking Supervision (BCBS) was created in 1988 when regulators saw the great impact a smaller German bank's default had on the market.¹ Globalization and the consequent interconnection between markets from different areas of the globe also demanded a more uniform legislation between countries. Differences in regulations created loopholes in the banking system that made off-shore banking grow with globalization. Global and homogeneous rules are important since the financial market is so interconnected. A crisis in one country can create serious economic damage in another corner of the world and this became very clear during the last crises. In recent time, the Asian crisis of 1997 showed very clearly how quickly a crisis could spread around the globe. But the problem was not unknown before that event.

The first global standard for bank regulations was introduced in 1988 as an attempt to solve this problem: Basel I was introduced by legislation in the countries that were members of the G10² and some of the legislation's fundamental concepts remained present in Basel II and are still present in the new Basel III accords. The first Basel accord introduced the concept of risk-weighted assets (RWA), the capital that banks were required to hold as coverage for any eventual losses would then be a percentage of the risk-weighted assets from the balance sheet, e.g. government bonds from the U.S. or any other credit-worthy OECD country would get a 0% risk-weight so no capital would be required by regulation to cover for losses in those bonds because they were considered risk-free. Commercial loans that, on the other hand, were considered as much riskier would get a 100% risk-weight. Professional rating agencies would then have standardized procedures to rate these financial assets and the risk-weight would be based on these ratings. This system of risk-based leverage is still present today in Basel III but with some modifications.

As the market evolved and with the advent of new and more complex financial instruments and institutions, the BCBS needed to improve Basel I and come up with a new set of regulations. Basel II was originally presented in June 2004, but never got the chance to become fully implemented before

¹ Herstatt Bank defaulted in 1974 and the BCBS was created to prevent similar events.

² The members of The Group of Ten were: Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Switzerland United Kingdom and USA.

the financial crisis of 2007-2008. As a result many countries were still regulated under Basel I during the crisis. The first two Basel accords and the major differences between them are well summarized in Elliot (2010). The BCBS had set up a three pillar framework in Basel II:

- Pillar 1 – Capital requirements
- Pillar 2 – Supervisory review process
- Pillar 3 – Market discipline

Adding to the capital requirements, pillar 2 and 3 were supposed to complement the regulations by setting a standard for supervisors and also promoting better internal market discipline from the banks' side. The Internal Capital Adequacy Assessment Process (ICAAP) is a direct consequence of the second pillar. Basel II requires that banks demonstrate to regulators that they have internal methods for assessing risk and that they constantly evaluate their capital ratios so that they are constantly up to date with the banks' operations. Banks should also use stress testing techniques to control that they can face a period of distress in the financial system, and that all risks involved in their operations are well-known by the board and management. The purpose is to raise transparency and the ability for regulators to attain insight in how banks deal with risk. The third pillar also has the purpose to raise transparency but between market actors instead. Banks are required to provide the market with disclosures about their activities. This involves not only pushing for better accounting standards in order to improve financial reports, but also better and more information released through other sources as internet, press-releases, etc. Transparency and insight in banks' businesses are supposed to reward banks that have a good risk-management because of the investors' willingness to deal with those banks and then giving them a good incentive for better overall market discipline.

While retaining the structure with risk-weighted assets, Basel II contained a broader definition of capital. Basel I had a certain roughness in its categorization allowing banks to create new and creative forms of capital and thus game away the restrictions. Elliot (2010) writes that *"The core of the Basel rules on capital reflects a belief that the necessary level of capital depends primarily on the riskiness of a bank's assets."* (p. 4). He also explains how this is essentially different from the way one would handle an insurance company's risk; for banks, the asset side is important because the different types of financial resources put up there often represent uncertain future revenue. The new classification of capital also gave rating agencies greater influence in the risk-weighting because the weights depended on credit valuation made by these companies. The role of credit rating agencies and their contribution to the crisis will be further explored later in this paper.

Basel II also allowed companies to utilize their own internally constructed models to set the risk-weightings for their assets. This was done by promoting an internal-ratings-based approach (IRB) when dealing with credit risk. For market risk Basel II also promoted the use of an internal modeling

approach (IMA) and for operational risk they were allowed to use something called an advanced-measurement approach (AMA).

The estimation of value at risk (VaR) was also introduced by Basel II, to evaluate the risk on assets for trading purposes, this in relation to market risk. A simplified mathematical definition of Value at Risk is the following:

Given a probability $\alpha \in]0,1[$, the value-at-risk VaR_α is the lower quartile of the cumulative distribution function F for the returns R of a given portfolio, multiplied by the total value V of that portfolio. The returns are calculated for a given and fixed time-period t . That is:

$$VaR_\alpha = F_{R(t)}^{-1}(1 - \alpha) \cdot V$$

VaR can be interpreted in the following way: In the worst case scenario with $1 - \alpha$ probability, the company can face a loss in the portfolio of at least the VaR or higher. We note that VaR is computed for a fixed time period t and that $1 - \alpha$ is the left tail area for the distribution of returns, e.g. a 99% VaR would represent the smallest value that a company would lose during a given time-period, in the 1% worst cases. VaR was the preferred approach in Basel II to calculate market risk.

The capital requirements for assets in trading accounts are based on all the different risk-measures that are added together in a formula that calculates the risk-weights:

$$RWA = 12.5(OR + MR) + 1.06 \cdot \sum w_i A_i$$

Where: OR and MR are measurements of operational risk and market risk that are calculated separately and added together in the model. Credit-risk is estimated separately, either internally but mostly by external agencies and then also depending on the class of asset a risk weight w_i is calculated and multiplied to the asset A_i (Atkinson and Blundell-Wignall, 2010).

Basel II includes some standardized approaches that banks could use instead. On the other hand, the use of internally created models would often generate lower risk-weights and this was allowed because of the intentions of the BCBS to internal practices regarding risk and its management. The choice of model is, however, important because it can influence a lot on the risk-weights. Banks now had the possibility to choose their models, with some limitations, depending on what they wanted to achieve. The idea was that there existed an incentive for the banks themselves to use better and more sophisticated models to calculate the risk correctly, and therefore banks should be allowed and incentivized to create these models on their own.

According to Acharya, Kulkarny and Richardson (2010), Basel II did little to improve the safety in the financial market. They are therefore critical towards the rules and write that: ... *“LCFIs³, armed with their too-big-to-fail funding advantage, easily exploited the conflict of interest of rating agencies, played off external versus internal risk models, and minimized value at risk, though not systemic risk”*. (p. 153) Basel II might have had just the contrary of the desired effects because it created incentives for banks to use themselves of regulatory arbitrage which led to the creation of a much more complex financial system than necessary, and as stated, complexity comes with costs. The failure of Basel I and II became clear during the financial crisis of 2007-2008.

