INTRODUCTION

The entire human society’s history is marked by the exposure to risks of all kinds and the efforts undergone by humans to deal with the risks. From ancient time, at the emergence of species, the human practiced risk management in order to survive. The practice of survival instincts lead to the avoidance of risks threatening to extinct the human kind. The very existence of human kind today is the proof of the success of applying risk management strategies by our ancestors. Risks are uncertainties. In the banking universe, there are a large number of risks. As the goal of any privately own company, the main goal of bank’s management is to maximize the shareholdes’ value. Bankruptcies in the financial sector are costly, not only for the equity and debt holders of banks’ but often also for taxpayers. In order to avoid that the banks are constantly under pressure and have to assume high risks and at the same time manage the risks in order to avoid, or at least minimize losses.

Competition in the banking sector is typically seen as detrimental to financial stability. The basic idea is that when banks compete intensely for deposits, interest rates fall and their franchise value is eroded. Banks have then less to lose from a default and their incentives to take on risk increase. This argument has been very important in shaping banking regulation around the world, for instance in the form of competition and merger policies. A recent influential paper by Boyd De Nicoló (2005) has challenged this view. Boyd DeNicolo consequently argues that the lending market should be central to future models of bank stability. The paper written by Wagner (2010) extends the analysis of the lending channel.

In Boyd De Nicoló borrowers are implicitly assumed, through their influence on the risk of firms, to have complete control over the riskiness of banks. Wagner argues that, while borrowers may determine the riskiness of their firms, it is banks who decide how much risk they ultimately want to take on. Wagner introduced in a model with a lending channel the possibility for banks to select among different types of borrowers. Thus, they essentially allows for both a risk choice of borrowers as in Boyd De Nicolo and a risk choice for banks. They find that this alteration reverses the stability effect of the lending channel. Wagner has shown that when banks have control over their risk-taking, the stability impact of lending market competition may be reversed. This is because banks have an optimal amount of risk they want to hold and thus want to offset the impact of safer borrowers on their balance sheet by taking on more risk. Since competition in the loan market at the same time erodes banks’ franchise values, they even want to overcompensate the impact of safer borrowers because their risk-taking incentives increase.

Bank regulators and researchers have long sought to understand the determinants of bank risk-taking. Existing theoretical and empirical work developed by Buser, Chen and Kane (1981), Benston (1983), Goodman and Santomero (1986), Kane (1987), Merton (1977), Jensen (1986), Stultz (1990), Kahane (1977), Kim and Santomero (1988), Koehn and Santomero (1997), Saunders, Strock and Travlos (1990) and Galai and Masulis (1976) suggest that risk-taking will be affected by a number of factors such as the moral hazard provided by mispriced deposit insurance, agency problems between management and shareholders, leverage, ownership structure, risk preferences, and regulatory actions. Yet, much of this work yields conflicting predictions and empirical evidence. For example, while the moral hazard of deposit insurance would suggest that banks would increase their risk positions as capital declines, in practice, others do not observe widespread risk-shifting activities by banks (Hughes, Lang, Mester and Moon, 1995), or thrifts (Hughes and Moon, 1995). A slightly different twist on the managerial risk preference hypothesis is offered by Berger and DeYoung (1995) and Kwan and Eisenbeis (1997) who linked risk-taking and banking operational efficiency. Starting from the results obtained by Gehrig (1998) and Winton (1999) proposed a different methodology based on structural relationship between bank risk-taking and efficiency, using different combinations of credit risk, interest rate risk, and financial leverage in their model. Independent of these conflicting views, information considerations play an important role in lending according to Jeonk (2001), Almazan (2002), Hauswald and Marquez (2003), Hauswald and Marquez (2006), Yasuda (2005), Kenneth and Ramirez (2008) and Altman (1968), and differential information or screening technologies among intermediaries induce specialization in lending according to Altman, Haldeman and Narayanan (1977).

RISK DEFINITIONS

The risk has long been studied especially in the last years. It is one of those concepts that don’t have a universal definition. Every author has a different approach to risk.

Gallati (2003) defines risk as a condition in which there exists an exposure to adversity, or a condition in which there exists a possibility of deviation from a desired outcome that is expected or hoped for. Other definitions (Bessis, 2002; Machiraju, 2008;
Schroeck, 2002) include the restriction that risk is based on real world events, including a combination of circumstances in the external environment. But unfortunately this definition does not take into consideration the circumstances in the internal environment. Many crises in the economy and the financial services industry happen because of problems within organizations. Often the term risk is used interchangeably with terms such as danger, hazard, peril, and thus the need to properly make the differentiation between these terms. The term peril is used to define the potential for loss. It is closely used in cases of potential losses occurred from a natural phenomenon. In this aspect peril includes floods, fire, earthquakes and so on. The term hazard refers to the condition that may create or increase the chance of loss arising from a peril. For example, a damaged brake rotor on a car is a peril that causes an economic loss. But, it also is a hazard that increases the likelihood of loss from the peril of a car accident that causes premature death (Gallati, 2003). The financial markets have been constantly changing over the last decades and risks went along with the trends in these markets. Commercial banks undertake the important process of financial intermediation whereby the funds or savings of the surplus sector are channeled to deficit sector. Financial intermediation can enhance growth by pooling funds of the small and scattered savers and allocating them for investment in an efficient manner by using their informational advantage in the loan market (Machiraju, 2008).

TYPES OF RISKS IN BANKING

Banks that manage their risks have a competitive advantage. They take risks consciously, anticipate adverse changes and protect themselves from such changes. Figure 1 is a brief description of the types of risks that banks have to protect themselves from.

