

## A note on contemporary literature of risk and risk management in banking

Tonmoy Choudhury and Kevin Daly  
School of Business, Western Sydney University  
Corresponding Authors Email: t.choudhury@westernsydney.edu.au

*Abstract-* Risk has been defined by numerous of forms by the current researchers when relating it to financial services. In this paper, we investigate different definitions of risk and risk management using qualitative analysis given by the previous authors in the past decades and how the financial institutions are using them to manage their risk. A financial institution risk management is not only dependent on how the shocks are spreading or spilling over to other institutions, but it also depends on how much of the risk can we decrease in the first place by using internal control mechanism. Keeping these in mind, our discussion from the qualitative analysis is used to create a modern framework for internal risk management for individual financial institutions.

*JEL Classifications:* G20, G21, G28.

*Key word:* Risk, Risk Management, Literature Review.

### 1. What is risk?

Risk has been defined by numerous of forms by the current researchers when relating it to financial services (Douglas & Wildavsky, 1983). If we scrutinize the prevailing data about risk, we would see a highly methodological field created with refined mathematics and statistics, where risks are abridged to statistics and dimensions (Power, 2008). These researchers have described the core of risk as the negative effect of uncertainty (He, Li, Wei, & Yu, 2013). This has a deeper impact on the mechanisms of risk management which has been created from different understanding of risk (Deguest, Martellini, & Meucci, 2013). The target of this part of the paper is to create a broad literature study on the concept of risk from a methodological point of view. Different researchers have different point of view when it comes to explaining risk. McGoun (1995) has verified this effect using financial products and markets (McGoun, 1995). Another good example on this point can be systematic financial risk associated with banking sector (Shah, 1997) where past researchers used available boundaries to define risk. But the very nature of risk is the biggest obstacle in this regard. It is dissimilar and idiosyncratic in nature. Thus, to identify and define risk one should look inside mechanism of risk. A key example of this strategy is

explained by the liberation of regulation for the financial entities (Reinhart & Rogoff, 2009). The following table shows definitions of risk used by previous authors and researchers with critical analysis.

#### *Vcdig'30'lpewfgf'tv'tj g'gpf'qhl'tveng*

Looking at the table, it can be stated that, the main challenge is to bring all the definitions together in one structure. Thus, when it comes to defining the characteristics of modern day concept of risk, Baker (2015) demonstrated, “*Risk is a highly subjective idea which requires knowledge of alternative value and activities. It is primarily a social and cultural phenomenon. Finance’s determination to ‘objectify’ it and ‘measure’ selective aspects of risk is shown to be biased and driven by hidden operational imperatives rather than fundamental scientific goals. It seems to be ideologically motivated by a desire to protect a particular academic hegemony in finance*”. He further added that in order to understand risk, one must look into the subdivision of risks that are currently in use (Baker, 2015). He pointed out the following topics in conjunction for further academic research and discussion:

- Individual preferences and attitudes to risk - risk averse, risk neutral, risk seeker;

- Portfolio theory - risk as variance of return; risk reduction through diversification; Beta risk and the Capital Asset Pricing Model;
- Option volatility and the risk of derivative securities – Black-Scholes Option Pricing model;
- Measuring risk using probability theory or state-preference theory;
- Risk Management - hedging strategies;
- Bond Duration and volatility;
- Portfolio insurance;
- Different types of risk - e.g. interest rate risk, market risk, credit/default risk.

This shows how risk has truly become a cross sectional concept. On the other hand, there are other researchers who have objected to this ideology of defining risk. These authors have described risk as more macro social phenomenon (Kasperson et al., 1988; Rasmussen, 1997). Based on all these judgements Dionne (2013) has divided the modern day financial risk into following categories:

- Pure risk (insurable or not, and not necessarily exogenous in the presence of moral hazard);
- Market risk (variation in prices of commodities, exchange rates, asset returns);
- Default risk (probability of default, recovery rate, exposure at default);
- Operational risk (employee errors, fraud, IT system breakdown);
- Liquidity risk: risk of not possessing sufficient funds to meet short-term financial obligations without affecting prices.

Working on this ideology most researchers have divided risks specific to banking industry into eight categories. They are credit, market, operational, liquidity, reputational, business, moral hazard and systematic risk. The coming paragraphs briefly describe about these risk divisions more specifically.

## 2. Categories of risk

Credit risk is regarded as the most important risk of all the eight risk categories of a bank (Longstaff, Pan, Pedersen, & Singleton, 2011). It has many variations but the underlying concept of them is same. It is the risk of debtor's failure to repay a loan or meet contractual obligations which have deep financial impact. It ascends whenever a borrower is

expecting to use future cash flows to reimbursement an existing debt. For most banks balance sheet credits are the major and most recognizable symbol of credit risk. Still, there are other causes of credit risk exists both on and off the balance sheet, like letters of credit, unfunded loan commitments, lines of credit, credit derivatives, foreign exchange, and cash management services (Committee, 2010).

The next category of risk is Market risk. It incorporates the risk of monetary forfeiture caused by negative movements in market prices. It is rated based upon, but not restricted to, a valuation of limited estimation features (Hannoun, 2010) namely- the commercial assessment of its capital which is subject to hostile fluctuations in interest rates, foreign exchanges rates, commodity prices or equity prices in stock markets. In US, the market risk is calculated through The Federal Reserve's Market Risk Rule (MRR) which launches supervisory capital requirements for all Bank Holding Companies (BHCs) and state member banks (together known as banking establishments). This MRR also circles out definite key market-risk supervision requirements for banks using stress testing and autonomous market risk management (Malloy, 2011). It requires banks to capture all of its enclosed positions within its internal VaR model including ongoing trading accounts and all foreign-exchange and commodities positions in both on and off-balance sheet items. These positions should include back testing and focus to repurchase and lending contracts. Deposits with yields (tied to foreign-exchange or commodities indices) also need to be disclosed and included in the calculations.

