RISK GOVERNANCE & CONTROL:
FINANCIAL MARKETS & INSTITUTIONS

EDITORIAL

Dear readers!

The recent issue of the journal is devoted to several risk governance issues.

Peiyi Yu, Jessica Hong Yang, Nada K. Kakabadse proposed hybrid capital securities as a significant part of senior bank executive incentive compensation in light of Basel III, a new global regulatory standard on bank capital adequacy and liquidity agreed by the members of the Basel Committee on Banking Supervision.

Roberto Moro Visconti states that global recession, started in 2008, is still proving an unresolved perfect storm and the financial crisis has affected also the real economy, creating widespread social unrest. He studies global recession and microfinance risk governance in developing countries.

Sylvia Gottschalk analyses the properties of the KMV model of credit portfolio loss. This theoretical model constitutes the cornerstone of Basel II's Internal Ratings Based (IRB) approach to regulatory capital.

Thomas Dietz investigates the issue of risk control function under the Basel II. Basel II aims at strengthening risk management within the institutions in order to enhance financial stability. Has Basel II failed because it could not prevent the financial crisis starting in summer 2007? This popular argument cannot really be subscribed to. His article takes a closer look at the provisions and - primarily driven by the financial crisis - at current suggestions for strengthening the rules further.

Metin Kaptan examines the optimal design of retention in securitisation, in order to maximize welfare of screening per unit of retention, assuming that screening is costly and that the bank intends to securitise its loans. In contrast to the focus of previous literature on tranche retention, he deviate from the constitutional mechanisms of tranche retention to present a pareto-optimal method of tranche retention.

César Fuentes, Edmundo R. Lizarzaburu, Edgar Vivanco aims their work to develop a revision of the literature within the main concepts in the international rules and standards related to risk management in companies. By this way, there will be an analysis of issues such as the COSO - ERM model, an introduction to the ISO 27000 and 31000 standards; and the Project Management according to PMI targeted at risk management.

We hope that you will enjoy reading the journal and in future we will receive new papers, outlining the most important issues in the field of risk governance and best practices of corporate governance!

RISK GOVERNANCE & CONTROL:
Financial markets and institutions

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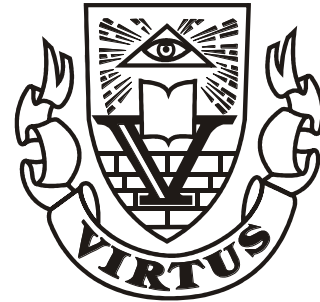
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probabilities of portfolio loss are underestimated when the probability of default of a single firm and asset correlations are high. Moreover, the relationship between asset correlation and probability of loan portfolio loss is only consistent at very high quantiles of the portfolio loss distribution. These are precisely those adopted by the Basel II Capital Accord for the calculations of capital adequacy provisions. So, although the counterintuitive properties of the KMV model do not extend to Basel II, they do restrict its generality as a model of credit portfolio loss.

DEVELOPING "BEST PRACTICES" FOR BANKERS' PAY IN LINE WITH BASEL III

Peiyi Yu*, Jessica Hong Yang**, Nada K. Kakabadse***

Abstract

This paper proposes hybrid capital securities as a significant part of senior bank executive incentive compensation in light of Basel III, a new global regulatory standard on bank capital adequacy and liquidity agreed by the members of the Basel Committee on Banking Supervision. The committee developed Basel III in a response to the deficiencies in financial regulation brought about by the global financial crisis. Basel III strengthens bank capital requirements and introduces new regulatory requirements on bank liquidity and bank leverage. The hybrid bank capital securities we propose for bank executives' compensation are preferred shares and subordinated debt that the June 2004 Basel II regulatory framework recognised as other admissible forms of capital. The past two decades have witnessed dramatic increase in performance-related pay in the banking industry. Stakeholders such as shareholders, debtholders and regulators criticise traditional cash and equity-based compensation for encouraging bank executives' excessive risk taking and short-termism, which has resulted in the failure of risk management in high profile banks during the global financial crisis. Paying compensation in the form of hybrid bank capital securities may align the interests of executives with those of stakeholders and help banks regain their reputation for prudence after years of aggressive risk-taking. Additionally, banks are desperately seeking to raise capital in order to bolster balance sheets damaged by the ongoing credit crisis. Tapping their own senior employees with large incentive compensation packages may be a viable additional source of capital that is politically acceptable in times of large-scale bailouts of the financial sector and economically wise as it aligns the interests of the executives with the need for a stable financial system.

Keywords: Basel III, Executive Compensation, Corporate Governance, Global Financial Crisis

*University of East London, Dockland Campus, University Way, London, E16 2RD
Email: p.yu@uel.ac.uk
**University of East London, Dockland Campus, University Way, London, E16 2RD
Email: j.h.yang@uel.ac.uk
***Northampton Business School, C214, Park Campus, Boughton Green Road, Northampton NN2 7AL
Email: nada.kakabadse@northampton.ac.uk

Introduction

The global financial crisis sparked in 2008 highlighted the weakness in risk management developed through the Basel II process. The purpose of Basel II was to create an international standard that banking regulators can use when creating regulations about how much capital banks need to reserve to guard against financial and operational risks. As a key component of bank governance, equity-based compensation usually induces bankers to take excessive risk and create asymmetric rewards and penalties: large bonus for good performance, but no penalties for failure (Bebchuk et al., 2010, Tung, 2010). Because banks are highly leveraged, shareholders are likely to use their control power over executive compensation to encourage a manager's risk taking behaviour and then shift the risk to regulators and debtholders (Vallascas and

Hagendorff, 2010). Government guaranties of bank deposits further limit debtholders' incentive to monitor and control management by insulating bank creditors from bank failure (Bolton et al., 2010, Benston et al., 1995). Stock-based incentives, in fact, align the risk preferences of managers with those of shareholders at the expense of debtholders and regulators (John et al., 2010, Jensen and Meckling, 1976).

In response to the 2007–2009 credit crises, financial institutions have started to overhaul their compensation structure. Scholars believe that compensation systems are key components of a bank's governance and risk management, contributing to bank performance and risk-taking (Barnes et al., 2010). The Basel Committee on Banking Supervision (BCBS) updated its guidelines for capital and banking regulations with the aim to promote a "*best practices*" approach to risk

management (Bank For International Settlements, 2010). Any revised compensation schemes after the crisis should meet the aim of the FSF Principles for Sound Compensation Practices (2009) in order to curb bankers' appetite for risk taking and align the arrangement of compensation with the regulators' goal of assuring bank safety, prudent risk-taking, effective supervisory oversight and stakeholder engagement. For example, in November 2008, UBS set out a new bonus system that requires its senior bankers to repay part of their bonuses if they under-perform in years of losses (Gow, 2008). In the U.K., Lloyds TSB agreed to pay 2008 bonuses over three years starting from 2010 in its subordinated debt or loan notes[*] (Martin, 2008).

In light of Basel III, we propose hybrid capital securities to be a significant part of the variable incentive compensation for senior bank executives. In other words, banks pay their bankers with their own banks' preferred shares and subordinated debt. The new scheme aims to reward for those who deliver good results over several years without taking unnecessarily high risk. Recipients of hybrid capital securities could not sell their securities before maturity. The maturities of these securities are usually longer than five years and the payoff from holding them is limited by the face value plus coupons. This new bonus scheme could help banks avoid the problems caused by paying cash and stock-based bonuses.

The Relationship between Corporate Governance and Executive Compensation

The concept of corporate governance is initially pointed out by Adam Smith (1776) based on the work *The Wealth of Nations*. He observes the possible danger connected to the diffusion of stock companies by the lack of incentive for both the owners and managers to manage and control the enterprise efficiently and effectively. Since its conception, Berle and Means' (1932) Principal-Agent model underpins the philosophy of the modern theory of the firm and many models of corporate governance, including that of executive compensation (Ratneser, 2000). Providing incentives to managers of publicly-owned companies is the classic example of the Principal-Agent challenge that assumes that the primary means for shareholders to ensure that managers take optimal actions is to tie managers' pay to the firm's performance (Ratneser, 2000). In effect, this assumption provides incentives for managers to maximise returns to shareholders (Berle and Means, 1932). Pursuing such a linkage aligns the interests of managers with the interests of shareholders. Jensen and Meckling (1976) propose the agency theory that defines the agency relationship as a contract under

which one party (the principal) engages another party (the agent) to perform some service on its behalf. Agency problems arises when the agents (managers) do not necessarily make decisions in the best interest of the principal (shareholders) (Jensen and Meckling, 1976). In order to reduce the divergences of interests between managers and shareholders, two complementary mechanisms – monitoring and incentives – have been designed with the aim to prevent financial damage that can arise due to potential conflicts of interest between managers and shareholders (Jensen and Meckling, 1976, Shleifer and Vishny, 1997). Incentives via executive compensation schemes take a number of different forms such as salaries, bonuses, recruitment incentives, stock options, equity ownership, or pension benefits (Jensen and Meckling, 1976, Fama, 1980, Fama and Jensen, 1983). Agency theory predicts that compensation such as stock options can be the standard solution for inducing risk-seeking behaviour because of their payoff function (Jensen and Meckling, 1976, Smith and Stulz, 1985). The overall purpose of these incentives is to place the managers in a position congruent with the economic interests of the enterprise as a whole.

Theoretically, scholars divide the study of executive compensation into two competing views: the optimal contracting view and the managerial power view (Bebchuk and Weisbach, 2010, Bebchuk and Fried, 2005, Choe et al., 2009, Sun et al., 2010, Bebchuk et al., 2010, Weisbach, 2007). Optimal contracting anticipates that remuneration committees have sufficient incentives to determine executive compensation that optimises on behalf of shareholders (Mirrlees, 1976, Holmstrom, 1979) Structural variables such as board composition and characteristics are insignificant or relevant. In contrast, the managerial power view believes that optimal contracting, originally designed to help remedy agency problems, may have actually become part of the problems because board structure is inefficient due to unresolved agency problems, leading to sub-optimal outcomes (Bebchuk and Fried, 2003). Executives may exert enormous influence over the board of directors to make such pay arrangements in favor of themselves instead of the shareholders. Lee (2006) expresses considerable concern about the contractual terms of compensating top executives, particularly in the form of profit-related bonuses, share options and termination payments which often transpire when company performance has been poor. According to Osterloh and Frey (2005), the performance-pay relation might be a misleading indicator of the compensation arrangements, which are difficult to implement and encourage risk behaviour in a very short-term period. The main academic voice against executive bonuses was raised in the 1930s by John C. Baker, a professor and associate dean at the Harvard Business School (Baker, 1936, Baker, 1939). Baker (1939) reports that

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[*] The UK government has agreed to the Lloyds bank's staff, including low-level workers, receiving about £80 million in 2008 bonuses.

he could find little correlation between executive salaries and corporate earnings (i.e. the lack of evidence that bonuses contributed positively to organisational performance). Baker (1939) argues that there is both the lack of "*guiding principles*" in the field of executive compensation and of "*definite objectives*" in the creation of compensation schemes within large corporations. Similarly, Roberts (1956: 271) also finds that "*executive compensation is related significantly to ... corporate size. Its relationship to the level of profit is superficial and disappears when the influence of size on both compensation and profit is taken into account*".

A Review of "Pay for Performance" Compensation Scheme

The past two decades have witnessed the dramatic increase in the performance-related pay in the banking industry. Pay for performance compensation schemes which link executive pay with stock price has been an important feature of executive contracts in Anglo-American systems prevailing in the U.S./U.K. (Murphy, 2003, Benmelech et al., 2010). Agency theory promotes the use of management-shared ownership via stock compensation to ensure that managers make decisions in the best interest of the company (Jensen and Meckling, 1976). Stock compensation has strong association with managerial performance, providing a solution to an agency problem between shareholders and managers. The studies by Murphy (1985), Antle and Smith (1986) and Jensen and Murphy (1990) document the evidence of a statistically significant association between total compensation (cash and share options) and share price performance. For example, Jensen and Murphy (1990) identify that stock options offer the stronger basis for strengthening the performance-pay link than other pay components through the analysis of the pay structure of 1688 executives' compensation between 1974 and 1986. Murphy (1985) highlights the importance of building a comprehensive pay variable from the analysis of 461 individuals in 72 U.S. firms from 1964 to 1981. According to Hall and Murphy (2003), stock-based compensation, such as restricted stock and stock options, help align managerial and shareholder interests and motivate shareholder wealth creation.

By contract, a large amount of academic debates have drawn attention to the danger of a stock-based compensation structure that might lead to earning manipulation, excessive risk taking and fraudulent schemes (Goldman and Slezak, 2006, Crocker and Slemrod, 2007). Bebchuk and Spamann (2010) argue that stock-based awards, associated with the capital structure of banks, link executives' compensation to a highly levered bet on the value of banks' assets. Overly complicated compensation schemes further encourage such profit-oriented behaviour. John and John (1993) argue that stock-based compensation

increased managerial risk appetite and offered executives an opportunity to take excessive risk in order to bolster a company's share price with short-term maneuvers and gain significant reward without having to bear any downside risks. Sawers *et al.* (2007) have based a study on the behavioral agency model, which predicts that a manager's wealth in stock-based compensation will influence managerial risk-seeking behaviour. The results suggest that the subjective overvaluation of stock options based on historical rising stock price trends increases risk-bearing behaviour.

Although causes of the financial turmoil are multidimensional, analysts and scholars (Miller, 2008, Bebchuk and Spamann, 2010) have blamed the misaligned compensation arrangements that encouraged management short-termism for the failure of high profile companies such as Bear Sterns, Lehman Brothers, Fannie Mae and Freddie Mac in the U.S. The financial regulators blame those who devised pay-for-performance incentive schemes, which encouraged and rewarded short-term and excessive risk-taking behavior (Miller, 2008). Prior studies on risk taking by financial institutions generally find that risk taking by banks is higher in those with large and diversified blockholders[†] (Laeven and Levine, 2009). Mehran and Rosenberg (2008) associate CEO stock option grants with lower debt and higher capital ratios, but riskier investments. Bebchuk *et al.* (2010) indicate that the top-five executive teams of Bear Sterns and Lehman Brothers cashed out large amounts of performance-based compensation in the form of cash bonus and equity sales during the period 2000-2008. Shareholders are highly concerned with rewards for failure as executives walked away with large pay packets even when the stock market collapsed (Healy, 2009, Goldfarb, 2009).

What are the Hybrid Bank Capital Securities?

The bank hybrid securities that our study examines are *not* the traditional hybrid securities that financial institutions issue on the condition that on conversion time, one hybrid security will convert into one equity share. The hybrid bank capital securities that we propose for bank executives' compensation are preferred shares and subordinated debt that the Basel II regulatory framework recognises as other forms of admissible capital. Instead of adopting the traditional way of obtaining more capital by issuing ordinary shares, banks were allowed to use hybrid bank capital securities as one alternative of creating regulatory capital.

Briefly speaking, these hybrid bank capital securities are debt-like instruments that exhibit

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[†] The owner of a large amount of a company's shares. These owners are often able to influence the company with the voting rights awarded with their holding.

certain characteristics of shares, such as the possibility of interest deferral, deep subordination and very long maturities. We can classify these hybrids into the following three groups: Tier 1 securities,

Upper Tier 2 securities and Lower Tier 2 securities in accordance to the risk and return characteristics. *Table 1* highlights some important features of these hybrids.

Table 1. Features of Three Hybrid Bank Capital Securities

Category	Description	Basel II
Core Tier 1		Common stocks and retained earnings
Hybrid bank capital securities	Tier 1 hybrids	o Deferred coupons **non-cumulative** o No/ very long maturity o Call rights for issuer o **Innovative**: the capital instruments with step-ups in the coupon rate o **Non-innovative**: the capital instruments with no step-ups in the coupon rate o With high subordination
	Upper Tier 2 hybrids	o Deferred coupons **cumulative** o No/ very long maturity o Call rights for issuer o **Innovative**: the capital instruments with step-ups in the coupon rate o **Non-innovative**: the capital instruments with no step-ups in the coupon rate
	Lower Tier 2 hybrids	o No coupon can be deferred o Very long maturity o Call rights for issuer o **Innovative**: the capital instruments with step-ups in the coupon rate o **Non-innovative**: the capital instruments with no step-ups in the coupon rate

Source: Compiled by Authors

Figure 1. Risk and Return of Hybrid Bank Capital Securities
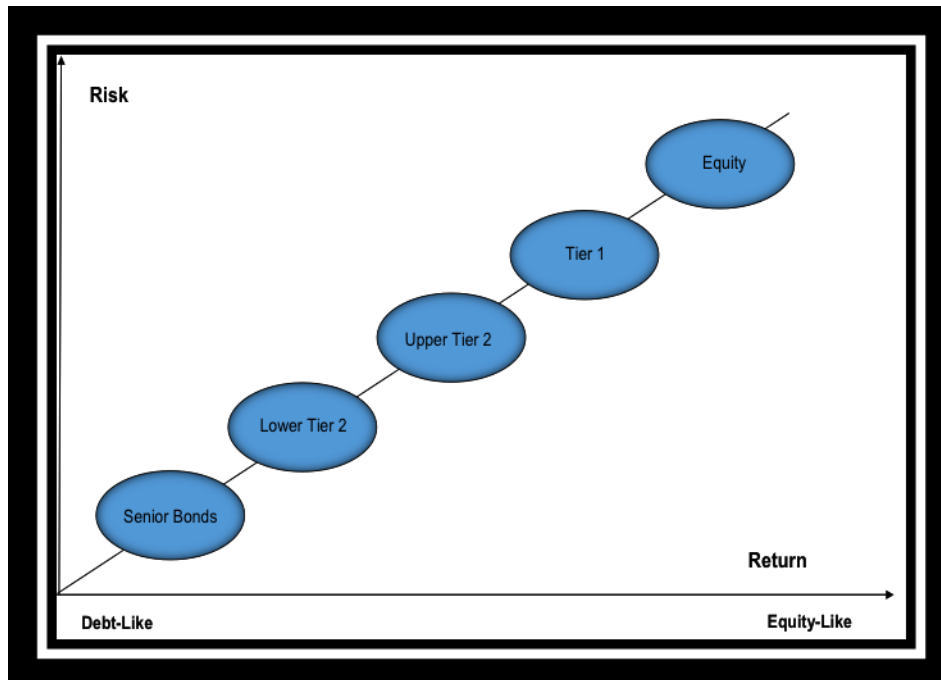
Source: Compiled by Authors

Figure 1 below is a stylised representation of the risk-return relationship of the various hybrid bank capital securities. In general, investors in hybrids bear a number of risks which are not present in senior

bonds, such as the risk of a cancelled or deferred coupon payment, and risk of extension[‡]. Tier 1

[‡] Risk of extension: If an issuer, whose credit quality deteriorates, decides not to call a security at the call date,

securities are more **equity-like** than Upper Tier 2 and Lower Tier 2 securities as they subordinate to all other kinds of instruments, except ordinary shares. For Tier 1 securities, deferred coupons are non-cumulative, i.e. the financial institution will not pay them in the future (BIS, 2004)).

Investors in Upper Tier 2 hybrid bank capital securities bear similar risks as Tier 1, but coupons are **cumulative** (i.e. the financial institution will pay the deferred coupons in the future). Lower Tier 2 securities are more like **senior bonds**, insofar as they rule out coupon payment deferral or cancellation. However, they are more volatile than senior bonds during their term to maturity due to their subordination to senior bonds in the case of insolvency.

Basel II and Bank Hybrid Capital Securities

In the original 1988 version of the Basel Accord (Basel I), only two elements were eligible to make up core capital: equity capital and reserves (Basel Committee 1988). Only undisclosed reserves, revaluation of reserves, general provisions and hybrid debt/ capital instruments and subordinated term debt could comprise supplementary capital. At first, the Basel Accord (Basel Committee, 1988) viewed hybrid capital instruments as part of supplementary capital. In the October 1998 "*Instruments Eligible for Inclusion in Tier 1 Capital*" press release, the BCBS admitted the inclusion of hybrid instruments as part of core capital, provided that financial institutions fulfilled certain conditions. The Basel Committee on Banking Supervision (Bank For International Settlements, 1998) foresaw the issuance of "innovative" capital instruments, with step-ups in the coupon rate at the call date and for the purpose of generating core regulatory capital at a lower cost. The BCBS placed a 15 percent cap on these innovative securities as core capital. Moreover, the BCBS allowed banks to issue additional "*non-innovative*" capital securities that had a call date and often included a switch from fixed rate to floating rate at that day, but did not involve a coupon step-up.

This change was one of the main drivers of the increased issuance of hybrid capital securities by financial institutions. In *Figure 2*, we show that the face value of hybrid bank capital securities outstanding in the euro zone grew 25-fold between 1998 and 2008. The market for hybrid securities expanded rapidly because the market perceived them as a timely solution to the demands of both issuing institutions and investors. There are three major growth drivers in the European market for hybrid bank capital securities: 1) the aforementioned Basel regulatory framework; 2) the adoption of easy-to-

understand rating standards by the rating agencies; and 3) and the introduction of the Euro (Yu and Luu, 2009).

Basel II, the revised framework agreed on by the BCBS in 2004, made amendments to the capital adequacy rules for financial institutions, but it maintained the 15% limit for innovative Tier 1 securities (Bank For International Settlements, 2004). The Basel committee conceded individual governments some flexibility with regard to non-innovative Tier 1 securities (Bank For International Settlements, 2004). Therefore, the limits for non-innovative Tier 1 hybrids vary across different jurisdictions, with some countries allowing hybrid debt to form up to 50% of all Tier 1 capital, whilst other jurisdictions allow significantly less. *Table 2* shows a summary of national regulations. For example, Austrian banks can issue both innovative and non-innovative hybrid bank capital securities totaling up to 50% of net Tier 1 capital. Since innovative hybrid bank securities are limited to 15%, Austrian banks can issue up to 35% of their hybrid capacity in the form of non-innovative securities if they want to maximise the hybrid component of the capital mix.

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the investor is subject to extension risk. Often, a step-up occurs at the call-date, which may not be sufficient to compensate investors for the deteriorating credit risks.

Figure 2. Euro Financial Corporate Index Sub-Debt (Face Value)

Unit: € million
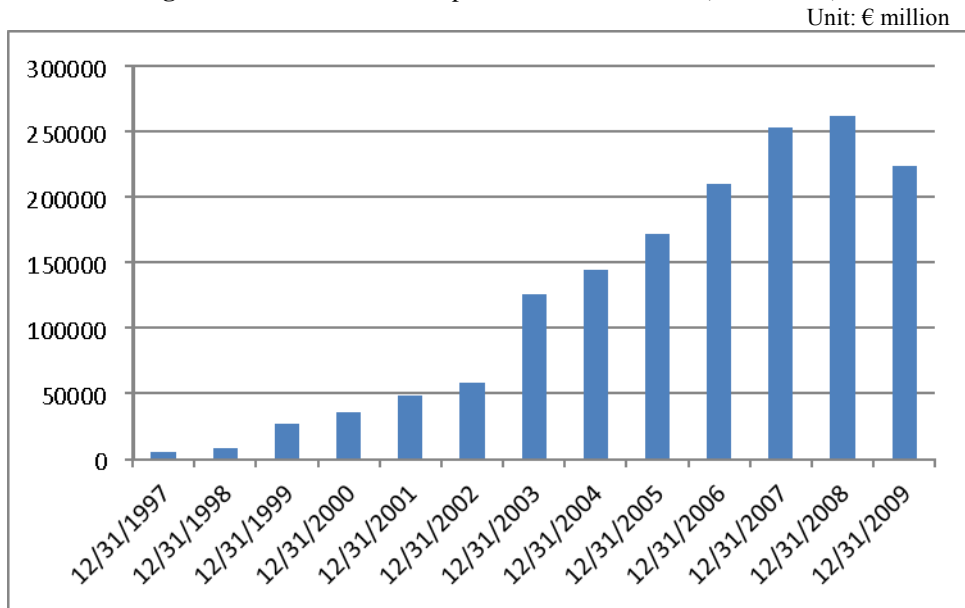
Source: Compiled by authors (data collected from Global Index System)

Table 2. Hybrid Limits as a Proportion of Total Tier 1

	Supervisory Limit on Innovative Tier 1	Supervisory Limit on Hybrids Excluding Non-cumulative Preference Shares	Limit on Tier 1 Bank Hybrids under National Company Law
Non-additive limits			
Austria	15%	30%	50%
Belgium	15%	33%	33%
Denmark	15%	15%	Not recognised
France	15%	25%	No issuance so far
Germany	15%	50%	Not recognised
Greece	15%	30%	No limit (Issuance unusual)
Ireland	15%	50%	No limit
Italy	15%	15%	50%
Netherlands	15%	50%	50%
Norway	15%	15%	No issuance
Portugal	20%	20%	50% (Issuance unusual)
Spain	15%	30%	30%
Sweden	15%	15%	No limit
U.K.	15%	15%	50%

Source:CEBS (European Banking Authority, 2007)

Why Should Bank Executives' Compensation Comprise Hybrid Bank Capital Securities?