4. The 2007-2008 Financial Crisis and its mechanisms

Many analyses have been made on the crisis (See: Acharya et.al (2009) Brunnermeiner (2009), Gambacorta (2011), Gorton and Metrick (2010), Kacperczyk and Schnabl (2010), Reinhart and Rogoff (2008), and many others) and correct analyses are of importance to help policymakers and regulators prevent future crises. The financial crisis started with a shock in the housing market. Banks had for a time prior to the crisis issued a large amount of sub-prime loans that carried a high credit-risk but with low mortgages using property as collateral. As prices for houses were expected to always go up, banks underestimated the risks involved. Real estate prices in the U.S had increased for several years prior to the crisis. However, when prices began to fall in early 2007 banks quickly became forced to write down a big amount of their assets. The crisis then spread fast to other institutions because of an unfortunate combination of factors, each one with its own particular contribution.

Reinhart and Rogoff (2008) believe that the 2007-2008 crisis wasn't so different from previous financial crises. They looked at asset prices, real economic growth and public debt, and compared these indicators with data from previous crises. The results showed striking similarities in the build-up prior to the crisis and as in many other crises before, the U.S. suffered from a large build-up of debt prior to the crisis; a build-up that later became subject to a run. Nevertheless, one very important difference existed: Because of innovation in finance, new financial institutions emerged creating a shadow banking sector and these financial institutions had many similarities to banks but without being traditional banks. Gorton and Metrick (2010) explain how the recent crisis instead spread largely in the shadow banking sector that lately had been more responsible for providing liquidity to the market as traditional banks had done historically. These financial institutions include companies that provide the market with a large variety of financial services but since they don't accept deposits as banks do, they remain largely unregulated; they do not abide to the requirements in the Basel accords.

³ Large, complex financial institutions

The shadow banking system is an intricate system involving investment banks, insurance companies, funds, trusts and many other non-banking financial institutions. Securitization is often used to move certain assets from the commercial banks into the unregulated shadow banking system.

While it might have started as a fall in housing prices with consequent defaults, its effect was greatly magnified by the complex and risky financial instruments that different financial institutions issued, and by the securitizations in the shadow banking system. The theoretical idea with these obligations was to spread out their own risk efficiently. The problem was, however, that they also became very illiquid and non-transparent while at the same time largely being used for speculative purposes, which actually have the contrary effect to risk. Brunnermeiner (2009) explains how banks would transfer much of their risk to the financial market by issuing a certain type of asset-backed securities (ABSs) with mortgages as an underlying asset: Mortgage-backed securities (MBSs). These are created by pooling different assets into large portfolio. The portfolios would in turn be assigned to a special purpose vehicle (SPV). This is a certain type of legal entity created to fulfill a limited purpose, in this case to isolate the particular company from financial risk. An SPV can also be used for other purposes e.g. to hide certain assets or liabilities from the books, for hedging purposes, to hide losses as in Enron's case, and it can be used for regulatory and tax arbitrage. Since the MBSs could be based on very risky and badly rated sub-prime loans that would have otherwise been hard to sell, the financial market found creative ways of making new assets out of these risky loans. The MBSs would be grouped into different tranches that investors could buy, depending on their desired risk exposure. The different tranches would have different priorities on their payout, and depending on what tranche investors bought the tranches would also generate different return. This way, what would have been badly rated or unrated bonds could be turned into AAA-rated assets and thus resold into the financial market. This could be very profitable for banks because higher rated assets would in turn get a lower risk-weight and would then require less capital as coverage, avoiding the opportunity cost of holding those assets. When thinking today about how the lowest rated or the mezzanine tranches of an MBS could in turn be repacked into something called a collateralized debt obligation (CDO), using the same method of dividing it into different tranches with the tranches sold separately, and how the CDOs could also be repacked in the same fashion creating CDO-squared and so on, it becomes suddenly very clear that actors in the financial market had a tendency to take excessive risks.

Many times the risk involved in investing in asset-backed securities could be hedged with other financial instruments. An example is the credit-default swap (CDS) where the issuer of the CDS is obliged to compensate the buyer in a possible credit event. The issuer of the CDS receives then a regular payment until maturity for exposing themselves to default-risk. The biggest difference between the CDS and a regular insurance is that the buyer of the CDS doesn't need to hold the underlying asset. This opens up for speculation in a particular company's default because they multiply risks, e.g.

if the same company issues ten CDSs on the same loan, they must be able to pay out ten times the loss suffered by the company holding the bond. These payouts could go to purely speculative buyers of the CDS. The company issuing a CDS could do it because they speculated that a certain reference instrument would not default while the buyer would speculate in its default. None of these companies needed to have any particular interest in hedging risk. These instruments proved to be particularly risky in the case of AIG. They had prior to the crisis made large profits from selling these instruments but when companies started to default, AIG started suffer big losses from their CDSs and were in the end rescued by the Federal Reserve to avoid bankruptcy.

The shadow banking sector includes one type of institutions that became pivotal during the crisis: The money-market mutual funds (MMMFs). They invest in short-term securities on the money market that are usually backed-up with collateral from an underlying asset and this is in practice done with a repurchase agreement (repo), i.e. a contractual agreement, not only used by MMMFs but by other institutions as well, where the investor provides the bank with money and receives some asset as collateral with an obligation from the bank to buy back the asset at maturity for a higher and previously stipulated price. If the borrower defaults then the lender keeps the asset to cover the loan. The bank can in turn use itself of securitization through an SPV as mentioned earlier to move their assets away from the balance sheet and these created asset-backed securities (ABSs)⁴ can also be bought by MMMFs, investment banks or other institutions. Securitizes bonds with short maturity had risky underlying assets but could now with facility be used as money and be traded over the counter in the money market. MMMFs would typically invest in very low-risk and high-liquid assets and with very short maturity, sometimes just over the night. A MMMF would normally not invest in the mortgage market and sell repos backed by MBSs if it had not been for the securitizations by the banks.

Before the crisis, repos backed-up by certain assets could be sold with a 0% haircut⁵. The repo market and the MMMFs are important for the short-term lending and provide the market with liquidity in a similar way to what banks have done historically. When the real risk of MBSs started to show itself, many investors panicked and stopped investing in the money market so a liquidity shortage started to spread in the market. The demand for commercial paper went down together with the demand for other money market instruments. Many companies started to suffer liquidity problems because they were highly dependent of short-term funding, and as the market started to suffer from losses banks also started to restrict on lending. Gorton and Metrick (2009) argue that the crash of the housing market quickly turned into a liquidity crisis because of a panic-run on the repo market. What looked like safe collateral suddenly became very risky so higher haircuts were demanded. An upward shock

⁴ The mortgage backed securities mentioned earlier are a type of asset backed securities using mortgages as underlying asset.