The third category Operational risk ascends from the prospective that poor technological infrastructure, operational glitches, cracks in internal controls, fraud or unforeseen calamities will result in unexpected losses. The concept of operational risk was first created through BASEL II regulations. Defined as the new generation of risk, the most undesirable problem of operational risk is the conceptualize of its definition. It is more commonly denoted as hybrid risk and grafted to work with different practical environment (Barakat & Hussainey, 2013). It unites many contemporary "risk and control issues" such as fraudulent practice, system error, product line discontinuation effects and human resource dispute as ill as strategic infrastructure risk. It has the unique ability to bridge capital management with corporate governance issues at a macro level.

Liquidity is a bank's ability to encounter its cash and collateral commitments without experiencing undesirable losses (Drehmann & Nikolaou, 2013). Satisfactory liquidity is reliant upon the establishment's capability to meet both anticipated and bewildering cash flows and indemnity requirements without unfavourably distressing daily manoeuvres of the bank (Cornett, McNutt, Strahan, & Tehranian, 2011). It is also described as the threat to a bank's monetary state to encounter its pledged cash commitments. Since most banks use a substantial amount of leverage in their running operations and obligated to meet promised debts in order to maintain the confidence of clientele and fund benefactors, liquidity risk control is very prominent for a bank's productivity and trustworthiness (V. Acharya & Naqvi, 2012). The current fund managers have divided the liquidity risk into two parts - market liquidity risk (the market liquidity deteriorates when one necessities to unwind a position) and funding liquidity risk (a bank cannot fund its position and is required to unwind). BASEL infers to use two ratios to calculate and control liquidity risk - Liquidity coverage ratio and net stable funding ratio (Supervision, 2010). But there could be other ways to calculate and control liquidity risk. Market liquidity risk can be calculated or measured into three ways - bid ask spread, market depth and market resiliency. On the other hand funding liquidity risk can be measured through margin funding risk, rollover risk and redemption risk.

The next risk criterion is reputational risk for banks. Reputational risk is defined as the threat ascending from objectionable perception on the part of clientele, counterparties, stockholders, financiers, debt-holders, market experts, other relevant parties or watchdogs that can undesirably affect a bank's capacity to sustain existing, or inaugurate new business associations and continuous access to capital (Cantor, 2001). The issue of reputational risk has never been so important given the increase in fraudulent activities by banks in the last decades and so, namely - Allied Irish Bank, Barings and Daiwa Bank Ltd, The Republic New York Corp etc. Past researchers have identified six factors to the underlying cause or controlling issue in regard to the reputational risk - bank riskiness, profitability, level of intangible assets, capitalization, size, the entity of the operational loss and the business units that suffered the operational loss (Fiordelisi, Soana, & Schwizer, 2013) which is consistent to the common belief that reputational risk is multidimensional and

reflects the perception of other market participants (Sturm, 2013).

Business risk is more commonly known as non-systematic or diversifiable risk. It is the risk attributable to business elements that distress all businesses and that can be eradicated through diversification of the firm's portfolio. It is risk that is specific to the underlying banking organization. It is the mathematically calculated residual risk after deducting the market or systematic risk. Asset pricing model or more commonly regarded as capital asset pricing model (CAPM) first gave the theoretical linkage to the non-systematic or non-diversifiable risk (Dempsey, 2013). Afterwards, it was greatly elaborated by the creation of the Black-Scholes model (Albrecher, Binder, Lautscham, & Mayer, 2013). Most of the past researchers came to same conclusion that given its entity specific nature business risk will be mostly unique to each financial institutions (McNeil, Frey, & Embrechts, 2015).

On the other hand, systematic risk or market risk is the portion of risk that cannot be diversified through market operations given its macro level impact. This thesis particularly deals with this sub-division of risk using three different distance to risk measures. Moving on, the modern corporate world mostly use 2 typical measures of systematic risk measurement - Value-at-Risk (VaR) and Expected-Shortfall (ES) (May & Arinaminpathy, 2010). These models generate the residual of total risk minus non-systematic risk to define systemic risk. A specific bank cannot totally shield itself from systematic risk given the current interconnected global banking industry (Ariss, 2010). Past academicians have put numerous factors as default cause of this risk - alterations in investment policy, foreign investment strategy, modifications in taxation clauses, altering of socio-economic considerations, international security intimidations and dealings etc. (Ewens, Jones, & Rhodes-Kropf, 2013; Hall & Woodward, 2010). Past researchers have proved that it is tough to find a systemic risk measure that is at the same time essentially relevant and totally acceptable by a general equilibrium model (V. V. Acharya, Pedersen, Philippon, & Richardson, 2010). The problem is the gap between the academic endorsements with the applied requirements of regulators which has been so extensive that it is somewhat bound to fail at extreme cases. To overcome these shortcomings at this thesis, I have used three different measures of systematic risk (distance to default, distance to inefficiency and distance to capital) rather than VAR and ES.

Detailed description of these measures will be given at forthcoming chapters.

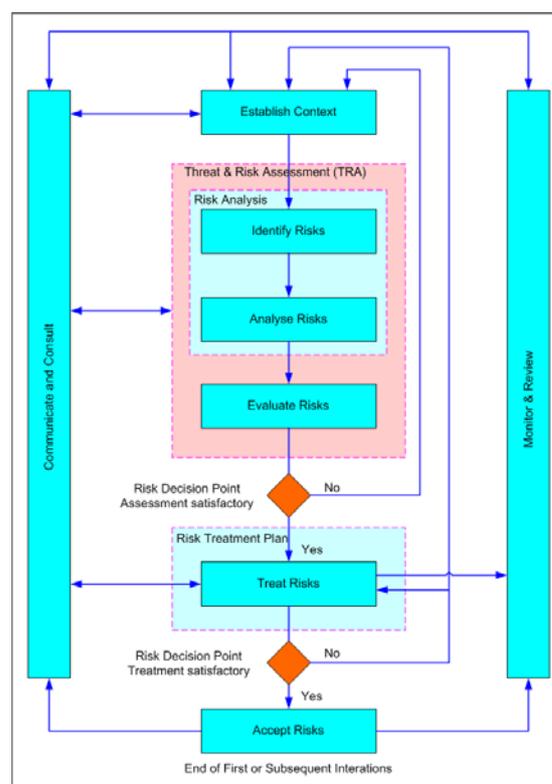
Finally, moral hazard risk is the risk created through lack of moral standard in financial industry or the risk due to moral hazard. It is being described as a state in which a firm gets involved in a risky event with hedged protection of that risk and at the end the other party will experience loss (Dam & Koetter, 2012). Like other abstract risk it is hard to measure moral hazard in an absolute quantifiable way (Farhi & Tirole, 2012). As been identified by previous researchers, the scope of moral hazard hinge on the sensitivity of the hedged position and price changes (J. H. Boyd & De Nicolo, 2005). They have also used other fields like insurance used price elasticity of demand to calculate moral hazard (Joseph, 1972).