Fig. 1. Main risks undertaken by banks

As depicted from the figure above the banks have to manage more types of risks in order to maximize the shareholders’ wealth. The most important categories of risks include credit risk, interest rate risk, liquidity risk and operational risk. Credit risk arises when a bank cannot get back the money from loans or investments. Interest rate risk arises when the market value of a bank asset, loan or security falls when interest rates rise. The solvency of the bank would be threatened when the bank cannot fulfill its promise to pay a fixed amount to depositors because of the decline in the value of the assets caused by increase in interest rate. Liquidity risk arises when the bank is unable to meet the demands of depositors and needs of borrowers by turning assets into cash or borrow funds when needed with minimal loss. And last but not least, operational risk arises out of inability to control operating expenses, especially non-interest expenses such as salaries and wages. In a competitive environment high operational expenses would jeopardize the bank’s prospects to survive. Of course these are not the only categories of risks that banks have to take into consideration when designing a risk management strategy. There have to be taken into consideration the risks that could result from the political situation from that country (country risk), the fluctuations of the foreign exchange rates (foreign currency risk), the technological advances (environmental risks) and so on.
THE DEGREE OF RISK

Why would risk-averse individuals and entities expose themselves intentionally to risk and increase that exposure over time? One reason would be that they believe that they can exploit these risks to their advantage and generate value. How else can one explain why companies embark into emerging markets that have substantial political and economic risk or into technologies where the ground rules change on a day-to-day basis.

All financial institutions face risks to some extent. When talking about risk it must be analyzed which situation carries more risk than another. Thus, a bank must weigh both the return and the risk embedded in the portfolio. Banks must measure the expected profit and evaluate the prudence of the various risks enumerated to be sure that the result achieves the stated goal of maximizing shareholder value (Santomero, 1997). How is risk measured? As in the case of defining risk, expressing the degree of risk has also more approaches. On one side there is the link created between the degree of risk and the likelihood of occurrence. In this approach a situation with a higher likelihood is considered to be riskier than another situation with a lower likelihood of occurrence.

On the other hand, there are authors that disagree with this approach (Galatti, 200, p 10). Gallati argues that this approach is affected by the insurance industry’s definition of risk. He proposes to be changed the likelihood of occurrence of one event with the possibility of a deviation from the desired outcome expected, and thus the degree of risk is expressed by the likelihood of deviation from the desired outcome. When saying that a situation carries more or less risk, it is taken into consideration also the value impact of the deviation. According to ISO Standards Guide 73:2009 on Risk management – Vocabulary, risk can be defined as the combination of the probability of an event and its consequences. Therefore, risks may have positive or negative outcomes or can result in uncertainty. Therefore, we can say that risks can be related to a loss (when it has a negative outcome), to an opportunity (when it has a positive outcome) or to an increase in the degree of uncertainty. In the case of the individual, the hope is that no loss will occur, so that the probability of a deviation from what is hoped for (which is the measure of risk) varies directly with the probability that a loss will occur. So, we measure risk in terms of the probability of an adverse deviation from what is hoped for. Actuarial tables tell us, for example, that the probability of death at age 52 is approximately 1 percent and that at age 79 it is about 10 percent. At age 97, the probability of death increases to nearly 50 percent. Using the probability of an adverse deviation from the outcome that is hoped for, we view the risk of death at age 79 as greater than that at age 52, but less than that at age 97. The higher the probability that an event will occur, the greater the likelihood of a deviation from the outcome hoped for and the greater the risk.

In the game of Russian roulette, there is more risk when there are two bullets in a revolver’s six chambers than when there is one bullet. Adding a third bullet increases the risk, as does adding the fourth bullet and fifth bullet. Adding the fourth and fifth bullets increases the probability of a deviation from a desired outcome. If a sixth bullet is added, the player can no longer expect or even hope that the outcome will be favorable. The sixth bullet makes the outcome certain, and risk no longer exists. If the probability of loss is 1, there is no chance of an outcome other than that which is expected and, therefore, no hope of a favorable result. Similarly when the probability of loss is zero, there is no possibility of loss and therefore no risk.

RISK MANAGEMENT

In the process of doing business, it is inevitable that you will be faced with unexpected and very often unpleasant surprises that threaten to undercut or, even worse, to destroy the business. That is the essence of risk and how a company or an individual respond to it will determine whether it will survive and succeed or not. Risk management is a concept that has been used since the beginnings of the human kind, it is an evolving concept. The roots of risk management can be found in corporate insurance industry. It did not evolve naturally from the purchase of insurance by corporations. The concept of risk management was first introduced into business strategy in 1916 by Henry Fayol. But it only became formalized after Russell Gallagher (1956) published “Risk Management: A New Phase of Cost Control” in the Harvard Business Review and argued that “the professional insurance manager should be a risk manager”.

Risk management as we understand it today has been conceptualized in the early 1950s. There was a transition period when the development from the insurance management to organizational risk management was paralleled by the evolution of the academic discipline of risk management. Without any doubts the academic discipline produced valuable approaches, methodologies and models that further supported the development of risk management in the real business world.

The Nobel award winner, Harry Markowitz, was the first financial theorist to explicitly include risk in the portfolio and diversification discussion. He linked terms such as return and utility with the concept of risk. Risk management can be regarded as an active, strategic, and integrated process that encompasses both the measurement and the mitigation of risk, with the ultimate goal of maximizing the value of a bank, while minimizing the risk of bankruptcy (Schroeck, 2002).

Risk management is often performed by an organizational unit, ideally an independent staff function reporting directly to the board of directors, making risk management a board responsibility and task. The board has to set strategic targets and ensure, via strict controls, that the delegated goals are actually achieved within the centrally mandated guidelines. Running a risk-management function in a centralized manner is advantageous because it allows for an independent, integrated view of all types of risk, so that only the net positions need to be managed and specialized staff can achieve better pricing in the capital markets.

Management has to develop strategic goals for the various risk areas (risk strategy) that are proportionate with the ultimate objective to maximize company value. The goal of risk management should be to identify any uneconomic risk taking, in other words, to ensure
that any risk-management activity is consistent with value maximization. The ultimate objective should not be to minimize, or worse, to avoid all risks, but it should be to find the optimal balance between risks taken and expected returns, concentrating on the competitive advantage of the company.

In a bank, there are various ways to conduct risk management. Figure 2 provides an overview of the options that banks have when approaching a risk. The bank can decide to eliminate certain risks that are not consistent with its desired financial characteristics or, as often encountered in practice, the risks are not essential to the financial asset created. In order to eliminate specific risks the bank can use as a strategy portfolio diversification or, in addition to this, can decide to buy insurance in the form of options or actuarial insurance, for example, for event risks. The banks can create certain business policies, such as process control, due diligence procedures, in order to reduce the chances of certain losses and even eliminate certain risks ex ante.