⁵ A haircut or margin is the percentage extra value of the collateral, compared to the amount of borrowed money.

in the size of haircuts is equivalent to a run on repos. Many repos have maturity over the night where the collateral is rebought the next day, however, now more collateral was demanded for an equivalent loan the next day. Many of those that lent money using a repo with longer maturity, after revaluating the value of the bonds, started to demand for margin calls i.e. the demand from lenders that the borrower must provide with more collateral to cover for the same loan or pay back the value of the loan. Many financial institutions were so heavily leveraged that they couldn't survive the fast outflow of liquid assets that resulted. What is interesting is that what first started in a small part of the financial market (the market for sub-prime loans), quickly spread around because of the panic that emerged; companies were so connected and dependent on each other that it became highly contagious.

Some believe that the complexity of the credit derivatives can have contributed to the panic. This is discussed by Beltran and Thomas (2010) "*When the housing price bubble burst, investors were unable to determine the size and location of the expected losses because information about the underlying loans was lost along the securitization chain.*" (p. 5) Since Akerlof's (1970) seminal paper on how "lemons" drive out "peaches" from the market the role of asymmetric information cannot be underestimated. Gorton and Metrick (2010) argue that under normal market conditions, the securitized bonds were information insensitive, i.e. the private cost for acquiring information about the securities is higher than the benefits from acquiring that information. Thus, they do not suffer from adverse selection because asymmetric information is not a problem for these securities under normal market conditions. However, in a crisis, information suddenly becomes an issue and then adverse selection occurs in the form of an almost complete stop of trade in those securities. The securities traded in the money suddenly became information sensitive during the crisis and consequently very illiquid. The run from the money market also made it hard for solid companies to borrow for their short-term activities. Demand dropped heavily and everyone stopped buying commercial papers that were essential even for solid non-financial companies to fulfill their short-term obligations.

It is also important to study the contribution of rating agencies to the crisis because Basel II gave them more influence over the valuation of credit-risk and some serious questions can be raised about how good this actually was for the market. The valuation of bonds was mostly done by few big actors on the market: Moody's, Standard & Poor's and Fitch. Investors had much confidence in the credit ratings done by these companies which made them powerful actors in a market which stability depends on confidence and expectations. Benmelech and Dlugosz (2010) see two main problems to why ratings collapsed: The first reason was the very aggressive ratings by these agencies because of the competition between them. The issuer of a bond would "shop" for ratings and often choose the rating agencies that provided them with the highest ratings for their bonds. The second reason would be that of model failure: Models that were used to determine the risks of securities actually underestimated credit-risks and this created inflated prices. They also write that ... "*many of the new*

exotic structured finance products were engineered to obtain high ratings, but the credit ratings were determined through cash flow simulations which are prone to model errors.” (Benmelech and Dlugosz, 2010, p.1)

Much criticism has been given in public debate about deregulations that occurred prior to the crisis, and in particular concerning the Gram-Leach-Bliley Act. The law, passed by congress and finally signed by President Bill Clinton in 1999, removed some of the regulations from the Glass-Steagall Act of 1933, and among other things allowed banks to form larger conglomerates involved in financial activities that previously had characterized non-bank financial institutions. Acharya, Kulkarny and Richardson (2010) wrote that ... *“in August 2004, investment banks successfully lobbied the Securities and Exchange Commission (SEC) to amend the net capital rule of the Securities Exchange Act of 1935, which effectively allowed for leverage to increase in return for greater supervision.”* (p. 148) Gorton and Metrick (2010) also argue that these three areas of the financial market: The market for securities, repo transactions and MMMFs, have also benefited greatly from deregulation and it's likely that this became a contributing factor to the magnitude of the effects from the crisis.

Acharya, Kulkarny and Richardson (2010) criticize Basel I and Basel II for allowing banks to perform regulatory arbitrage, find loopholes and thus avoid the rules; securitization helped banks to keep their balance sheets according to capital requirements. The largest financial institutions in the U.S. had apparently strong balance sheets using the risk-weighted leverage approach of Basel II with a large capital base that nearly got wiped out entirely in very short time. Acharya, Kulkarny and Richardson (2010) show a table⁶ of the largest write-downs and credit losses for financial institutions in the U.S. between June 2007 and March 2010: Fannie Mae, Citigroup and Freddy Mac are topping the list having each suffered credit losses of over 100 billion USD. Previously mentioned AIG had a return on equity of -97.57% between June 2007 and Dec. 2008. The 12 companies listed had combined losses of 962.6 billion USD.

Some concerns already existed before the crisis about the systemic threat these large institutions could pose (See: Herring and Santomero (1990), Barth, Brumbaugh and Wilcox (2000), Akhigbe and Whyte (2003)) but these concerns became more prominent after the collapse of Lehman Brothers and AIG. The idea of “Too Big to Fail” became a well-used expression when deliberating about the financial crisis. However the concept of a company being “Too Big to Fail” should not only be understood as a concept of size and this is well explained by Acharya, Pedersen et.al (2010). Rather, it should be understood as a concept of how dependent and interconnected the financial market is with the company in question. Every company contributes in part to the market's systemic risk and size is only one of several factors involved.

⁶ See Table 6.1, p. 147, of Acharya, Kulkarny and Richardson (2010)

5. Regulatory changes and Basel III

After the crisis, regulators couldn't stay idle anymore because of the considerable growth of opinion demanding tighter regulation. Basel III was therefore introduced by the BCBS in 2009 and it has been decided to be gradually adopted over the next years with a plan to be fully implemented in 2019. The major regulatory changes are well summarized in Elliot (2010) and are based on the previous framework of risk-based capital requirements. The three pillar framework is kept from the original Basel II accords. This means that Basel III doesn't change its basic approach to risk but instead focuses on strengthening the requirements. In addition to these three pillars, Basel III introduces long and short-term liquidity requirements, thus addressing the problem of banks becoming insolvent due to liquidity problems. The supervisory review process and market discipline are included in Pillar 2 respectively Pillar 3 of Basel III. The supervisory review process and market discipline have been strengthened in Basel III in relation to capital, also adding some tools for supervisors together with the new liquidity requirements.

5.1 Capital requirements

- Tier 3 capital will be completely eliminated, keeping only Tier 1 and Tier 2 capital. (BCBS, 2010a)
- Those capital instruments unable to fall under the requirements for Tier 1 or Tier 2 will be phased out on a time-horizon of 10 years starting from 2013. (BCBS, 2010a)

Tier 1 capital is split into common equity Tier 1 (CET1) and additional Tier 1 (AT1) that still comprises the core of the bank's capital but fails to fall under the definition of common equity. (BCBS, 2010a)⁷

- Goodwill, minority interest, deferred tax assets and investments in other financial institutions will be deducted from common equity (BCBS, 2010a) (Atkinson and Blundell-Wignall, 2010).

The basic idea behind classifying capital into different groups is that the parts of the credit side on the balance sheet that fall under the definition of capital also have different kinds of quality because they absorb losses differently.

⁷ Exact definitions on common equity Tier 1, additional Tier 1 and Tier 2 capital can be found in BCBS's document published December 2010: "A global regulatory framework for more resilient banks and banking system."