### 3. Risk management

Risk management is defined as a set of financial or operative mechanisms that maximize the value of a company or a portfolio by maintaining the costs allied with cash flow volatility (Stulz, 2003). The goal of modern day risk management is to create a reference framework to control risk and uncertainty (Dionne, 2013). It should be integrated to such a level that it will have total control over evaluating and monitoring all uncertainties in the underlying institution. The figure 3.1 shows the currently used ISO 31000 approved risk management framework (Purdy, 2010).

Moving on, in order to connect the measurement and management of the risk, previous researchers have stated that measurable risk is controllable risk (Das, 2011). This ideology was subsequently proved by the evidence of ritualistic nature of modern day risk management practices by the institutions (Hayne & Free, 2014; Power, 2008). The global financial crisis was the best example of that. Using forensic analysis researchers have shown that the inability to understand risk was one of the symptom of the global failure of financial institutions (Peston, 2008). Thus the birth of modern day risk management can easily be singled out to Markowitz when he propose to measure risk using standard deviation given they are normally distributed (Markowitz, 1952). The total risk scenario can easily be described by two variables standard deviation and mean. This definition has taken out the value of society or individual

Figure 3.1. Risk Management Framework ISO 31000



influence on risk management. Haldane (2012) has appealed that this evasion of uncertainty in the speculative models, and assumptions of rational anticipations, have been a key flaw in the understanding of risk management (Haldane & Madouros, 2012). The following table includes some of the most prominent definitions of risk management used by the modern academics.

*Vcdig'50'lpewfgf'tv'ij g'gpf'qh'tv'werg*

### 4. Risk management techniques used by the banks

Banks have used same risk management goals since the beginning of the financial industry – reducing risk but not the profit. Thus the true objective of the risk management practice of the financial institutions have become to identify the modern day risk and deciding how much of that the organization needs to manage or minimize. But in recent years the banking industry have changed a lot of the old practices after the global financial crisis particularly in risk based governance structures and lending practices (Calomiris & Carlson, 2016). In their latest study institute of international finance has put three

issues as key managerial concern for a sound risk management approach for global banks – impact of regulations on business models, market volatility and sovereign debt crisis (Finance, 2012). Adding to that, in order to improve the overall scenario, current researchers have suggested the banks need to work on several sectors – role of boards, role of chief risk officers, size and skill level of risk teams, risk evaluation models, liquidity management, stress testing, risk based culture and coping with regulatory reforms to maintain a sound health (Huang, Zhou, & Zhu, 2012; Imbierowicz & Rauch, 2014). Now looking into these issues, I have found that the key drivers of the modern day risk management practices are created to overcome global financial challenges like enhanced economic pressure in US and UK, the European debt crisis and ever changing regulatory environment in modern techno world (Reason, 2016). The amplified capital and liquidity buffers implemented through BASEL are also changing the playing field for good (Dowd, Hutchinson, & Ashby, 2011). But despite all the efforts, the risk management tools and techniques haven't produce the confidence that stakeholders are looking after the global financial crisis (Levine, 2012).

Moving on. If we look into the central risk management framework from a more practically implemented viewpoint, we will find that previous researchers have mentioned many models in this regard – the three lines of defence model (Straub & Welke, 1998), the offence and defence model (Sweeting, 2011), the policy and policing model (Caballero & Krishnamurthy, 2006) and the partnership model (Grimsey & Lewis, 2002). Taken consideration of all these frameworks risk management of banks can be divided into several steps – identifying risk, quantifying risk, assessing risk, responding to risk and continuous progression. Currently the financial regulators are implementing these steps through adaptation of BASEL III (global regulatory framework for banks). The following paragraphs describe these steps.

The first step risk identification process is to create a checklist of which of the many risk is currently effecting the productivity bottom-line (Gorzeń-Mitka, 2013) using quantitative or qualitative process. Researchers have mentioned that it should be a well-defined process with proper recording procedures. Thus the identification process can be again subdivided into tools, assessments and recording. Given the current knowledgebase on risk analysis, most banks will use SWOT analysis, risk

checklist, risk trigger check-up or risk taxonomy to identify the risks. Past researchers have confirmed that survey, gap analysis and Delphi technique is also widely used in that regard (Rowe & Wright, 2011). These results then transferred to a risk register where they input specific identification measure and description of these risks including identifier, category, description, quantification, severity, exposure, current status, linkage, cost, response, timetable and overall process (Pritchard & PMP, 2014).

The second step is quantifying risk which is the core ideology of modern day risk management (Cunningham, Herzog, & London, 2012). Some good example of quantification of modern risk process can be market and liquidity risk measurement. Most banks use Greek letter-based mechanisms to measure market risk. The first technique delta ( $\Delta$ ) of a portfolio is the degree of modification with respect to the value of the underlying portfolio. Managing risk through delta hedging includes generating a position with delta is neutral or zero (Gobet & Makhoulf, 2012). Another common measure is gamma – which is the percentage change in delta. The third and last one is Vega. The last two can be controlled by trading options on the banks asset base (Natenberg, 2014). The BASEL III has prescribed using two ratios for liquidity risk - Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR). The LCR emphasizes on a bank's capacity to endure a 30-day period of extreme liquidity stress. It is calculated as: High-Quality Liquid Assets divided by Net Cash Outflows in a 30-Day Period. On the other hand NSFR looks in more long term or 12 months. It is calculated by Amount of Stable Funding divided by Required Amount of Stable Funding.