Fig. 2. Strategies for risk management

![Figure 2: Strategies for risk management](source)

Source: Schroeck, 2002

If the bank does not want to avoid some risk, it can decide to transfer it to other market participants. The decision to transfer the risk to other market participants is made on the basis of whether or not the bank has a competitive advantage in a specific segment and whether or not it can achieve the fair market value for it.

The alternative to transferring risks is to keep the risks, to absorb (manage) them. Some risks must or should be absorbed at the bank level, because they are too complex, or cannot be traded or hedged easily or they are a business necessity.

Some risks play a central role in the bank’s business purpose and should therefore not be eliminated or transferred.

The instruments that banks can use in order to manage the risks can be:

a. Diversification is a technique that mixes a wide variety of investments within a portfolio. It is the spreading out of investments to reduce risks. Diversification, typically, reduces the frequency of both worst-case and best-case outcomes, which generally reduces the bank’s probability of failure.

b. Hedge is a position established in one market in an attempt to offset exposure to price fluctuations in some opposite position in another market with the goal of minimizing one’s exposure to unwanted risk. There are many specific financial vehicles to accomplish this, including insurance policies, forward contracts, swaps, options, many types of over-the-counter and derivative products, and perhaps most popularly, futures contracts.

c. Internal insurance: The bank is supposed to have superior risk pooling skills for some risks, that is, it is cheaper for the bank to hold a pool of risks internally than to buy external insurance.

d. Holding capital: For all other risks that cannot be diversified away or insured internally and which the bank decides to absorb, it has to make sure that it holds a sufficient amount of capital in order to ensure that its probability of default is kept at a sufficiently low level.

RISK MANAGEMENT REGULATIONS

The Basel Committee on Banking Supervision is an institution created by the central bank Governors of the Group of 10 nations (G10) (Belgium, Canada, France, Italy, Japan, the Netherlands, the United Kingdom, the United States, Germany and Sweden). The Basel Committee formulates broad supervisory standards and guidelines and recommends statements of best practice in banking supervision (Basel II Accord, for example) in the expectation that member authorities and other nations’ authorities will take steps to
implement them through their own national systems. The purpose of the committee is to encourage convergence toward common approaches and standards.

Basel II is the second of the Basel Accords, recommendations on banking laws and regulations issued by the Basel Committee on Banking Supervision. The purpose of Basel II, initially published in June 2004, is to create an international standard that banking regulators can use when creating regulations about how much capital banks need to put aside to guard against the types of financial and operational risks banks face. Basel II sets up rigorous risk and capital management requirements designed to ensure that a bank holds capital reserves appropriate to the risk the bank exposes itself to through its lending and investment practices.

Basel II uses a three pillars’ concept – (1) minimum capital requirements (addressing risk), (2) supervisory review and (3) market discipline – in order to promote greater stability in the financial system. The first pillar deals with maintenance of regulatory capital calculated for three major components of risk that a bank faces: credit risk, operational risk and market risk. Other risks are not considered fully quantifiable at this stage. The second pillar deals with the regulatory response to the first pillar. It also provides a framework for dealing with all the other risks a bank may face, such as systemic risk, pension risk, concentration risk, strategic risk, reputation risk, liquidity risk and legal risk, which the accord combines under the title of residual risk. It gives banks a power to review their risk management system (van Greuning, Brajovic Bratanovic, 2009; Tarullo, 2008).

As a response of the deficiencies in the financial regulations revealed by the financial crisis affecting the world since 2008 it was developed a new Basel Accord, BASEL III. BASEL III is a global regulatory standard on bank capital adequacy, stress testing and market liquidity risk agreed upon by the members of the Basel Committee on Banking Supervision in 2010-11. Basel III strengthens bank capital requirements and introduces new regulatory requirements on bank liquidity and bank leverage.

Some of the measures introduced in the new Basel III framework will require banks to hold 4.5% of common equity (up from 2% in Basel II) and 6% of Tier I capital (up from 4% in Basel II) of risk-weighted assets (RWA). Basel III also introduces additional capital buffers, a mandatory capital conservation buffer of 2.5% and a discretionary countercyclical buffer, which allows national regulators to require up to another 2.5% of capital during periods of high credit growth. These measures aim to improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source, improve risk management and governance and strengthen banks' transparency and disclosures.

TYPES OF RISKS IN BANKING

Interest rate risk
Net interest income, the difference between interest income and interest expense, is the main determinant of the profitability of banks. It is determined by interest rates on assets and paid for funds, volume of funds, and as a consequence the changes in interest rate affect the net interest income. Interest rate risk is the potential negative impact on the net interest income and it refers to the vulnerability of an institution’s financial conditions to the movement in interest rates. Changes in interest rate affect earnings, value of assets, liability off-balance sheet items and cash flow. Therefore, the objective of interest rate risk management is to maintain earnings, improve the capability, the ability to absorb potential loss and to ensure the adequacy of the compensation received for the risk taken and affect risk return trade-off.

All financial institutions face interest rate risk. Changes in interest rates affect both bank’s earning and expenses and also the economic value of its assets and liabilities. The effects resulting from these changes are reflected in the bank’s capital and income. Bank regulators and supervisors place great emphasis on the evaluation of bank interest rate risk management. These have begun to grow in importance since the implementation of market-risk-based capital charges recommended by the Basel Committee. Interest rate risk management comprises various policies, actions, and techniques that banks use to reduce the risk of reduction of its net equity as a result of adverse changes in interest rates (van Greuning, Brajovic Bratanovic, 2003).

Complementary with the interest rate risk are among others re-pricing risks, yield curve risk. Any occasion on which interest rates are to be reset, either due to maturities or floating rate resets, is called a re-pricing. The date on which it occurs is called the re-pricing date. Re-pricing risk is when there are fluctuations in interest rates that expose the bank’s income and the underlying value of its instruments to fluctuations, and hence the risk that arises from timing differences in the maturity of fixed rates and the re-pricing of the floating rates of bank assets, liabilities, and off-balance-sheet positions. Re-pricing mismatches expose a bank also to risk deriving from changes in the slope and shape of the yield curve.