- The capital requirement for common equity Tier 1 will be raised and this requirement, like many others, will be phased in gradually: In 2013 it will be set at 3.5% of RWA, in 2014 to 4% and in 2015 it will be fully implemented at its final level of 4.5%. (BCBS, 2010a)
- Basel III includes an additional 2.5% so called capital conservation buffer that will push the capital requirements up to 7%. Even if it is not a requirement in the strict sense, failing to hold the requirement of the capital conservation buffer would limit banks because it would force them to withhold dividends to shareholders. (BCBS, 2010a)
- Basel III also includes a counter cyclical buffer that can be added by a national authority set by the government, with the purpose of preventing excessive build-up of risk. The counter cyclical buffer can be set between 0 – 2.5%, and this requirement is additional to the capital conservation buffer adding up to a maximum of 9.5% of RWA (BCBS, 2010a).

The idea here is to prevent the build-up of bubbles before they burst and thus reduce systemic risk. The counter cyclical buffer is one of the proposals by the BCBS that actually directly address systemic risk but the practical details are still unclear. The Basel II rules were criticized for being pro-cyclical, forcing banks to hold more liquidity in times when the market had a liquidity shortage.

- The new rules impose additional capital requirements for systematically important banks. That extra capital has to be put above the already stated capital requirements and will be set at a maximum of 2.5% which means that some banks could be required to hold 12% of RWA in CET1 capital (BCBS, 2010a)
- As an addition to the risk-based approach from the previous accords Basel III also includes a non-risk-based leverage ratio that is calculated on Tier 1 capital. Between January 2013 and January 2017, a minimum leverage ratio of 3% will be tested by the committee. (BCBS, 2010a)

The rationale for a non-risk-based leverage ratio is that the inclusion of only a risk-based ratio can lead to excessively large balance sheets because the banks can still build up high leverage and risk investing in low-risk assets, making them subject to other types of risks that can generate losses to the bank. The adoption of an exclusively risk-based leverage ratio would expose the bank to excessive model-risk in the calculation of the risk-weights and could also easily be gamed away by the banks. A non-risk-based leverage ratio will then instead complement the risk-based measure and provide extra

protection against insolvency. As confirmed during the last crisis, when facing a meltdown in the credit markets even highly rated instruments that required 0% capital could become very risky and suffer severe losses and this can be problematic to a firm that is highly leveraged.

One topic that has also been discussed by the Basel committee is the inclusion of contingent forms of capital in the balance sheet. The basic idea of contingent capital is that it be considered as debt until a certain event, predetermined in a contract, triggers a conversion of it into equity (Elliot, 2010). The usefulness of it is widely discussed in the Acharya, Kulkarny and Richardson (2010) a paper where they also present some different forms for this type of capital. Especially important to determine is the event that activates the changes of the particular liabilities from debt into equity. There exist a series of proposals on how this trigger can be set using market values or book value, equity or credit market triggers, CDS prices, stock price, market capital ratios, market value of equity, liquidity measures, etc. (See: Duffie 2009, Flannery (2005), Flannery (2009a), Flannery (2009b), Hart and Zingales (2009), McDonald (2010), among others). Acharya, Kulkarny and Richardson (2010) believe that contingent capital should be used to address systemic risk and that the trigger should be designed in such way. The Basel committee has to date not agreed on the specifics of contingent capital but its inclusion in Basel III would probably take the form of some reduction in capital requirements for the banks that choose to use contingent capital in their funding, or that this kind of liabilities would be defined as stronger form of capital.

Some important changes are made in the treatment of the asset-side on the balance sheet. The risk-weights attributed to each asset will be substantially changed, especially those treating structured instruments and assets created from securitization. Risk-weights are calculated using estimation methods for credit, market and operational risk individually. Capital for counterparty credit risk will have higher requirements and there will be a clear distinction between dealing with over-the-counter (OTC) derivatives and instruments traded with the supervision of an exchange (Elliot, 2010). Instruments traded without an intermediary face a counterparty credit risk i.e. the risk that the counterparty of a contract defaults before he can fulfill his obligations. The Basel III regulations contain capital incentives for banks to make more use of central counterparties (CCPs) in their trading. The use of CCPs improves transparency, reduces information sensitivity for securities and makes it easier for supervisors to monitor risk-exposure. Basel III also requires higher capital in general to assets held for trading purposes independently if traded OTC or by an intermediary. The requirements will be much tougher for the kind of instruments that helped fuel the crisis.

The basic framework from Basel II will be kept in Basel III. No considerable changes will be made to how banks deal with operational risk but when dealing with credit and market risk some important proposals have been made by the BCBS. A VaR framework will be kept for the calculation of market risk but now calculating it over a simulated period of stress in the financial market. When

creditworthiness deteriorates, Basel III will require a credit valuation adjustment (CVA) to account for counter party credit risk (Atkinson and Blundell-Wignall, 2010). In addition to this, wrong-way risk⁸ must be taken into account when evaluating credit-risk (BCBS, 2010a).

5.2 Liquidity requirements

Because of the recent crisis' fast development into a liquidity crisis, regulators decided to include liquidity requirements in the form of a short-term requirement, a liquidity coverage ratio (LCR), and a net stable funding ratio (NSFR). A short-term requirement is set to ensure that banks are less vulnerable to runs and can handle a liquidity crisis that characterized the 2007-2008 sub-prime mortgage crisis. Another problem during the crisis was the overreliance some banks had on short-term wholesale funding for assets and activities. Wholesale funding is short-term and much riskier compared to core demand deposit which is the traditional way banks have used to fund their operations. The NSFR is set to promote a more stable funding and demands more long-term loans in the balance sheet (BCBS, 2010b).

Liquidity requirements reduce banks' dependency on central banks as lenders of last resort. When central banks lend money to illiquid banks, they buy them the necessary time to avoid a fire-sale of their assets with longer maturity. When central banks act as lenders of last resort, they should lend to banks that are still viable and must make sure that they have enough long-term assets to cover for the losses.

The banks are also required to present other metrics used to measure liquidity. This is a part of the supervisory review process in the Basel III and the proposed monitoring tools are:

- Contractual maturity mismatch: Banks present data on contractual inflows and outflows of liquid assets according to their maturity. Assets with no particular maturity should be presented separately. The purpose is to understand the expected inflow or outflow of liquid assets for existing contracts and detect any possible mismatches. No assumptions on the company's future behavior or strategic plans that could change the expected cash flows are allowed to be included. Such assumptions could, however, be included by supervisors in their comparisons, once the raw data has been handed over to them by the banks. Another important point is that both on and off-balance sheet exposure is required to be reported.

⁸ Wrong-way risk originates from a positive correlation between risk-exposure to a particular asset and the probability of a credit event for that particular asset.