The next stage of risk management involves assessing risk. It can be defined as “trying to observe the effect of maximum risk” on the banking organization on different parameters (Higgins et al., 2011) by evaluating different prospective or retrospective risk and return (income and capital) measures. A common measurement of risk assessment is risk tolerance (Sahm, 2012). Risk tolerance can be shown using utility function. It shows the theoretical risk tolerance of the bank. Mostly it will be expression utility or preference function (inserted below).

$$\delta_2 > \delta_1, [u(W + \delta_1) - u(W)]/\delta_1 > [u(W + \delta_2) - u(W)]/\delta_2$$

Bases on this measure, we can create three different utility functions to express the trade-off between risk and return – quadratic (2.2.4.2), exponential (2.2.4.3) and power (2.3.3.4) utility function.

$$u(W) = \alpha E(W) - \frac{1}{2} \sigma^2 E(W^2) \quad (\text{Where } W \leq \alpha, 2.2.4.2)$$

$$u(W) = -e^{-\alpha W} \quad (\text{Where } \alpha > 0, 2.2.4.3)$$

$$u(W) = \begin{cases} \frac{W^{1-\alpha}}{1-\alpha} & \text{if } \alpha > 0 \text{ and } \alpha \neq 1 \\ \ln W & \text{if } \alpha = 1 \end{cases} \quad \left( \text{where } a(W) = \frac{\alpha}{W} \right) \quad (2.2.4.4)$$

Other than this, volatility measured with standard deviation is also common and prominent measure of risk. It is cited as difference between actual and standard performance benchmark in a portfolio context (Bollerslev, Gibson, & Zhou, 2011). In equation 2.2.4.5, the volatility is measured through standard deviation of returns given the average return is more the zero.

$$\text{Volatility} = \sqrt{\frac{1}{T} \sum_{t=1}^T (r_{x,t} - r_{B,t})^2}$$

But the most acceptable way to measure financial risk is the calculation of VaR or value at risk (Hubbert, 2012). Sometimes it is also defined as the absolute monetary loss as on equation 2.2.4.6.

$$\text{VaR} = W_0 - (1 + \alpha_c)W_0 = -\alpha_c W_0 \quad (2.2.4.6)$$

Where  $W_0$ ... original portfolio's price (financial amount)

$\mu$  = Anticipated rate of return

$\mu W_0$  = Anticipated variation in portfolio's price (financial amount)

$\alpha_c$  = Cut-off rate of return for given CI

$\alpha_c W_0$  = Loss analogous to the cut-off rate of return (financial amount).

Once all the first three steps (identifying risk, quantifying risk and assessing risk) are finished, a financial institution will move to risk minimization or responding to risk. It involves taking steps before the risk event to minimize or control the possible downside (Ellul & Yerramilli, 2013). Past

researchers on risk management theory have shown numerous ways to reduce the risk for a bank starting from diversification to risk transfer. These mechanisms can be divided into three parts: insurances, internal control and external control. The oldest way to assure protection from financial risk is the insurance policy (Trenerry, 1926). A bank can protect itself against any risk through insurance up to a certain ceiling (Ai, Brockett, Cooper, & Golden, 2012). But it can be very costly and there are regulatory limitations. If we see the trend of the past couple of decades, the banking industry is gradually losing interest on using insurance as the primary instrument of risk management equipment (Diamond & Dybvig, 1983) and moving towards more on internal control mechanisms. Which refers to the organizational activates to prevent the risk event before it occurs using policies, procedures and limits. All of these measures are non-capital market-based mechanisms and non-investment based. Measures like corporate governance practices have become a key ingredient in this regard after the global financial crisis (Erkens, Hung, & Matos, 2012). The third and final way of risk responding can be quoted as an external measure where we use financial products and investment strategy to minimize risk. Some of the most used methods in this regard are diversification, increasing efficiency and hedging with derivatives like options and futures. All this risk managing instruments are used to create a global regulatory framework for the banks and financial institutions to reduce risk and increase efficiency called BASEL (discussed below).

## 5. Regulation – BASEL

Basel or Basel accords is the key financial regulation for all banking entities. The core aim of Basel is to increase inherent stability and soundness of banks considering their impact on the macro economical level (Sutorova & Teplý, 2013). By connecting the banking sector with legal framework, it attaches the financial entities directly to the global liquidity and capital control mechanism which can be very helpful in the time of financial distress (Gleeson, 2010). The past researchers have also tied Basel with economic development and poverty reduction on a large scale basis (Calice, 2010). In my thesis, I use one of the most prominent safeguards from the BASEL accord – mandatory capital adequacy ratio of 8% to calculate distance to

capital, which is part of the core methodology of this research.

### 5.1. BASEL I – The Credit and Market risk

The Basel committee was first formed in 1974 by the central bank regulators of global top 10 economies in the aftermath of the failure of the Germany's prominent organization Bankhaus Herstatt<sup>1</sup> (Levinson, 2010). Their objective was to set minimum criteria for central banks and standard-setting organizations all over the world on regulatory matters, tactics and practices to endorse common understanding, to progress cross-border collaboration and to help classify developing risks in banking system. Their first achievement on a global level was achieved on 1975 known as The Basel Concordat. It was created to make sure no global banks can pass through inadequate supervision which opens the gate for further development of high quality and high coherence of banking supervision in participatory countries. Afterwards their core focus soon move to issue of capital adequacy to protect the over all stakeholders in the financial system. They have found that capital ratios of the global banks are detreating in a rapid speed caused by heightened political and financial stability risk. Thus they have pointed out the need to measure the risk using both on and off balance sheet activities of the banks. Taking all of these under considerations they published the first regulation accord or BASEL I in 1988. The key feature of this accord was the requirement of minimum capital to risk weighted asset standardized at 8% by 1992 in all of the international banks. After that, the Basel was readjusted time to time for better evolution of global regulation and capital adequacy. In the end of 1991 definition of loan loss reserve were published for improved calculation standers in capital adequacy requirement. At the end of 1995 they made another adjustment to recognise the bilateral netting of banks credit risk in derivatives with the adding matrix factors. At the end of 1997 they added market risk with the previous credit risk which introduced the value at risk or VaR model to measure capital requirement-based market risk exposure.