The yield curve is a graphic representation of the relationship between time to maturity and yield to maturity for a given risk class of securities. It provides a snapshot of the term structure of interest rates in the market. The yield to maturity is the average annual rate earned by an investor who holds a security until its maturity. Typically yield curves slope upwards with interest rates rising as the tenor of the security increases. The yield curve shifts with a change in generalized perception about interest rates. The slope of the yield curve tends to be influenced by monetary policy action (Machiraju, 2008). Yield curve risk is when yield curve shifts adversely affect a bank’s income or underlying economic value. A rise in interest rates not only triggers an increase in interest earned and paid by the bank, but also a decrease in the market value of fixed-rate assets and liabilities. Usually such a change also causes a decline in demand liabilities and call loans. In effect, when market rates go up, account holders usually find it more convenient to transfer their funds to more profitable types of investment. At the same time, the bank’s debtors (be they firms or individuals) tend to cut down on the use of credit lines due to the higher cost of these services. Nonetheless, interest rate risk pertains to all positions in the bank’s assets and liabilities portfolio (namely, the banking book). To measure this risk the bank has to consider all interest-earning and interest-bearing financial instruments and contracts on both sides of the balance sheet, as well as any derivatives whose value depends on market interest rates.
One of the main requests in risk management regulations is for banks to have clearly defined policies and procedures for limiting and controlling interest rate risk. The interest rate risk measurement system employed by a bank should comprise all material sources of interest rate risk and should be sufficient to assess the effect of interest rate changes on both earnings and economic value (van Greuning, Brajovic Bratanovic, 2003).

Among the techniques of measuring and analyzing interest rate risk there are included static gap model, sensitivity analysis and interest rate swaps.

The first approach, static gap model, aims to allocate the assets and liabilities to the so-called maturity buckets and measure the gap at each maturity point. In this model the components of the balance sheet are separated into items that are sensitive to interest rates and those that are not. These are in turn sorted by re-pricing period and allocated to time periods known as maturity buckets. A positive gap indicates that a higher level of assets than liabilities re-price in the timeframe of the maturity bucket - position that is also referred to as asset-sensitive. The opposite balance sheet position is known as liability-sensitive or negative gap, and describes a situation in which a similar increase in the yields associated with a specific time interval would produce a decrease in net interest income. The gap is closed when the re-pricing of rate-sensitive assets and liabilities is adequately matched.

The main drawback of this technique is that by assuming a linear reinvestment, the static gap model will lead to future decisions similar to the ones that resulted in the bank's original re-pricing schedule. More than that, a static gap model usually fails to predict the impact of a change in funding strategy on net interest margins.

A more complex technique is that of the use of swaps, options, and forward rate agreements to hedge interest rate exposure. In an interest rate swap, two parties, counterparties, agree to exchange periodic interest payments. The dollar amount of the interest payments exchanged is based on some predetermined dollar principal, which is called the notional amount. The only dollars that are exchanged between the parties are the interest payments, not the notional amount. Accordingly, the notional principal serves only as a scale factor to translate an interest rate into a cash flow (Fabozzi, Mann, Choudhry, 2003). In the most common type of swap, one party agrees to pay the other party fixed interest payments at designated dates for the life of the contract. This party is referred to as the fixed-rate payer. The other party, who agrees to make interest rate payments that float with some reference rate, is referred to as the floating-rate payer.

The risks that the two parties take on when they enter into a swap is that the other party will fail to fulfill its obligations as set forth in the swap agreement. That is, each party faces default risk, or counterparty risk.

Guidelines on how to go about estimating interest rate risk on the banking book were drawn up by the Basel Committee ever since January 1997. The 12 fundamental principles related to interest rate risk are intended as a tool for facilitating the work of authorities for banking supervision from individual nations who are responsible for evaluating the adequacy and effectiveness of interest rate risk management systems developed by banks under their supervision. The principles address the role of boards of directors and senior management; policies and procedures for managing interest rate risk; systems for measuring and monitoring risk, and for internal controls; and information to be provided to supervisory bodies on a periodic basis. These standards are not simply methodological instructions, but go further to provide recommendations on organizational issues.

For example, under Basel I the principles were revised and increased to 15 in July 2004. The Accord does not call for a specific capital requirement for interest rate risk arising from the banking book. Rather, it focuses on transparency, and gives supervisory bodies in member countries the right to request extra capital from banks exposed to high interest rate risks.
Credit risk
The field of credit risk gained considerable momentum (e.g., Bharath and Shumway, 2008; Davydenko, 2008; Korteweg and Polson, 2008) due to the increased competition in the field and the challenges of the present financial crisis. Credit risk is one of the main risks of commercial banks that will affect the banks’ ability of sustainable operation.

Banks assume credit risk when they act as intermediaries of funds and credit risk management lies at the heart of commercial banking. Studies of banking crises show that the most frequent factor in the failure of banks has been poor loan quality. The credit risk management process of a bank is believed to be a good indicator of the quality of the bank’s loan portfolio. Credit risk emerged as a significant risk management issue during the 1990s. In increasingly competitive markets, banks began taking on greater credit risk in this period.

In a 1996 report the Bank of International Settlement (BIS) defined credit risk as the risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter. In exchange for value systems, the risk is generally defined to include replacement risk and principal risk.

Credit risk covers all risks related to a borrower not fulfilling his obligations on time. Even where assets are exactly matched by liabilities of same maturity, the same interest rate conditions and the same currency, the only on balance sheet risk remaining would be credit risk.

There are two main types of credit risk that a portfolio or position is exposed to, credit default risk and credit spread risk. Credit default risk is the risk occurring when an issuer of debt, obligor, is unable to meet its financial obligations. Where an obligor defaults, an investor generally incurs a loss equal to the amount owed by the obligor less any recovery amount which the investor recovers as a result of foreclosure, liquidation or restructuring of the defaulted obligor. All portfolios with credit exposure exhibit credit default risk. The magnitude of credit default risk is described by a firm’s credit rating. The credit rating is announced after a formal analysis of the borrower. This analysis is undertaken by rating agencies. The most known rating agencies are Fitch Ratings, Moody’s and Standard & Poor’s. In order to assess the analysis several issues are analyzed. Among these issues there are: the balance sheet position and expected cash flows and revenues, quality of management, company’s ability to meet scheduled interest and principal and an outlook of the industry as a whole.