- Concentration of funding: This should be provided by banks to supervisors so that they control that the banks don't rely on too few sources for funding. The funding sources that make up of more than 1% of the banks total balance sheet are considered significant and should therefore be presented to the supervisors. A withdrawal of those funding sources can create liquidity problems for the banks. The purpose is to promote diversification and to avoid problems that can occur because of a too high dependence on single funding sources. Presentation of funding from specific products and specific currencies are also required to be presented for the same reasons as for specific sources.
- Available unencumbered assets: The bank should provide disclosures of available additional funding in the private markets or by central banks. It should include the type, amount and sources of additional funding. The purpose is to provide supervisors with data on how easily the bank can obtain high-quality-liquid assets (HQLA) in case they are needed.
- LCR by significant currency: This metric is defined in the same way as the LCR⁹ but presented in each significant currency. A significant currency is then a currency that is included in more than 5% of the balance sheet exposure.
- Market-related monitoring tools: Supervisors should in general collect high-frequency data related to the market and that can affect liquidity. Data on three proposed levels are supposed to be monitored: Firstly, on market level data that provides information about the aggregate market. Secondly, data on the financial sector and thirdly, data on that is specific to the bank.

(BCBS, 2013)

5.2.1 Liquidity Coverage Ratio

The LCR has a timeframe of 1 month where the bank should be able to endure a simulated period of stress in the financial market with a net outflow of liquid assets. It is planned to be implemented gradually starting with a minimum level of 60% in 2015 and then raised with 10% every year until its final level of 100% in 2019. The bank will be required to hold a stock of HQLA to cover for the net outflow of capital so the LCR is calculated using the following formula:

$$LCR = \frac{\text{Stock of HQLA}}{\text{Total cash outflow over the next 30 calendar days}} \geq 100\%$$

⁹ See definition in the section: 5.2.1

It is important to define here what is considered as HQLA and the BCBS clearly states that not only does the asset need to remain liquid under normal market condition but to be considered as a HQLA it also has to keep its liquid quality during a period of stress. HQLA¹⁰ will be divided into different levels of assets:

- Level 1 – Assets of the highest quality: cash, government bonds, etc.
- Level 2A – Assets of lower quality. Ex. certain government securities, covered bonds, corporate debt securities, etc.
- Level 2B – Lowest quality of assets that still qualify as HQLA. Examples are lower rated corporate bonds, certain structured debt, residential mortgage backed securities, etc.

The BCBS have set the rules limiting Level 2 assets to maximum 40% of HQLA and Level 2B assets to maximum 15% of HQLA. As part of the second pillar, supervisors must make sure that the stock of HQLA is well diversified and avoid high correlations in default between the assets.

The idea is that banks should be allowed to use the LCR in times of distress and go below that. This puts a great deal of responsibility on supervisors because they are supposed to respond at an early stage and also find the sources for the distress. Liquidity problems can have internal causes and not necessarily be related to external problems in the market. Supervisors should then have power to deal with banks that fall below the 100% limit. They will be able to demand better insight in the problem and detailed disclosures on what is done to solve it. At appropriate times, supervisors will be able to demand certain actions to be taken to address the liquidity problem. It is also necessary for supervisors to define the stress test so that it covers all the potential problems that a liquidity crisis can have. This is not an easy task because it would need to cover for the unexpected. Liquidity requirements are in contrast to capital requirements, very expensive for the economy. Thus, every extra margin comes with a cost and should therefore be well-motivated. The denominator in the model i.e. the total cash outflow is calculated according to certain parameters determined by what is considered as a period of stress. Knowledge from the financial crisis of 2007-2008 is used to create the simulated scenario for the stress test and the expected effects of a new crisis include many of the shocks experienced then. (BCBS, 2013)

What are then the implications for the market of securities? The capital requirements targets one aspect of assets' quality which is credit risk. The problem with only addressing credit risk is that even what is considered safe assets can become very illiquid during a crisis. Structured products created in the securitization chain proved to be very illiquid during the crisis much because of an information mismatch. The LCR will probably limit the banks' exposure to these kinds of products.

¹⁰ Exact criteria for inclusion in the different levels of assets are found in the consultative document by the BCBS (2013): "Basel III: The Liquidity Coverage Ratio and Liquidity Monitoring Tools".

5.2.2 Net Stable Funding Ratio

The NSFR is set to complement the LCR and forces banks to rely on more stable funding. It targets in particular off-balance exposure and instruments used in the shadow banking system. The NSFR covers the entire balance sheet and is defined as:

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

The required amount of stable funding is measured by weighting all the assets on the balance sheet with a required stable funding (RSF) factor. This factor is determined by the liquidity risk profile of the assets on the balance sheets. For example, cash and money market instruments have a 0% RSF factor while gold has a 50% RSF factor, unencumbered corporate bonds that meet certain criteria have a 20% RSF factor, etc. The available amount of stable funding (ASF) is an aggregate of assets that are considered as long-term sources for funding. The BCBS have set a required maturity larger than 1 year for most liabilities; Tier 1 and Tier 2 capital are included, preferred stock and other liabilities with maturity larger than 1 year, etc.¹¹

The same effect to securitization as with the LCR can be expected with the NSFR. Off-balance sheet activity will have higher RSF. There is problem, however, with the NSFR because it requires good definitions on what is considered as liquid assets. The RSF is set depending on estimates of the different assets' liquidity in a situation of distress. However, this liquidity can vary from time to time, which isn't totally unproblematic. The RSF is set higher for off-balance sheet vehicles because of this knowledge from the crisis.

The NSFR also needs careful definitions on what is considered to be a stress scenario. One significant difference from the LCR will be the time-frame of 1 year. Operational risk, market risk and credit risk are assumed to increase, which will lead to a decline in profitability and solvency for the banks. Downgrading by credit raters of the bank's assets and fast changes in the institutions' credit reputation which all lead to higher funding costs and write-offs on the asset side. All these situations are expected in the stress scenario.

¹¹ Exact requirements for RSF and ASF are found in BCBS's (2009) consultative document: "International framework for liquidity risk measurement, standards and monitoring."

6. Possible Shortcomings and Unintended Consequences

6.1 Capital

Despite the previous Basel II accord's almost complete failure to deal with the crisis, the Basel III will be mostly incremental. A number of academics detect a problem with the fact that the BCBS have based the new rules on the previous ones (See: Acharya, Kulkarny and Richardson (2010), Admati et al. (2010), Al-Darwish et al. (2011), Atkinson and Blundell-Wignall (2010), Admati and Hellwig (2013), and others). Acharya, Kulkarny and Richardson (2010) posit that the primary rationale for global banking regulation should be systemic risk. The new accords have clearly taken a different approach focusing on the individual company's risk. Systemic risk is mostly dealt with by using larger multipliers when adding the risk-contribution to the calculation of the RWA, but the approach taken doesn't deal with the fundamental incentives to risk-taking behavior. Managers are still rewarded for taking excessive risks while government subsidies makes them avoid the down-side risk. Systemic risk has been lightly considered in Basel III and in few of the proposals, e.g., in those dealing with CCR, wrong-way risk and OTC-derivatives. Even if all details haven't been decided yet it is clear that the problem of systemic risk doesn't have the primary focus of the BCBS.