### 5.2. BASEL II – Inclusion of trading books

<sup>1</sup> for three times over exposure in foreign exchange comparing their equity value.

By the 1998 through 2004 Basel committee did intensive research on global banking regulation using in-depth interview with banking sector legislatures, managerial agencies, central banks and stakeholders. Their objective was to heighten the regulatory boundaries for better risk management. In the middle of 2004, they issued a new standard known as Basel II (Basel, 2010). It compromised three pillars or focal points in regulations - minimum capital requirement as previous 1988 accord, supervisory review of internal capital adequacy and effective disclosure-based sound practices. In 2005 they included the regulations of trading book with banking or accounting book and published a comprehensive version of another set of revised standards with the help of International Organization of Securities Commissions (IOSCO).

### 5.3. BASEL III – After global financial crisis

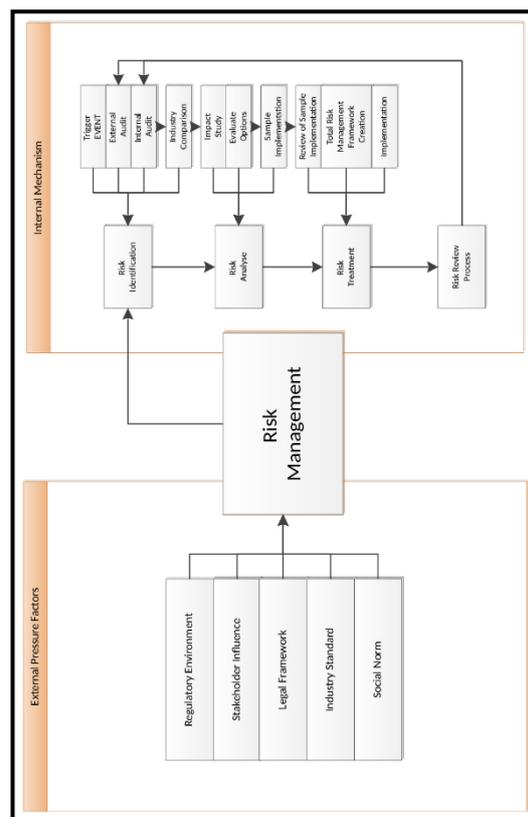
During and after the global financial crisis, the necessity for an essential solidification of the Basel II charter had become obvious. The combination of excessive leverage, inadequate liquidity buffers and poor governance ridicule the risk management practice. Furthermore questionable incentive structures created a crisis that literally reduced half of the global economy (Claessens, Dell'Ariccia, Igan, & Laeven, 2010). Supported by the G 20 leaders, at the end of 2010 latest version of the regulation were introduced as Basel III: A global regulatory framework for more resilient banks and banking systems. It incorporated considerable changes from the past standards to protect the global financial system from another crisis. Basel III has put another layer of common equity as capital conversion buffer. It restricted the payouts of earnings to protect the minimum common equity threshold. A countercyclical capital buffer is enforced to make sure banks don't participate in credit boom thus protecting them from credit bust. It also introduced leverage ratio measured as a least amount of loss-absorbing capital comparative to bank's assets and off-balance sheet risk exposures. Liquidity coverage ratio and net stable funding ratio were two more golden aspects of Basel III. Liquidity coverage ratio covers the company's cash requirement for a highly stressful, 30 days period and net stable funding ration address the maturity mismatch. Other issues on Basel III include supplementary and contingent capital increase with reinforced cross-border regulation. The committee currently expecting to implement all the changes by 2017 in the member countries. In my methodology, I have incorporated the capital adequacy ratio from

BASEL guideline to represent the practical representation of BASEL accord.

## 6. Conclusion - A proposed regulatory framework

A financial institution risk management is not only dependent on how the shocks are spreading or spilling over to other institutions, but it also depends on how much of the risk can we decrease in the first place by using internal control mechanism. Keeping these in mind, our discussion from the literature review is used to create a modern framework for internal risk management for individual financial institutions (Figure 6.1). It divided the risk management into two sub parts- internal and external. External pressure factors influence the risk management practice from outside. They create boundary and guidelines for the participating institutions to work on. Past authors have clearly suggested about these factors when considering risk management framework. These factors include regulatory environment, stakeholders influence, legal framework, industry standard and social norms. Regulatory environment generally refers to the implementation of BASEL standards in the banking world (Young, 2013). Most countries now days have accepted BASEL for their internal financial practices. This regulatory pressure plays an enormous role in determining the risk management practice standards in any country. The next external pressure entity is the stakeholders. They are defined by the pressure groups outside the banks legal structure and can be seen as an interested party on the risk management practices of the underlying institution given the interconnected nature of the financial world in post global crisis (Hopt, 2013). Legal framework refers to the law governing the banks in the designated countries (Neyapti & Dincer, 2014). The second last external factor has been identified as the industry standard of the risk prevention given most banks first point of risk management procedures are created based on what other peers are doing in risk mitigation and control. Past researchers have clearly suggested that all banks try to maintain same standard of risk prevention in banking industry as required by the BASEL (Powers, Hassan Al-Tamimi, & Mohammed Al-Mazrooei, 2007). The final entity in the external pressure is the social norms which have been proved to have distinguishable influencing power on the risk management conduct of the banks (Gathergood, 2012).