Figure 4 summarizes the credit ratings of the three most known credit rating agencies. Bonds rated triple B or higher are referred to as investment grade bonds. Bonds rated below triple B are referred to as non-investment grade bonds, or junk bonds.

<table>
<thead>
<tr>
<th>Fitch</th>
<th>Moody’s</th>
<th>S&amp;P</th>
<th>Summary Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAA</td>
<td>Aaa</td>
<td>AAA</td>
<td>Gilt edged, prime, maximum safety, lowest risk, and when sovereign borrower considered &quot;default-free&quot;</td>
</tr>
<tr>
<td>AA+</td>
<td>Aa1</td>
<td>AA+</td>
<td></td>
</tr>
<tr>
<td>AA</td>
<td>Aa2</td>
<td>AA</td>
<td>High-grade, high-credit quality</td>
</tr>
<tr>
<td>AA-</td>
<td>Aa3</td>
<td>AA-</td>
<td></td>
</tr>
<tr>
<td>A+</td>
<td>A1</td>
<td>A+</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>A2</td>
<td>A</td>
<td>Upper-medium grade</td>
</tr>
<tr>
<td>A-</td>
<td>A3</td>
<td>A-</td>
<td></td>
</tr>
<tr>
<td>BBB+</td>
<td>Baa1</td>
<td>BBB+</td>
<td></td>
</tr>
<tr>
<td>BBB</td>
<td>Baa2</td>
<td>BBB</td>
<td>Lower-medium grade</td>
</tr>
<tr>
<td>BBB-</td>
<td>Baa3</td>
<td>BBB-</td>
<td></td>
</tr>
<tr>
<td><strong>Speculative Grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BB+</td>
<td>Ba1</td>
<td>BB+</td>
<td></td>
</tr>
<tr>
<td>BB</td>
<td>Ba2</td>
<td>BB</td>
<td>Low grade; speculative</td>
</tr>
<tr>
<td>BB-</td>
<td>Ba3</td>
<td>BB-</td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>B1</td>
<td>B</td>
<td>Highly speculative</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>B-</td>
<td>B3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Predominantly speculative, Substantial Risk or in Default**

| CCC+    | Caa     | CCC  | Substantial risk, in poor standing                      |
| CC      | Ca      | CC   | May be in default, very speculative                     |
| C       | C       | C    | Extremely speculative                                   |
| CI      |         |      | Income bonds - no interest being paid                   |
| DDD     | D       |      | Default                                                 |

Source: Fabozzi, Mann, Choudhry, 2003
The credit spread is the excess premium over the government or risk-free rate required by the market for taking on a certain assumed credit exposure. It is important to notice that the higher the credit rating, the smaller the credit spread. Thus, the credit spread risk is the risk of financial loss resulting from changes in the level of credit spreads used in the marking-to-market of a fixed income product. Changes in observed credit spreads affect the value of the portfolio and can lead to losses for traders or underperformance for portfolio managers.

The discussion of the credit risk management function is primarily focused on the loan portfolio. Bank supervisors place considerable importance on formal policies laid down by the board of directors and implemented or administered by management. This requires that a bank must adopt a sound system for managing credit risk. A lending policy should contain an outline of the scope and allocation of a bank’s credit facilities and the manner in which a credit portfolio is managed, how loans are originated, appraised, supervised, and collected. A good lending policy is not overly restrictive, but allows for the presentation of loans to the board that officers believe are worthy of consideration but which do not fall within the parameters of written guidelines (Fight, 2004). A good lending policy should include at least the following considerations (van Greuning, Brajovic Bratanovic, 2003):

a. A limit on the total loan portfolio is usually expressed relative to deposits, capital, or total assets. In setting such a limit, factors such as credit demand, the volatility of deposits, and credit risks should be considered.

b. The bank’s business market should be clearly established and matched with its market knowledge and managerial and staff experience. Bank officers should be fully aware of specific geographical limitations for lending purposes, an aspect that is particularly relevant for new banks.

c. A lending policy should stimulate portfolio diversification and strike a balance between maximum yield and minimum risk. Concentration limits usually refer to the maximum permitted exposure to a single client, and/or sector of economic activity (e.g., agriculture, steel, or textiles).

d. The types of loans and other credit instruments that the bank intends to offer to clients should be specified within the policy and also guidelines for specific loans should be provided. Decisions about types of credit instruments should be based on the expertise of lending officers, the deposit structure of a bank, and anticipated credit demand. Types of credit that have resulted in an abnormal loss should be controlled by senior management or avoided completely.

e. The maximum maturity for each type of credit should be established within the policy, and loans should be granted with a realistic repayment schedule. Maturity scheduling should be determined in relation to the anticipated source of repayment, the purpose of the loan, and the useful life of the collateral.

f. Rates on various loan types must be sufficient to cover the costs of funds, loan supervision, administration (including general overhead), and probable losses. At the same time, they should provide a reasonable margin of profit. Rates should be periodically reviewed and adjusted to reflect changes in costs or competitive factors. Guidelines for other relevant procedures, such as the determination of fees on commitments or penalty interest rates, are also an element of pricing policy. A lending policy should also contain a schedule of down payment requirements, where applicable.

g. A lending policy should set into the open margin requirements for all types of securities that are accepted as collateral. Margin requirements should be related to the marketability of securities. A lending policy should also assign responsibility and establish a timetable for periodic pricing of collateral.

A sound credit risk management is built upon a good-quality portfolio of performing assets. The pricing of the loans has to reflect the risk. A good selection strategy aims to avoid high losses. Credit scoring is a credit risk management technique that analyzes the borrower’s risk.

In its early meaning, credit scores were assigned to each customer to indicate its risk level. A good credit scoring model has to be highly discriminative; high scores reflect almost no risk and low scores correspond to very high risk. The more highly discriminative the scoring system, the better are the customers ranked from high to low risk.

In the past, credit scoring focused on measuring the risk that a customer would not fulfill his/her financial obligations and run into payment debts. More recently, credit scoring evolved to loss and exposure risk as well. Scoring techniques are nowadays used throughout the whole life cycle of a credit as a decision support tool or automated decision algorithm for large customer bases. Increasing competition, electronic sale channels and recent banking regulation have been important catalysts for the application of automated scoring systems.