However, Basel III will set tighter limits for leverage with purpose to strengthen banks' capital base. But are the new capital requirements really enough to make the system safer? Kuritzkes and Scott (2009) point out that the capital ratio for the top 20 banks in the U.S stayed on average around 11.7% before the crisis so most of these companies were well above the 8% required by Basel II. The 5 largest LCFIs also had strong capital ratios ranging between 12.3 – 16.1%. It is therefore natural to question: Will capital ratios of maximum 12% of RWA be enough to protect the financial system from another crisis? With all the existing incentives to take on risk, these banks had on average almost 5 percentage points more leverage than required which shows that managers judged it too risky to go below that, despite the personal profits they could make from it. The new capital requirements are now, with Basel III, still below what the top 20 U.S. banks had on average before the crisis.

Another problem Basel III fails to deal with is the shadow banking system. We must remember that the financial crisis was a result of systemic risk build-up, risk-migration and growth of an increasingly lucrative shadow banking sector with complex and opaque financial instruments, a shadow banking system without limits on capital structure, which knew about its systemic importance and the fact that they would be bailed out. Gorton and Metrick (2010) suggest two fundamental remedies to this, that are not included in Basel III, writing that: *“Repos and securitization should be regulated because they are, in effect, new forms of banking, but with the same vulnerability as other forms of bank-created money.”* The two suggested methods are government deposit insurances for MMMFs and strict guidelines on collateral in a repo contract. Since the shadow banks are not included in Basel III,

neither of the two are used. Even if the details on the Dodd-Frank Act are outside the scope of this paper, we may note that it might actually do better than Basel III because the new rules include MMMFs and other non-bank financial institutions in its regulation. However, The Dodd-Frank Act doesn't take the final step to include MMMFs, which are also involved in maturity transformation, in a deposit insurance scheme similar to the banks.

Risk-migration can sometimes be used as an argument against higher capital requirements. Admati and Hellwig (2013) make no distinction between traditional banks and the shadow banking sector, and neither does Gorton and Metrick (2010). The shadow banks during the crisis fulfilled the same role as traditional banks have done historically. Admati, DeMarzo, Hellwig and Pfleiderer (2011) posit that the shadow banking sector was mostly driven by regulated banks during the crisis. It was the regulated banking sector that started the securitization chain with MBSs that they resold to the shadow banking system. Regulation of the shadow banks should therefore seriously be considered, especially if they benefit from the same subsidies as commercial banks. It should be taken as a regulatory challenge instead of a limitation to regulation.

A migration of risky assets can build up unnecessary risks in the system, created by financial institutions new methods to avoid legislation. Basel III proposes a much more complex set of rules than the previous accords did and complicated legislation can also lead to the creation of ingenious methods to avoid it, reducing transparency and available information. Basel III continues to rely on a meager raise of the risk-weighted capital ratios as primary countermeasure to risk, suggesting that it's only a question of fine-tuning the previous standard to make the financial system safe. What would prevent banks and LCFI from finding new ways to circumvent the new capital requirements, exactly as they did prior to the crisis?

It is also unclear if the enhancement of Pillar 2 and 3 in the new Basel accords will be enough to protect from regulatory arbitrage and generate enough transparency as wished for. The rules there are, however, yet to be defined in their complete form. But banks have in the past shown ability to often remain a step ahead of the supervisory review process. As banks will be required to hold less risky assets there is a possibility that risk could not only migrate to other parts of the financial sector but also passed on to their customers by selling financial products. This was a highly controversial issue and heavily discussed in relation to losses in pension funds during the crisis. For example, in 2008, Irish pension funds lost 38% of their value, in Australia 27% and in the U.S. they faced a 26% decline, with some particular funds in these countries losing much more (Keeley and Love, 2010). Some LCFIs went even further by suggesting bad investments to costumers and thus inflating prices; investments that they would simultaneously sell-off or bet against. This was done in particular with structured products holding residential mortgages as underlying assets. Some LCFIs had particularly cynical ways of making profits, as is well-illustrated by the given example, and they were often fueled

by distorted compensation incentives. Admati and Hellwig (2013) argue that market discipline could become better if capital ratios were set much tighter. Since governments have signaled to the market that systemically important financial institutions will be bailed out, there is a risk that lenders to banks could become even worse in their monitoring because they feel even more secure against any possible risk of default.

There is a risk that Basel III could lead to less diversification and higher concentration of risk in the same way that Basel I and II did. Regulatory arbitrage will make some assets more attractive than others. There is still a risk that Basel III can lead to an even greater deal of off-balance-sheet financing and demand could actually increase for the type of instruments that banks want to hold to avoid capital requirements: Instruments that are debt-like in their economic essence but accounted for as capital due to legislative reasons. MBSs became popular and led to non-diversified portfolios because of an over-reliance in the housing market. Banks would shop for assets that provided them with low risk-weights and regulations actually incentivized this behavior. This turns out to be an ineffective allocation of resources where funding doesn't necessarily go to those in need of it and that adds value to the economy, but goes instead to those parts that can provide banks with low risk weights. What happens if banks find new such assets as MBSs, which quickly become popular, not because of their value, but because of the regulatory arbitrage that can be performed? The clear benefits that banks have in lowering their capital ratios can lead to a misallocation of resources, lowering diversification and increasing the concentration of risk, e.g., Basel III gives a particular low weight to sovereign bonds or municipal bonds. These are not completely risk free which has become very clear with the current sovereign debt crisis in Europe. Cypriot banks are currently in serious trouble because much of their assets consist of Greek sovereign bonds that they suffered losses from. There is always a discrepancy between the added risk-weights and the market value of the risk, e.g. when risk is underestimated by the models that the capital ratios are based on, comparing to the market's estimation. Because of risk-shifting, capital will be allocated there because profits can be made by banks that will not suffer the down-side risk covered for by governments.

The fundamental risk-weighting approach of Basel III can also be questioned in relation to the risk-modeling. There are two points in Basel III that are particularly alarming: First is allowing banks to use internally created models for the evaluation of credit, market and operational risk. The fact that these risks are key factors for calculations of the risk-weighted assets creates incentives for banks to use the model that minimizes them. This is well-summarized by Al-Darwish, et.al. (2011): *In other words, either banks have progressively found innovative ways to inflate their capital adequacy ratios or supervisors have progressively relaxed, maybe unintentionally, validation standards.*" There are fundamental reasons to why one should watch out with internal models, and if allowed they require a very strict supervisory review process. Bank-managers with good understanding of the models can

also easier manipulate those using data to underestimate the risk-measures, use creative accounting methods, etc.

Another major issue that Basel III fails to deal with is the over-reliance on credit rating agencies. Not just allowing but also heavily relying on external credit-ratings could once again generate the same problems that financial markets faced during the crisis: Bad risk-modeling creating inflated prices and systematic underestimation of risk related to certain financial products. There are, however, reasons to believe that the risk-modeling is better now than it was before the crisis: Credit rating agencies today use a new historical record that didn't exist before and possess better knowledge about the risks involved in the products being rated.