Figure 6.1 – Author’s framework for risk management



On the other hand, the internal risk management practice of the banks includes four process steps- identification, analyse, treatment and review. The process starts by identifying where the risk is. It may be triggered by an underlying situation recognised with the help of internal or external auditing (Gaganis, Pasiouras, & Spathis, 2013). Then the risk can be analysed through industry comparison based impact study (Kanagaretnam, Lim, & Lobo, 2013). Bankers may use sample implementation of different risk management techniques before widespread implementation of these measures. If the sample implementation is successful, then these techniques can be used throughout the financial institutions. In the final stage, it is highly recommended that banks take periodic review of their risk management standards to make sure a complete risk prevention guarantee.

### References

- Acharya, V., & Naqvi, H. (2012). The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of financial Economics*, 106(2), 349-366.

- Acharya, V. V., Pedersen, L. H., Philippon, T., & Richardson, M. P. (2010). Measuring systemic risk.
- Ai, J., Brockett, P. L., Cooper, W. W., & Golden, L. L. (2012). Enterprise risk management through strategic allocation of capital. *Journal of Risk and Insurance*, 79(1), 29-56.
- Albrecher, H., Binder, A., Lautscham, V., & Mayer, P. (2013). The Black-Scholes Formula *Introduction to Quantitative Methods for Financial Markets* (pp. 63-75): Springer.
- Ariss, R. T. (2010). Competitive conditions in Islamic and conventional banking: A global perspective. *Review of Financial Economics*, 19(3), 101-108.
- Aven, T. (2011). On how to conceptualise and describe risk.
- Baker, C. R. (2015). *Defining Financial Risk*. Paper presented at the BAFA Annual Conference, University of Manchester.
- Barakat, A., & Hussainey, K. (2013). Bank governance, regulation, supervision, and risk reporting: Evidence from operational risk disclosures in European banks. *International Review of Financial Analysis*, 30, 254-273.
- Basel, I. (2010). International Convergence of Capital Measurement and Capital Standards, A Revised Framework. Comprehensive Version, Basel Committee on Banking Supervision, Bank for International Settlements, Basel, June 2006. 4. *Basel III: A global regulatory framework for more resilient banks and banking systems*, Basel Committee on Banking Supervision, Bank for International Settlements, Basel, December, 5, 2002-2010.
- Bessis, J., & O'Kelly, B. (2015). *Risk management in banking*: John Wiley & Sons.
- Bollerslev, T., Gibson, M., & Zhou, H. (2011). Dynamic estimation of volatility risk premia and investor risk aversion from option-implied and realized volatilities. *Journal of Econometrics*, 160(1), 235-245.
- Boyd, J. H., & De Nicolo, G. (2005). The theory of bank risk taking and competition revisited. *The Journal of Finance*, 60(3), 1329-1343.
- Boyd, W. (1993). Risk Society: Towards a New Modernity. *Economic Geography*, 69(4), 432-436.
- Caballero, R. J., & Krishnamurthy, A. (2006). Bubbles and capital flow volatility: Causes and risk management. *Journal of Monetary Economics*, 53(1), 35-53.
- Calice, P. (2010). Basel II and Development Finance: Establishing Regional Guarantee Funds to Ease Access to Credit for SMEs *The Basel Capital Accords in Developing Countries* (pp. 156-168): Springer.
- Calomiris, C. W., & Carlson, M. (2016). Corporate governance and risk management at unprotected banks: National banks in the 1890s. *Journal of Financial Economics*, 119(3), 512-532.
- Cantor, R. (2001). Moody's investors service response to the consultative paper issued by the Basel Committee on Bank Supervision "A new capital adequacy framework". *Journal of Banking & Finance*, 25(1), 171-185.
- Claessens, S., Dell'Ariccia, G., Igan, D., & Laeven, L. (2010). Cross-country experiences and policy implications from the global financial crisis. *Economic Policy*, 25(62), 267-293.
- Committee, B. (2010). Basel III: A global regulatory framework for more resilient banks and banking systems. *Basel Committee on Banking Supervision, Basel*.
- Cornett, M. M., McNutt, J. J., Strahan, P. E., & Tehranian, H. (2011). Liquidity risk management and credit supply in the financial crisis. *Journal of Financial Economics*, 101(2), 297-312.
- Cunningham, R. J., Herzog, T. N., & London, R. L. (2012). *Models for quantifying risk*: Actex Publications.
- Dam, L., & Koetter, M. (2012). Bank bailouts and moral hazard: Evidence from Germany. *Review of Financial Studies*, 25(8), 2343-2380.
- Das, S. (2011). *Extreme money: Masters of the universe and the cult of risk*: FT Press.
- Deguest, R., Martellini, L., & Meucci, A. (2013). Risk parity and beyond-from asset allocation to risk allocation decisions. *Available at SSRN 2355778*.
- Dempsey, M. (2013). The capital asset pricing model (CAPM): the history of a failed revolutionary idea in finance? *Abacus*, 49(S1), 7-23.
- Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *The Journal of Political Economy*, 401-419.
- Dionne, G. (2013). Risk Management: History, Definition, and Critique. *Risk Management and Insurance Review*, 16(2), 147-166. doi:10.1111/rmir.12016
- Douglas, M., & Wildavsky, A. (1983). *Risk and culture: An essay on the selection of*