Moral hazard problems exist, particularly in the monitoring of managerial risk-taking behaviour in the banking industry because the corporate governance in banks differs from that of a generic company (Mülbert, 2010, Vallascas and Hagendorff, 2010). Bank shareholders benefit from high leverage, and thus encourage management to take excessive risk via the control of executive compensation. The cash and equity-based compensation exaggerates the management risk appetite due to the rewards that management bases on short-term performance (Vallascas and Hagendorff, 2010). Since some long-term compensation incentive risks are not incorporated in the traditional compensation scheme, we suggest that banks' stakeholders and regulators should push for a change in remuneration practices. In particular, we argue that hybrid bank capital securities should pay a substantial part of senior bank executives' incentive compensation**.** Our rationale is that the face value and all coupon payments during the maturity will restrict the payoff from holding these hybrid bank capital securities (Yu and Luu, 2009).

$$\text{Hybrid Valuation} = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} \ldots + \frac{C_n + F}{(1+r)^N}$$

Where:
The maturity of this hybrid will last for N years
C: Coupon payments of these bank hybrids
F: Face value of these bank hybrids (In the U.K., face value=£100)
R: Required rate of return

According to the hybrid valuation equation, we can observe that the financial institutions have already fixed the future cash flows which Bank CEOs will receive through the whole maturity at the same time when they pay these bank hybrids as their bonus at Year 0 (Yu and Luu, 2009). No matter how much risk a banker undertakes later on (in the following N years), the maximum bonus rewarded to these bank CEOs will be limited to these fixed cash flows generated from coupon payments and face value. We believe that this design will discourage these bank CEOs to take excessive risks.

Unlike common stock and stock options, which are currently popular forms of incentive compensation for executives (Bebchuk et al., 2010), hybrid bank capital securities would limit the upside from driving bank profits even higher since the maximum future cash flows are fixed. However, this new bonus system still exposes bank managers to the downside risk of insolvency. We can use the aforementioned equation to explain our proposal. If a bank goes bankrupt before the maturity, its CEOs will lose several coupon payments and face value which they originally expect to receive at the end of maturity. Yu and Luu (2009) and Tung (2010) argue that paying bankers with their own banks' public subordinated debt securities will give bankers direct personal incentives to avoid excessive risk because market pricing of these securities is sensitive to downside risk at the bank. In return, this may contribute to a more prudent management of financial institutions in the future.

The emphasis on the share price has led some bank executives to take greater risks than they otherwise would have to achieve a higher reported return on equity in a short term, as exemplified by Mehran and Rosenberg's (2008) findings. The proposed new bonus scheme may overcome this drawback if the recipients of these hybrid bank capital securities cannot sell the securities before the issuer repays them. This occurs when the financial institution calls the hybrid bank capital securities or at final maturity (Yu and Luu, 2009). Maturity of these hybrid bank capital securities are usually longer than 5 years, so the new remuneration system would see rewards for those who deliver good results for longer terms.

In addition, we propose that banks should publish the purchases and sales of an institution's own hybrid bank capital securities by its senior executives, as is already the case with equity purchases and sales by company directors. The signal that executives send by buying their own institutions' hybrid bank capital securities could help investors and other stakeholders gain greater confidence in the solvency of a bank. Unusual sales of hybrid capital securities by executives may have the opposite effect, but would also provide useful information and help market participants identify well in advance deteriorating financial institutions.

Basel III

The nationalisation of Northern Rock in the U.K. wiped out some Tier 1 securities, whilst others continued to receive coupon payments (Davies, 2009). In the case of Bradford & Bingley, all Tier 1 issues became worthless (Unmack, 2009). As the lack of international consistency in the treatment of hybrids became apparent, the European Commission (according to the BCBS 164) recently harmonised the rules of capital definition for all EC banks (Bank For International Settlements, 2004). It includes limits on hybrids, with predominant core capital of a minimum of 50% and a possibility of having hybrids up to 35% of total capital before any bank holding deductions.

In January 2011, the Basel Committee outlined the new rules for hybrids in the context of Basel III (Bank For International Settlements, 2011). The Committee requires consistency of the regulatory capital after the end of the transition period (the end of 2012) with the following instruments (Bank For International Settlements, 2011):
a) No change for Core Tier 1 which still includes common stocks and retained earnings;
b) New terms for Tier 1 hybrids: no maturity, non-cumulative deferred coupons, no step-up, conversion after breach of objective trigger, and write off / conversion on decision of regulator; and
c) New features for Tier 2: no step-up, long maturity, no distinction between Lower Tier 2 and Upper Tier 2, write-off/conversion on decision of regulator.

Table 3 summarises these changes:

Table 3. Bank Hybrid Securities under Basel III

Category	Basel II	Basel III	
Core Tier 1	Common stocks and retained earnings	The same as Basel II	
Hybrid bank capital securities	Tier 1 hybrids	o Deferred coupons **non-cumulative** o No maturity o No step-up o Conversion after breach of objective trigger o Conversion on decision of regulator o Write-off	
	Upper Tier 2 hybrids Lower Tier 2 hybrids	No distinction between Upper Tier 2 and Lower Tier 2 hybrids	o Long maturity o No coupon deferral o No step-up o Conversion on decision of regulator o Write-off

Source: Compiled by Authors

The most important innovation is that, in the case of Tier 1 hybrids, conversion into equity will occur once a fixed objective trigger has been reached, although the Committee has yet to define the trigger. The exact trigger will probably not become clear until the Basel guidelines become national law. Furthermore, the Committee should not include step-ups in the Tier 1 hybrid's new terms. Currently, the new Tier 1 hybrids are popular in the market. Contingent Convertible instruments, or "*CoCos*", it is unclear whether already issued CoCos meet the criteria of Basel III. For Tier 2 hybrids, the new Basel III document allows these Tier 2 hybrids to have a long maturity and in order to include them in equity capital, a company or any of its subsidiaries cannot hold or own its Tier 2 hybrids [§].

After reviewing the new regulatory framework of Basel III on hybrids (Bank For International Settlements, 2011), we believe that both the new Tier 1 and Tier 2 securities are suitable as a significant portion of bank executives' compensation pay. Although there is a mandatory conversion of the new Tier 1 securities into equities when the trigger is breached, this conversion arguably occurs when the bank is in a situation of some financial distress and share prices are likely to be depressed (Bank For International Settlements, 2011). Executives would not unduly benefit from attempting to raise share prices through risky strategies, as may be the case if their compensation is primarily made up of common stock and options.

The global financial crisis provided an initiative to reform bankers' pay coincided with a decades-long tread of banking deregulation (Yu and Luu, 2009, Tung, 2010). We propose that the only way towards "best practices" is to design a new approach to executive compensation which incorporates new bank regulations on capital requirements and market discipline into the pay-for-performance design. In addition, aligning the interests of management with those of shareholders via equity-based compensation, hybrid securities encourage the use of debt-like instruments that take debtholders and regulators' interests into consideration.

Conclusion

This paper provides an overview of the initiatives of reforming bankers' compensation in light of recent corporate governance failures in banks and the risk management under Basel III (Bank For International Settlements, 2011). Paying compensation in the form of hybrid bank capital securities may help banks regain their reputation for prudence after years of aggressive risk-taking. We position that the asymmetric payoff of these securities to the holders makes them particularly suitable as part of executive compensation packages. Moreover, banks are desperately seeking to raise capital in order to bolster balance sheets damaged by the ongoing credit crisis (Bank For International Settlements, 2011). Basel III especially expects banks to meet the requirements by 2019. For banks to tap into their own senior employees with large incentive compensation packages may be a viable additional source of capital that is politically acceptable in times of large-scale financial sector bailouts and is economically wise as it aligns executive interests with the need for a stable financial system. Given the important role of banks in the economy, the public and the market have a high degree of sensitivity to any difficulties potentially arising from any corporate governance failures in banks (Bank For International Settlements, 2010). Studying a new form of compensation might contribute to the bank's sound governance, stability of the international financial system and the reaction

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[§] After January 1, 2013, there will be only Basel III compliant issuance.

to the public anger over 'rewards for failure'. Thus, risk management in corporate governance is of great relevance both to the individual bank and to the economy as a whole.

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GLOBAL RECESSION AND MICROFINANCE RISK GOVERNANCE IN DEVELOPING COUNTRIES

Roberto Moro Visconti*

Abstract

Global recession, started in 2008, is still proving an unresolved perfect storm and the financial crisis has affected also the real economy, creating widespread social unrest. Microfinance institutions (MFIs) in developing countries seem however less affected by the worldwide turmoil, due to their segmentation and resilience to external shocks. Recession has a big impact on governance mechanisms, altering the equilibriums among different stakeholders and increasing the risk of investment returns; any governance improvement is highly welcome and recommended. No governance, no money for growth or bare survival. In the confused phase we are living in, at the moment there are not evident winners, but the underbanked poorest, unless properly supported, once again risk being the ultimate losers.

Keywords: Microfinance, Governance Risk, Recession, Developing Countries

*Department of Business Administration, Università Cattolica del Sacro Cuore, Milano, ITALY
Tel: +39.02.89072549
Fax: +39.02.89073293
Email: roberto.morovisconti@morovisconti.it

1. The Magic in Microfinance: Is It a Solution for Adverse Selection, Moral Hazard, Strategic Default and other Governance Issues?

"Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment", according to Shleifer and Vishny (1997). In synthesis, it is essential to give investors legal protection from expropriation by managers, limiting self dealing.

In a broader sense, corporate governance sets the rules of cohabitation and the behavior of the different stakeholders that pivot around the MFI (borrowers, lenders, shareholders, supervisory authorities …). As pointed out by Kostyuk et al. (2011) and Choi and Dow (2008), corporate governance mechanisms greatly differ across the world, reflecting country specific attitudes.

Information asymmetries - a classical governance problem - traditionally arise since borrowers have better information about their creditworthiness and risk taking than the lending bank has. They originate conflicts of interest which might seriously prevent efficient allocation of finance: the liquidity allocation problem derives from the fact that although money is abundant, it is nevertheless not easy to give it to the right and deserving borrowers.

Relationship lending relies on personal interaction between borrower and lender and is based on an understanding of the borrower's business, more than to standard guarantees or credit scoring mechanisms, and represents a key factor in countries with a weak financial system counterbalanced by strong informal economic activity (World Bank, 2008, p. 9); multi-period and state contingent contracts – typical of relationship lending – are an efficient device for dealing with asymmetric information (Petersen and Rajan, 1995).

Adverse selection is a typical problem in money lending and it occurs even in traditional banks, when – not knowing who is who – they cannot easily discriminate between good and risky borrowers, who should deserve higher interest rate charges.

Moral hazard is a classical "take the money and run problem", since borrowers might try to abscond with the bank's money or try not to fully get engaged in the project for which they have been financed.

Strategic bankruptcy is false information that the borrower gives about the outcome of his financed investment, stating that it has failed even if it is not true only in order not to give back the borrowed money. Poor borrowers generally have little or no collateral, so they might have little reason to avoid strategic default.

These classical corporate governance problems are well known in traditional banking and they naturally bring to sub-optimal allocation of financial

resources and to capital rationing problems that frequently affect even potentially sound borrowers, if they are not able to differentiate themselves from those who bluff.

Standard banks in developed countries normally react trying to reduce information asymmetries, using credit scoring analyses, monitoring and asking for guarantees (in the form of sizeable collateral with an intrinsic market value).

Since microfinance borrowers are normally unable to give any worthy guarantee, these problems normally are even more acute in a context that has also to take care of greater information fallacies and weak judicial systems (Armendariz De Aghion and Morduch, 2010).

As a consequence, any attempt or device to find a solution which can contribute to mitigate these conflicts of interest between the lending bank and the borrower is of crucial importance for the success of microfinance. As we shall see, if microfinance bears higher problems on some aspects, in others it can intrinsically reduce risks, if compared to traditional banks. Specific microfinance loan contracts are designed with distinctive features (such as joint liability and dynamic incentives) to mitigate these pervasive problems.

The standard agency problem concerns conflict of interests between a potential lender (the principal), who has the money but is not the entrepreneur, and a potential borrower (the agent), a manager with business ideas who lacks the money to finance them. The principal can become a shareholder, so sharing risk and rewards with the agent, or a lender, entitled to receive a fixed claim. Agency theory explains the mismatch of resources and abilities that can affect both the principal and the agent: since they need each other, incentives for reaching a compromise are typically strong. In microfinance, equity stakes are typically rare (Pretes, 2002) and the standard model is concerned with a peculiar form of lending, which tries to overcome the abovementioned problems.

The main differences in dealing with these agency problems between traditional banks and microfinance institutions are the following:

- limited liability companies, where shareholders risk only the capital invested, are frequently financed by traditional banks, whereas MFI mainly finance households or small companies with unlimited responsibility; limited liability protects borrowers who might not be stimulated to repay their debt, especially if it exceeds their equity stake;
- the motto "no collateral, no money" traditionally applicable in standard banking undergoes severe problems in poor areas, where the collateral is mostly nonexistent (by definition, those who have valuable collateral … are not poor) or difficult to seize, also due to unclear property rights, a primitive judicial system and ethical problems (taking resources away from poor households might seriously undermine their chances of survival);

- microfinance loans have very short maturities, if compared with traditional banking loans, which can last even several years, and this gives the lender a big monitoring and enforcing power, checking weekly or monthly the repayment of interest rates, cashing early the lent capital and preventing the borrower from asking new money if he has proven delinquent with the first loan;
- microloans typically consist of very limited amounts, which strongly reduce the magnitude of the lending risk and allow for a better diversification;
- monitoring MF borrowers is more expensive and difficult, since credit scoring devices, computerized data, credit histories with delinquency rates and proper bookkeeping from the borrower are normally nonexistent or present at an infantry stage; on the other side, weekly meetings between the MFI and the group members (borrowers) allow the creditor to monitor the repayment status of each debtor publicly, increasing the transparency within the group and generating a form of peer pressure which is expected to foster internal monitoring, minimizing debt screening costs (Deutsche Bank, 2007, p. 4);
- *ex post* moral hazard, which emerges after the loan is made and when the investment is in process, might lead to the abovementioned "take the money and run" temptation, even invoking a fake strategic default (Tedeschi, 2006)[5]: while this well known phenomenon might be present in both cases, in traditional banking guarantees can represent a parachute, while in a MF context the absence of guarantees can be counterbalanced by a deeper in site (on field) control on the borrower and lower chances for him to leave his rural area (take the money without knowing where to run away might prove difficult); as a matter of fact, poor have poor chances for escaping repayments …
- reputation also plays an important role in preventing opportunistic behavior and poor borrowers, who at first sight do not have much to lose, in reality often are more concerned about this issue, since the chances they have are very limited and new opportunities strongly depend on a good track record; they also face the abovementioned mobility problems and, in general, these "problems", which can become positive chances for enforcing reputation, are stronger in women, so introducing a gender discrimination – well known in the MF experience – according to which at least in some

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[5] Dynamic incentives, such as access to additional loans, prove useful in reducing the strategic default option.

areas[6] women are better borrowers than men and might have stronger incentives to pay back the borrowed money, seen as a chance of emancipation (breaking gender-based barriers, typically considerable in underdeveloped countries), taking also profit or their better understanding of basic rural economics, since they – more than men - tend to run the limited resources of the family;

- strong information fallacies and asymmetries which evidently affect poor borrowers are in reality offset by good local information and enforcement mechanism which characterize rural lenders;
- MF might soften information asymmetry problems, if relationship lending and peer monitoring – often associated with mutual responsibility – is in place;
- microsaving and microinsurance can be positively linked to microloans, with a double side effect: if they are not available – as it frequently happens – than the whole microfinance circuit is weakened and more exposed to conflicts of interest.

The lender and the borrower might align their interests, paddling in the same direction – so reducing opportunistic behavior, one of the worst and most slippery hidden problems – if the borrower participates to the MFI business, becoming also a depositor and, possibly, a shareholder, this being a possible solution especially for loyal and not-so-poor customers; multi-role stakeholdership is a well known device to reduce many conflicts (and to worsen others)[7].

Adverse selection and moral hazard are, as a matter of fact, mutual governance problems, since they might characterize not only the behavior of the borrower towards the MFI, as it is universally known, but also the strategy of the MFI which, for instance, might use its informational advantage in the money market to charge too high loan rates or to take on too much risk with depositors' money.

High cost of capital (interest rate charges and banking fees) and short term repayment schedules represent an incentive for proper allocation of the loans to cash-flow-producing investments, able to ensure the service of the debt, preventing the temptation to address loans to consumables or working capital, which normally act as cash burning devices. The property of small investment fixed

assets (e.g., cars, agriculture tools …) might sometimes represent a limited guarantee for the lender, so decreasing the overall risk of the loan.

Short term (high-frequency) repayment installments, unrelated to the gestation timing of investments and to their ability to generate cash flows, are based on current income and assets of the borrower, marking a difference with the rigid philosophy of Basel II principles, now applying to mainstream banks in Western countries, according to which the capacity to generate adequate cash flow to service debt repayment should be the key parameter for lending scrutiny.

Lending is normally cash-flow based or collateral-based but with micro-credit this general banking classification seems too rigid and unable to describe its peculiar nature; poor borrowers with hardly predictable cash flows and unworthy collateral might still get credit, using typical microfinance innovative products. Improving cash-flow forecasting and/or use of effectively worthy collateral might be of great help in reducing interest rates: while this strategy seems hardly consistent with the poorest real possibilities, it might prove easier – at least to some extent – for the not-so-poor taking individual loans, with an established and growing business.

Focusing on ambitious but realistic scopes, albeit difficult to reach, is the right strategy, especially for illiterate poor who are not culturally used to targeting.

Progressive lending, a powerful device experimented in particular within group lending, might show some drawbacks – well known to industrial or trading corporations which increase their sales to clients which have gained a good reputation, but then start to misbehave, avoiding payments – if borrowers who lack the increased repayment capacity, go to other lenders in search for bridge loans, and pay old debts making new ones, exploiting information asymmetries and moral hazard techniques, in a well-known spiral of growing indebtedness, concealing and deferring the solution of problems that sooner or later come to a final judgment.

Adverse selection is also present, since riskier borrowers have a natural incentive in looking for extreme scenarios, while safer ones are more concerned about their reputation. The social or macroeconomic scenario, should external shocks occur (conflict; natural disaster; raise in interest rates …) might worsen these governance problems. Offering a borrower a lower interest rate on his next loan is a financial innovation device which had a huge impact on repayment of the current one (see the South African evidence analyzed by Karlan and Zinman, 2005).

The limited size and the short time horizon of loans is however a major obstacle to riskier but higher value-added projects, which become increasingly important with the growth of the

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[6] This is the case in Bangla Desh, where up to 95% of the clients of Grameen Bank are women, but not elsewhere, for example in Sub-Saharan Africa …

[7] A multi-role stakeholder simultaneously occupies different positions and he can act as a shareholder, lender, borrower, worker, manager. This context is typical in cooperatives (even credit cooperatives). Corporate governance problems might arise if the multiple stakeholder interest are not properly known outside, due to information asymmetries, and he has an undeclared and hidden prevailing interest, potentially harmful for the other players.

economy, and the consequent higher demand for differentiation. For these investments, other financial intermediaries are more adapt, being represented by bigger MFIs (ranking as Tier 1 institutions) or ordinary commercial banks.

In synthesis, microfinance can in some cases become a "magic tool" to produce new, cheap, flexible and simple ideas to circumvent information problems and asymmetries that are the main obstacle to optimal allocation of capital, exploiting smart innovations in corporate governance, contract theory and (flexible) product design. But enchantments soon vanish and are uneasy to deal with: MF soon reveals to be a difficult instrument, to manage with care, which needs fine tuning and constant monitoring. A useful device, although not a miracle or a panacea that comes for free.

In MFIs, separation of ownership and control, the standard agency problem of which corporate governance is much concerned about, is often somewhat milder than in traditional private corporations and social objectives might soften the conflicts of interests between the different stakeholders, although risking to decrease the stimuli for a better performance, harder to measure whereas non monetary parameters are also considered.

Even in MFIs, corporate governance is far from optimal and in underdeveloped countries it greatly suffers its backward environment. Any improvement in corporate governance mechanisms, both internal within each MFI and at the larger macroeconomic level (domestic financial system and country's economic and legal framework) can substantially reduce the cost of collected capital, in times of dramatic capital rationing, where those who do not fully comply with stricter rules are increasingly prevented from having any access to capital – if you do not follow the international rules of the game, you are not admitted playing.

2. THE HARMFUL IMPACT OF THE GLOBAL RECESSION ON POOR MICROFINANCE STAKEHOLDERS: HIGHLIGHTS AND EMPIRICAL EVIDENCE

It is widely recognized that "wild" globalization - without any control and driven by an unchallenged trust in the "market" - brings to growing inequalities between the richer and the poorer; recession typically worsens this perverse divergence of status, bringing to an increased necessity of financial access and outreach to relief the poorest. In this, microfinance can play a small but increasingly significant role.

The June 2008 Fitch's report[8] highlighted the growing integration of the microfinance industry into the global financial system. Fitch finds evidence of a positive relationship between the size and level of integration of an MFI and the impact that the financial crisis is having on its business plan, performance, and asset quality, outlining the dual impact that the crisis will have on MFIs: a funding or liquidity impact and an economic impact.

The report outlines the main sources of wholesale funding for the MFI sector as:

1) wholesale funding from development finance institutions (DFIs), socially-motivated funders, and to a lesser extent customer deposits
2) commercially orientated public and private sector funding.

While the first category of funding is usually counter-cyclical, MFIs access to commercial funding has been reduced and become more expensive when it is available. This has led to increased levels of refinancing risk, although the level of financing constraints varies by region. For example, Fitch notes that Eastern Europe (see also Dragan et al., 2009), central Asia, and the Balkans are experiencing tighter funding constraints than central and Latin America and raises the concern that from an operational standpoint, some MFIs may not be prepared to deal with these challenges[9].

According to Wellen and Mulder (2008), although microfinance did not feel the impact of some of the past financial crises, the current global financial crisis has brought tough times for most MFIs, first because of their greater integration within the larger financial markets, and second because the economy itself is suffering a hit due to rising inflation and reduced remittances. For the microfinance sector, it means that the capital funds will dry up, there will be shorter-term credits, and the demand for microfinance may eventually diminish. The authors suggest that in order to withstand the crisis, MFIs will have to diversify the sources of their funds, get a clear picture of their capital costs, develop a workable liquidity plan, diversify their portfolio, and increase operational efficiency.

There has been a dearth of international funding as a result of the current global financial crisis, as Murphy (2008) points out. This means that MFIs have to rethink their existing strategy to achieve their revenue and expansion targets. Standard & Poor's conducted a survey of MFIs, investments banks, microfinance investment funds, microfinance networks, microfinance industry associations and a rating agency to examine the needs of the sector. His paper highlights that industry experts see this phase as a positive development since slower growth will encourage MFIs to improve their operating discipline and enhance infrastructure to meet future expansion demands. It also recommends that MFIs should ensure portfolio diversification; improve risk management processes; work closely with

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[8] http://www.microcapital.org/microfinance-paper-wrap-up-the-microfinance-sector-its-success-could-be-its-biggest-risk-fitch-ratings/.

[9] See also http://www.microcapital.org/paper-wrap-up-fitch-ratings-report-microfinance-testing-its-resilience-to-the-global-financial-crisis-by-sandra-hamilton/

international financial institutions, development agencies and investors; and diversify the sources of funding to perform well in the current financial environment.

Krauss and Walter (2008) argue that microfinance, supported by donor agencies and non-government organizations, is traditionally recognized as a self-sustainable tool for alleviating poverty. In recent years, the access to funding by MFIs has diversified, for example, client deposits, refinancing via interbank deposits and commercial loans, and raising funds in capital markets. This paper analyzes both the market risk associated with microfinance, as well as the relative market risk by comparing MFIs to other potential emerging market investments. It concludes that MFIs seem to be significantly detached from global capital markets, both in absolute and relative terms. However, as the microfinance industry matures, market risk associated with MFIs will increase, although to a lower level than for most other emerging market investments.

Kyereboah-Coleman (2007) examine the impact of capital structure on the performance of microfinance institutions. The paper reports that most MFIs are experiencing slow growth, which is both a cause and effect of the global recession. Refinancing risk is a great concern for large and smaller donor-driven MFIs. Lower growth may make debt more expensive for current borrowers and practically unavailable for the new ones, causing a heavy blow to MFIs. Some financial consolidation happen as a result of small MFIs converging to cope with the crisis, however, it would be premature to say that bigger entities will survive the crisis unscathed.

Other sources, with almost daily updates, are easily found in the Web (Watson, 2009)[10].

Optimism about the capacity of MFIs located in developing countries to withstand the recession might be overestimated, since international Microfinance Investment Vehicles (MIVs) are naturally reluctant to admit that they are reducing their funding, if they so do. The main trade-off is between problems at home, due to exhausted shareholders of MIVs which recall funds to cover their own capital losses, and the attractive investment returns in a diversified business with good growth expectations. Risk is the other hot issue and since international investors have consistently mispriced risky Western assets, we wonder if they are enough lucid and capable to fairly price and assess the risk of MFIs in developing countries - a completely different case, increasingly looking for specialized investors.

In the confused phase we are living in, there are not evident winners, but the underbanked poorest once again risk being the ultimate losers.

3. THE IMPACT OF RECESSION ON THE RISK MATRIX OF A MFI

As we have seen, MFIs operating in developing countries are bound to face some impact during the ongoing global recession despite profiting from the double safety net of both being only partially correlated to their domestic financial markets, which in turn are often segmented from international markets. Bad and good news are blended and interact in many possible combinations, with so many potential outcomes that forecasts are difficult to make. As Niels Bohr used to say "it is very difficult to make forecasts, especially for the future".

The risk matrix might be conveniently interpreted in extreme situations, using stress tests to simulate problems and solutions in different scenarios; the simple and unsophisticated nature of many MFIs - especially the small, NGO driven, entities – makes this analysis difficult, even if not useless.