Any analysis should include an overview of what products have been lent, to whom, and for how long. The first requirement is to whom to lend. This is usually based on customers’ request. A model loan request would be in terms of filing all the information required in a printed loan application form which elicits information on amount of loan, purpose of loan, repayment and collateral. Information on the organization of the business (proprietorship, partnership, company (private or public)), trade/industry area and other banking relationships would be required.

The early success of application scorecards drew the attention of the academics and researchers to develop advanced statistical and machine-learning techniques that apply a wide range of explanatory variables or characteristics. An application scorecard then assigns sub-scores to each of the values of these characteristics. These sub-scores are determined based on the relationship between the values of the characteristics and the default behavior, and are aggregated into one overall application score reflecting the total default risk posed by the customer.

Banks can reduce credit risk by (Machiraju, 2008):

- Raising credit standards to reject risky loans.
- Obtaining collateral and guarantees.
- Ensuring compliance with loan agreement.
- Transferring credit risk by selling standardized loans.
- Transferring risk of changing interest rates by hedging in financial futures, options or by using swaps.
- Creating synthetic loans through a hedge and interest rate futures to convert a floating rate loan into a fixed rate loan.
- Making loans to a variety of firms whose returns are not perfectly positively correlated.

**Liquidity risk**

Liquidity of bank may be defined as the ability to meet anticipated and contingent cash needs. Cash needs arise from withdrawal of deposits, liability maturities and loan disbursements. The requirement for cash is met by increases in deposits and borrowings, loan repayments, investment maturities and the sale of assets. Inadequate liquidity can lead to unexpected cash shortfalls that must be covered at inordinate cost which reduces profitability. It can lead to liquidity insolvency of the bank without being capital insolvent (Crouhy, Galai, Mark, 2005).

Bank liquidity management policies should comprise a risk management structure, a liquidity management and funding strategy, a set of limits to liquidity risk exposures, and a set of procedures for liquidity planning under alternative scenarios, including crisis situations. Liquidity is necessary for banks to compensate for expected and unexpected balance sheet fluctuations and to provide funds for growth. A bank has adequate liquidity potential when it can obtain needed funds promptly and at a reasonable cost. The price of liquidity is a function of market conditions and the market’s perception of the inherent riskiness of the borrowing institution (van Greuning, Brajovic Bratanovic, 2003).

The importance of liquidity transcends the individual institution, because a liquidity shortfall at a single institution can have systemic-wide repercussions. It is in the nature of a bank to transform the term of its liabilities to different maturities on the asset side of the balance sheet.

Liquidity risks are normally managed by a bank’s asset-liability management committee (ALCO), which must therefore have a thorough understanding of the interrelationship between liquidity and other market and credit risk exposures on the balance sheet.

Forecasting possible future events is an essential part of liquidity planning and risk management. An evaluation of whether or not a bank is sufficiently liquid depends on the behavior of cash flows under different conditions. Liquidity risk management must therefore involve various scenarios (van Greuning, Brajovic Bratanovic, 2009). The first scenario, also called “going concern” is ordinarily applied to the management of a bank’s use of deposits. This scenario establishes a benchmark for balance sheet-related cash flows during the normal course of business. The second scenario is related to a bank’s liquidity in a crisis situation, when a significant part of its liabilities cannot be rolled over or replaced. And last but not least, the third scenario is related to general market crises. In this case the liquidity is affected in the entire banking system. Liquidity management under this scenario is predicated on credit quality, with significant differences in funding access existing among banks.

The ability to readily convert assets into cash and access to other sources of funding in the event of a liquidity shortage are very important. Diversified liabilities and funding sources usually indicate that a bank has well-developed liquidity management. The level of diversification can be judged according to instrument types, the type of fund provider, and geographical markets.

**Operational risk**

Although operational risk is by itself not a new concept, it has by far not received the same amount of attention as credit and market risk until recent years. Operational risk becomes a major constraint since involve taking appropriate measures to ensure the qualitative transactions without processing errors in order to deliver the best services to the customers. Fundamental changes in financial markets, increasing globalization and deregulation, as well as corporate restructuring had a large impact on the magnitude and nature of operational risks confronting banks. Following severe operational failures resulting in the restructuring of the affected financial institutions (e.g. Natwest, Allied Irish Bank, LTCM) or in the sale of the entity (e.g. Barings), the emphasis on operational risk within banks has increased, leading regulators, auditors, and rating agencies to expand their focus to include operational risks as a separate entity besides market and credit risk (Helbok and Wagner, 2006).

Operational risk was for the first time treated as a self-contained regulatory issue in the “Operational Risk Management” document published by the Basel Committee on Banking Supervision in 1998. “The New Basel Capital Accord” was first formulated in a proposal in 1999, released in 2001 and became effective in 2007; within the framework, operational risk was integrated in the so-called Pillar I which implies its inclusion in the calculation of a banks' overall capital charge. Along with revising the minimum capital standards already covering credit and market risk, Basel II sets a new minimum capital standard for operational risk. While requiring capital to protect against operational risk losses, the new framework is meant to encourage banks to improve their risk management techniques as to reduce operational risk exposure and mitigate losses resulting from operational failures. The new capital accord provides incentive of lower capital requirements to those banks that demonstrate strengthened risk management practices and reduced risk exposures (Haubenstock and Andrews, 2001).

As one of the innovations proposed by the Basel II, the operational risk is defined by this institution as "the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events". This approach is in accordance with other opinions (Santomero, 1997) that consider operational risk associated with the problems of accurately processing, settling, and taking or making delivery on trades in exchange for cash. However, operational risk is a term that has a variety of meanings within the banking industry, and therefore for internal purposes banks may choose to adopt their own definitions.
of operational risk. This internal definition should respect the individual situation of every bank, such as its size, and sophistication, its nature and complexity of its activities in an economic manner, considering the full range of material operational risks facing the bank and captures the most significant causes of severe operational losses.

Management of operational risk is not a new practice; it has always been important for banks to try to prevent fraud, maintain the integrity of internal controls, reduce errors in transaction processing, and so on in order to preserve the best quality services for their customers, but also because errors can lead to huge losses. However, what is relatively new is the view of operational risk management as a comprehensive practice comparable to the management of credit and market risk in principle. In the past, banks relied almost exclusively upon internal control mechanisms within business lines, supplemented by the audit function, to manage operational risk. While these remain important, recently there has been an emergence of specific structures and processes aimed at managing operational risk.