The VaR approach is also subject to critique, mostly because it is often misused and misinterpreted. The VaR approach is based on previous data and is prone to model error, underestimating large-tail-risk. The computation of VaR demands the choice of a correct probability distribution. Many VaR computations prior to the crisis were based on the normal distribution that tend to underestimate extreme events. The VaR measure is also prone to input error. Historical data doesn't necessarily predict the future and financial time-series are non-stationary, with means and standard deviations that quickly change with time. The VaR measure is also criticized for having a very narrow time-perspective. The short-term perspective is useful for financial institutions when they hedge risks on a day-to-day basis. But a bank that calculates VaR for its risk-weighted assets used for trading purposes could have a longer time-perspective for their assets. Because of non-stationarity, long-term VaR is very hard to predict and more subject to errors. The use of a single and absolute value to measure risk is also problematic because it is often interpreted as a worst case scenario. The problem with this is that in worst-case scenarios, a bank has to be prepared to face much larger losses than the VaR measure. The VaR measure doesn't account for the unexpected which is exactly what a bank would need to cover for. It is in the worst cases banks need their capital, to absorb losses and to signal stability to the market.

There exist some less conservative opinions about Basel III, contrary to the proposed standard, and presented by some highly respected academics. These opinions can't be overseen so easily. In a letter to the Financial Times, 20 of the leading researchers in the field of economics and finance make a joint effort to promote much higher capital ratios that are not based on risk-weights as in the previous accords (Admati et al., 2010). They ask themselves, why only put 3% non-risk weighted leverage and not at least 15% leverage? Admati (2012) is even less conservative demanding *at least* 20 – 30% equity over total assets for the most systemically important banks. In Admati and Hellwig (2013) they ask: Why couldn't banks have equity levels of around 20 – 30% instead of the low levels they have today? They call for fundamental regulatory modifications as the only way to invert the distortions that exist today. Basel III is making a move towards higher capital ratios, but there are no reasons for

them to be so low. If the arguments about costs of funding banks' activities with equity were true, one could understand the BCBS's special attention to all the details in order to not impose more social costs than necessary. But the arguments for low capital ratios, as previously mentioned, are mostly based on fallacies, irrelevant facts and sometimes insufficient understanding about basic economic mechanisms. Quite often, these arguments are given deliberately by bankers and bank lobbyists because of the high profits they can make out of lower capital ratios and deregulation. These are the same reasons as to why deregulation was promoted in the U.S before the crisis. However, as the 20 academics have already with the title of their letter to the Financial Times rhetorically reminded us: "*Healthy Banking System is the Goal, Not Profitable Banks.*" (Admati et al., 2010) It is also important to point out that Admati and Hellwig (2013) and Admati, DeMarzo, Hellwig and Pfleiderer (2011) do not posit that the social costs of higher capital requirements are inexistent but instead minimal. If we then add a financial crisis to the equation, the benefits of much higher capital ratios clearly exceed the costs. Empirical attempts to estimate the costs tend to grossly overestimate them. Admati, DeMarzo, Hellwig and Pfleiderer (2011) cite three different studies (See: Bank of Canada (2010), BCBS (2010c) and IIF (2010), including one by the Basel Committee, that have some clear limitations. Some of the same theoretical mistakes that are used in the banking lobby's arguments are also included in these studies. Using fixed estimates for the cost of equity, as Admati, DeMarzo, Hellwig and Pfleiderer (2011) claim has been done in these studies, would be equivalent to assuming that the required return is fixed and thus remains unchanged when risk decreases, which is incorrect.

The current system with subsidies and compensations for risk-taking behavior in banks doesn't change with Basel III, and those subsidies and compensations are probably the reasons why bankers are so reluctant to adopt higher capital ratios. The moral hazard problem is significant when it comes to banks. Bank management can borrow money on much more favorable terms than other institutions that are not protected by government bail-outs, encouraging banks to rely on debt instead of equity funding. Banks can also borrow cheap from central banks at below market rates. This gives them a clear competitive advantage in relation to other companies. Why should banks have such competitive advantages? Admati, DeMarzo, Hellwig and Pfleiderer (2011) discuss how banks don't only compete against other banks and financial institutions, but should be seen as competing with any other companies in the market. A usual argument that is made in favor of keeping the subsidies for the financial services sector is that its decrease would lead to an aggregate decrease for the economy. This argument, however, does not into account for the fact that resources and competence allocated in the financial services sector could instead be allocated in other sectors that currently don't benefit from the subsidies that the financial sector receives. Many intelligent and skilled students that graduate from University choose a career in finance because of the high profits. Had those profits not been subsidized by the government, all that competence could have been used in other fields generating growth.

The long transition period for capital requirements has also been a reason for criticism, in both Admati and Hellwig (2013), and Admati, DeMarzo, Hellwig and Pfleiderer (2011). The argument from the BCBS is that directly imposing the full regulations on the system could dampen growth and delay the world economy's recovery from the crisis. The problem is that arguments favorable to a slow adaptation have the same fallacies as the ones used by bankers when they argue for lower capital in the first place. Retaining dividends to shareholders would easily recapitalize banks and if the banks are liable then there are no reasons why they wouldn't be able to issue new shares. The Myers and Majluf (1984) effect that is created by an informational mismatch can be avoided by forcing banks to raise their equity gradually, according to a well-defined schedule. This would prevent the market from believing that the issuing of new shares is because of an overpricing of the firms stock.

Finally, the proposal of including contingent capital is a move towards higher capital ratios but can be seen as an unwarranted settlement with the demand from bankers to let them keep their high leverage. Acharya, Kulkarny and Richardson (2010) identify the benefits that can come from using contingent capital but posit that the proposal also has limitations. Firstly, contingent capital doesn't have the ability to limit the build-up of systemic risk but only reacts to save the company in an already distressed financial system. Secondly, there exist limitations in how well contingent capital can contain a system in distress. Contingent capital would in its essence be equity, but only converted to such when the bank needs it. However, holders of both normal capital and contingent capital would have the same incentives to take on additional debt because that part would still be protected by government bail-out. For the proposal of contingent capital to be effective, it must be included as a significant portion of the balance sheet in order to significantly reduce the already existing leverage. Thirdly, and this argument is closely related to the one presented in Admati, DeMarzo, Hellwig and Pfleiderer's (2011), why would contingent capital be better than the alternative: Equity? The reasons for banks to prefer contingent capital is mostly because of the huge tax advantages to debt. But this raises another question: Will contingent capital with all its equity attributes be able to benefit from the same tax subsidies as normal debt? If not, there would be no reasons for banks to hold contingent capital instead of normal capital. If the answer is yes, it would not create any social benefits allowing it to be, using the same arguments presented earlier in this text, for why debt shouldn't be subsidized in the first place. Fourthly, contingent capital needs a well-working bond market which not all countries have. Global capital requirements should work equally in all parts of the world. The complexity of the proposal makes it hard to rely on because it would demand a uniform international standard that is very difficult to create around contingent capital.