The matrix of risks which affect the MFIs, often interacting among them, has a deep impact on the corporate governance of the MFI, since the reaction of the different stakeholders (domestic and foreign shareholders and bondholders; employees; depositors; borrowers; NGOs; local communities related to the MFI; government …) is asymmetric and brings to new *ex post* equilibriums.

According to Watson (2009), there is a critical dimension of country and capital, if we consider the impact of the current recession on MFIs. Not all countries are in the same conditions and, among the different MFIs within each country, a big discriminator is represented by cash and capital, considered as a shelter against adversities and as an unavoidable fuel for growth.

Liquidity constraints increase risk and might also have unfavorable pro-cyclical effects, since lack of provision of adequate finance to borrowers can stop their investment plans and undermine their survival capabilities, preventing them to pay back their debt. Increasing default rates exacerbate liquidity constraints, with a spiral and self fulfilling effect which might prove extremely dangerous, even from a psychological point of view - "irrational" expectations, often neglected by purist academicians, are unfortunately quite common.

It takes years to build up trust and reputation whereas few weeks are enough to destroy both. And hysteria in financial markets is difficult to handle and might bring to "run to deposits" behaviors and panic selling, often irrational but in any case harmful.

In comparing the impact of recession in rich western countries versus poor and underdeveloped countries, the first - obvious - consideration is that at the very bottom line of poverty, there is not much wealth to be destroyed and if this might paradoxically look as good news for the destitute, well we should also consider that they have no parachutes or safe

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[10] See, for instance, http://www.microcapital.org; http://www.microfinancegateway.org; www.cgap.org.

nets and little if any shelter against adversities. The poorest can't simply lose what they already do not have! And financial exclusion for the destitute is paradoxically protecting them from the global turmoil.

In such a context, bad events such as recession might seem less harmful - since the poorest are much closer to bareness - even if they can give the kiss of death to those - and they are many - who are too weak to stand additional adversities, the last straw potentially being the fatal one.

Credit is a fundamental but dangerous human right, to handle with care, especially by those who are unfamiliar to it, preventing over-indebtedness.

The reaction of the poorest is often silent and their problems consequently underestimated, this being one of the hidden costs of being neglected.

Table 1 shows the different types of risks associated with MFIs, their behavior during the recession period and the impact on corporate governance mechanisms.

Table 1. The impact of microfinance risks on the MFI and its stakeholders during the recession period

Type of risk	Description of risk	Impact of recession	Impact on the MFI's stakeholders
Country and political (sovereign) risk	The likelihood that changes in the business environment will adversely affect operating profits or the value of assets in a specific country. Political risk derives from harmful political decisions or instability. In times of distress, sovereign risk becomes effective; credit default swaps spreads "explode" and recovery value shrinks.	Recession brings to a domino effect of country risk and credit default swaps on Government Bonds show a higher premium.. Successful MFIs show flexibility and resilience from economic volatility and since MFIs are not strongly correlated to the country's GDP and macroeconomic situation, they are most likely to experience less country risk which is affected by recession. See Krauss, Walter (2008).	Country and political risk increases the cost of capital and might discourage intervention of foreign investors (equityholders and bondholders). Even foreign NGOs can be frightened. Domestic stakeholders might consequently suffer and growth can be put at risk.
Financial Market risk	The risk that the financial conditions will be adversely affected by changes in market prices or interest rates, foreign exchange rates and equity prices.	During a recession, market risk for MFIs remains low as they are less dependent on capital markets. Institutional risk (due for example to Central banking or stock market regulations) can be a consequence of overreaction to the crisis by policymakers.	If interest rates increase or lending policies become stricter, borrowers find it increasingly difficult to get credit, but the whole workings of the MFI slows down, with a subsequent impact even on other stakeholders.
Foreign exchange risk	The risk of losses due to unstable currency exchange rates and adverse changes, such as devaluation of the local currency. MFIs face foreign exchange risk only to the extent that debt is denominated in hard foreign currencies.	Weak currencies are likely to devaluate against harder currencies and recession might speed up this process, if local inflation is higher and country risk worsens. Credit crunch deriving from recession and bank crises dries up foreign funds, so limiting new sources of risk.	If the MFI suffers an exchange risk unbalance, it becomes more fragile and all its stakeholders sooner or later get troubled.
Interest rate risk	The risk that changes in interest rates might affect operating and net margins of the MFI. Interest rates increases raise the cost of collected capital and are not always transmittable to more expensive loans, since borrowers might be unable to pay higher rates and their default risk might increase.	During a recession, basic interest rates normally decrease, since inflation is low. Risk premiums conversely tend to increase, due to a general higher default risk. The net effect often brings to an overall increase of interest rates and, consequently, to a higher risk of non - repayment from borrowers.	Borrowers' natural resilience and elasticity to interest rates helps to cope with this problem – up to a certain limit. Beyond that, borrowers are affected, with a chain reaction on other stakeholders.
Operational risk	It considers the risk that operational costs are higher than revenues, with consequent negative margins (borrowing and running costs are higher than lending profits).	MFIs face less operating risk due to the relationship they have with their clients who closely monitor their MFIs. Operational margins squeeze, due to creeping costs of funding and higher delinquency of borrowers. Growth is hindered and fixed costs have an evolutionary higher break even point.	Equityholders are the firs who suffer from margins' shrinking. Other stakeholders, such as debtholders, follow and even borrowers, sooner or later, pay their price, in the form of higher interests or reduced access to credit.

Type of risk	Description of risk	Impact of recession	Impact on the MFI's stakeholders
Credit (repayment or delinquency) risk	Credit risk applies to lending and investing activities and it considers the risk of financial losses resulting from borrowers' delay or nonpayment of loan obligations.	Credit risk is likely to grow during recession due to higher interest rates, higher repayment difficulties and probabilities of default. Emergency consumption dries up savings, so eroding guarantees and ability to match obligation from the poorest.	Capital rationing, which almost automatically follows any credit risk increase, affects borrowers, hardening new loans, and erodes margins and capital, damaging also the other stakeholders.
Liquidity risk	The risk of losses that arise from the possibility that the MFIs may not have sufficient funds to meet their obligations or be unable to access adequate funding.	During recession, funding is most likely to squeeze as donors hold back their subsidies and due to increased interest rates on the capital markets, MFIs will reduce acquisition of more debt financing. However MFIs should mobilize other sources of funding in the form of local savings and local debt.	No cash, no loans for borrowers, but also no job for the MFI.
Strategic risk	Earnings or capital arising from adverse business decisions or improper implementation of strategies, due to mismanagement or organization fallouts.	Strategic risk increases in recession as targets are more difficult to be reached. Mission drift might be a consequence of high strategic risk and subsequent fight for survival.	If the MFI modifies its targets, it changes also its stakeholders, bringing problems to the old ones and opportunities to newcomers.
Inflation risk	Probability of loss resulting from erosion of an income or in the value of assets due to the rising costs of goods and services. Surge in inflation levels might bring to deposits withdrawals for survival needs.	In recession, inflation risk normally decreases. The impact in poor countries is however asymmetrical and very volatile.	Foreign investors might get frightened, shrinking investments in local devaluating currencies (linked with inflation through the Purchasing Power Parity theorem), with a chain effect on other stakeholders.
Capital adequacy risk	Capital adequacy risk refers to the possibility of losses resulting from the firm's lack of sufficient capital to finance business operations. With under-capitalization, small adverse shift in circumstances can impair the solvency of the MFI, if bad loans erode the capital.	Capital adequacy of most MFIs might decline during the recession and may render some MFIs insolvent. The cost of raising capital grows when there are liquidity constraints and lack of confidence in the inter-bank loan market and in the capital markets.	No capital, no loans and no upgrading to higher ranking Tier MFIs. All stakeholders, again starting from borrowers, are affected.
Savings risk	Strongly linked with liquidity and funding risk, this risk has a direct impact on the licensed MFI's ability to collect deposits, which also represent a guarantee for loans to the same depositors	The attitude to save in recession is psychologically higher but physically much more difficult, since revenues are falling, affecting households' income. Survival consumption (cash needs) and lower remittances burn savings.	Depositors - borrowers are the first affected.
Default risk	The inability of the MFI to meet its obligations, unless occasional, brings it to bankruptcy. The risk can be considered an unlucky combination of some of the other risks described above, with particular reference to operational, credit and liquidity risk.	In recession risks are typically higher and their combination might be more frequent.	Game over for all the stakeholders! Lucky debtholders might get back some of their loans.

4. RISK GOVERNANCE AND BANANA SKINS AFFECTING MICROFINANCE STAKEHOLDERS

The Microfinance Banana Skins surveys explore the risks that the worldwide microfinance industry faces, considering both the current hazards and their trends (fastest rising risk factors). A table with the 2011 microfinance banana skins can help to have a first glimpse on the issue.

For what concerns in particular governance risk, it should be noted that (Moro Visconti, 2011, ch. 23):

- reputation, fast rising in ranking, is linked to transparency and other related factors (accountability, corporate governance, fairness …);
- corporate governance, also growing in its ranking, is concerned not only with the good management quality seen above, but also - more generally - to the set of regulations, agreements, processes, customs, and policies that affect the way a MFI is directed, administered or controlled, pivoting around its stakeholders;
- transparency concerns the real cost of microfinance loans and, more generally, the accountability of the business. It is closely linked with confidence and fair corporate governance relationship among stakeholders with potentially diverging interests. Shortage of funding increases competition and incentives towards better transparency.

Banana skins are closely related among them and require a holistic managerial approach to risk handling, adapting the MFI's business objectives and reengineering survival strategies, as an answer to external shocks such as recession.

5. GOVERNANCE IMPLICATIONS AND TRENDS: HOW RECESSION AFFECTS THE DIFFERENT MICROFINANCE STAKEHOLDERS

Recession affects different microfinance stakeholders, starting from the international equityholders and bondholders, which suffer severe cash constraints which might dry up Microfinance Investment Vehicles financing. Even borrowers might face increasing repayment difficulties and when the delinquency rate grows, lenders tend to become overcautious.

But MFIs have a gravity problem and growth cannot decelerate too much and too suddenly; rebalancing of power and new equilibriums among the different stakeholders is a typical consequence of the elasticity with which MFIs try to cope with the crisis, considering also the classical shanghai effect, according to which if You move one stick, all the others might follow, with a chain effect difficult to forecast.

Table 2. Microfinance banana skins 2011 (2009 position in brackets)[11]

Biggest risks	Fastest risers
1 Credit risk (1)	1 Competition (3)
2 Reputation (17)	2 Credit risk (1)
3 Competition (9)	3 Reputation (11)
4 Corporate governance (7)	4 Political interference (7)
5 Political interference (10)	5 Mission drift (13)
6 Inappropriate regulation (13)	6 Strategy (-)
7 Management quality (4)	7 Staffing (20)
8 Staffing (14)	8 Unrealisable expectations (17)
9 Mission drift (19)	9 Profitability (9)
10 Unrealisable expectations (18)	10 Inappropriate regulation (22)
11 Managing technology (15)	11 Corporate governance (12)
12 Profitability (12)	12 Management quality (18)
13 Back office (22)	13 Ownership (16)
14 Transparency (16)	14 Liquidity (5)
15 Strategy (-)	15 Product development (24)
16 Liquidity (2)	16 Macro-economic trends (2)
17 Macro-economic trends (3)	17 Managing technology (23)
18 Fraud (20)	18 Interest rates (10)
19 Product development (24)	19 Fraud (14)
20 Ownership (17)	20 Transparency (21)
21 Interest rates (11)	21 Back office (19)
22 Too much funding (25)	22 Too much funding (25)
23 Too little funding (6)	23 Too little funding (6)
24 Foreign exchange (8)	24 Foreign exchange (8)

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[11] Source: http://www.cgap.org/gm/document-1.9.49643/Microfinance_Banana_Skins_2011.pdf.

The impact on different MFIs is diverse, and each of them has its own reaction, according to its identifying parameters[12] (location; size; stage of development; Tier classification of capital; type of clients; funding and lending structure …). Some cope better than others and can even take advantage of this Darwinian selection. Time will tell which are the fittest who survive and the weakest might disappear or merge into stronger entities (the sooner, the better); this might drive to a consolidation within the microfinance industry, considering also that the current recession is a concrete obstacle to new initiatives, especially if sponsored by exhausted Western NGOs.

Conflicts of interest among different stakeholders arise when they pursue different goals - and this is what normally happens, following the "mors tua, vita mea" Roman motto - and any attempt to minimize them, aligning their interests with cooperative behaviors, can be of great help in the reduction of corporate governance problems. No conflicts, no governance puzzles.

And any change in the stakeholders' relationship and balance of power, induced also by the recession impact, is normally quite far from Pareto improvements, according to which a change from one allocation to another can make at least one individual better off without making any other individual worse off[13]. Even zero sum games normally incorporate huge asymmetric imbalances, with winners and losers, the latter sometimes being too weak to survive.

The conflicts of interests can be somewhat different and milder in credit cooperatives where multiple stakeholders interact, i.e. stakeholders which simultaneously cover different positions (shareholder, worker, lender and borrower …). Some primitive forms of dual stakeholdership are traditionally in place and proving effective in many MFIs, if borrowers are also lenders, with a deposit channeling which represents a partial guarantee for repayments (decreasing the net exposure towards the MFI); synergic use of microinsurance products can also help to reduce risk.

A hardly investigated frontier is represented by multilevel governance, which sets the rules of co-living between single MFIs (with their stakeholders) and a broader set of other MFIs and more complex financial institutions: renouncing at least partially to each MFI's sovereignty is a key step towards cooperation and flexible integration, with potentially relevant spill over on financial inclusion. Relationship banking, traditionally weak in underdeveloped countries and in small MFIs, is becoming harder in an international context where banks increasingly mistrust each other.

Table 3 contains a preliminary outlook of some conflicts of interests, with the identification of the stakeholders that originate the conflict and the counterpart, represented by other stakeholders. In many cases, multilateral events occur and conflicts are intertwined. The impact of recession is also described, following two main event streams:

1) global recession and credit crunch dries up the resources of international investors in MFIs located in developing countries, rationing the flow of funds;

2) the underserved clients of the MFIs, due to the slow down of exports to Western countries, remittances from abroad and the relative stagnation of local economies, are less eager to save and deposit their money in MFIs, run short of the capital they need for investments and when they get it, they pay more than before.

What damages the MFI has - sooner or later - a harmful impact on its clients. The MFI's celebrated resilience can soften this effect, but unfortunately for miracles we need something more.

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[12] Performance benchmarks used to set up peer groups of MFIs might conveniently divide MFIs in groups using more characteristics.
See, for a good example, http://www.themix.org/sites/default/files/MBB%2017%20Autumn%202008.pdf, page 33.
[13] Pareto optimality and corporate governance have broad applications in game theory and might be an interesting field of research, unfortunately beyond the aim of the present study.

Table 3. Conflicts of interests among the different stakeholders and impact of the global recession on the MFI

Stakeholders	Source of the conflict of interest	Description of the conflict	Impact of recession
International (professional) equityholders	Economic return has a priority over social achievements (maximization of outreach …). Sharp decrease in funding.	The targets of Microfinance Investment Vehicles or other institutional investors might privilege expected returns over outreach. With no additional money, repatriation of previous investments becomes harder and the investment might be a sunk cost.	International investors might transfer their own problems (concerning also their own Western shareholders) of MFIs, rationing capital injections, cutting investments and growth and speeding up disinvestments
International (professional) bondholders	Similar to those of equityholders, although with a softer risk/return profile	Even here returns for investors and sustainability of the MFI might predominate over outreach of the destitute; if debt is denominated in hard currencies, foreign exchange risk is borne by the MFI	Similar to that of international equityholders. If there is not money for equity, there are also no resources for debt underwriting.
International (NGO) equityholder	Capital rationing (also considering foreign exchange risk exposure)	If money dries up in Western countries, growth and development of MFIs slows down and might stop, preventing also the welcomed transition from NGOs to banks.	Recession typically slows down donations and might erode the equity of the NGO foundation, with an impact on funding.
International (NGO) bondholders	Same as above; foreign exchange risk is here only sometimes borne by bondholders	NGO bondholders often intervene at a later stage, when the MFI is about to transform into a regulated bank. So, the conflict might hit the MFI at a crucial stage of its development.	In recession, if there is little money for equity, a similar pattern applies to bonds.
borrowers	Opportunistic behavior (moral hazard; strategic bankruptcy …)	Borrowers might have an incentive to give false information about their economic status, in order to get otherwise undeserved credit or to stop repayments[14]	Recession can polarize behaviors, making MFIs overcautious, while desperate borrowers might exacerbate opportunistic attitudes, having nothing to lose
depositors	Lack of trust in the MFI	While borrowers do not have to trust the MFIs, since they have an inflow of money, depositors need to be cautious and carefully check the solvency of the MFI	Deposits are not regular and withdrawals for survival reasons are more frequent in recession, especially during crises which affect primary needs ("foodflation"; biblical plagues …), with systemic effects (everybody is affected) often difficult to handle. Financial stability of MFIs can be endangered.
employees	Opportunistic behavior (minimization of the job effort to get the salary anyway) from the workers' side; overexploitation and underpayment from the MFI's side.	The conflict between employers and employees is a classic in human history and life: any part wants to get the most at the expense of the other; long and continuous bargaining is unavoidable. Monitoring of performance is often difficult.	Employees bargaining power decreases in recession, when risk of unemployment substantially grows.

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[14] For further details, see paragraph 1.

Stakeholders	Source of the conflict of interest	Description of the conflict	Impact of recession
Central Bank / supervising authorities	Over / under regulation; independence	Under regulation might be ineffective and useless, while over regulation and bureaucracy can be suffocating and again useless, especially if form prevails over substance. Skilled supervisors are highly wanted and often missing. Like a medicine, regulation is effective if properly weighed out: too little is useless and too much kills the patient.. Supervisors are often in collusion with supervised, especially in countries where corruption is endemic.	With recession, solvency problems within banks - and regulated MFIs - normally exacerbate and overreaction is frequent, increasing the competitive disadvantage of being regulated, so providing incentives to informal and not transparent institutions (oh gosh, back to moneylenders?)
Other banks / domestic and international financial system	Competition might bypass cooperation and economic marginality of single institutions can be pursued at the expense of the stability of the financial system	Banks and MFIs at different stages of development compete for the best customers (the biggest and safer, able to generate higher margins), to the detriment of the neglected underserved. The regulating role of Central Banks might be weak and ineffective in preventing crises	With recession and financial crises, banks mistrust themselves and interbank loans, whose importance is essential for the circulation of liquidity within the financial system, might dramatically drop. Fly to quality strategies, addressed at serving only the marginal fittest clients, shrink the market, making finance unavailable for most customers, and the underserved become untouchable, with a strong halt to outreach and severe social consequences.
Microinsurers and Other intermediaries	Lack of cooperation and self dealing - no team synergies with other intermediaries	The interactions and the synergies within the financial intermediation chain, which aims at giving customers a segmented and wider set of possible products and services, slow down and self interest strategies tend to prevail	During the recession and the financial crisis, intermediaries soften their links, often not trusting each other. Synergic products (microinsurance linked to microloans and microdeposits) are harder to find when they are most wanted and needed. Financial inclusion is at risk, especially for the neglected poorest
Stock Exchanges (Domestic and International)	Timing for listing and raising new equity tends to privilege historical shareholders - at the expense of newcomers	Information asymmetries and conflicts between old and new shareholders are well known; any capital increase discounts these conflicts, increasing the cost of issuing equity	Stock exchanges of underdeveloped countries are very primitive and - albeit partially segmented from international stock exchanges and so insulated from global recession - traditionally illiquid. Linkages with international financial and stock markets slow down with recession and deglobalization - which might lead to protectionism - this being good news for further risk reduction and segmentation but bad news for development and maximization of outreach and financial inclusion.

6. LESSONS FROM RECESSIONS

Recession has started in the U.S. with the subprime crisis in mid 2007, with a breaking point in mid September 2008, when the U.S. Treasury refused to rescue the ailing Lehman Brothers investment bank - with unprecedented and uncontrollable global chain effects - and has rapidly infected the highly connected financial and banking institutions of other developed countries.

International banks have shown to have incredibly complex business models, intrinsically characterized by information asymmetries, and as a consequence risk of underlying assets - magnified by an increasing multiplier effect induced by leverage beyond any control - has led to a systematic mispricing of assets, not properly perceived when the whole drugged market was growing and expanding beyond any reasonable control, but suddenly evident to everybody, at the burst of the speculative bubble.

By sharp contrast, MFIs in underdeveloped countries follow a basic and simple business model, intermediating funds (when they can afford it, if allowed to collect deposits) between unsophisticated and often illiterate counterparts. No toxic assets, no strange derivatives or awkward and pro-cyclical accounting principles - as IAS and IFRS have shown to be, especially with marking to market and impairment methods - little if any information asymmetries and a sound and continuous link with real problems and "tangible" clients, so far from an increasingly virtual reality built on highly inflammable paper money.

Microfinance clients, many of whom are below the poverty line, have felt the squeeze with rising food and energy prices, decreases in remittances and less availability of loans. Many MFIs, particularly those not permitted to mobilize deposits, have struggled to maintain the liquidity to continue loan cycles without interruption. As the situation worsens, equity investors continue to show interest in investing in large microfinance institutions, confident that many established MFIs will weather the crisis. Over 80 percent of investors have not reduced their microfinance investment portfolio due to the global recession[15].

Information asymmetries - a classical governance problem - consistently stronger in informal markets, are typically blamed by corporate governance advocates, since they increase the conflicts of interests between the different stakeholders, making the credit market riskier and more expensive, so preventing optimal outreach to the poorest.

These pitfalls are real in any state of the economy, even if during a global recession they may -involuntarily - represent a natural shield against market shocks, softening overreaction and panic selling against price fluctuations.

The portfolio quality of microfinance does not decline during an economic shock simply because their clients are in the informal sector. This is because economic shocks like a global recession affect the informal sector less than the formal sector.

In times of recession, bargain prices are the rule more than the exception - and this is unsurprisingly the best timing for investments, following the old but still valid rule "buy low and sell high"[16]: the problem with this golden rule that everybody shares but hardly anybody follows (making it marginally more convenient) is that pessimism is even more contagious than euphoria and it is difficult, if not impossible, to detect when prices have reached their minimum; also, in difficult times, ideas - even smart ones - might prevail over funds' availability (the contrary being a much more dangerous situation, as the excess of liquidity experienced till mid 2007 has shown). And with no cash to support them, ideas simply remain dreams.

Microfinance institutions in these circumstances begin to seem, if not recession-proof, at least recession resistant. Even as the value of their loan portfolio declines on international markets, the volume of loans they service can increase, because traditional banks tighten their lending habits.

Should we look more carefully at the ultimate root of the problem - corporate governance and the relationship between different stakeholders - we might find that a comparison between the stakeholders which pivot around western banks, on one side, and those who are connected with MFIs in developing countries, on the other, could hardly be more different: extreme sophistication against illiteracy; technology and abundance of products, devices and alternatives versus bareness and little if any choice; self fulfilling wealth with apparent no ceilings against a spiral of poverty where starvation is the ultimate floor …

If different stakeholders find a compromise concerning their naturally divergent interests, they can all start paddling in the same direction, doing the best they can to reach common and shared goals. Efficiency gains can be impressive and any stakeholder can get unprecedented and long lasting benefits - synergies and common enthusiasm can really make the difference. Even in economic and banking issues, psychology does matter.

The social life in rural villages of the poorest countries is a little but remarkable micro-example of what sharing is about, since in extreme conditions, any deviation from basic survival rules can bring to death and mistakes are simply not affordable.

Is there something to learn from the governance of the underserved?

In comparing the impact of the recession in rich Western countries versus poor and underdeveloped countries, the first and most obvious consideration is that at the very bottom of the pyramid there is not much wealth to be destroyed. However, we would do well to consider that the poor have no parachutes or safety nets and little, if any, shelter against adversities. Long term investors have to be more patient than ever and keep hard at it; early and unplanned exits from investments (fire sales) destroy value, especially in countries where secondary markets are non-existent. Disinvestments and de-leveraging can have severe drawbacks, especially on MFIs with ambitious growth plans; even if their plans are now unrealistic, they cannot suddenly decrease beyond break even. In hard and confusing times, it pays to be small, flexible and simple. Only the fattest and the fittest of MFIs will survive this Darwinian selection.

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[15] https://www.microfinanceinsights.com/press_release_details. asp?id=19.

[16] See, for an example, http://www.indiamicrofinance.com/2009/03/recession-is-best-time-for.html.

7. CONCLUDING REMARKS: FROM CRISIS TO CATHARSIS?

The current severe recession in Western countries has many origins and causes and from this experience we can draw many useful lessons for the future, remembering that those who forget historical events are condemned to live again past experiences.

One theoretical lesson should bring to a paradigm shift, in order to change the interpretation philters of the market economy, somewhat distant from the experience of small MFIs located in rural areas, but still dominating in the capitalistic world.

MFIs in underdeveloped countries are, at varying degrees, more or less insulated from these problems, even if globalization has sharply reduced their distance from the Western financial markets. As interested – if not concerned – witnesses, it is however important for MFIs to carefully look at what happens abroad, trying to figure out the impact on themselves. Any outcome is possible and good news interact with bad ones in such an unpredictable way that any forecast is impossible - maybe that is why historians are much more common than prophets.