Following the widespread recognition of the importance of operational risk in banking and the knowledge that operational risk exhibits characteristics fundamentally different from those of other risks, an increasing amount of academic research has been devoted to this issue. Power (2005) or Harmanzis (2002) reviews the development of operational risk in general; approaches to measure and manage operational risk are presented by Ebnother, Vanini, McNeil, and Antolínez (2003) and surveys in Healy and Palepu (2001). Most research on operational risk in recent past has focused either on the quality of quantitative measurement methods of operational risk exposure (Makarov, 2006, Degen et al., 2006; Mignola and Ugoccioni, 2006 and 2005; Nešlehová et al., 2006; Grody et al, 2005; de Fontnouvelle et al., 2004; Moscadelì, 2004; Alexander, 2003; Coleman and Cruz, 1999; Cruz et al., 1998) or theoretical models of economic incentives for the management and insurance of operational risk (Leippold and Vanini, 2005, Crouhy et al., 2004; Banerjee and Banipal, 2005). Only little attention has been devoted to statistical issues of coherent and consistent operational risk reporting and measurement within and across banks (Dutta and Perry, 2006; Currie, 2004 and 2005) and operational risk reporting has remained to be an unexplored topic in academic research (Dima, 2009).

Harmanzis (2002) assumes that the correlation among risk type is zero, that is to say that all risk types are completely independent of each other. De Fontnouvelle et al. (2004) use publicly available data to quantify operational risk and prove that capital charge for operational risk will often exceed that of market risk. Ebnother et al (2003) present study-cases on operational risk measuring and show that for a production unit of a bank with well-defined workflows, operational risk can be unambiguously defined and modeled. Although quantitative models in operational risk management have become more common in the last two decades, the measuring of operational risk is not a trivial exercise. Today's turbulent financial markets, growing regulatory environments, and increasingly complex financial systems have led risk managers to realize the importance of measuring and managing Operational Risk (Harmanzis, 2002). However, it is used to be thought that operational risk could not be easily measured since it covered various risks such as transactions processing errors and omissions including system failure, theft and fraud, rogue trade, lawsuits and loss or damage to assets (Mori, Hiwatashi and Ide, 2000).

Operating risk and/or system failure, are a natural outgrowth of their business and banks usually employ standard risk avoidance techniques to mitigate them (Santomero, 1997). Self Risk Assessment method is one of the possible tools used by banks for identifying and assessing operational risk through a bank assesses its operations and activities against a menu of potential operational risk vulnerabilities. This process is internally driven and often incorporates checklists and/or workshops to identify the strengths and weaknesses of the operational risk environment. Scorecards, for example, provide a means of translating qualitative assessments into quantitative metrics that give a relative ranking of different types of operational risk exposures. Some scores may relate to risks unique to a specific business line while others may rank risks that cut across business lines. Scores may address inherent risks, as well as the controls to mitigate them. In addition, scorecards may be used by banks to allocate economic capital to business lines in relation to performance in managing and controlling various aspects of operational risk.

An accurate estimation of operational risk, and its use in corporate or global financial risk models, could be translated into a more efficient use of resources. One important ingredient to accomplish this goal is to find accurate predictors of individual risk in the credit portfolios of institutions (Galindo and Tamayo, 2000).

Categorizing operational risk in terms of the light of its measurement and management we have:

- Event risk is the risk that losses to the bank are caused by rare events such as a major systems failure, process and control failures (e.g., errors and omissions), fraud, legal risk, and external disruption (e.g., fire or other catastrophes).
- Business risk is the risk that the bank will experience losses through unexpected changes in either (future) revenues (affected by volume and price) or (fixed) costs that are not due to credit or market risk, but rather driven by fundamental (and unexpected) changes in the bank’s competitive environment (e.g., price wars, new competitors, changes in regulation, etc.).

When measuring operational risk it is required to estimate both the probability of an operational loss event occurring and the potential size of the loss. The risk factors are generally quantitative but may be qualitative and subjective assessments translated into scores (such as an audit assessment) (Moosa, 2007). The set of risk factors often used includes variables that measure risk in each business unit, such as grades from qualitative assessments including internal audit ratings; generic operational data such as volume, turnover, and complexity; and data on quality of operations such as error rate or measures of business riskiness such as revenue volatility. Banks may choose different analytical or judgmental techniques to arrive at an overall operational risk level for the firm (Gallati, 2003).
When setting the policy for operational risk management the management should consider as main objectives to:

- Define and explain exposures and incidents that result from people, processes, systems, and external events; and generate enterprise-wide understanding of the drivers of operational risk incidents.
- Provide early warning of incidents and escalation of potential risk by anticipating risks and identify problem areas through ongoing monitoring of key risk indicators.
- Clearly define the roles and responsibilities of line personnel in managing operational risk and empower business units to take necessary actions.
- Strengthen management oversight.
- Provide objective measurement tools.
- Integrate qualitative and quantitative data and other information.

There are a great number of options that management can choose for managing operational risk. These options can be divided in three categories (Schroeck, 2002):

- Third-party insurance of risks - By paying a premium, banks can insure event risks externally. Banks are then no longer subject to the event risks insured and, hence, are not required to hold event risk capital for that part of their event risks. Because insurance companies can build portfolios of assets that benefit more from diversification effects and because insurance companies might have accumulated more expertise in evaluating these risks, they can offer the insurance contracts at lower prices.
- Self-insurance of risks - For a number of reasons, including cost considerations, a bank may choose not to buy external insurance for some risks. This can make sense especially if the bank can achieve the benefits of risk pooling on its own, and more economically than provided by a third party.
- Controlling risk internally - Some risks (e.g. internal fraud) are best managed internally through tight guidelines and controls. However, establishing and running these instruments can also be costly.

The last two options of banks with regard to managing operational risk should be aligned with a total quality management (TQM) framework and should always try to stay within a predetermined three sigma (3σ) range, where only acceptable losses occur. For these expected losses it is advisable for banks to calculate an internal insurance premium or to buy insurance at a premium. For the remaining probability that event risks outside the three sigma range lead to larger losses, the bank should hold capital.