Admati, DeMarzo, Hellwig and Pfleiderer (2011) have a simple but strong critique to the proposals of including contingent capital: With the perspective of social welfare in mind, why would contingent capital be so much better than equity? There are no justifications for the tax subsidies that banks

benefit from and therefore no benefits to create government policy around contingent capital. The same arguments as to why equity funding shouldn't cost more than debt also hold for the debt-like attributes of contingent capital. Contingent capital would just add another unnecessary dimension of complexity to the regulations. Complexity in the sense that it would add to the fact that bank regulation and capital definitions are already hard to comprehend for non-professionals, create new problems for regulators on how to define the new rules and their implications, strain regulatory resources and capacity, and also reduce transparency and accountability.

6.2 Liquidity

The function of the liquidity requirements depends heavily on the design of the capital requirements. It is true that the crisis evolved into a liquidity crisis. Still, the primary reason as to why institutions started to restrict on lending was because of an uncertainty over banks' ability to pay back. What triggered the crisis was in principle a solvency problem. The regulated banks started the whole securitization process by creating subsidiaries that they kept off the balance sheet with the purpose of performing regulatory arbitrage. These companies acted in the shadow banking system and were mostly funded by commercial paper. When the liquidity crunch started it went off as a run on repos on LCFIs because of the solvency of these institutions was questioned. Had LCFIs been less leveraged, they would have easily been able to absorb the losses that occurred due to the decline in the housing market and they wouldn't have suffered a run triggered by uncertainty.

If capital requirements are set low, liquidity requirements can serve as a cushion for possible liquidity crises. This is however expensive because in contrast to capital, any additional HQLA held by the banks is a one less in the economy. Liquidity is a reserve that is set aside, capital however is not. Elliot (2010) suggests that the average price of loans could be much more affected by the liquidity requirements than the, according to his calculations (0.2% points), small effect that capital requirements would have. The only reason for including liquidity requirements instead of letting the banks deal with it without regulation is if leverage is too high. Then liquidity requirements would serve as a cushion.

Admati, DeMarzo, Hellwig and Pfleiderer (2011) have only some short remarks about liquidity primarily in relation to capital. Two important points are made about the liquidity requirements: Firstly, better capital requirements would reduce the risk for a liquidity crisis as stated above. So with good capital requirements, liquidity requirements are superfluous because capital translates confidence to the markets. The role of providing liquidity as a lender of last resort would then be maintained by the central bank. Secondly, central banks should provide the market with liquidity in cases when the

bank is solvent. A liquidity crisis is not equivalent to a solvency crisis because an illiquid but solvent bank has a net asset value that is higher than its liabilities. The assets have a real value but owing to an information mismatch, they can only liquidate them at a loss. More capital would create a situation where central banks don't need to worry if they lend to solvent banks or not.

7. Concluding remarks

Admittedly, the question of financial regulation is way too vast and complex to be completely resolved in this short paper. An attempt is made here to understand the Basel III regulations and their implications to the safety of the financial system in the light of existing research in the field. A broader understanding of crises and how to prevent them would require the studying of many other aspects of the financial system that add to systemic risk. Two other examples of regulations that were created to improve the financial system are The Dodd-Frank Act which regulates financial institutions in the U.S., and Solvency II¹² which are new regulations for insurance companies, similar to Basel III. The Basel III regulations are narrow and focus only and directly on banks.

We conclude that since banks play a pivotal role in the financial system, primarily to solve informational problems about different investments, they also deserve special attention when it comes to regulation. The holding of long-term assets makes them susceptible to runs and these can occur in commercial banks, and as Gorton and Metrick (2009) posit happened during the crisis, in the shadow banking system. Studying the financial crisis is important to understand the banks' role in adding to systemic risk. Admati and Hellwig (2013) make no difference between the economical function of shadow banks and regular commercial banks, and their fundamental problems, so any regulation should involve both types of institutions. Both shadow banks and commercial banks can be seen as producing externalities in the form of systemic risk and government policy should therefore be directed to address this problem.

Basel III, as in previous regulations, does not include shadow banks, which can lead to problems of risk-shifting to other markets, and is set up primarily as a modification of its antecedents, Basel I and II, containing basically the same risk-weighting approach. However, some important changes are made. The new regulations take a step towards strengthening the capital requirements for banks including a non-risk-based leverage ratio that should serve as a back-stop to the risk based leverage ratio. The leverage ratios will be set at maximum of 12% for the risk-weighted, and 3% for the non-

¹² A complete disclosure of the Solvency II regulations remains outside the scope of this paper. Solvency II is, however, related, mostly in its structure with the Basel II also including a three pillars framework. In contrast to the Basel standards, Solvency II is an EU directive and harmonizes regulations for insurance companies inside the European Union, while Basel III is a regulatory standard adopted by each country's legislators.

risk-weighted. The rules include also new capital definitions and some novelties in how to count the risk-weights including capital requirements to address counterparty credit risk and credit value adjustments. Other important features that are completely new to Basel III are the liquidity requirements set as a short-term (1 month horizon) Liquidity Coverage Ratio and as long-term (1 year horizon) Net Stable Funding Ratio. The liquidity coverage ratio has the purpose to ensure that banks always have a necessary stock of High Quality Liquid Assets to cover for a net outflow of cash during a time of financial distress. The long-term requirement is set to ensure that banks use more stable assets in their funding.

Recent studies (See: Admati, DeMarzo, Hellwig and Pfleiderer (2011) (2012), and Admati and Hellwig (2013)) by some leading academics in the field have tried to direct the attention to problems with high leverage in banks, their contribution to systemic risk and the fact that many arguments proponents for lower capital requirements use, have fundamental fallacies. Opponents to higher capital requirements use arguments that are often based on confusions between social and private cost, and between capital and bank reserves. The causes for equity funding being more expensive than debt are the subsidies from the government in the form of tax relief and bail-out when insolvent, thus removing the down-turn risk from shareholders that benefit from a higher return on their equity due to high leverage.

Since the deposit insurance scheme of the central banks plays such a vital role in maintaining confidence for banks, reducing the risk of a run, it is hard to argue against this government subsidy. The role of central banks as lenders of last resort should then be kept and other forms of government bail-outs shouldn't be completely ruled out either as a last extreme means to containing financial distress. A complete disclosure on tax regulation remains outside the scope of this paper but we suggest a revision of the alternatives to the current rules.¹³

To conclude, a better alternative to the Basel III banking rules would be to set much tighter capital requirements that are primarily not risk-based. Risk-based capital requirements are also important to prevent balance sheets from excessively consisting of risky assets. Further empirical studies would need to be conducted on the eventual costs of raising capital requirements, and these should be made with special attention to the theoretical arguments presented by Admati and Hellwig (2013).

¹³ Four different proposals that have surged after the crisis are presented and evaluated in Page (2010).

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