Codes of conduct structured around core values such as transparency, fair practices, dignified treatment, privacy, fair disclosure, inclusiveness (outreach), sustainability and client satisfaction can positively affect MFI's governance, easing the relationship among its stakeholders and smoothing conflicts of interest[17].

Recession can however bring to deglobalization and protectionism, which is – obviously – particularly harmful for poor countries that hardly have anything to protect. Should capital rationing continue, underserved borrowers would have an increasingly difficult access to finance and outreach of the poorest mixed with financial stability – the ultimate dream and target of microfinance – would be puzzled and hardened for a long time.

A better governance can really help MFIs in underdeveloped countries to get to adult age, making a jump of quality and relying less and less on volatile external help. This may consistently reduce the MFI's risk.

The impact of the recession on the different stakeholders is unsurprisingly asymmetric and winners and losers will emerge when the storm is finished - when rainy days are over, time will tell.

Paraphrasing Orwell's Animal Farm, all stakeholders are born equal, but some are more equal than others.

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[17] See, for example http://www.microfinancegateway.org/content/article/detail/55222; http://www.grameenkoota.org/fair_practices_code.pdf; http://www.microcapital.org/microcapital-story-code-of-ethics-proposed-for-microfinance/.

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ASSET CORRELATION, PORTFOLIO DIVERSIFICATION AND REGULATORY CAPITAL IN THE BASEL CAPITAL ACCORD

Sylvia Gottschalk*

Abstract

In this paper, we analyze the properties of the KMV model of credit portfolio loss. This theoretical model constitutes the cornerstone of Basel II's Internal Ratings Based(IRB) approach to regulatory capital. Our results show that this model tends to overestimate the probability of portfolio loss when the probability of default of a single firm and the firms' asset correlations are low. On the contrary, probabilities of portfolio loss are underestimated when the probability of default of a single firm and asset correlations are high. Moreover, the relationship between asset correlation and probability of loan portfolio loss is only consistent at very high quantiles of the portfolio loss distribution. These are precisely those adopted by the Basel II Capital Accord for the calculations of capital adequacy provisions. So, although the counterintuitive properties of the KMV model do not extend to Basel II, they do restrict its generality as a model of credit portfolio loss.

Keywords: Assets, Basel Accord, Regulatory Capital

**Middlesex University Business School, Economics and Statistics department, The Burroughs, London NW4 4BT
Email: s.gottschalk@mdx.ac.uk*

1 Introduction

The idea that regulatory capital requirements should be risk sensitive is at the core of the second Basel Capital Accord (Basel II), BIS (2005a). Even the Basel Committee's current proposals for reform of the Capital Accord (Basel III), which were prompted by the 2008 Credit Crunch, are firmly built on the risk-sensitive framework of Basel II (See BIS, 2009a,b). At the conceptual level there clearly is widespread support for the idea of risk-based capital provisions. However, in order to move this support from the conceptual to the practical level, it is essential that capital provisions accurately reflect credit risk.

The Basel II's Internal Ratings Based (IRB) framework of capital adequacy was built on a credit risk model developed by the KMV Corporation, which was acquired by Moody's in 2002. The KMV model is an extension of Merton (1974) to credit risk (Vasicek, 1987), and more importantly, to loan portfolio risk (Vasicek, 2002). A significant issue in credit risk analysis is how default and asset correlations are taken into account. It is generally accepted that the overall risk of a portfolio can be reduced by diversifying its assets either sectorally or geographically. There is growing evidence that the same principle applies to credit portfolios. Griffith-

Jones et al. (2002a) and Griffith-Jones et al. (2002b), for instance, suggest that the overall risk of a geographically diversified portfolio is lower than that of a geographically concentrated portfolio. Garc´ıa (2002), Garc´ıa et al. (2006), show that the credit risk of a portfolio based on a two-factor model is lower than that of a single-factor portfolio. Tasche (2005) generalised this result to a multi-factor setting. So far,the theoretical and empirical research has taken two main directions. The first approach consists of the empirical estimation of asset correlations and default correlations (Dietsch and Petey, 2004; D¨ullmann and Scheule, 2003; Erlenmaier and Gerbach, 2001; Servigny and Renault, 2002). Other papers focus on the theoretical result of the main credit risk model showing that lower asset correlations imply lower default correlations (Garc´ıa, 2002; Garc´ıa et al., 2006; Tasche, 2005, amongst others).

In this paper, we analyse the properties of the KMV model of credit portfolio loss which constitutes the cornerstone of the IRB approach to regulatory capital. We find that the KMV model represents the probability of portfolio losses very poorly at low p, and low p. More specifically, it tends to overestimate the probability of portfolio loss when the probability of default of a single firm and the firms' asset correlations are low. On the contrary, probabilities of

portfolio loss are underestimated when the probability of default of a single firm and asset correlations are high.

The paper is organised as follows. After this Introduction, Section 2 the KMV model is presented and its properties analysed. In Section 3 special emphasis is placed on the relationship between the KMV model and Basel II's IRB approach to regulatory capital provisions. Section 4 concludes.

2 Latent variable models and Basel II's IRB Approach

The theoretical foundations of the IRB approach of the 2005 Basel Capital Accord was first developed by KMV Corporation2 as an extension of Merton (1974)'s model of corporate debt pricing, and was later published in Vasicek (1987, 1991, 2002). This model belongs to the class of latent variable models and one of its results is a factor representation of the determinants of individual default. The main property of this factor representation is the independence of individual defaults relative to each other, given the occurrence of the determinants of individual defaults. The KMV model is thus considered as an example of conditionally independent credit risk models. However, as we will show below, it does not adequately capture dependencies between individual default probabilities, and that this failure extends to Basel II's IRB approach.

2.1 KMV model

The main objective of the KMV model is the derivation of the probability distribution function of the loss of a portfolio of loans. The model first derives the probability distribution function of a single default. Single loans are then aggregated into a portfolio of loans, and assumptions concerning default correlations are made at this stage. Finally, Vasicek (2002) presents Monte Carlo simulations of the limiting distribution function of portfolio loss distribution function.

It is worth emphasizing at this stage that we are modeling corporate rather than retail (consumer credit) default, and that we take the perspective of the borrowing firms rather than that of the lender when using the term "assets". In the literature on financial regulation or in the documents published by the Basel Committee on Banking Supervision, assets usually refer to loans, which are the firms' liabilities. Throughout this paper, banking loans will always be referred to as debts or liabilities.

Assumptions

A portfolio consists of *M* loans of equal amounts, one loan per firm. For each firm *i = 1, ..., M* the following assumptions hold

1. Default occurs when the value of a firm's assets fall below the value of its debt, at maturity of its debt T_i. Formally, $A_iT_i < D_i$, where A_iT_i represents the value of firm *i*'s assets at the loan maturity time T_i and D_i the value of firms *i*'s liabilities. A_iT_i is the latent variable of the model.

2. The value of a firm's assets is described by the stochastic differential equation $dAi = A_i(\mu_idt + \sigma_idx_{it})$ where x_{it} is a standard Brownian Motion. Moreover, $E[dx_i]^{18} = dt$, and $E[dx_i][dx_j] = pdt$ *for i ≠ j. μi* and σ_i are constants. They may be interpreted as the drift and the volatility of the asset value of firm *i*, respectively. Finally, a Brownian motion has a Normal distribution with mean 0 and variance *dt*.

3. (Portfolio homogeneity) For the sake of simplicity, Vasicek (1987, 1991, 2002) assumes that all borrowers are identical. This implies that (i) all loans have the same maturity, $T_i = T_j = T$, *i, j = 1, . . . ,M,* (ii) asset correlations are identical, $p_i=p_j=p$ (iii) debt values D_i are identical, $D_i=D_j=D$.

In the Vasicek setting, the point in time where the occurrence of default is considered is the maturity of the debt, T_i in Assumption (1). In Assumption (2), *p* represents the two-by-two correlation of borrowing firms' assets, but not necessarily default correlation. Default correlation and asset correlation can differ significantly, as shown in Sch¨onbucher (2000), Zhou (2001), and mainly, Frey et al. (2001). Finally, it should be emphasized that asset correlation is exogenous in the KMV model. It is assumed to exist but its value is not obtained from the model. As a result, it may take any arbitrary value. In a consultative paper published by the Basel Committee in 1999, the asset correlation was set to 20%. Theoretically, *p* is the usual correlation formula

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[18] Kealhofer, McQuown, Vasicek Development, L. P.

$$p = Corr[Y_{1t}, Y_{2t}] = \frac{Cov[Y_{1t}, Y_{2t}]}{\sqrt{VAR[Y_{1t}]}\sqrt{VAR[Y_{2t}]}} \quad (1)$$

where $Cov[Y_{1t}, Y_{2t}]$ is the covariance of Y_{1t} and Y_{2t} and the square root of $VAR[Y_{1t}]$ is its standard deviation. The covariance is given by

$$Cov[Y_{1t}, Y_{2t}] = E[Y_{1t} * Y_{2t}] - E[Y_{1t}] * E[Y_{2t}] \quad (2)$$

where $E[\ ]$ is the expectation operator.

Given the assumptions above, let Y_{iT} be an indicator variable such that $Y_{iT} = 1$ if firm i defaults at time T and $Y_{iT} = 0$ if firm i does not default at time $t = T$. Then, the probability of default of a single firm is given by

$$P[Y_{1t} = 1] \Leftrightarrow P[A_{iT} < D_i] \quad (3)$$

A_{it} is obtained by solving the stochastic differential equation in Assumption (2) above,

$$Log(A_{iT}) = Log(A_0) + \mu_i T - \frac{1}{2}\sigma_i^2 T + \sigma_i\sqrt{TX_{it}} \quad (4)$$

where A_0 is the value of the firm's assets at time 0, T is maturity time and X_{it} is a variable with Normal $(0,T)$, i.e., with mean 0 and variance T.

Using (4), we can write (3) as
$$p_i = P[\log(A_{iT}) < \log(D_i)] \quad (5)$$
where pi is the probability of individual default.

$$p_i = P\left[\log(A_0) + \mu_i T - \frac{1}{2}\sigma_i^2 T + \sigma_i\sqrt{TX_{it}} < \log(D_i)\right] \quad (6)$$

The only random element in the left-hand side of this inequality is X_{it}. So we can re-write this expression as

$$p_i = P\left[X_{it} \frac{\log(D_i) - \log(A_0) - \mu_i T + \frac{1}{2}\sigma_i^2 T}{\sigma_i\sqrt{T}}\right] \quad (7)$$

Since *Xit* is a Normal distribution with mean 0 and variance 1, the expression above becomes

$$p_i = \Phi(DD_i) \quad (8)$$

where $DD_i \frac{\log(D_i) - \log(A_0) - \mu_i T + \frac{1}{2}\sigma_i^2 T}{\sigma_i\sqrt{T}}$ and Φ is the cumulative normal distribution function. DD_i is the "distance-to-default" of firm i (Merton, 1974; Vasicek, 1987, 1991, 2002).

Expression (8) clearly shows that the probability of default of a single firm i does not depend in any way on the probability of default of a single firm j, since the two-by-two correlation of firms' assets, p, does not appear in it. Asset correlations can be endogenized by assuming that the asset value of a single firm follows a multidimensional Brownian motion. In Assumption (2) above the stochastic differential equation describing the asset value becomes $dA_i = A_i(\mu_i dt + \sum_{j=1}^{M}\sigma_j\,dx_{jt})$. Recent papers have pursued this direction, for instance, Kafetztaki-Boulamatsis and Tasche (2001), and Nyfeler (2000). Although this approach is conceptually more adequate for modelling joint defaults or default dependencies, it suffers from a major shortcoming. Estimating the asset correlation matrix is practically impossible (see Gottschalk, 2011, for details).

2.2 Probability of loan portfolio loss

From result (8), Vasicek (2002) proceeds to derive the probability of the loss of a loan portfolio. Let L_i denote the gross loss on the i-th loan. The gross loss represents the loss before recoveries. $L_i = 1$ if the i-th firm defaults and $L_i = 0$ if the i-th firm does not default. Let L be the portfolio percentage gross loss, defined as the weighted sum of each individual portfolio percentage gross loss,

$$L = \sum_{i=1}^{M} L_i \quad (9)$$

where M is the total number of loans in the portfolio. We wish to calculate the probability of n defaults out of the M loans

$$P_n = P\left[L = \frac{n}{M}\right] \quad (10)$$

for n = 1,...,*M*. From Assumption 2, each firm's asset follows a Brownian motion, and the two-by-two correlations are identical, i.e., $p_{ij} = p_{uv} = p$, for any firm $i \neq j, u \neq v$,...,*M*. This implies that the Brownian motion variables X_{it} are jointly equicorrelated standard normal variables. A property of this type of probability distribution is the representation

$$X_{it} = \sqrt{p}F_t + \sqrt{1-p}Z_{it} \quad (11)$$

where, F_t and Z_{1t},...,Z_{Mt} are mutually independent standard normal distributions. (11) is a factor representation, the factor being F_t. Vasicek (1991) explicitly points out that expression (11) derives necessarily from the assumption of normality of asset returns, which in turn is a necessary outcome of the hypothesis that asset returns follow a Brownian motion. In many subsequent papers in the literature, (11) is presented as the starting point of the KMV credit risk model, with the assumption of normality replaced by the more convenient hypothesis that the factor F_t follows a Student' t distribution.[19] Vasicek (2002) suggested that F_t can be interpreted as a common macroeconomic factor affecting the whole portfolio of loans. Each firm's sensitivity to this factor is given by $\sqrt{p}F_t$. $\sqrt{1-p}Z_{it}$ stands for the firm's specific risk.

In order to evaluate the probability of *n* defaults in the portfolio, it is necessary to determine the number of possible combinations of *n* individual defaults in a portfolio of *M* loans. Since individual defaults are independent given the occurrence of the factor F_t,[20] the number of possible combinations of defaults is given by the Binomial factor $\binom{M}{n}$. Moreover, we now assume for the sake of simplicity, and following Vasicek (1991, 2002), that the portfolio is homogeneous. This implies that individual probabilities of default are identical, as are the distances-to-default DD and as before the maturities of the debts.

By the law of iterated expectations, the probability of having exactly *n* defaults is the average of the conditional probabilities of n defaults, averaged over the possible realizations of F_t and weighted by the probability density function of F_t evaluated at *u*,

$$P[X = n] = P[X = n|F = u] = \int_{-\infty}^{\infty} \binom{M}{n}(p(u))^n(1-p(u))^{N-n}\emptyset(u)dF \quad (12)$$

Once the individual defaults can be assumed to occur independently, the Vasicek model reduces to a Binomial model of default.

From (8), *p(u)* is given by

$$p(u) = P[X_T < |DD|F = u] \quad (13)$$

Substituting X_T in factor representation gives

$$p(u) = P\left[\sqrt{p}F_t + \sqrt{1-p}Z_{it} < D|DF_t = u\right] \quad (14)$$

Re-arranging the terms in the left-hand side of the inequality, we obtain

$$p(u) = P\left[Z_{it} < \frac{DD - \sqrt{p}F_t}{\sqrt{1-p}}|F_t = u\right] \quad (15)$$

As was seen above, since Z_{it}, $i = 1$,...,*M*, is Normally distributed

$$p(u) = \Phi\left(\frac{DD - \sqrt{p}F_t}{\sqrt{1-p}}\right) \quad (16)$$

Note that we have replaced F_t by its value *u*. Substituting (16) in (12) yields the probability of n defaults in the portfolio

$$p[L = n] = \int_{-\infty}^{\infty} \binom{M}{n}\left(\Phi\left(\frac{DD - \sqrt{p}F_t}{\sqrt{1-p}}\right)\right)^n\left(1 - \Phi\left(\frac{DD - \sqrt{p}F_t}{\sqrt{1-p}}\right)\right)^{M-n} \quad (17)$$

A limiting distribution of portfolio loss can be obtained by assuming the number of loans in the portfolio tends to infinity. If we maintain the assumptions of homogeneity, $L = \frac{1}{M}\sum_{i=1}^{M}L_i$ now becomes the fraction of defaulted loans in the portfolio. By the law of large numbers, the fraction of defaults is (almost surely) equal to the individual default probability, $P\left[\frac{1}{M}\sum_{i=1}^{M}L_i = p(u)|F = u\right] = 1$.

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[19] The probability of extreme events is higher in the Student's t distribution than in the Normal distri- bution. Distributions with higher probabilities of extreme events capture more adequately the empirical distributions of financial variables.
[20] See Gottschalk (2011) for proof.

$$P[L < x] = E[P(L \le x | F = u)] = \int_{-\infty}^{\infty} P[p(u) \le x] \emptyset(u) du \quad (17)$$

The cumulative distribution function of the fraction L portfolio loss is thus

$$F_{\infty}(x) = P(L \le x) = \Phi\left(\frac{\sqrt{p}\,\Phi^{-1}(x) - \Phi^{-1}(p)}{\sqrt{p}}\right) \quad (19)$$

The notation $F_{\infty}(x)$ is used to emphasized that this distribution is valid only when the number of loans in the portfolio becomes infinitely large. The α-percentile of (19), denoted x_{α}, is given by inverting $F(x_{\alpha}) = \alpha$. The α -percentile of the loss distribution, $x_{\alpha}(L) \equiv q_{\alpha}(L)$ is thus

$$q_{\alpha}(L) = \Phi\left(\frac{\Phi^{-1}(p) + \sqrt{p}\,\Phi^{-1}(\alpha)}{\sqrt{1-p}}\right) \quad (20)$$

Finally, the derivative of (19) with respect to *x* gives the density distribution function

$$F_{\infty}(x) = \sqrt{\frac{1-p}{p}} exp\left\{\frac{1}{2p}\left(\Phi^{-1}(p) - \sqrt{1-p}\,\Phi^{-1}(x)\right)^2\right\} - \frac{1}{2p}\left(\Phi^{-1}(x)\right)^2 \quad (21)$$

where $\exp(.) \equiv e^{(.)}$ is the exponential function.

Vasicek (2002) and Gordy (2003) show that (20) is also valid when the weights of single loans in the portfolio are allowed to differ, i.e., when $L = \frac{1}{M}\sum_{i=1}^{M}\omega_i L_i$, where $\sum_{i=1}^{M}\omega_i = 1$. However, a necessary and sufficient condition is that no single loan may dominate the portfolio, which implies that $\sum_{i=1}^{M}\omega_i \to 0$. This result is particularly important in the light of Basel II's formulae to calculate regulatory capital.

The properties of the cumulative distribution function of portfolio loss (19) are summarized in Vasicek (2002), and a couple illustrative plots are presented in Sch¨onbucher (2000) and Garcıa (2002). A more useful reference is Bluhm et al. (2003), where the properties of (19) are more thoroughly described. When $\rho \to 0$, $F_{\infty}(x; p; \rho)$ converges to a one-point distribution concentrated at

$L = p$. When $\rho \to 1$ the distribution flattens and converges to a zero-one distribution with probabilities ρ and $1 - \rho$.

and 91%. The fixed parameter is the individual probability of default *p*. It is worth remembering at this stage that (19) hinges on the assumption that all the firms in the portfolio have the same probability of default.

Figure 1 clearly shows that for a probability of default equal to 1% $F_{\infty}(x; p; \rho)$ always collapses to *p*, when asset correlations are quite low (1% to 41%). Figure 1 also shows that at low *p* and low ρ, the probability of any fraction of the portfolio defaulting is 100%, irrespective of the level of asset correlation. This is quite counterintuitive since one would expect the probability of portfolio loss to be low when the probability of individual default and the asset correlations are low.

2.3 Is the KMV model adequate for modeling the probability of portfolio losses?

In Figures 1 and 2 we simulate (19) to illustrate some of these properties.[21] In all figures, the left-hand graph shows $F_{\infty}(x; p; \rho)$ for asset correlations between 1% and 41%. The right-hand side graph plots $F_{\infty}(x; p; \rho)$ for asset correlations between 51%

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[21] Results for other values of p and ρ can be found in Gottschalk (2011)

Figure 1. Probability of portfolio loss - *p*=1%
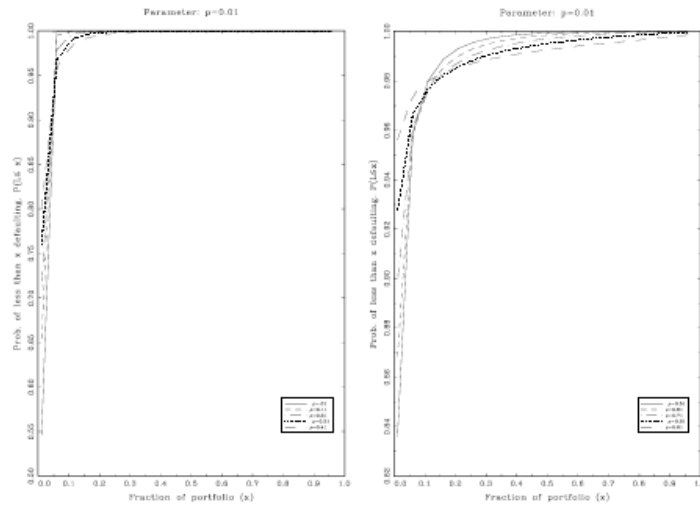
Figure 2. Probability of portfolio loss - *p*=50%
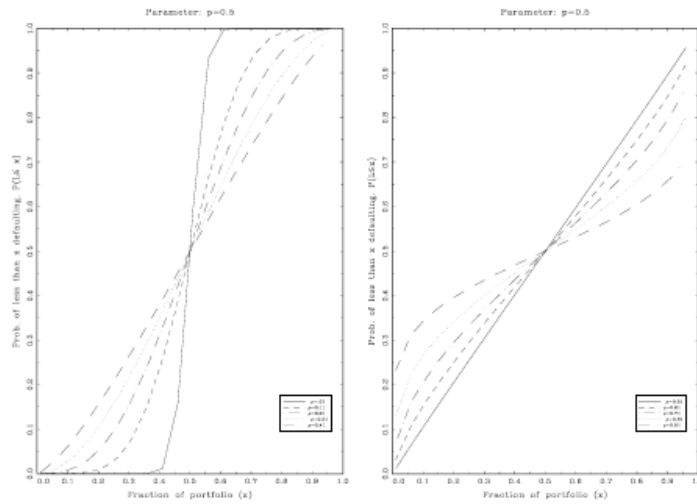
The KMV model performs a bit better at higher levels of asset correlation (40% to 91%). Portfolio default probabilities are more spread out, and more dependent on the level of asset correlation. Nonetheless, it is evident from the two figures that the KMV model represents the probability of portfolio losses very poorly at low *p*, and low ρ. This fact was pointed out by Schonbucher (2000), and Bluhm et al. (2003), amongst others.

In Figure 2 the probability of portfolio loss when the probability of default of a single firm is now p=50%. The left-hand side figure shows a more interesting result. When the asset correlation is 1%, $\rho = 00.1$, up to 40% of the firms in the portfolio do not default, even though the individual probabilities of default are quite high. The fraction of the portfolio that does not default obviously decreases inversely with asset correlation. When asset correlation is 41%, all the portfolio defaults.

3 The KMV model and regulatory capital

The IRB approach assumes heterogeneous portfolios of loans. This implies that each borrower may have a distinct probability of default p_i, each loan has a distinct maturity M_i, the weight of each loan in the portfolio is different ω_i, and that the percent loss on each loan can be different, s_i. In the Basel Committee's publications, s_i is the referred to as the loss given default, and is equal to 1 minus the recovery rate. For the sake of simplicity, it assumed in the KMV model that the loss is total, so $s_i = 1$, for all loans in the portfolio.

According to the rules of Basel II, regulatory capital is needed only to cover unexpected losses, given that banks are supposed to cover for expected losses as part of their on-going activities. Regulatory capital is thus given by $K(L) = q_\alpha(L) - E(L)$, where $E(L) = \sum_{i=1}^{M} s_i p_i$

and $q_\alpha(L)$ is given by expression (20) in the main text, factored by the loss given default s_i.

$$K(L) = \sum_{i=1}^{M} s_i \left[\Phi\left(\frac{\Phi^{-1}(p) + \sqrt{p}\,\Phi^{-1}(\alpha)}{\sqrt{1-p_i}} \right) - p_i \right] * m_i \quad (22)$$

To take into account the impacts of differing maturities on credit risk, the IRB rules require that the following expression be multiplied to the regulatory capital formula (22)

$$m_i = \frac{1 + (M - 2.5) * b(p_i)}{1 - 1.5 * b(p_i)} \quad (23)$$

where
$b(p_i) = (0.11852 - 0.05478 * \log(p_i))^2$. *M* is the maturity of the loan for which regulatory capital is being calculated, and pi is the borrower's probability of default. In the KMV context, p_i is given by (3)[22]

It is clear from (22) that regulatory capital in the IRB approach is fundamentally the α-percentile of the asymptotic cumulative distribution function of the portfolio loss in the KMV model, (20). In the IRB approach, α is set to 99.99 percent. The inclusion of asset correlation in (22) raises the issue of portfolio diversification on the IRB approach. A growing number of papers throw some light on the relationship between the KMV model and Basel II's IRB approach. Amongst those, Kjersti (2005), Hamerle et al. (2003) are the most straightforward without compromising technicality. Gordy (2003) is an important paper showing that Basel's capital adequacy rules can be reconciled with a class of credit risk models which are portfolio-invariant. Gordy (2003) is explicitly mentioned in the Basel Committee's official documents as one of the theoretical cornerstone of their IRB approach, along with Vasicek (2002) BIS (see 2005a).