Regression model (as presented in the work of Dima, 2009) might be considered a decision support tool for a bank willing to reduce the losses based on operational errors, an important element for risk management to provide the best quality services for its customers. An effective way of risk assessment is to establish a framework for systematically tracking and recording the frequency, severity and other relevant information on individual loss events. Promptly detecting and addressing these deficiencies can substantially reduce the potential frequency and/or severity of a loss event. Thus, an efficient monitoring process is essential for adequately managing operational risk, but sometimes is very costly. A large number of banking transaction will determine a higher number of operational errors, that will involve higher costs for reducing the negative effects.

Other types of risks

**Market risk**

Bank for International Settlement defines market risk as “the risk of losses in on- and off-balance-sheet positions arising from movements in market prices.” In this respect the main factors contributing to market risk are equity, interest rate, foreign exchange, and commodity risk. The total market risk is the aggregation of all risk factors (Sironi, Resti, 2007; Dowd, 2002). Market risk can impact on a company’s business in many different ways. Exposure to market risk may arise as a result of the bank taking deliberate speculative positions or may come from the bank’s market-making, dealer, activities. For example, operating margins can be eroded due to the rising prices of raw materials or depreciating currencies in countries in which a company has foreign sales (direct market risk impact). Changes in the market environment may eventually force companies to adjust the prices of their products or services, potentially altering sales volumes or competitiveness, depending on the positioning and market exposures of the company’s competitors (the indirect impact of market risk on business results). Some organizations may be paid to take market risks (e.g., financial organizations), but most seek to manage the impact of market risk on financial results (Gallati, 2003).

Given the increasing involvement of banks in investment and trading activities combined with the high volatility of the market environment, the timely and accurate measurement of market risk is a necessity (Dowd, 2002). Trading activities require highly skilled analytical support. Traders must use some form of technical analysis to gauge market movements and market opportunities. A fundamental analysis of classes of securities and of market behavior is also needed for the trader to be able to anticipate price movements and position the portfolio accordingly. Ex post analysis is also important to understand how market movements have affected profit and loss.
Currency risk

The relaxation of exchange controls and the liberalization of cross-border capital movements have fueled a tremendous growth in international financial markets. The volume and growth of global foreign exchange trading has far exceeded the growth of international and capital flows and has contributed to greater exchange rate volatility and therefore currency risk. Currency risk results from changes in exchange rates and originates in mismatches between the values of assets and liabilities denominated in different currencies (Grath, 2008). This mismatch may cause a bank to experience losses as a result of adverse exchange rate movements when the bank has an open on- or off-balance-sheet position, either spot or forward, in an individual foreign currency. In recent years, a market environment with freely floating exchange rates has practically become the global norm. This has opened the doors for speculative trading opportunities and increased currency risk. For example, in the case of a net long position in foreign currency, domestic currency depreciation will result in a net gain for a bank and appreciation will produce a loss. Under a net short position, exchange rate movements will have the opposite effect.

The fluctuations in the value of domestic currency creating currency risk are normally motivated by macroeconomic factors manifested over long periods of time. Among the factors affecting these fluctuations are the volume and directions of a country’s trade and capital flows. But the fluctuations are also influenced by expected or unexpected political events, changed expectations on the part of market participants, or speculation based currency trading may also give rise to currency changes. All these factors affect the supply and demand for the currency and therefore the movement of the exchange rate in the currency market (Grath, 2008).

A bank has a net position in foreign currency and is exposed to currency risk when its assets and its liabilities are not equal in a given currency. Banks should have written policies to govern their activities in foreign currencies and to limit their exposure to currency risk and therefore to potential incurred losses.

In principle, limits are established based on the nature of currency risk and the type of business by which that risk is incurred. Risk in a banking context arises from any transaction or business decision that contains uncertainty concerning the result. Because virtually every bank’s transaction is associated with some level of uncertainty, nearly every transaction contributes to the overall risk of a bank. All of the risks enumerated in this chapter and many more lead to possible fluctuations in the bank’s income statement or profitability and hence the value of the bank. As a general rule, event risk has a much larger impact on a company’s cash flows and value than continuous risk (Schroeck, 2002).

CONCLUSIONS

The essence of risk management is not avoiding or eliminating risk but deciding which risks to exploit, which ones to let pass through to investors and which ones to avoid or hedge. Risk management prevents an organization from suffering unacceptable loss that can cause failure or can materially damage its competitive position. Risk management should be a continuous and developing process which runs throughout the organization’s strategy and the implementation of that strategy. It should address as many of the risks surrounding the organization’s activities past, present and in particular, future, as possible. It cannot be developed a one-size-fit-all risk management process for all the organizations. In the case of a bank, functions of risk management should actually be bank specific dictated by the size and quality of balance sheet, complexity of functions, technical/professional manpower and the status of Management Information System in place in that bank. Balancing risk and return is not an easy task as risk is subjective and not quantifiable, whereas return is objective and measurable.

The extent, to which a bank can take risk more consciously, can anticipate the adverse changes and reacts accordingly, is a determinant of its competitive advantage, as it can as it can offer its products at a better price than its competitors.

Because of the fast-changing nature of a bank’s trading book and the complexity of risk management, banks engaged in trading must have market risk measurement and management systems that are conceptually sound and that are implemented with high integrity. This reinforces the fact that risk management structures and related strategies should be embedded in a bank’s culture and not be dependent on just one or two people. Risk management must be integrated into the culture of the organization with an effective policy and a program led by the senior management. It must translate the strategy into tactical and operational objectives, assigning responsibility throughout the organization with each manager and employee responsible for the management of risk as part of their job description. The Basel proposals provide a good starting point that banks can use to start building processes and systems attuned to risk management practice.

ACKNOWLEDGEMENTS

This work is supported by project PNII-RU-TE-351 financed by CNCSIS.

REFERENCES


AcademyPublish.org – *Risk Assessment and Management*


Sironi, A, Resti, A (2007). Risk management and shareholders’ value in banking: from risk measurement models to capital allocation policies, John Wiley & Sons Ltd


*** ISO Guide 73: 2002
***http://www.bis.org/bchs/basel3.htm
***http://www.bis.org/publ/bchsca.htm