- technological and environmental dangers*: Univ of California Press.
- Dowd, K., Hutchinson, M. O., & Ashby, S. G. (2011). Capital Inadequacies: The dismal failure of the Basel regime of bank capital regulation. *Cato Institute Policy Analysis*(681).
- Drehmann, M., & Nikolaou, K. (2013). Funding liquidity risk: definition and measurement. *Journal of Banking & Finance*, 37(7), 2173-2182.
- Ellul, A., & Yerramilli, V. (2013). Stronger risk controls, lower risk: Evidence from US bank holding companies. *The journal of finance*, 68(5), 1757-1803.
- Erkens, D. H., Hung, M., & Matos, P. (2012). Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance*, 18(2), 389-411.
- Ewens, M., Jones, C. M., & Rhodes-Kropf, M. (2013). The price of diversifiable risk in venture capital and private equity. *Review of Financial Studies*, 26(8), 1854-1889.
- Farhi, E., & Tirole, J. (2012). Collective moral hazard, maturity mismatch, and systemic bailouts. *The American Economic Review*, 102(1), 60-93.
- Finance, I. o. I. (2012). *Progress in financial services risk management*. Retrieved from
- Fiordelisi, F., Soana, M.-G., & Schwizer, P. (2013). The determinants of reputational risk in the banking sector. *Journal of Banking & Finance*, 37(5), 1359-1371.
- Gaganis, C., Pasiouras, F., & Spathis, C. (2013). Regulations and audit opinions: evidence from EU banking institutions. *Computational Economics*, 41(3), 387-405.
- Gathergood, J. (2012). Debt and depression: causal links and social norm effects. *The Economic Journal*, 122(563), 1094-1114.
- Gleeson, S. (2010). International regulation of banking: Basel II: capital and risk requirements. *OUP Catalogue*.
- Gobet, E., & Makhlouf, A. (2012). The Tracking Error Rate of the Delta-Gamma Hedging Strategy. *Mathematical Finance*, 22(2), 277-309.
- Gorzeń-Mitka, I. (2013). Risk identification tools-Polish MSMEs companies practices. *Problems of Management in the 21st Century*, 7, 6-11.
- Grimsey, D., & Lewis, M. K. (2002). Evaluating the risks of public private partnerships for infrastructure projects. *International Journal of Project Management*, 20(2), 107-118.
- Haldane, A. G., & Madouros, V. (2012). The dog and the frisbee. *Revista de Economía Institucional*, 14(27), 13-56.
- Hall, R. E., & Woodward, S. E. (2010). The burden of the nondiversifiable risk of entrepreneurship. *The American Economic Review*, 100(3), 1163-1194.
- Hannoun, H. (2010). The Basel III capital framework: a decisive breakthrough. *BIS, Hong Kong*.
- Hayne, C., & Free, C. (2014). Hybridized professional groups and institutional work: COSO and the rise of enterprise risk management. *Accounting, Organizations and Society*, 39(5), 309-330.
- He, Z., Li, S., Wei, B., & Yu, J. (2013). Uncertainty, risk, and incentives: theory and evidence. *Management Science*, 60(1), 206-226.
- Higgins, J. P., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., . . . Sterne, J. A. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *Bmj*, 343, d5928.
- Holton, G. A. (2004). Defining risk. *Financial Analysts Journal*, 60(6), 19-25.
- Hopt, K. J. (2013). Corporate governance of banks and other financial institutions after the financial crisis. *Journal of Corporate Law Studies*, 13(2), 219-253.
- Huang, X., Zhou, H., & Zhu, H. (2012). Assessing the systemic risk of a heterogeneous portfolio of banks during the recent financial crisis. *Journal of Financial Stability*, 8(3), 193-205.
- Hubbert, S. (2012). The Value at Risk Concept. *Essential Mathematics for Market Risk Management*, 117-129.
- Imbierowicz, B., & Rauch, C. (2014). The relationship between liquidity risk and credit risk in banks. *Journal of Banking & Finance*, 40, 242-256.
- Joseph, H. (1972). The measurement of moral hazard. *Journal of Risk and Insurance*, 257-262.
- Kalia, V., & Müller, R. (2007). *Risk management at board level: A practical guide for board members*: Haupt Bern.
- Kanagaretnam, K., Lim, C. Y., & Lobo, G. J. (2013). Influence of national culture on accounting conservatism and risk-taking in the banking industry. *The Accounting Review*, 89(3), 1115-1149.

- Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., . . . Ratick, S. (1988). The social amplification of risk: A conceptual framework. *Risk analysis*, 8(2), 177-187.
- Knight, F. H. (2012). *Risk, uncertainty and profit*: Courier Corporation.
- Levine, R. (2012). The governance of financial regulation: reform lessons from the recent crisis. *International Review of Finance*, 12(1), 39-56.
- Levinson, M. (2010). Faulty Basel: Why More Diplomacy Won't Keep the Financial System Safe. *Foreign Affairs*, 76-88.
- Longstaff, F. A., Pan, J., Pedersen, L. H., & Singleton, K. J. (2011). How sovereign is sovereign credit risk? *American Economic Journal: Macroeconomics*, 3(2), 75-103.
- Malloy, M. P. (2011). *Banking Law and Regulation*: Aspen Publishers Online.
- Markowitz, H. (1952). Portfolio selection. *The journal of finance*, 7(1), 77-91.
- May, R. M., & Arinaminpathy, N. (2010). Systemic risk: the dynamics of model banking systems. *Journal of the Royal Society Interface*, 7(46), 823-838.
- McGoun, E. G. (1995). The History of Risk" Measurement". *Critical Perspectives on Accounting*, 6(6), 511-532.
- McNeil, A. J., Frey, R., & Embrechts, P. (2015). *Quantitative risk management: Concepts, techniques and tools*: Princeton university press.
- Natenberg, S. (2014). *Option volatility and pricing: advanced trading strategies and techniques*: McGraw Hill Professional.
- Neyapti, B., & Dincer, N. N. (2014). Macroeconomic Impact of Bank Regulation and Supervision: A cross-country investigation. *Emerging Markets Finance and Trade*, 50(1), 52-70.
- Peston, R. (2008). *Who Runs Britain?.... and who's to blame for the economic mess we're in*: Hachette UK.
- Peterson, S. (2012). *Investment Theory and Risk Management,+ Website* (Vol. 711): John Wiley & Sons.
- Power, M. (2008). Organized uncertainty: Designing a world of risk management. *OUP Catalogue*.
- Powers, M. R., Hassan Al-Tamimi, H. A., & Mohammed Al-Mazrooei, F. (2007). Banks' risk management: a comparison study of UAE national and foreign banks. *The Journal of Risk Finance*, 8(4), 394-409.
- Pritchard, C. L., & PMP, P.-R. (2014). *Risk management: concepts and guidance*: CRC Press.
- Purdy, G. (2010). ISO 31000: 2009—setting a new standard for risk management. *Risk analysis*, 30(6), 881-886.
- Rasmussen, J. (1997). Risk management in a dynamic society: a modelling problem. *Safety science*, 27(2), 183-213.
- Reason, J. (2016). *Managing the risks of organizational accidents*: Routledge.
- Reinhart, C. M., & Rogoff, K. (2009). *This time is different: eight centuries of financial folly*: princeton university press.
- Rowe, G., & Wright, G. (2011). The Delphi technique: Past, present, and future prospects—Introduction to the special issue. *Technological Forecasting and Social Change*, 78(9), 1487-1490.
- Sahm, C. R. (2012). How much does risk tolerance change? *The quarterly journal of finance*, 2(04), 1250020.
- Shah, A. K. (1997). Analysing systemic risk in banking and financial markets. *Journal of Financial Regulation and Compliance*, 5(1), 37-48.
- Straub, D. W., & Welke, R. J. (1998). Coping with systems risk: security planning models for management decision making. *MIS quarterly*, 441-469.
- Stulz, R. M. (2003). *Risk management and derivatives*: South-Western Pub.
- Sturm, P. (2013). Operational and reputational risk in the European banking industry: The market reaction to operational risk events. *Journal of Economic Behavior & Organization*, 85, 191-206.
- Supervision, B. C. o. B. (2010). *Basel III: International framework for liquidity risk measurement, standards and monitoring*: Bank for International Settlements.
- Sutorova, B., & Teplý, P. (2013). The impact of Basel III on lending rates of EU banks. *Finance a Uver*, 63(3), 226.
- Sweeting, P. (2011). *Financial enterprise risk management*: Cambridge University Press.
- Trenerry, C. F. (1926). *The origin and early history of insurance*: PS King.
- Young, K. (2013). Financial industry groups' adaptation to the post-crisis regulatory environment: Changing approaches to the policy cycle. *Regulation & Governance*, 7(4), 460-480.