3.1 Default correlation and portfolio diversification

Following Markowitz(1952) a portfolio is efficient if there is no other portfolio with lower risk and an at least equal expected return, and no portfolio with a higher expected return and at most equal risk. In this context diversification is a means to change the risk of the portfolio. The portfolio risk is measured as the standard deviation from expected returns, and, by definition, is the sum of the variances of each component of the portfolio from the expected return and the correlations (p_{ij}) between components $i \neq j$. Risk diversification can be achieved if $-1 \leq 1p_{ij} < 1$, but not when the components of the portfolio are perfectly correlated $(p_{ij} = 1)$. Moreover, increasing the number of components in the portfolio decreases its overall variance, regardless of the sign of cross-correlations,[23] since in a large portfolio, cross-correlations among assets determine the portfolio variance. The variance of each asset then contribute little to portfolio risk (see Ingersoll, 1987).

Extending this setting to credit portfolios is not straightforward. In the case of credit, the concept of risk is not solely associated from that of variance. Risk is an inherent characteristic of a loan, and can be proxied by the probability of default. In the Vasicek model the probability of default is determined by the behaviour of the latent variable, and increasing the number of loans may not necessarily lead to lower probability of default.

First, default correlation is positively related to asset correlation. Second, asset correlations in the Vasicek model can only assume positive values, unlike conventional portfolios. As a result, the opportunities for credit risk diversification are limited to assets presenting cross- correlations converging to zero.

Morever, Figures 1 and 2 suggest that the Vasicek model yields a negative relationship between asset correlation and the probability of portfolio loss, for certain levels of probability. For instance, for $P[L \leq 0.96]$, Figure 1 shows that the fraction of the portfolio that is lost is lower when $\rho = 0.91$ (dashed curve) than when $\rho = 0.51$ (solid curve). An analogous result can be seen for $P[L \leq 0.90]$. The dashed curve corresponds to $\rho = 0.41$, whilst the solid curve is associated to $\rho = 0.01$. This counterintuitive result is much more pronounced for higher values of the individual probability of default, as Figure 2 illustrates. For $\alpha = 0.95$ the fraction of portfolio lost is lower when $\rho = 0.91$ (dashed line) than when $\rho = 0.51$ (solid line). This implies that at these levels of probability, increasing asset correlation actually reduces the overall risk of the portfolio.

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[22] Note that there is a discrepancy between two Basel Committee's publications regarding the Normal distribution used in expression (22). In BIS (2005a, p.7) Φ(.) is the Normal distribution function N(.). However, in BIS (2005b, p.60 footnote 71) Φ(.) is the cumulative Normal distribution. Since BIS (2005a) is the main document of the Basel Capital Accord and thus supercedes BIS (2005a), we use its formula here.

[23] provided the assets are not perfectly correlated.

Figure 3. Regulatory Capital
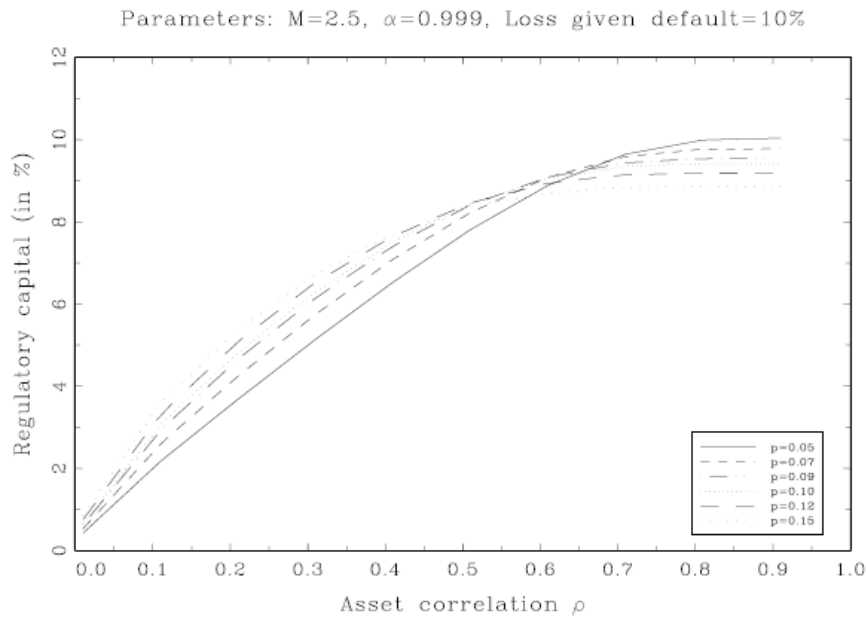
However, for $\alpha = 0.98$ and $\alpha = 0.95$, respectively, the more intuitive relationship between asset correlation and risk holds. The higher asset correlation, the higher default risk. In the context of Basel II's IRB Approach, these findings have hardly any implications. First, the Basel Committee decided that banks should make capital provisions for losses occurring with a probability of less than 0.01%. Second, the formulae adopted by the Basel Committee for the asset correlation restrict its value to the interval [0.12;0.24], (see BIS, 2005a).

In the IRB formulae, the correlation between individual assets and the macroeconomic factor is given by the expression (24) for bank and sovereign borrowers,

$$p_i = 0.12 * \frac{1 - e^{-50 p_i}}{1 - e^{-50}} + 0.24 * \left(-\frac{1 - e^{-50 p_i}}{1 - e^{-50}} \right) \quad (24)$$

The correlation between individual asset and the macroeconomic factor for corporate borrowers are derived from (24). $\rho_c = p_i - 0.04$ for $S_i \leq 5$. $\rho_c = p_i - 0.04 * (1 - S_i - 5)/45$ for $5 \leq S_i \leq 50$, and $\rho_c = p_i$ for $S_i \geq 50$. ρ_c is the correlation coefficient for corporate borrowers and ρ_i is given by (24). Si are annual sales of firms i. Clearly, ρ_c is reduced for small firms. (24) assumes a downward relationship between the asset/factor correlation and default probability. The higher the individual probability of default, the lower the asset/factor correlation, since in this case, the idiosyncratic factors Z_i are assumed to dominate the macroeconomic factor. In other words, the higher the probability of default the higher the likelihood that default will be determined by factors specific to the borrower rather than macroeconomic conditions. The

IRB's assumption of a negative relationship between asset/factor correlation and default probability stems from Lopez (2004). However, several subsequent studies have produced results that contradict this assumption. Amongst other, Dietsch and Petey (2004), D¨ullmann and Scheule (2003), and Hamerle et al. (2003).

Figure 3 plots the regulatory capital given by (22), for various levels of individual probability of default $p \in [0.05; 0.15]$, a loan maturity of 2.5 years (standard value in BIS (2005b)), $\alpha = 99.99$ and a loss given default of 10%. Clearly, the higher the probability of default, the higher the necessary amount regulatory capital, for asset correlations lower than 0.65.

4 Conclusions

In this paper, we present the theoretical model that constitutes the cornerstone of Basel II's Internal Ratings Based (IRB) approach to regulatory capital. This model was developed by KMV Corporation, and later published in Vasicek (1987, 1991, 2002). We then analyse the properties of the KMV model of credit portfolio loss, for distinct value of single firm default probability and asset correlations. Our results show that this model tends to overestimate the probability of portfolio loss when the probability of default of a single firm and the firms' asset correlations are low. On the contrary, probabilities of portfolio loss are underestimated when the probability of default of a single firm and asset correlations are high. Moreover, the relationship between asset correlation and probability of loan portfolio loss is only consistent at very high quantiles of the portfolio loss distribution. These are precisely those adopted by

the Basel II Capital Accord for the calculations of capital adequacy provisions. So, although the counterintuitive properties of the KMV model do not extend to Basel II, they do restrict its generality as a model of credit portfolio loss.

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THE ROLE OF THE RISK CONTROL FUNCTION UNDER THE BASEL II FRAMEWORK

Thomas Dietz

Abstract

While the financial turmoil has left the business approach of ethical banks unchanged, as evidenced in the striking stability of their balance sheet from 2007 to 2009, the pattern shown by big banks has substantially changed over this same period. These developments would tend to suggest the need to reform the business model of big banks. There is no clear empirical evidence that a banking system with a large number of small institutions would be any more stable than the system as it currently stands. Besides, financing certain big projects would always require the existence of large international banks. Both types of financial institutions are in fact complementary. How to regulate the banking and financial sector is thus a complex and multifaceted issue. One cannot impose the same requirements on big international-oriented banks and small domestic banks. As this paper has tried to demonstrate, both have a distinct business model.

The following statements and assessments represent the author's opinion only. They should not be interpreted as official statements or assessments from Deutsche Bundesbank.

"[…] risk monitoring and management reduces to the basics of getting the right information, at the right time, to the right people, such that those people can make the most informed judgments possible."[24]

If a bank wants to earn money it has to take risks. From an economic point of view this is a good thing to do. In a world without banks and without institutionalised financial markets each consumer would need to look for a potential counterpart he could lend money to (savings he currently doesn't need) and would need to bear the risk of his contract partner's insolvency personally. Conversely, enterprises willing to invest in the real economy might be restricted by not finding enough consumers to collect the amount of money needed for these investments. Even if they do so, these consumers might not be willing to lend their money long enough.

Financial intermediaries are lowering transaction costs in the economy as a whole, take over counterparty credit risk from their depositors and fulfil important maturity transformation functions. This is especially important for emerging markets like the countries from central, eastern and south eastern Europe (CESEE countries) where financial markets have only started to develop. Taking risks is not enough, however. For permanent financial stability it is equally important that banks are able to survive stress situations in which risks have become virulent. Otherwise depositors will lose their confidence in the sound functioning of financial markets causing a shortage of savings needed to refinance investments.

Financial regulation aims at minimising the risks for financial stability. For this purpose supervisory authorities all over the world have implemented rules that are supposed to mitigate banks' insolvency risk. Under these rules banks have to hold enough capital and liquidity to survive stress situations. To guarantee a level-playing field for banks (and for banking supervisory authorities!) worldwide the Basel Committee on Banking Supervision (BCBS) has published a framework for Capital standards and Capital measurement (called Basel II[25]) on credit, market and operational risk and several complementary guidelines, for instance on the management of liquidity or on stress testing. On the European Union level two directives have been adopted that implement the Basel II framework. The Banking Directive (2006/48/EC[26]) sets minimum capital requirements for credit and operational risk, the Capital Adequacy Directive (2006/49/EC[27]) minimum capital requirements for market risk. Both directives are subsumed under the term "Capital requirements directive" (CRD).

However, holding enough capital and liquidity under a regulatory perspective might still not be enough. Even well capitalized institutions have gone bankrupt (or have come close to bankruptcy) in the past because they have become victims of rogue traders like Nick Leeson from Baring's Bank or

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[24] Counterparty risk management group (2008), p. 70.

[25] BCBS (2006a).
[26] EU (2006a).
[27] EU (2006b).

Jerome Kervel from Société Général[28]. In such cases risk management has had some serious shortcomings. On the other hand, if risk management in a credit institution is sound, capital and liquidity cushions might not need to be that strong since taking certain (excessive) risks is either avoided completely or risks are managed in a way that they do not become excessive at all. In that respect, a sound risk management is the first line of defence against a bank's possible bankruptcy. Consequently, the Basel II framework also contains some rules concerning risk management in general and an independent risk control function in particular.

The following article takes a closer look at these provisions and – primarily driven by the financial crisis - at current suggestions for strengthening these rules further.

Risks in financial institutions

Risk management plays a decisive role within financial institutions. Risk identification, risk measurement, risk control and risk management in a narrower sense (in terms of hedging, reducing or completely selling off risky positions) are crucial for institutions which business it is to earn money by taking risks without being killed by those risks.

The most important risks a bank is facing are

- credit risk
- operational risk
- market risk
- liquidity risk

Risk as a general concept is symmetrical and simply means that actual outcomes differ from expectations. For instance buying a share for 100 € with the expectation of selling it for 120 € three months later bears a downside risk (the value of the share then is lower than 120) but also an upside risk (what would typically be labelled as the "chance" of showing a value higher than 120).

The banking supervision community has a biased view on risk. In their terms risk always means potential losses (and never potential gains). Under this perspective credit risk is the risk that a counterparty to a financial obligation, such as a loan, will default on repayments linked to the obligation causing losses at the creditor. Operational risk according to Article 4 section 22 of the Banking directive means the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. Market risk is the risk that investments will lose money due to fluctuations in market prices like interest rates, stock values or exchange rates. Finally, liquidity risk is defined as the risk that a bank is not able anymore to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses[29].

The Basel II framework

The Basel II framework is divided into three different so-called pillars. For the first three types of risk mentioned above Pillar I sets some minimum capital requirements the banks have to comply with at all times. However, for other risks like liquidity risk, concentration risk or business risk there are no such requirements. The same holds true for interest rate risk in the banking book. Thus, when it comes to capital requirements, there are some risks that are not or at least not completely covered (like concentration risk as part of credit risk) under Pillar I.

For those kinds of risk Pillar II (the "Supervisory Review Process" – SRP) sets some requirements concerning a bank's internal processes aligning the total of risks it has taken to the capital it holds internally as a cushion against these risks. This "Internal Capital Adequacy Assessment Process" (ICAAP) is monitored and reviewed by the supervisory authorities taking into account the principle of proportionality (the more important the bank and the more complex its business the more often and the more detailed it will be monitored by the supervisor). As a result of this "Supervisory Review and Evaluation Process" (SREP) the supervisors might impose some additional capital requirements exceeding those under Pillar I.

However, as the Basel framework points out, the SREP should not only make sure that banks hold adequate capital to cover all the risks in their business, but also to "encourage banks to develop and use better risk management techniques in monitoring and managing their risks."[30] This is because capital cannot be regarded as a substitute for addressing shortcomings in the bank's risk control or risk management processes. Moreover, liquidity risk – especially in crisis situations - is not mitigated by holding capital against it at all.

Furthermore, under the SREP the supervisory authorities have to assess whether or not the banks do comply with some minimum standards for the more advanced risk measurement and management methods in Pillar 1, particularly the so-called IRB framework for credit risk, the Advanced Measurement Approaches (AMA) for operational risk and (typically) Value-at-risk models for market risk. In all these cases the minimum capital requirements depend on bank's internal estimations of potential losses assuming a certain stochastical confidence level. The adequacy of the minimum capital requirements therefore depends on the accuracy of parameter estimations used to calculate these losses.

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[28] For some interesting background information on the most important financial losses of banks and other companies in the 1990s see Jorion (2001), p. 15-21.

[29] BCBS (2008), p. 1
[30] BCBS (2006a), p. 204.

A good way to guarantee this is a strong internal governance structure.

As a general approach, Basel II allows for lower capital requirements when using advanced methods compared to the standardised approaches for credit, operational and market risk respectively. However, since the supervisory authorities need to grant approval for the use of these models first, and since approval will depend on the compliance with some qualitative minimum requirements also referring to risk control and risk management processes, the price the banks have to pay for lower capital requirements are higher costs for risk management. Basel II therefore has increased the sophistication of risk management within banks.

To complete the picture, the third pillar of Basel II sets some disclosure requirements for the risks banks have taken. It is supposed to "encourage market discipline by developing a set of disclosure requirements which will allow market participants to assess key pieces of information on the scope of application, capital, risk exposures risk assessment processes, and hence the capital adequacy of the institution."[31]

The institution's internal governance structure

A bank's risk control function is part of a broader internal governance structure comprised of

– the management body
– senior management
– the risk control function
– the internal audit function

Several international institutions have published guidance on internal and corporate governance aspects, inter alia the BCBS[32], the OECD[33] or the industry-based Institute of International Finance (IIF)[34]. Also some national authorities like the british Treasury have only recently joined the crowd here (Walker Report)[35].

On the EU level the London based Committee of European Banking Supervisors (CEBS), a coordinating and advisory body for the national banking supervisory authorities and for the European Commission, has issued guidance on this topic, too[36]. As a "Level 3 Committee" CEBS is part of the Lamfalussy procedure, a specific comitology procedure established to speed up legislation on financial integration in the EU. CEBS recommendations are not legally binding yet.

However, this will change as soon as it has been transformed into the European Banking Authority (EBA), one of the three European Supervisory Agencies that are supposed to be established at the beginning of 2011 following the recommendations of the so called De Larosière Report[37].

Under the Banking Directive Internal Governance is referred to in Article 22 and in Annex V. It aims at ensuring that an institution's management body is explicitly and transparently responsible for the bank's business strategy, organisation and internal control procedures and is concerned mainly with

– setting the institution's business objectives and its appetite for risk
– how the business of the institution is organised
– how responsibilities and authority are allocated
– how reporting lines are set up and what information they convey
– how internal control (including risk control, compliance, and internal audit) is organised.

An example for a possible internal governance structure is given in Figure 1. In this example the Risk Control function reports to the Chief Risk Officer (CRO) being a member of the management body. Since the CRO does not take positions that bear credit, market or liquidity risks for the bank the Risk Control function is located independently within the governance structure of the bank. Since Internal audit is also controlling the control functions within the bank (like the Risk control function) Internal audit should not report to the CRO. Instead it reports directly to the CEO.

In this graph the management body represents the top (executive) management level of the bank as circumscribed in Article 11 of the Banking Directive. Senior management should be understood to represent the level of management directly below the management body, like the head of Compliance or the head of Risk control in our example. This classification is complient with the CEBS Guidelines on the Supervisory Review Process[38] (GL 03) and the Guidelines on the implementation, validation and assessment of Advanced Measurement (AMA) and Internal Ratings Based (IRB) approaches (GL 10)[39].

However, this classification is not the only one on the market. For instance, the Basel II framework defines "senior management" as the highest executive body in a bank and the "board of directors" as the highest supervisory body (supervising the executive body). These deviating definitions are due to the different institutional solutions around the globe when fulfilling the two key functions in an institution: management and supervision. Most EU member states for instance use one of two corporate

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[31] BCBS (2006a), p. 226.
[32] BCBS (1998; 2006b).
[33] OECD (2004).
[34] IIF (2008).
[35] HM Treasury (2009).
[36] CEBS (2006a; 2006b; 2009)

[37] The High level Group (2009).
[38] CEBS (2006a), p. 6.
[39] CEBS (2006b), p. 103.

governance structures: a unitary or a dual board structure. In a unitary board structure, one body (e.g. the "board of directors") performs supervisory and management functions at the same time (by allocating management and supervisory functions to different persons respectively), whereas in a dual board structure the two functions are performed by different bodies[40].

Getting it to the right people - The management body and senior management

The management body bears the overall responsibility for almost all aspects of the banking business. It cannot be expected therefore that each member of the management body is an expert for each field the bank is conducting business in. Nor should it be made a requirement that the members of the management need to understand each technical detail of risk measurement systems like a sophisticated rating system. However, they must have a basic understanding of the risks the institution is taking in order to take informed decisions concerning the risk profile of the institution. According to the two CEBS guidelines mentioned above the management body is responsible for (inter alia)

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[40] BCBS (2006a), p. 205 and CEBS (2006a), p. 6. For the sake of simplicity in the following we do not distinguish between the supervisory and the management function of the management body when describing its responsibilities. Details on this can be found in the respective Guidelines themselves.

Figure 1. Example for an internal governance structure in a bank
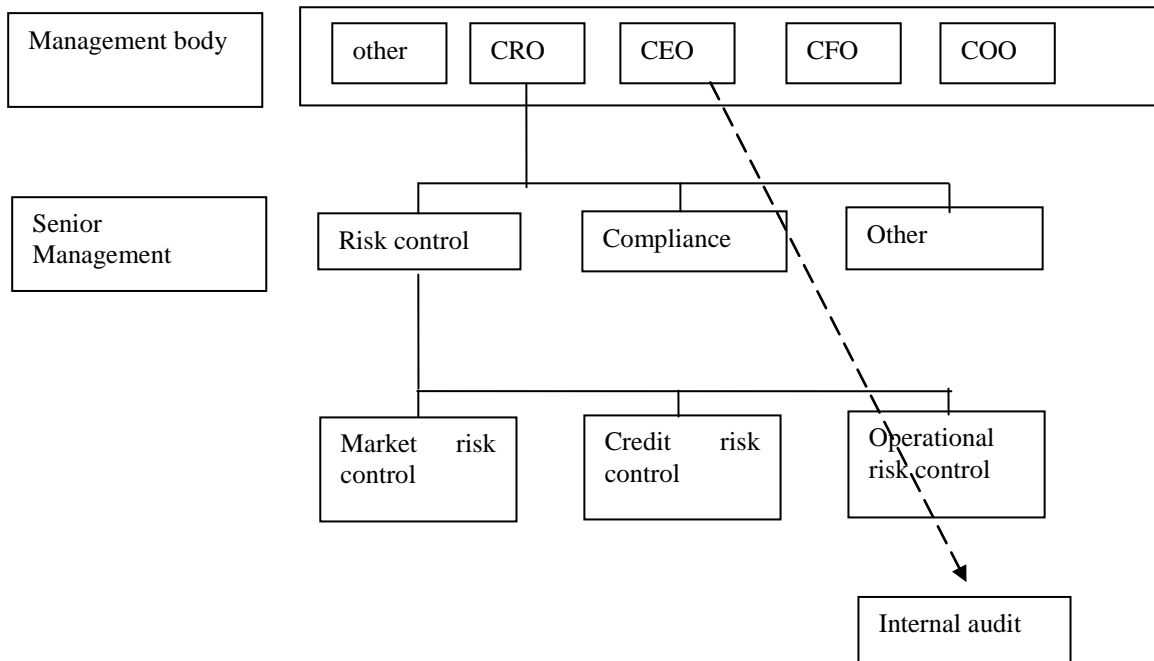
CRO: Chief Risk Officer
CEO: Chief Executive Officer
CFO: Chief Financial Officer
COO: Chief Operating Officer

- understanding the nature and level of risk taken and its relation to adequate capital levels
- setting the bank's tolerance for risk (taking into account all relevant risks including off-balance sheet transactions)[41]
- the strategic planning of (i.a.) the bank's capital needs and the bank's access to external funding sources
- setting and enforcing clear lines of responsibility and authority within the institution
- documenting risk strategies and policies with the help of written guidelines, manuals and other means
- monitoring and periodically assessing the effectiveness of the institution's internal governance structure
- developing strong internal control systems providing for adequate segregation of duties in order to prevent conflicts of interest (for instance banking supervisors would not accept a member of the management body responsible for the trading activities of the institution being at the same Chief Risk Officer)
- overseeing senior management[42]
- setting regular and transparent communication mechanisms for the sharing of information about

risk measurement, analysis and monitoring[43], e.g. by setting up risk committees
- setting compensation schemes that discourage "unhealthy risk taking or maximisation of short term profits"[44], both for the management body and lower down the management chain (including the sales and trading function level)

Especially the last point has become crucial for supervisors in the aftermath of the financial crisis, since excessive risk taking was encouraged by short-termed profit- but not risk oriented compensation schemes. Several initiatives have been launched both on the European and the international level to foster more sustainable compensation schemes in the future.

There are several other lessons to be learned from the financial crisis when it comes to internal governance. As the Senior Supervisor's group points out, banks having suffered least from the crisis are the ones where the above-mentioned principles were respected, inter alia since

- risks were managed under an integrated, firm-wide approach with good communication across several risk management teams
- an authoritative CRO was in place

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[41] CEBS (2010), p. 4.
[42] CEBS (2010), p. 3.

[43] CEBS (2010), p. 6.
[44] CEBS (2008a), p. 477-481.

- information was passed swiftly upwards to the management body[45]

There are enough examples, however, where these principles had not been taken into account:

- information about (excessive) risk taking did not reach the management body or senior management
- members of the management body had approved a risk strategy but did not establish suitable metrics to monitor its implementation[46]
- banks' management bodies took strategic decisions to retain large exposures to super senior tranches of Collateralized Debt Obligations (CDOs) without understanding the risks inherent in such investments
- a number of management bodies were not aware of senior management or even lower management levels taking risks beyond the risk appetite set by the management body
- it was difficult to persuade the management body to pay sufficient attention to the results of forward-looking stress testing
- there was a lack of systemic procedures for escalating red flags to the management body[47]

Not only CEBS, also the Banking Directive itself makes direct reference to the management body, for instance when it comes to Internal Ratings Based Approaches. According to Annex VII Part IV paragraph 124 of the Banking Directive the management body has to approve all material aspects of the rating and estimation processes. Furthermore the management body needs to have general understanding of the credit institution's ratings systems and detailed comprehension of its associated management reports. In order to improve the understanding of the rating system and to improve the efficiency the management body may delegate certain aspects to specific risk committees.

However, as the CEBS Guidelines point out, this does neither relieve the members of the Management body from their obligation to have a general understanding of the IRB framework nor from its ultimate responsibility for developing and implementing it[48]. The same holds true for the use of an Advanced Measurement Approach for calculating the capital requirements for operational risk[49]. Furthermore, according to CEBS the management body holds ultimate responsibility also for

- policies and key procedures in relation to exposure to concentration risk
- the overall stress testing framework

- the proper management of the risks associated with outsourcing[50]

Finally, when it comes to liquidity risk, Annex V of the recast Banking Directive calls for robust strategies, policies, processes and systems for the identification, measurement, management and monitoring of liquidity risk, proportionate to the complexity of the institution's business the and liquidity risk tolerance set by the management body[51]. In addition to this, according to the 2008 CEBS Advice to the Commission on liquidity risk management the management body needs to have a sound understanding of the tools used to measure liquidity risk and the results of stress tests, being able to take appropriate action if necessary[52].

Senior management

Senior management is responsible for risk management on a day-to-day basis but still on a rather highly aggregated level of risk. On the other hand, for senior management a deeper knowledge of technical details of the risk measurement and management system compared to the management body should be expected. In particular, senior management should ensure that the institution sets trading, liquidity, credit and other risk limits based upon the institution's risk appetite[53]. For instance, when it comes to IRB systems Pragraphs 124 to 127 of the Banking Directive set the following requirements: Senior management shall

- possess a general understanding of the credit institution's rating systems and detailed comprehension of its associated management reports
- provide notice to the management body or a designated committee thereof of material changes or exceptions from established policies that will materially impact the operations of the credit institution's rating systems
- have a good understanding of the rating systems designs and operations
- ensure, on an ongoing basis that the rating systems are operating properly
- be regularly informed by the credit risk control units about the performance of the rating process, areas needing improvement, and the status of efforts to improve previously identified deficiencies.

Furthermore, in the case of an IRB approach, the CEBS guidelines 10 call for a good understanding of credit policies, underwriting standards, lending practices, and collection and recovery practices, and

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[45] Kirkpatrick (2009), p. 69.
[46] Kirkpatrick (2009), p. 62.
[47] Kirkpatrick (2009), p. 67-71.
[48] CEBS (2006b), p. 104.
[49] CEBS (2006b), p. 135.

[50] CEBS (2008a), p. 488-489.
[51] EU (2009), p. 116.
[52] CEBS (2008b), p. 44.
[53] CEBS (2010), p. 4.

should understand how these factors affect the estimation of relevant risk parameters. When it comes to operational risk, senior management should adequately assess operational risk inherent in new areas (products, activities, processes, and systems) before they are introduced, and identifying risks tied to new product development and other significant changes in order to ensure that the risk profiles of product lines are updated regularly[54].

In general, senior management should ensure that the following tasks are being addressed:

− Ensuring the soundness of risk taking processes
− Determining how internal ratings are used in the risk taking processes
− Identifying and assessing the main risk drivers, based on the information provided by the Credit Risk Control Unit or the Operational Risk Management Function
− Defining the tasks of the risk control or risk management function and evaluating the adequacy of its professional skills
− Monitoring and managing all sources of potential conflicts of interest;
− Establishing effective communication channels in order to ensure that all staff are aware of relevant policies and procedures;
− Defining the minimum content of reporting to the management body or to bodies to which it has delegated responsibilities (e.g., the Risk Committee), and
− Examining reports from Internal Audit or another comparable independent audit unit[55].

Senior management should also check, on a regular basis, that the control procedures and measurement systems adopted by the credit risk control unit and Internal Audit (or another comparable independent audit unit) are adequate and that the overall IRB system remains effective over time[56].

Getting the right information at the right time - The risk control function

If senior management or the management body is supposed to "*make the most informed judgments possible*" these judgements must be based upon correct and timely information. The more independent the unit to which risk control functions are allocated the higher the probability that the right (i.e. not manipulated) information can indeed be delivered at the right time. Conversely, the more this unit depends on the risk taking units in a bank the higher the likelihood that unfavourable information will be hidden or completely oppressed and that the

management body will never see it (or will only get aware of it when it is too late to rescue the bank like in the case of Nick Leeson). One of the painful experiences some banks had during the financial crisis was indeed that the proximity of risk managers to traders was (too) high[57].

It doesn't come as a surprise therefore that all guidelines covering aspects of a risk control function call for the independence of this function from the business lines it monitors and controls. According to the CEBS Guidelines 03 a control function can generally be regarded as independent if the following conditions are met:

• The control function staff do not perform any tasks that fall within the scope of the activities that the control function is intended to monitor and control
• The control function is organisationally separate from the activities it is assigned to monitor and control.
• The head of the control function is subordinated to a person who has no responsibilities for managing the activities that are being monitored and controlled.
• The head of the control function reports directly to the management body and/or the audit committee, and is present at least once a year at meetings of the body it reports to.
• The remuneration of the control function staff is not linked to the performance of the activities that the control function is intended to monitor and control.

As already mentioned before, it is the responsibility of the management body to ensure that the risk control function has sufficient resources, well-qualified and experienced staff, as well as a sufficient number of staff. Since an organisational separation or, in general, meeting all of the above conditions may not be practical for smaller institutions, the CEBS Guidelines explicitly allow for taking other measures to safeguard independence as long as the institutions can show how any real or potential conflicts of interest are avoided or mitigated.[58]

This is exactly the reason why the CEBS Guidelines generally speak of an independent risk control function and not of an independent risk control unit (like the Banking Directive – see below) – this unit might not exist! Or a bank might not choose "risk control" but "risk management" (which would usually be aligned with risk-taking activities!) as the name for a unit being responsible for risk control functions. Finally, the risk control functions might be spread over two or more different organisational units[59].

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[54] CEBS (2006b), p. 136.
[55] CEBS (2006b), p. 105 and 136.
[56] CEBS (2006b), p. 105.

[57] Kirkpatrick (2009), p. 71.
[58] CEBS (2006a), p. 16-17.
[59] CEBS (2006b), p. 107.

But what exactly would be the tasks of an independent risk control function? The Banking Directive defines these tasks for institutions applying an AMA or an IRB approach quite clearly. According to Annex VII Part IV Paragraph 128 the "Credit risk control unit" shall

− be independent from the personnel and management functions responsible for originating or renewing exposures
− report directly to senior management
− be responsible for the design or selection, implementation, oversight and performance of the rating systems
− regularly produce and analyse reports on the output of the rating systems.

Paragraph 129 provides further details on this. Also CEBS offers some more responsibilities like backtesting and benchmarking the predicted parameters (Probability of default, Loss given default, Credit conversion factors) against third party data sources[60].

Similarly, according to Annex X, Part III Paragraph 3 of the Banking Directive the credit institution must have an independent risk management function for operational risk. Again, the CEBS Guidelines 10 elaborate further on this: The Operational risk management function (ORMF) should have sufficient resources and skills in operational risk management and measurement methods and knowledge of the processes of the institution and is responsible (inter alia) for the following aspects:

− The operational risk measurement methodology
− Monitoring systems
− Reporting
− Operational risk quantification and allocation processes
− Backtesting and benchmarking, and the methodology for allocating operational risk capital to subsidiaries[61].

Furthermore, if an institution uses an internal model for calculating the minimum capital requirements for market risk, the Capital Adequacy Directive (CAD) requires in Annex V Paragraph 2 inter alia that

− the institution has a risk control unit that is independent from business trading units and reports directly to senior management.
− this unit must be responsible for designing and implementing the institution's risk management system and shall produce and analyse daily reports on the output of the risk measurement

model and on the appropriate measures to be taken in terms of trading limits.
− this unit shall also conduct the initial and on-going validation of the internal model;
− the institution's board of directors and senior management are actively involved in the risk control process and the daily reports produced by the risk control unit are reviewed by a level of management with sufficient authority to enforce both reductions of positions taken by individual traders as well as in the institution's overall risk exposure;
− the institution has sufficient numbers of staff skilled in the use of sophisticated models in the trading, risk control, audit and back office areas;

One important point in all these requirements seems to be reporting directly at least to senior management. The establishment and maintenance of management information systems that cover the full range of its activities is indeed a critical component. This information is typically provided through both electronic and non electronic means. Management decision making could be adversely affected by unreliable or misleading information provided especially by systems that are poorly designed and controlled[62]. Again, the independence of the function being responsible for the reporting process is therefore crucial.

Recipients of internal reporting should at least be senior management and (typically less frequently and less detailed) the management body. The frequency and content of reporting will in general depend on an institution's size and the complexity of its business and should be formally approved by both the management body and senior management.

The minimum requirements of the CRD relating to IRB reporting are specified in Annex VII, Part 4, Paragraphs 126 and 128. CEBS provides some examples for what this could include:

− A description of the rated portfolios (amounts, number of obligors, PDs per grade, percentage of coverage with ratings with respect to the total portfolio, breakdown by entities, sectors, subportfolios, and business units)
− The distribution of the overall portfolio according to rating grades, PD bands, and LGD grades, and a comparison with the previous year
− A comparison of realised default rates (and loss given default and credit Conversion Factors for institutions on advanced approaches) against expectations
− The results of stress tests[63]

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[60] CEBS (2006b), p. 107.
[61] CEBS (2006b), p. 138.
[62] CEBS (2006a), p. 18.
[63] CEBS (2006b), p. 106.

For operational risk calculated with the help of an Advanced Measurement Approach reporting could include:

- New or improved management policies, procedures, and practices (e.g., changes in the business environment, business practices, and internal control factors);
- Risk reduction and risk transfer strategies (e.g., the effect of any expected loss deductions, cost benefit analysis of insurance policies, mitigation and corrective actions on the business line/event type exposure and/or losses, cost benefit analysis of the mitigation actions);
- Operational risk exposure (e.g., description of key operational risk events and drivers, and the distribution, trend, and migration of the operational risk exposure across business lines);
- Internal and (where relevant) external loss experience (e.g., event type loss analysis and comparison in term of trends, seasonality, geographical distribution, etc.);

Furthermore, the CEBS Advice on liquidity risk management stresses the importance of an efficient reporting system, too, as "[…] the quality of the reporting process is essential to ensuring that the management body and senior management have a sound understanding of the tools used to measure liquidity risk and the results of stress tests, and that they are able to take appropriate action if necessary."[64]

As the examples listed above show, the CRD offers similar requirements concerning an independent risk control function whenever it comes to the use of internal models for the calculation of minimum capital requirements. However, there is no need to go further into details of other risk models made reference to in the CRD, since the examples from credit risk, operational risk and market risk have already provided a rather detailed overview of how important the independence of the risk control function is and what tasks such a function would typically be responsible for (reporting, design of the models, backtesting and benchmarking, conducting stress testing, etc.).

The internal audit function

The last piece in the internal governance structure introduced is the internal audit function. The role of internal audit under the Basel II framework is predominantly assessing the independence and the efficiency of the risk control function but also the assessment of the overall compliance with the minimum requirements of the Banking Directive and the Capital Adequacy Directive. In this respect

internal audit should regularly report (at least annually) to both the management body and senior management. In order to fulfil this function properly it needs to have access to all relevant internal documents. All recommendations of internal audit should be subject to a formal follow-up procedure in order to ensure their resolution.

By this it should allow the management body to ensure that the quality of the internal controls is both effective and efficient[65].

Internal Audit should also review the adequacy of the IT infrastructure and data maintenance. For institutions using statistical models, this means conducting tests (for example, on specific business units) in order to check data input processes. The audit function should not be involved in day-to-day operations, however, like reviewing each individual rating assignment[66].

Finally, Internal Audit units should always be staffed by individuals possessing the requisite stature, skills, and experience.[67] It is important that they be familiar with the institution's strategy and its processes for identifying, assessing, monitoring, controlling, and mitigating risks.[68].

Summary and outlook

The internal governance structure of a bank is crucial for surviving stress situations or for avoiding them at all. This has been proved once again during the financial crisis, where institutions with a bad internal governance structure were hit the hardest. A crucial part of the internal governance structure is an independent risk control function providing independent reporting to the management body and senior management. Basel II aims at strengthening risk management within the institutions in order to enhance financial stability.

Has Basel II failed because it could not prevent the financial crisis starting in summer 2007? This popular argument cannot really be subscribed to. The moment the crisis evolved Basel II had come into force only for the institutions with a more simple business model using the standardised approaches for credit and operational risk. The more sophisticated IRB and AMA models with their strict requirements concerning an institution's internal governance and the respective Pillar II requirements were coming into force only on 1 January 2008. Both the institutions and the supervisory authorities were therefore still in a preparatory pre-Basel II phase when the crisis got virulent.

With the Banking directive, the Capital Adequacy Directive and the BCBS and CEBS Guidelines complementing these directives the tool box for efficiently supervising an institution and the

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[64] CEBS (2008b), p. 44.

[65] CEBS (2006a), p. 18.
[66] CEBS (2006b), p. 109.
[67] CEBS (2006b), p. 137.
[68] CEBS (2006 b), p. 139.

risks it is taking and for enforcing a better quality of risk management has already been established in the years 2006 to 2008. Consequently, there is no real general need for a further set of rules on internal governance like the CEBS high level principles for risk management. It is more the strict application of the already existing framework that matters.

There are two exceptions to this rule, however. One is the forthcoming new rules on compensation schemes, the other considerations on strengthening the role of the Chief Risk Officer. The crisis has shown that independent and swift reporting lines are obviously not enough. It is more the power to make the management body act (or preventing it from acting) following this information that is lacking. The CEBS High-level-principles for risk management therefore correctly stress the necessity to strengthen the role of the CRO. In this respect they reflect industry's best (but not widespread) practice where an authoritative CRO chairs the risk committee(s) that are directly accountable to the management body and – as a member of the management body - reports directly to the CEO[69].

According to the CEBS High-level-principles, that are supposed to be followed by a comprehensive guidebook addressing risk management issues, the Chief Risk Officer should have sufficient independence and seniority to enable him or her to challenge (and potentially veto) the decision-making process of the institution[70]. This seems to be the right way. Only the future, however, will show whether or not this – together with a more strict application of the already existing internal governance requirements and guidelines - will really have helped to avoid further crises.

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[69] Mongiardino/Plath (2010), p. 117-120.
[70] CEBS (2010), p. 4-5.

ON THE OPTIMAL DESIGN OF RISK RETENTION IN SECURITISATION

Metin Kaptan*

Abstract

This paper examines the optimal design of retention in securitisation, in order to maximize welfare of screening per unit of retention, assuming that screening is costly and that the bank intends to securitise its loans. In contrast to the focus of previous literature on tranche retention, we deviate from the constitutional mechanisms of tranche retention to present a pareto-optimal method of tranche retention. Unlike the current ad-hoc-regulations, we derive the optimal design of retention from a utility maximization problem. We show that the level of retention per tranche should be dependent on the rate of credit default, i.e. the higher the rate of default, the higher the optimal rate of retention required to provide an incentive to screen carefully. From this approach, it follows that the rate of retention per tranche should be higher, the higher the position within the ranking order of subordination. Accordingly, the efficiency of tranche retention can be enhanced, reducing the level of retention required to maintain a given level of screening-effort. This retention design entails a recovery of the bank's equity capital, thereby increasing liquidity and lending capacities.

* Department of Economics, University of Muenster, Germany
Email: kaptan@insiwo.de

1 Introduction

Securitisation, the transformation of illiquid bank loans and other financial assets into liquid, tradable securities, grew tremendously over the period 2004-2007, and declined rapidly thereafter. The annual amount declined from over $3.5 trillion to just over $2 trillion in 2008 (Fender and Mitchell, 2009). This decline in the volume of securitisation reflects a loss of investor trust in the instrument of securitisation, a consequence of malpractice both before and during the crisis.

The technique of securitisation allows banks to transfer default risk to the capital markets. This instrument entails various benefits, such as increased liquidity and lending capacities, and a cost reduction of lending (Geithner, 2011). However, it simultaneously creates a moral hazard problem, which is likely to arise "when individuals engage in risk sharing under conditions such that their privately taken actions affect the probability distribution of the outcome" (Hölmstrom, 1979). Purnanandam (2011) has shown empirically, that banks with high involvement in the so-called originate-to-distribute market did not devote sufficient resources to screening their borrowers. In other words, banks have little incentive to screen borrowers carefully if they intend to securitise the default risk, and once the risk has been transferred, they have no incentive to monitor loans to reduce the probability of credit default. Thus, moral hazard refers here to the tendency towards a low incentive to screen borrower solvency.

The debate on solutions to the problem of moral hazard can be traced back to Arrow (1963), after which it developed into a broad strand of economic literature, specific to the field of insurance economics. Economists have mainly discussed the three following solutions to the problem of moral hazard: (i) "incomplete coverage against loss", (ii) "observation by the insurer of the care taken to prevent loss" (Shavell, 1979) and (iii) "reputational concerns" (Stiglitz and Weiss, 1981). Within the framework of securitisation transactions, screening-effort is unobservable, because it is too time-consuming to be economically viable. The recent crisis has shown that reputational concerns can overcome the moral hazard problem only to some extent. Thus, in this paper, we focus on incomplete coverage against losses, i.e. the originating bank retains so-called "skin in the game". The originating bank should retain some risk associated with the performance of the securitised credit portfolio. The share of risk held by the originating bank provides, ceteris paribus, an incentive to prevent losses and to screen effectively, so that the interests of the investors and the originator are at least partially aligned (Franke and Krahnen, 2008).

In fact, before and during the crisis, originating banks typically retained the first loss piece of their

transactions, similar to a deductible in insurance contracts. "By construction, the first loss piece fully absorbs all [credit] default losses up to its notional amount" (Franke and Krahnen, 2008). However, the notional amount of the first loss piece was so small that it did not provide an incentive to pursue sufficient screening. In addition, a first loss retention generally does not provide an incentive to prevent losses that exceed the notional amount of that first loss piece.

In order to address the deficiencies that contributed to the global financial crisis, the U.S. and European legislative authorities passed laws that require a risk retention of no less than 5 percent, which exceeds the traditional level. Accordingly the United States passed the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank Act") in July 2010 (Kiff and Kisser, 2011). The amendments to the securitisation market include "greater transparency for investors, measures to mitigate conflicts of interest at credit ratings agencies, and [a required] [...] credit risk retention" of no less than 5 percent (Geithner, 2011). In May 2009, the European Capital Requirements Directive was approved and came into force in January 2011. This reform introduces risk retention requirements and intensifies due diligence obligations. "In December 2010, the Committee of European Bank Supervisors (CEBS) issued final guidelines with respect to the application of Article 122a" (Geithner, 2011).

The analysis of risk transfer and moral hazard has attracted considerable attention in the literature[71]. Keys et al. (2010) investigate whether the securitisation process reduces the incentive of banks to pursue proper screening. Chiesa (2008) examines the impact of credit risk transfer on screening-efforts and the incentive for banks to engage in credit risk transfer. Fender and Mitchell (2009) use a moral hazard model, closely related to Innes[72] (1990), to analyse the effectiveness of different forms of retention on the originator's level of screening-effort. The authors differentiate between the retention of a vertical slice, a first loss tranche and a mezzanine tranche. Introducing accounting frictions, Kiff and Kisser (2011) compare the efficiency of equity and mezzanine retention. They demonstrate theoretically, that different forms of risk retention result in different levels of screening-effort.

In contrast to Fender and Mitchell (2009) and Kiff and Kisser (2011) we deviate from existing regulations and derive an optimal design of retention that leads to the welfare maximizing level of screening incentives. We show that neither of the current regulations is welfare maximizing. Our

retention scheme increases screening incentives, given the level of retention. Such a scheme is desirable from a social point of view, because it increases the efficiency of capital allocation. This in turn induces an increase in portfolio quality, which then decreases spreads and leads to an increase in investor demand for securities. The increase in the quality of credit portfolios may be used to reduce the required level of risk retention, which induces a release of costly equity capital and thus promotes financial stability. Furthermore, the release of equity capital leads to an increase in lending capacities, facilitating economic growth.

We use a slightly modified version of the models presented by Bender (2002) and Holmström (1979), to derive the optimal form of an incentive contract under moral hazard. We show that the level of retention per tranche should be relatively high for highly ranked tranches and relatively low for subordinated tranches. The underlying logic is that the bank should be punished for a "bad" outcome and rewarded for a "good" one.

This paper is organised as follows. Section 2 presents the current regulations. Section 3 introduces the model and Section 4 concludes and considers the policy implications.

2 Current Securitisation Regulations

The theoretical literature on risk allocation generally finds that under asymmetric information, the screening incentives decrease when risk is transferred. The real-world poor quality of the underlying assets of securitised portfolios during the financial crisis supports the theoretical literature. As a response to the financial crisis, the US and EU legislative authorities interfered through regulation, introducing tranche retention to solve the problem of moral hazard.

In April 2010, the Securities and Exchange Commission (SEC) proposed a rule obliging originators to satisfy risk retention requirements. "Under the proposed Regulation AB II regime, [the originator has to] [...] retain either (i) at least 5 percent of the nominal amount of each tranche [of the portfolio securitised] [...] or (ii) in the case of revolving [exposures] [...], a seller's interest of at least 5 percent of the nominal amount of the securitized exposures" (De Sear and Hwang, 2011).

The European Union considered a risk retention regime for asset backed securities (ABS), which to some extent differs in its design from AB II. On 1st January 2011, the European retention requirements came into force. The key requirement of tranche retention (see Article 122a, Capital Requirements Directive) stipulates that EU-based credit institutions[73] investing in securitisation transactions

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[71] See e.g. Keys et al. (2010), Fender and Mitchell (2009), Chiesa (2008), DeMarzo (2005), Gorton and Pennacchi (1995), Innes (1990), Leland and Pyle (1977), Stiglitz (1974) and Spence and Zeckhauser (1971).
[72] Innes (1990) considers a principal-agent problem, in which a risk-neutral agent makes an unobservable effort choice and thereby influences the principal's income under limited liability of the agent.

[73] Note that in contrast to the US-regulation AB II, the EU Capital Requirements Directive "does not impose risk retention requirements directly on originators of securitisations [...], but instead regulates the activities of

retain no less than 5 percent of the "net economic interest". Article 122a provides the following retention options that may be chosen from (see also Figure 1):

- Random selection - originators are required to retain randomly selected exposures equal to no less than 5 percent of the nominal amount of the securitised exposures, provided that the nominal amount is no less than 100 at origination,
- First loss tranche - originators are required to retain the subordinated first loss tranche and, if necessary, other tranches of the same or a higher risk profile as those sold or transferred, so that the retention equals no less than 5 percent of the nominal amount of the securitized exposures,
- Vertical slice - originators are required to retain no less than 5 percent of the nominal value of all securitised tranches sold or transferred to investors,
- Pari passu share[74] - originators are required to retain no less than 5 percent of the nominal value of securitised exposures in the case of securitisations of revolving exposures (Capital Requirements Directive, Article 122a[75]).

The need for retention requirements is widely accepted, but the level and nature remain controversial. Some market participants fear that a retention rate of 5 percent is not high enough to create a sufficient incentive for banks to carefully screen borrowers. Others argue that a retention of 5 percent is too high and thus constrains lending capacities.

Instead of analysing the optimal level of risk retention, this paper aims to identify the optimal retention design. For this purpose, we deviate from the earlier presented forms of retention. The risk retention should rather be designed so that the screening incentive is maximized per unit of retention. This approach therefore maximizes the originator's incentive to screen carefully without causing additional costs in terms of retained equity capital. The efficiency of securitisation transaction may be increased in two ways. (i) An increase in screening-effort due to optimal incentive setting, ceteris paribus, reduces the notional level of retention needed to ensure a given level of effort and thereby increases bank lending capacities. (ii) With a given percentage share of tranche retention, an increase in screening-effort entails an increase in the quality of the portfolio. This provides greater certainty among

investors, thereby decreasing spreads and increasing the demand for asset backed securities.

Thus, we provide a simple incentive-based approach to enhance the market for securities by decreasing the costs and increasing the quality.

3 The Model

The model focuses on a principal-agent relationship between two utility maximizing market participants in a securitisation transaction - an originator[76] (bank) B and an investor I. The investor is risk-averse. The bank may or may not be risk-averse.

The bank gives credit to borrowers. Borrowers i differ in default probabilities $x_i \in \{\underline{x}; \overline{x}\}$. The default probability x cannot be influenced by borrowers, i.e. there is a purely adverse selection problem between bank and borrowers. The bank can mitigate the adverse selection problem only with the costly screening-effort e. The bank securitises the credit portfolio and the size of the credit portfolio is normalized to 1. The default risk of the portfolio $x \in \{\underline{x}; \overline{x}\}$ is determined by the screening-effort. The level of screening-effort cannot be observed by the investor. Since screening is costly, originators are tempted not to screen, when credits are to be securitised. Accordingly, the information asymmetry originates in the unobservability of the screening-effort.

The investor's utility function is defined by wealth only, while the originator's utility function is defined by both wealth and effort. An increase in effort entails two opposing effects on the originator's utility function: (i) there is a direct negative effect as a result of an increase in costs and (ii) there is an indirect positive effect due to a decrease in the probability of credit default. The latter effect only applies, if the originator retains risk in terms of tranche retention. The lower the level of risk retention, the higher is the probability that the negative effect prevails. If the level of risk retention does not exceed the expected (non-influenceable[77]) level of credit default, the originator has no incentive to pursue proper screening, since an increase in effort only affects the utility negatively through an increase in costs. In contrast to the originator, the investor always benefits from an increase in effort, due to the decrease in credit default to be covered and because the costs are borne by the originator. Therefore, a conflict in objectives is likely to arise.

The originator's utility-function is given by

$$u_B(Y) = u_B(x, e) = u_B\big(\Omega_B - R(x) - c(e)\big), \quad (1)$$

where Ω_B denotes the originator's initial wealth, x displays the credit default rate, $R(x)$ is the level of the credit default which is covered by the

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[74] This form of risk retention is not depicted in Figure 1, because it can be treated as equivalent to a vertical slice.
[75] See DIRECTIVE 2009/111/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 September 2009 amending Directives 2006/48/EC, 2006/49/EC and 2007/64/EC as regards banks affiliated to central institutions, certain own funds items, large exposures, supervisory arrangements, and crisis management.

investors in asset-backed securities" (De Sear and Hwang, 2011).