## Appendix

Table 1.1 - Definitions of Risk

| Author and Year published        | Definition  | Country or Settings | Critical analysis  |
|----------------------------------|---|---------------------|--|
| 1<br>Knight, 2012                | To preserve the distinction between measurable uncertainty and unmeasurable one we may use the term risk to designate the former and term uncertainty for latter (Knight, 2012).                                      | USA                 | Risk includes both uncertainty and exposure. This definition focuses only on one.                        |
| 2<br>Markowitz, 1952             | Variance of return (Markowitz, 1952)  | USA                 | The definition is too subjective. It totally forgoes the objectivity perceptions of risk.                |
| 3<br>Holton, 2004                | Risk is a human condition of self-aware which cannot be observed by the organizations. Organizations merely observe the risk by the act of individual stakeholders (Holton, 2004).                                    | USA                 | It undermines the whole conceptualizations of modern financial risk framework.                           |
| 4<br>He et al., 2013             | The negative effect of uncertainty (He et al., 2013)  | USA                 | Mostly like previous authors too much subjective definition of the term.                                 |
| 5<br>Deloitte, 2016              | Risk is something that creates transformative change if it's recognized correctly (Deloitte, 2016).   | World               | The negative effects of risk are totally invisible.  |
| 6<br>Boyd, 1993                  | Risk is claimed to be an independent paradigm, and as such it is challenging to evaluate from an objective perspective (W. Boyd, 1993).   | World               | Complete lack of objectivity of risk measurement.  |
| 7<br>Douglas and Wildavsky, 1983 | Combined creation of knowledge about the future and agreement about the relative status of certain consequences (Douglas & Wildavsky, 1983).  | USA                 | Too complex to use in financial field given the abstract ideology.                                       |
| 8<br>Bessis and O'Kelly, 2015    | The randomness of the return of investments, including both positive and negative outcomes. Under this view, a greater expected return is associated with a greater variability of outcomes (Bessis & O'Kelly, 2015). | Europe              | Only focuses on financial concept of the risk.   |
| 9<br>Peterson, 2012              | Choices we make in a world in which outcomes are random but their probabilities are known in advance (Peterson, 2012).  | USA                 | A strong mathematical conceptualization of risk which misses the error terms of the regression equation. |

Table 3.1 - Risk Management definitions

| Author and Year published     | Definition  | Country or Settings | Critical analysis   |
|-------------------------------|---|---------------------|---|
| 1<br>Stulz, 2003              | Risk management is defined as a set of financial or operative events that maximize the value of a company or a portfolio by plummeting the costs allied with cash flow volatility (Stulz, 2003)   | USA                 | A pure mathematical model not appealing enough to control abstract risk or human factors of risk. |
| 2<br>Dionne, 2013             | The goal of modern day risk management is to create a reference framework to control risk and uncertainty (Dionne, 2013)  | World               | A good and prospective of risk management but too abstract in the nature.                         |
| 3<br>Bessis and O'Kelly, 2015 | Risk management requires that the risks of a financial institution be identified, assessed and controlled. Enterprise risk management addresses a combination of credit risk, market risk, interest rate risk, liquidity risk and operational risk. Sound risk practices define who should be accountable for these risks and how the risk processes should be implemented (Bessis & O'Kelly, 2015).  | Europe              | A contemporary complete definition to cover all the aspects of modern risk.                       |
| 4<br>Kalia and Müller, 2007   | Risk Management means the permanent and systematic recording of all kinds of risks about the existence and the development of the enterprise; it involves analysing and prioritizing recognized risks as ill as defining and implementing adequate strategic or surgical measures to minimize non-tolerable risks. Therefore it is a holistic process that encompasses a modular cycle of communication, documentation, control, early warning mechanism, and advancement (Kalia & Müller, 2007). | Europe              | Too abstract in nature for modern day mechanism.  |
| 5<br>Aven, 2011               | All coordinated activities to direct and control an organisation with regard to risk (Aven, 2011).  | Europe              | Too vague to imply anything and not suitable to theoretical purpose.                              |