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[76] The terms "originator" and "bank" are used interchangeably.
[77] It is assumed that, even with meticulous screening, the default rate can never be reduced to zero.

originator and e represents the screening-effort. Let $c(e)$ denote the costs of screening, with $c'(e) = 1$. The initial wealth already accounts for a risk-premium paid to the investor for covering part of the default risk.

The investor's utility function is given by

$$u_I(Z) = u_I(x) = u_I(\Omega_I - (x - R(x))), \quad (2)$$

where Ω_I displays the investor's initial wealth, including the premium for taking the default risk.

The investor benefits from an increase in effort, since it reduces the credit default rate and consequently leads to a decrease in the covered losses $(x - R(x))$, whereas screening-effort implies, ceteris paribus, that financial penalties accrue to the originator when the level of retention $R(x)$ is low. Consequently, an incentive problem arises, conditional on the level of unobservability of screening-effort. An incentive to pursue costly screening can be attained by risk retention, i.e. the investor does not cover all potential losses, $R(x) > 0$.

Figure 1. Current retention requirements
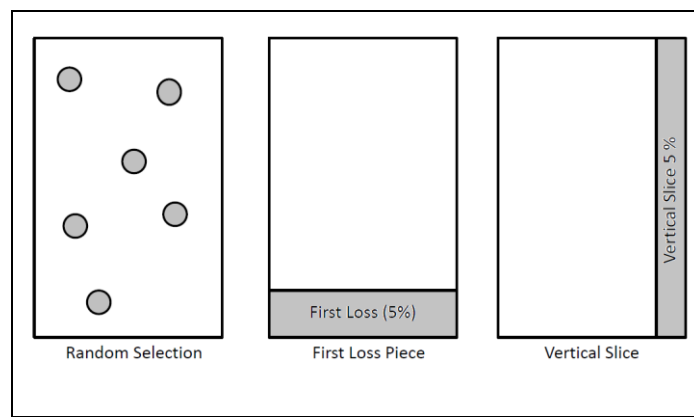
The realized credit default rate is assumed to be a stochastic function of e, i.e. screening-effort only reduces the probability of credit default. Otherwise, the incentive problem could easily be solved by inducing special enforcement contracts, that specify a defined minimum screening-level. Any deviation from the agreed minimum screening-level would be punished.

The credit portfolio has a default probability $x \in \{\underline{x}; \overline{x}\}$. We denote the density of the default risk given screening level e by $f(x, e)$, i.e. the credit default rate is not directly dependent on the level of screening-effort, but indirectly by the effect of an increase in effort on the density function of x (see e.g. Mirrlees, 1974 and Holmström, 1979).

We assume that the density function $f(x, e)$ satisfies the following properties:

- First Order Stochastic Dominance (FOSD) – $f(x, e)$ dominates $f(x, \hat{e})$ with $e > \hat{e}$, i.e. $F(x, e) \geq F(x, \hat{e}) \, \forall \, x$ and $F(x, e) > F(x, \hat{e})$ for at least one x. This means that an increase in effort will shift the density function $f(x, e)$ to the left.
- Monotone Likelihood Ratio Property (MLRP) - The derivative of the probability density function $f_e(x, e)$ reflects the marginal change in the density function caused by an increase in effort. The so-called Likelihood Ratio $f_e(x, e)/f(x, e)$ decreases monotonically in e and thus satisfies

MLRP, i.e. $\frac{\partial}{\partial x}\left(\frac{f_e(x,e)}{f(x,e)}\right) < 0$. Intuitively, MLRP implies that in relative terms, low default levels become more likely, while high default levels become less likely.

- Concavity of the Distribution Function Condition (CDFC) - This condition requires that the function increases at a decreasing rate, i.e. $F_e(x, e) > 0$, $F_{ee}(x, e) < 0$. Therefore, the effect of an increase in effort on the probability of default is decreasing.

The maximization problem

Since screening-effort cannot be observed, the originator will choose a level of effort, such that the marginal costs of an additional unit of effort will equal the marginal benefit. Accounting for this condition, the retention rate $R(x)$ must be such that the originator chooses a screening-effort which simultaneously maximizes total utility.

We apply the First-Order Approach (FOA) to solve this problem[78]:

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[78] This model is closely related to the model presented e.g. by Bender (2002). Bender (2002) applies this model to derive optimal reinsurance contracts for catastrophe risks.

$$\max_{R(x),e} L = \left(\int_{\underline{x}}^{\overline{x}} u_B[\Omega_B - R(x) - c(e)] f(x,e)\,dx \right) + \mu \left(\int_{\underline{x}}^{\overline{x}} u_I[\Omega_I - (x - R(x))] f(x,e)\,dx - \overline{u_I} \right)$$

$$+ \lambda \left(\int_{\underline{x}}^{\overline{x}} u_B[Y(x,e)] f_e(x,e)\,dx - c'(e) \int_{\underline{x}}^{\overline{x}} u'_B[Y(x,e)] f(x,e)\,dx \right) \quad (3)$$

with

$$Y(x,e) = \Omega_B - R(x) - c(e).$$

Let μ and λ denote the Lagrangian multipliers. In the spirit of Holmström (1979), the necessary condition for optimality is replaced by the first-order constraint. MLRP and CDFC are sufficient conditions for the FOA to be valid[79]. The first-order constraint

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[79] See Rogerson (1985) for a detailed discussion and proof of the validity of the FOA.

reflects the fact that at the optimum, the marginal costs of screening-effort equal its marginal benefit.

A point-wise optimization of the Lagrangian with respect to $R(x)$ yields:

$$-u'_B(Y) f(x,e) + \mu u'_I(Z) f(x,e) + \lambda[-u'_B(Y) f_e(x,e) + c'(e) u''_B(Y) f(x,e)] = 0. \quad (4)$$

Rewriting equation (4) gives:

$$\frac{u'_I(Z)}{u'_B(Y)} + \frac{\lambda}{\mu} c'(e) \frac{u''_B(Y)}{u'_B(Y)} = \frac{1}{\mu} + \frac{\lambda}{\mu} \frac{f_e(x,e)}{f(x,e)} \quad (5)$$

The optimal shape of the retention function

Differentiating equation (5) with respect to x yields:

$$\frac{u''_I u'_B \left(\frac{dR(x)}{dx} - 1 \right) - u'_I u''_B \left(-\frac{dR(x)}{dx} \right)}{(u'_B)^2} + \frac{\lambda}{\mu} c'(e) \frac{\partial \left(\frac{u''_B}{u'_B} \right)}{\partial x} = \frac{\lambda}{\mu} \frac{\partial \left(\frac{f_e}{f} \right)}{\partial x} \quad (6)$$

with $\quad dZ(x)/dx = dR(x)/dx - 1 \quad$ and $dY(x)/dx = -dR(x)/dx$.

Factoring out u'_I / u'_B gives:

$$\frac{u'_I}{u'_B} \left[\frac{u''_I}{u'_I} \left(\frac{dR(x)}{dx} - 1 \right) - \frac{u''_B}{u'_B} \left(\frac{-dR(x)}{dx} \right) \right] + \frac{\lambda}{\mu} c'(e) \frac{\partial \left(\frac{u''_B}{u'_B} \right)}{\partial x} = \frac{\lambda}{\mu} \frac{\partial \left(\frac{f_e}{f} \right)}{\partial x}. \quad (7)$$

We can simplify equation (7) by using the Arrow-Pratt Measure, $r_i = -u''_i / u'_i$, with $i = B, I$:

$$\frac{u'_I}{u'_B} \left(-r_I \frac{dR(x)}{dx} + r_I - r_B \frac{dR(x)}{dx} \right) - \frac{\lambda}{\mu} c'(e) \frac{\partial r_B}{\partial x} = \frac{\lambda}{\mu} \frac{\partial \left(\frac{f_e}{f} \right)}{\partial x} \quad (8)$$

Extending the quotient $\frac{\partial r_B}{\partial x}$ with $\frac{\partial r_B}{\partial x} = \frac{\partial r_B}{\partial Y} \frac{\partial Y}{\partial x}$ yields:

$$\frac{u'_I}{u'_B} \left(-r_I \frac{dR(x)}{dx} + r_I - r_B \frac{dR(x)}{dx} \right) + \frac{\lambda}{\mu} c'(e) \frac{\partial r_B}{\partial x} \left(\frac{dR(x)}{dx} \right) = \frac{\lambda}{\mu} \frac{\partial \left(\frac{f_e}{f} \right)}{\partial x} \quad (9)$$

Solving for $\frac{dR(x)}{dx}$ yields:

$$\frac{dR(x)}{dx} = \frac{r_I \left(\frac{u_I'}{u_B'}\right) - \frac{\lambda}{\mu} \left(\frac{\partial \left(\frac{f_B}{f}\right)}{\partial x}\right)}{(r_B + r_I) \left(\frac{u_I'}{u_B'}\right) - \frac{\lambda}{\mu} c'(e) \frac{\partial r_B}{\partial Y}}. \quad (10)$$

For simplicity and without changing the main result, constant absolute risk aversion (respectively risk neutrality) is assumed, i.e. $\frac{\partial r_B}{\partial Y} = 0$. Hence, equation (10) reduces to:

$$\frac{dR(x)}{dx} = \frac{r_I \left(\frac{u_I'}{u_B'}\right) - \frac{\lambda}{\mu} \left(\frac{\partial \left(\frac{f_B}{f}\right)}{\partial x}\right)}{(r_B + r_I) \left(\frac{u_I'}{u_B'}\right)}. \quad (11)$$

Equation (11) indicates that the shape of the function $R(x)$ is determined mainly by two factors, (i) the relationship between the originator's and the investor's risk-profile and (ii) the likelihood ratio.

The higher the investor's absolute risk aversion r_I in relation to the originator's risk-attitude r_B, the steeper the function. In other words, the more risk-averse the investor, the higher is the necessary rate of risk retention.

The likelihood ratio reflects the impact of an increase in screening-effort on the density function. The likelihood ratio decreases monotonically in x, because an increase in screening-effort induces a decrease in the probability of high default rates and an increase in the probability of low default rates, i.e. $\frac{\partial}{\partial x} \left(\frac{f_e(x,e)}{f(x,e)}\right) < 0$. With $\lambda > 0$, the slope of the retention function increases progressively.

Equation (11) indicates that the level of retention should be increasing in x, i.e. the higher the default rate, the higher the relative share of default carried by the originator. In other words, the level of retention per tranche should be relatively low for low default rates and relatively high for high default rates, i.e. the level of retention should increase for higher ranked tranches. Intuitively, we could argue that the bank will be punished for a bad outcome and rewarded for a good outcome, since the outcome reflects the level of screening-effort. Accordingly, we increase the incentive for banks to prevent high default rates.

Figure 2. Optimal retention function
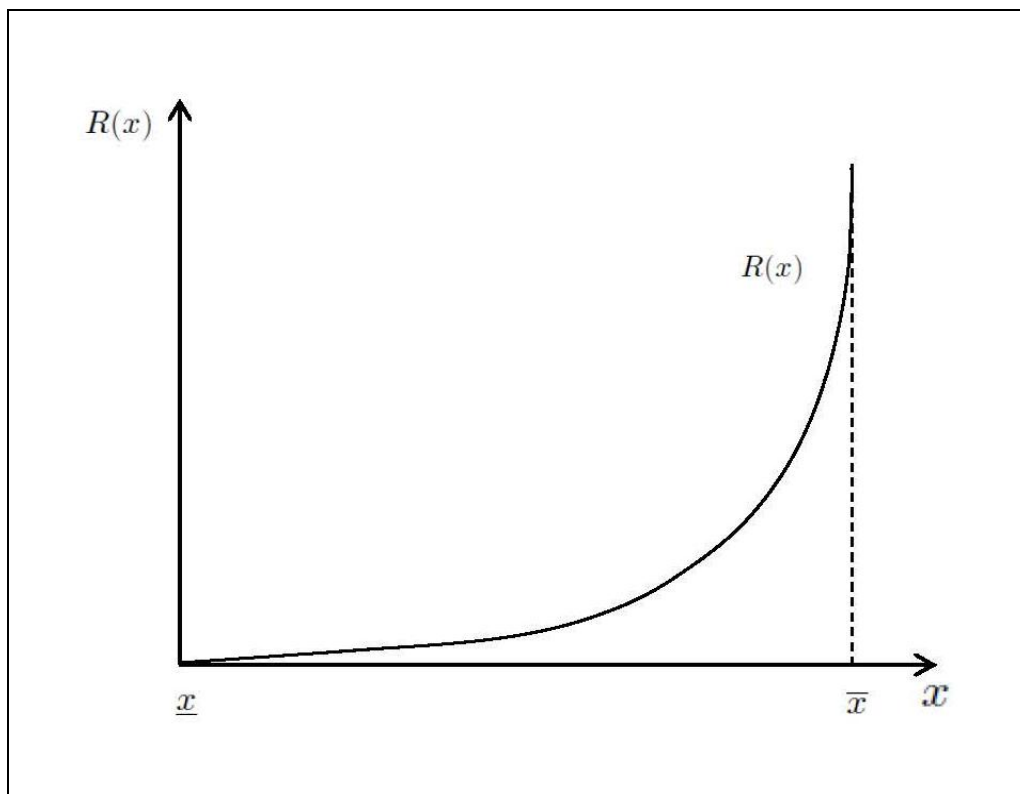
Applied to the structure of a securitised credit portfolio, this means that the originator should retain a share of each tranche that might be affected by a credit default and whose probability of default can be influenced by screening. The higher the default rate x, the higher the proportional share carried by the originator, i.e. the originator should retain a relatively small share of low ranked tranches and an increasing

share, the higher the position within the ranking order of subordination. Accordingly, the originator is punished disproportionately severely for bad outcomes (high default rates) and rewarded excessively for good outcomes (low default rates). Thus, the originator has an increased incentive to screen carefully in order to avoid high default rates. Figure 3 depicts an example of an optimal retention design. The retention is marked in grey. The thin

lines subdivide the influenceable interval of $\underline{x}$ and $\overline{x}$ into different tranches. Since the interval of $\underline{x}$ and $\overline{x}$ cannot be subdivided into indefinitely small tranches, the actual retention function will be stepwise. It can be seen that this retention design differs radically from the current legal regulations presented in Figure 1.

Figure 3. Optimal design of retention
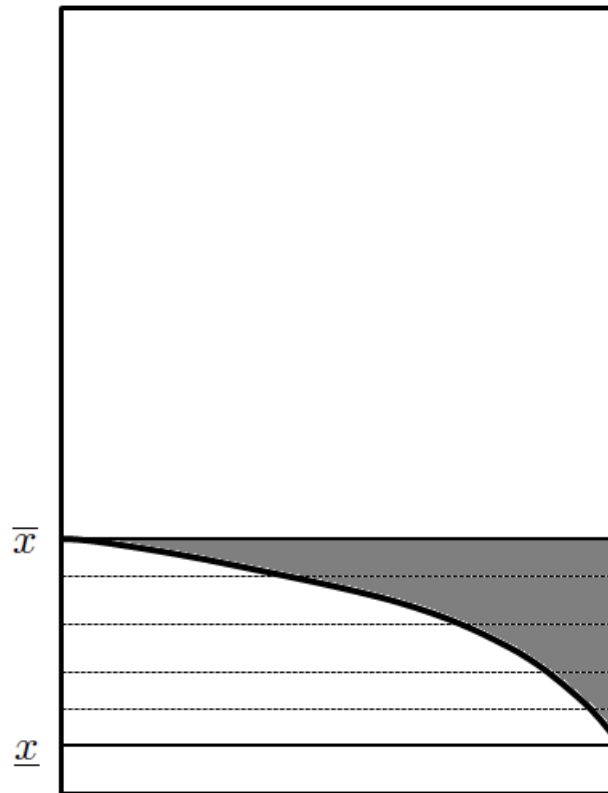
Concluding Remarks

It is common wisdom that the transfer of risk induces moral hazard. As has been demonstrated dramatically during the financial crisis, the securitisation of loan portfolios severely reduces and even eliminates the originator's screening incentives. Consequently, the quality of securities deteriorates, so that investors demand for an extremely high risk premium or alternatively leave the market for securities. As shown by Akerlof (1970), markets may even collapse due to informational asymmetries. In order to prevent an overall breakdown of the market for securities, the partial retention of risk has emerged as the most effective solution. Risk retention entails an alignment of originator and investor incentives.

In the aftermath of the financial crisis, policy makers have decreed that originator's must retain 5 percent of the portfolio, thereby creating an incentive for originators to screen carefully. Nevertheless, policy makers should not neglect the fact that retention design has a strong impact on its

effectiveness. This is of particular importance, because bank equity capital is limited, so that lending capacities are affected directly. Thus, retention should be minimized, but no less than necessary to ensure an optimal screening level. This can only be achieved by an incentive-maximizing retention structure.

The current ad-hoc-regulation does not fulfill this requirement and hence is not optimal. This paper provides an approach which demonstrates that the design of retention should be modified. Policymakers should design risk retention so as to maximize the incentive for careful screening, while minimizing the costs. Therefore, the rate of retention should be relatively high for high-rank tranches and lower for subordinate tranches, as to motivate originators to prevent high default rates. The first loss tranche, which is so small that it may not even be influenced by excessive screening-efforts, should be securitised. In short, the originator should only retain the risk of tranches within the bounds of influenceable credit default, and the level of retention should increase in credit default rates in order to prevent the originator

for lax screening. Thus, with less risk retention, the same amount of screening-effort could be generated. In this manner, the bank's equity capital will be discharged and lending capacity will increase.

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NORMS AND INTERNATIONAL STANDARDS RELATED TO REDUCE RISK MANAGEMENT: A LITERATURE REVIEW

César Fuentes*, Edmundo R. Lizarzaburu**, Edgar Vivanco***

Abstract

The current work aims to develop a revision of the literature within the main concepts in the international rules and standards related to risk management in companies. By this way, there will be an analysis of issues such as the COSO - ERM model, an introduction to the ISO 27000 and 31000 standards; and the Project Management according to PMI targeted at risk management.

Keywords: COSO, ISO 27001, ISO 3100, PMI, Risk Management, Projects, Information Security, Risk Evaluation

*Corresponding Author School of Business, Esan University, Alonso de Molina 1652, Monterrico Chico, Surco, Lima, Peru
E-mail: cfuentes@esan.edu.pe
**School of Business, Esan University, Alonso de Molina 1652, Monterrico Chico, Surco, Lima, Peru
Email: elizarzaburu@esan.edu.pe
***Email: edgar.vivanco@usil.pe

1. Introduction

In recent years there has been a growing concern about risk management and the need of having a solid reference frame to identify, evaluate and manage risk effectively has been identified (Flaherty, 2004).

Therein, several scholars such as Robert I. Mesh, Bob A. Hedges, Clifford W. Smith and Rene M. Stulz have focused on Enterprise Risk Management (ERM) (Liebenberg & Hoyt, 2003). This provides a process by which the company articulates all the features of risk management (Pagach & Warr, 2007) and as a consequence, that company improves the management of the volatility of prices of their actions and their profits, as well as an improvement in the capacity of supervising the portfolio risks (Beasley et al, 2006 & Warr, 2008).

On the other side, the information of the company is one of the most important assets they own and has such a value for the organization that several mechanisms must be developed to ensure a suitable protection (Alvares & Garcia, 2007). That is why, the information security which main purpose or objective is to keep the continuity of the organizational processes that support assets, reduce the global cost of performance of such processes and losses of the appointed resources for their operation (Sema Group, 2006), have become so important. For that reason, it is necessary that the responsible people of the information security in their organizations realize the role they perform and contrast risks their assets may go under. Risk evaluation, analysis and treatment allow take the risk level of the assets of the organization to acceptable values (Pessolani, 2007).

Finally, the globalization has hurried the rhythm of innovation and technological development creating a constant transformation in the market and a huge growth of the demand of products and services which has promoted great development of the knowledge management and the studies of project management (Karapetyan & Otieno, 2011).

2. Risk Management

Risk Management is an essential step in the economic and financial assessment. It is a strict and documented approach in all levels of development of analyzed events which demands information of all areas of interest.

Risk Management has become a central issue in the financial management[80] in the last years. Risk is not a new concept. From the beginning and the middle 20th Century several authors showed interest to that issue such as Markowitz[81] in 1952 and 1959. The seminal work of Knight (1921) clearly points out a distinction between risk and uncertainty, being the first measurable and feasible to delimit by historic experience, sample data or a subjective or Bayesian evaluation of risks. On the other hand, uncertainty is not measurable for the viewpoint of the author and most risk appraisers.

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[80] Das, S. *Risk Management*. Wiley Finance, 2006.
[81] Markowitz, Harry, (1959). *Portfolio Selection, Efficient Diversification of Investments,* John Wiley and Sons, Inc

Risk Management must take into account the dynamic nature of projects. Not only do we consider the negative consequences of an event but also the positive consequences. Cooper et al (2005) states this need saying that "only the management of the negative perception of risks is, in fact, to omit half the responsibilities of the projects manager". Jaafari (2001) and Ward and Chapman (2003) support this statement of showing the importance of considering the risks and opportunities during the process of risk analysis.

Furthermore, the Project Management Institute (PMI) and the Association for Project Management (APM), show the following definitions:

- **Risk:** "An uncertain event or condition that, if happens, produces a positive or negative effect in the objectives of a project" (PMI, 2004).
- **Risk:** "An uncertain event or group of circumstances that, if happens, produces an effect in the achievement of the objectives of the Project" (APM, 1997).

Ward and Chapman go further and suggest an approach called the uncertainty of management that considers the positive and negative consequences of uncertainty (Chapman and Ward, 2003). They state the word "risk" has a negative connotation which complicates the exploration of opportunities in the identification of risks and the analysis process. In this point, authors clearly deviate from the paradigm appointed by Knight (1921), the Risk Management focuses on the management and identification of all the sources of uncertainty, the formation of threats and opportunities.

"The complete management of risks or the Complete Management of Risks (CMR) has shown great development in the recent years as a consequence of the need to know and manage the levels of risk to which a company is exposed during the performance of the strategy and the achievement of goals due to the process of globalization mostly which has extended considerably the range of opportunities as well as risk to which companies face"[82].

The word "risk" comes from the Italian word risicare that means "to defy, to challenge, to face, to dare". In the New Spanish Dictionary, it is Latin etymologically defined as "Danger, test, attempt, to expose to danger, to put somebody in danger, to pose a danger, to face danger" (De Miguel and el Marqués de Morante, 1887, p. 211). "According to Philippe Jorion, risk can be defined as the volatility of unexpected financial flows generally produced from the values of assets and liabilities".

There is not only one accepted definition of risk at a long term. The Oxford English Dictionary defines risk as "the possibility of something unpleasant to happen" and the origins of the term are referred to 17th Century to Risco, Italian words, riscare and richiare (Hay-Gibson, 2009).

Giddens suggests that a root of the word risk comes from a Portuguese word that means "to dare" (Althaus, 2005; Hay-Gibson, 2009). As well as the definition of a record, risk is defined in different ways in different contexts and from different epistemological perspectives. As a matter of fact, Hay-Gibson (2009) defines risk as, "(…) The possibility of an event to happen in terms of its risk, generally with a negative connotation". He points out that risk is a "trans-disciplinary" issue.

The fact that risk is transverse to different activities makes the interpretation of the term more complex. The scope of risks of Information Technology defines risk as any event that affects the company, a case that happens with the frequency and uncertain extent and that creates problems in the achievement of goals and strategic objectives. (ISACA, 2010).

In other words, the perception of individuals of levels of risk and the real objective of the feasibility of an event neither match the regulations or definitions of risk nor the sequence defined by the academy. Even though the definitions vary, it is likely to obtain certain common ideas associated to the concept of risk. Risk is often typified as an unequal event related to specific consequences (ISO /IEC, 2009). In fact, the references to the risks are frequently associated to the mixture of the probability of the event and the consequences of such event (ISO / IEC, 2009). From the side of the computers security it is impossible to extend the additional concept of a menace combined with a vulnerability that a risk situation produces. (Harris, 2010)

Risk management has been followed by several authors (Bernstein, 1996; Barlow, 1993; Covello and Mumpower, 1985; Thompson, et al, 2005; Althaus, 2005; Hay-Gibson, 2009). These ones suggest that it is an old policy and the place and time that Duranti (1989) and others have traced at the beginning of this Management – is Tigris Region and Euphrates Valley. It started at about 3200 BC. Covello and Mumpower described the way in Asipu (risk early Managers) as consultants for uncertain or difficult decisions.

Others suggest that the origins at the beginning of the Risk Management are still under discussion (Hay-Gibson, 2009). The history of Risk Management takes into account that the information provided by Diderot and Voltaire promoted the beginning of the risk management as modernly known and at the same time produced the modern concept of historic files (Covello and Mumpower, 1985; Posner, 1984).

ISO 31000 standard defines Risk Management as "Coordinated activities to lead and control an organization with respect to risk" (ISO / IEC, 2009), whereas the Genetic Advisers compare risk management as the process to advise clients in the

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[82] AS / NZS Rule 4360:1999, Australian Standard of Risks Management

way of managing risk related to the genetic tendency to particular disorders (Austin, 2010). It is concluded by studies of Helsinky University of Technology (Porthin, 2004) in relation to the number and variety of definitions of risk management is that the idea of risk and its management is only referred to decisions made from high management which purpose is to identify, evaluate and reduce risks. Furthermore, the rule points out: "... Different types of organizations of all sizes face internal and external factors and influence that create uncertainty if they achieve their objectives or not.

All the activities of an organization imply certain risk. Organizations manage their risk by identification and analysis and then assessing if risk should be modified by the treatment of risk with the purpose of satisfying risk criteria. By this process, organizations communicate and advise implied parties, monitor and review risk and controls that are modifying it with the purpose of guaranteeing that no additional treatment of risk is needed. This rule describes this systematic and logical process in detail ..."[83]

Covello and Mumpower (2006) find that generally the risk analysis methodologies include the following common elements: (i) the mathematical notion of probability (It will perform either qualitatively or quantitatively), (ii) a process of establishing causation and risk identification, and (iii) the processes and strategies to reduce these risks. Risk Management ISO standards outlines a number of activities, including evaluation, treatment, monitoring and reviewing risk, and documentation of their management process (ISO / IEC, 2009). With slight variations of context, activities now form the basis of the standard practice of Risk Management through a number of different areas. So, "from fields as diverse as document management is genetic counseling, analysis activities related to risk management and strategies to face risk appear to be relatively uniform".[84]

3. Literature Review

3.1. COSO – ERM Model

The Treadway Commission *(Committee of Sponsoring Organizations of the Treadway Commission – COSO)* was formed in 1985, in response to the inefficiency of internal controls. For example, errors and irregularities by deficiencies in Information Technology, collusion and negligence of people, and other operational failure events. (Ernst & Young, 2011).

The result was published on the internal control integrated framework to help organizations assess and improve their internal control systems. This framework has been incorporated into policies and regulations within organizations seeking to improve control of their activities to improve the achievement of its objectives.

Thus, it was verified the need of a reference frame for Risk Management which provides among other things: principles and key concepts and a common language with clear guidance. COSO believes that this integrated framework of Enterprise Risk Management (ERM) meets this need, and expects to be widely accepted by companies and other organizations and, in fact by all other groups of interest (COSO, 2004).

In 1992 the publishing of the integrated Reference Frame redefines the internal control, developing a conceptual framework with tools to evaluate and improve controls. Then, in 1996 a comprehensive method that describes 89 principles of best practices for effective risk management within a financial institution is provided, collected in the Generally Accepted Risk Principles (GARP: Generally Accepted Risk Principles[85]).

In the field of audits and internal control, the Sarbanes-Oxley Law of 2002 (US Government Printing Office) aims to improve protection to shareholders through a series of measures, very demanding, affecting the different agents involved in public markets businesses. Thus, the Law influences significantly, among others, on the Boards of Directors, on the directors of these companies, on investment banks, on financial analysts, and also, on a major way, on the activity and regulation of accounts auditors. The duties and responsibilities of each of those involved in the companies listed in the American market (Díaz, 2005).

In terms of the evolution of the Internal Control Model, ERM began to be widely discussed and developed initially by large financial institutions. COSO began with the creation of an ERM framework by Financial Intelligence units to provide a solid base on which companies can improve corporate governance and deliver greater value to shareholders (Bowling & Rieger, 2005).

Even though ERM does not want to replace the internal control framework, it seeks to incorporate so as to provide a more solid and wide focus. However, ERM is not just limited to the internal control requirements but can evolve into a process of comprehensive risk management (COSO, 2004).

Despite the valuable contribution that the emerging practice of ERM makes the model, there are also some limitations. For example, it cannot establish a standard for identifying the effectiveness of the ERM. Its definition of risk focuses on the internal field and does not take into account the opportunities and external threats. Adopting an approach of command and control does not take into

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[83] ISO 91000:2009 Rule

[84] Lemieux, V. (2010). The record-risk nexus: exploring the relationship between records and risk,. Record Management Journal .20(2), 199-216.

[85] http://riskinstitute.ch/00011593.htm

account the shared management of threats with external factors and social implications of ERM.

As a result of that, the bias of not considering the opportunities becomes systemic. It is now apparent, since the ERM has been institutionalized within the rules, practice and expected standards of good management (Williamson, 2007).

Treadway Comission (1992) defines ERM as: *"A process affected by the board of directors, management and staff of an institution, applied in the development of the strategy throughout the organization designed to identify potential events that may affect the entity and manage the risk to find within the risk profile established to provide reasonable assurance of achieving the objectives of the organization."*

From the above definition it is concluded that ERM is a continuous process that is transverse to an entity. Shenkir and Walker (2006) suggest that executives should be willing to commit, because they are responsible to protect, create and increase shareholders value. It also involves fundamental concepts of risk management in companies, providing a basis for its application within organizations, industries and sectors. The ERM is focused directly on achieving the goals set by a particular entity and provides a basis for defining effective enterprise risk management.

According to the previously mentioned, it is identified that the widespread application of ERM has been established for two primary reasons:

- **Sarbanes-Oxley Law (2002):** It seeks to reach a higher level than the application of this Law, in which public financial instructions apply, in particular section 404 of the Law. *Therefore, increased emphasis on corporate governance and related to the rising costs of compliance are driving business leaders to consider if the enterprise-wide approach to risk management will generate greater value from their investments in SOA compliance. They see the ERM as the next step in a logical progression for the development of its risk management activities. In its fullness, the ERM has the potential to reduce compliance costs, improve operational performance, improve corporate governance and deliver greater value for shareholders.* (Wagner & Lee, 2006).

- **Publication of the new COSO framework:** The model describes the key components and principles of risk management for organizations regardless of size. The ERM has a broad view of risk, an important step forward compared with the fragmentation of risk management in many organizations. It focuses on the causes and effects that can keep companies achieve their strategic business objectives.

3.1.1. Achievement of Objectives Approach in the Model

In the context of the mission or vision of an institution, the administration has established strategic objectives, selects the strategy and sets targets through the company hierarchy. This framework of enterprise risk management is aimed at achieving the objectives of the organization, established in four categories: strategic, operational, finance and compliance with governing laws and regulations. This categorization of objectives focuses on different aspects of enterprise risk management. These different but overlapping categories (a particular target can belong to more than one category) address the needs of the organization and may be the direct responsibility of different executives. The categorization also allows distinguish between what can be expected from each category of objectives (Ernst & Young, 2011). Because the objectives regarding the reliability of the information and compliance with laws and regulations are within the control of the organization, it is expected that corporate risk management can provide reasonable assurance for the achievement of these objectives (Root, 1998).

3.1.2. Components of the Model

COSO-ERM model consists of 8 interrelated elements, which are derived from the way management runs a business and are integrated with the management process (Moeller, 2007). It has been proposed a three-dimensional model that provides criteria for assessing internal controls with three objectives: effectiveness and efficiency of operations, reliability of financial information and compliance with laws and regulations.

These components are[86]:

- **Internal Environment:** The internal environment includes the style of the organization, and seeks to influence the awareness of people regarding to risk, including risk management philosophy, integrity and ethical values, and the environment in which they operate. (Ernst & Young, 2011).

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[86] Gupta, Parveen P., COSO 1992 Control Framework and Management Reporting on Internal Control: Survey and Analysis of Implementation Practices (June 10, 2009).

Chart 1. COSO - ERM: INTERNAL ENVIRONMENT INDICATORS

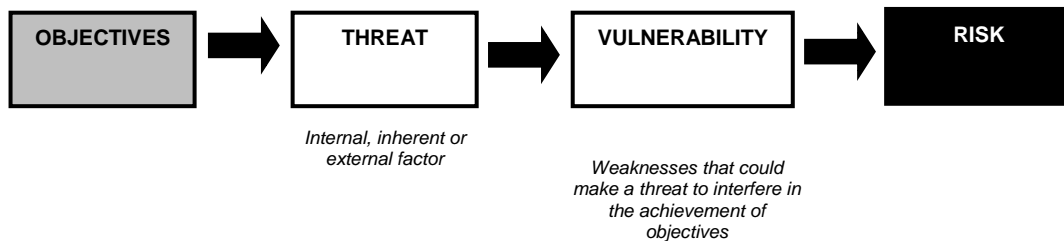| **INTEGRITY AND ETHICAL VALUES**	**DIRECTORY / AUDITS COMMITTEE**	**COMMITMENT TO COMPETITION**	**HR POLICIES AND PROCEDURES**
– Code of Conduct. – Ethics Training. – Policies with emphasis on ethics. – Good practices in relation to recruitment of personnel.	– Directory and Committee consists of independent and competent persons. – Active participation in major management decisions. – Supervision of management performance.	– Effective procedures for hiring and evaluation of performance by HR. – Clearly defined functions and responsibilities. – Training.	**ORGANIZATIONAL STRUCTURE** **PHILOSOPHY AND OPERATING STYLE OF MANAGEMENT** **ASSIGNMENT OF RESPONSIBILITIES**

Source: Ernst & Young 2011

- **Stating Objectives:** ERM ensures that management has implemented a process to set goals and that the selected targets support and match the goals of the organization and are consistent with their risk profile (Ernst & Young, 2011).

Chart 2. COSO - ERM: relationship between objects, threats and vulnerabilities

OBJECTIVES	→	THREAT	→	VULNERABILITY	→	RISK

Internal, inherent or external factor

Weaknesses that could make a threat to interfere in the achievement of objectives

Source: Ernst & Young 2011

- **Identification of Events:** Events (internal and external) that affect the achievement of the objectives of the organization must be identified, making a difference between risks and opportunities. (Ernst & Young, 2011).

Chart 3. COSO - ERM: risk categorization
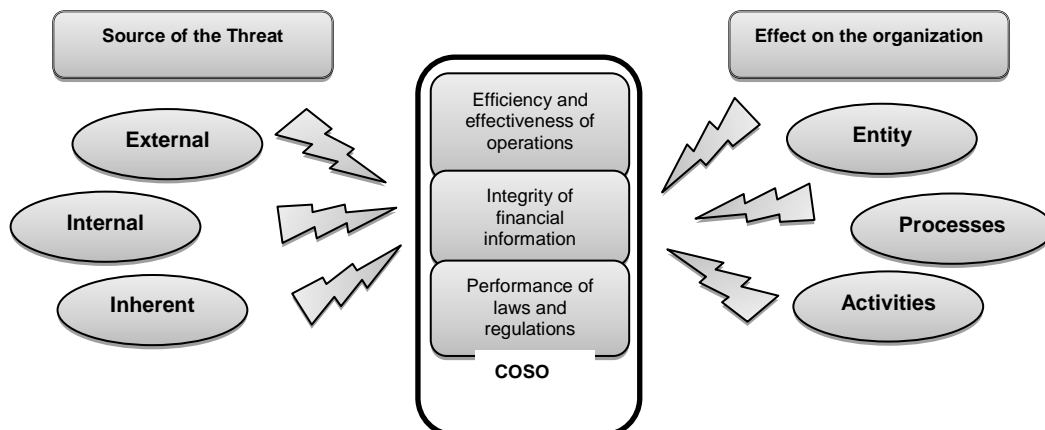
Source: Ernst & Young 2011

The organization should identify internal and external risks that could prevent business goals from achieving.

Table 1. COSO - ERM: internal and external risks

CATEGORY	DESCRIPTION
EXTERNAL	Risk that come from environmental conditions and which cannot influence the organization.
INTERNAL	Risk that come from decisions made by the organization and use of internal and external resources.
INHERENT	Risk inherent in the business, are usually independent of the sector or type of organization.

Source: Ernst & Young 2011

The risks may vary according to the effect they have on certain levels of the organization.

Table 2. COSO - ERM: HAZARD LEVELS OF ORGANIZATION

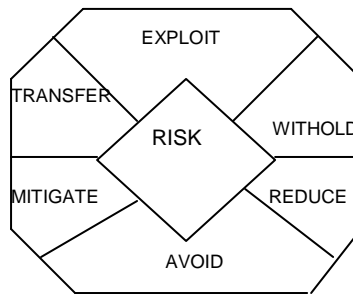| CATEGORY	DESCRIPTION
ENTITY	Broader risks that affect all the organization. Top management assumes responsibility for remedial.
PROCESS	Specific risks of a particular process. The solution is often left to those responsible for the processes.
ACTIVITY	Risks that come from the performance of particular tasks or activities.

Source: Ernst & Young 2011

- **Risk Evaluation:** Risk evaluation is the process of analysis and prioritization of risks relevant to achieving the objectives of the entity and to determine an appropriate response. (Ernst & Young, 2011).

Risks are analyzed, taking into account the probability of occurrence and impact, which will determine their treatment:

- **Severity of Impact:** Level of financial exposure of the company at risk or amount of financial loss that could be generated if a risk event occurs.
- **Probability of occurrence:** Degree of possibility that the risk event occurs over a period of time.

- **Answering to Risks:** Management selects risk responses: avoid, accept, reduce or share risk, developing a series of actions to adapt risks to the risk profile of the entity. (Ernst & Young, 2011).
- **Control Activities:** Policies and procedures are set up and implemented to help ensure that risk responses are effectively carried out. (Ernst & Young, 2011). These measures seek to mitigate and manage risk so that it is likely that a process achieves its objectives.

Chart 4. COSO - ERM: RISK EVALUATION LEVEL

Impact

(5) Catastrophic	High	Extreme	Extreme	Extreme	Extreme
(4) Higher	High	High	Extreme	Extreme	Extreme
(3) Moderate	Moderate	Moderate	High	High	Extreme
(2) Less	Low	Low	Moderate	High	High
(1) Insignificant	Low	Low	Low	Moderate	High
	(1) Rare	(2) Unlikely	(3) Possible	(4) Probable	(5) Almost Certain

Probability

Source: Ernst & Young 2011

Chart 5. COSO - ERM: STRATEGIES FOR THE TREATMENT OF RISKS

EXPLOIT

TRANSFER

RISK

WITHOLD

MITIGATE

REDUCE

AVOID

Source: Ernst & Young 2011

Chart 6. COSO - ERM: TYPES OF CONTROL

Opportunities according to execution

Preventive Control: Activity that helps to avoid a risk.

Detective Control: Activity that allows to identify errors after an accident.

According to degree of automation

Manual: Activity that seeks to detect errors.

Semiautomatic: Activity that seeks to detect or prevent errors using information from a system.

Automatic: Activity made by a system.
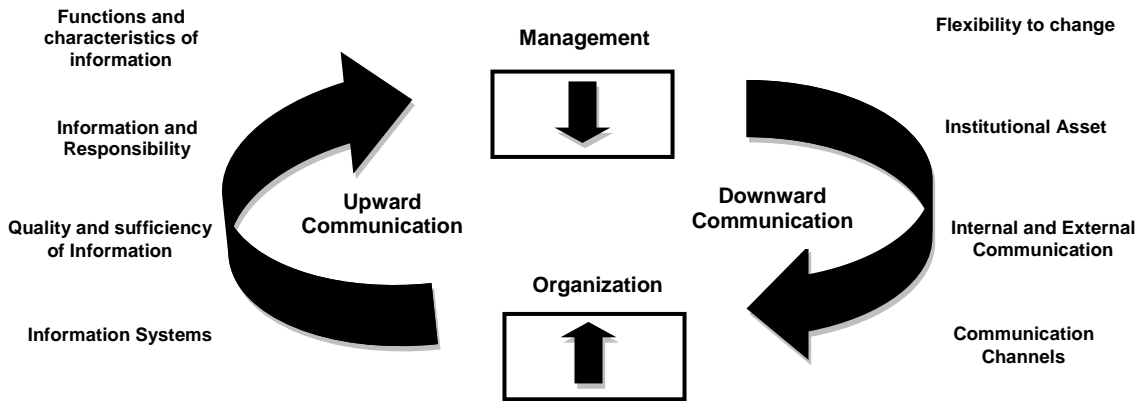
Source: Ernst & Young 2011

- **Information and Communication:** Relevant information is identified, stored and communicated in the way and terms that allow

people to carry out their responsibilities. (Ernst & Young, 2011)

Chart 7. COSO - ERM: INFORMATION AND COMMUNICATION SYSTEMS


Source: Ernst & Young 2011

- **Supervision:** Because management of risk is a multi-directional and interactive process where almost any component may have and has influence over another, supervision is carried out through activities of management in progress, separate assessment, or both aspects in order to obtain reasonable security that the objectives will be achieved as well as those related to internal control. (Ernst & Young, 2011)

3.1.3. *Relation to the objectives and components*

There is a direct link between the objectives the entity wants to achieve and the components of the management of corporate risk that represent what is missing to obtain to achieve them. The link is represented by a cube-shaped, three-dimensional array

Graph 8. COSO: EVOLUTION (1992-2004)
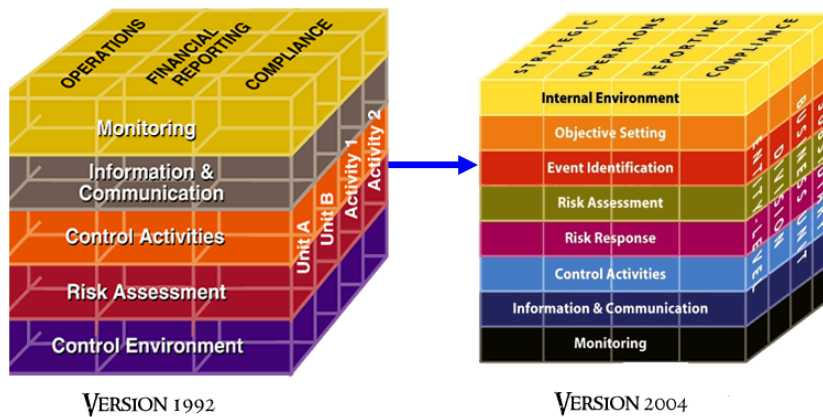
Source: COSO 2004

The four categories of objectives: strategy, operations, information and performance are represented by vertical supports. The eight components are represented by flat rows and the units of the entity by the third dimension of the cube. This graph shows the capacity of focusing on the whole management of corporate risk of an entity or by category of objectives, component, unit or any sub-group wanted, as well. (COSO, 2004)

3.2. *Information Security and Risk Management*

As business is developed rapidly and industries seek to organize efforts related to risk management, market participants expect that the corporate programs of Risk Management provide with more detailed data for their analysis and support a better

decision-making which involves new standards for Risk Management[87] and information security directly.

Thus, organizations realize that it is necessary to work under the guidelines of ISO rules. For example, ISO 9000 develops quality issues, whereas ISO 14000 Rule has an approach within management and respect to environment (Yates & Murphy, 2007). Furthermore, there is another series of ISO rules that has started to play a more important role in the scope of risk management.

The three rules that implement management systems have many issues in common (Brewer & Nash, 2005). Firstly, they are based on Deming Cycle (1950) that states the requirements and processes that allow a company to set up, implement, control, manage and keep efficient management, whether quality, environment, or information security (Humphreys, 2005). Secondly, they are made to complement each other in such a way that allows organizations to create an integrated management system. This means, a unique management system that complies with more than one of the rules or standards of management (Brewer & Nash, 2005). Thirdly, due to the compatibility among the rules, it becomes easy to companies with experience in implementing a management system, to do it with any of the others.

Fourthly, all management systems can be certified according to governing law and evidence of companies. Their implementation and certification hold a positive impact in their performance (Nicolau and Sellers, 2002). The essential premise of certification in ISO 9001/14001/2001 Rules is that the process of creation of products and services can be managed using any of the systems because their receipts and expenditures can be measured in several moments while the system adds value (Stevenson & Barnes, 2002). Fifthly, such rules are made to be applicable to any type of organization, that is to say, big, medium or small ones (Humphreys, 2005) and to any scope of business.

Particularly, and related to Information Security, these rules are respectively, the code of practice for the security management of information (ISO 17799) and the requirements of security of the Security Systems of Information (ISO 27001) and now the Guide ISO 31000 because it has been accepted that there is a very close link between information security and risk management and these rules help this relation (Saint-Germain, 2005).

3.2.1. ISO 27000 Standard

Due to the importance that information security has in organizations and with the purpose of facing malicious intruders that enter into them to do damage, best practices around setting security standards of information related to ISOIES BS7799-IT, RFC2196,

Baseline, SSE-CMM and ISO 27001, the most relevant in IT information security has been identified (Diaz, 2008).
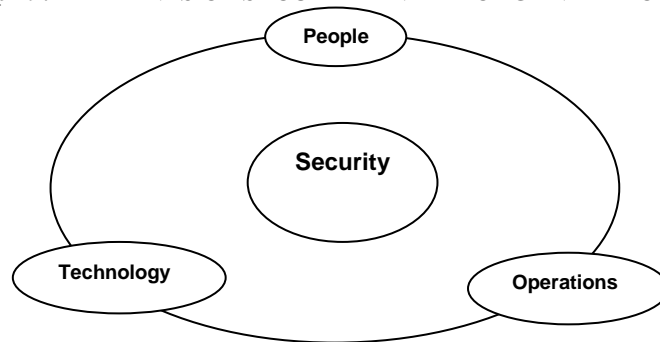
The purpose of information security is to protect resources of an organization such as hardware, software and people. By selecting and applying suitable security, organizations can reach their objectives or missions when they protect their physical and financial resources, reputation, legal position, employees and other tangible and intangible assets. The security systems of information start and end with the people within the organization and with the people who interact with the system (Shubhalaxmi, 2011). Thus, information security must be considered as a way of protecting assets of a business and at the same time a strategic element to add value to companies and keep them competitive in the market (Nicolau & Sellers, 2002)

Because of their economic activity and under the premise that emphasizes the importance of information within organizations, there is a need within organizations of designing mechanisms that allow to guarantee confidentiality, integrity and availability of information that it is handled and protect the assets of information by implementing suitable processes within a company.

On the whole, the elements that interact within the security of an organization are people, technology and operations or processes. That is to say the security of an organization is the result of operations made by people and supported by technology. The main reason of security of information is to protect the information assets by implementing suitable processes within the organization (ISO, 2005b)

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[87] Mc Clean, Chris. *ISO 31000 – The New, Streamlined Risk Management Standard.*2010.

Graph 9. ELEMENTS OF SECURITY IN THE ORGANIZATION

Source: AENOR Perú.

ISO / IEC 27001 standard has been developed to protect information assets of organizations (Humphreys, 2005). A critical indicator of Information Security in companies is shown in empirical results: 50% of companies that lose their critical systems of business for over 10 days do not recover them at all and get out of business (Louderback, 2005). This announcement impacted the world of information security (Humphreys, 2005). ISO / IEC 27001, recently introduced (in 2005) is a revised version of the British rules BS 7799-2 published by British Standards Institution (BSI) in 1999. By this way, the rule targeted at Management of Information Security has the objective of helping state and maintain an information system of efficient management, using an approach of continuous improvement. In Annex A of the Rule, 11 domains, 39 control targets and 133 controls that an organization should bear in mind to implement an Information Security Management System, are defined (ISO, 2005a)

To implement an Information Security Management System (ISMS) according to ISO 27001 Rule is important that the organization has suitably defined the tools used to identify the actual risk and the methodology to measure that risk and that they should be held in time and do not obstacle labor in future. Methodology and tools must be made according to the criteria of the organization and related to the main activity or core business (Lizarzaburu E, 2011)

Long before ISO / IEC 27001 was published, it was already known that this type of rule was what companies were looking forward (Humphreys, 2005). In fact, it was designed to be practical and flexible enough to be assembled with the actual management systems and suitable to any approach of risk that the organization can adopt. (Humphreys, 2005)
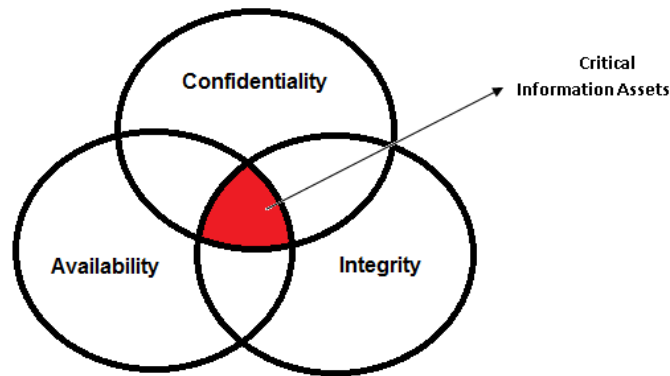
3.2.2. *Information Security Management System*

ISO 27001 Standard states the requirements of how an organization can implement the security requirements of ISO 17799:2005 Rule. According to ISO 27001 standard (Lineman, 2007) "This rule has been designed to provide with a model to state, implement, operate, supervise, revise, keep and improve an Information Security Management System (ISMS)". As per this Rule, Information Security Management is defined as: "The management system includes the organization structure, the policies, planning activities, responsibilities, practices, procedures and resources".

This rule can contribute to develop an approach of risk management based on the selection, implementation, revision and follow-up of strict controls. Development of ISMS and an "approach based on risk" are processes that require an important investment of time (Shubhalaxmi, 2011).

In other words, ISMS extends through all the program of information security, including their relation with other parts of the organization. Whereas ISO 27001 does not provide with a complete procedure for a security program of suitable information, but numbers each of the different organization functions necessary for certification, including a list of required documents that must be made, ISO 27001 uses an approach based on processes, duplicating the model defined for the first time by the organization for Cooperation and Economic Development (OCDE). The cycle Plan – Do – Check – Act (PDCA) (OCDE, 2002) divides the general processes of organization in four phases. A process that must be followed to ensure that ISMS, and by default, risk management must not be static processes (Shubhalaxmi, 2011).

Graph 10. ISMS: ISMS ESSENTIAL PRINCIPLES

Source: Calder, A. Information Security base on ISO27001/27002: A Management Guide.

MSIS adoption helps the company to develop measures to reduce the weaknesses related to the Information Security such as: physical access or information without restrictions, lack of information backup, incomplete activity records, lack of a clear separation of responsibilities and functions, among others. While more information is created, processed and stored digitally and a larger amount of income of the companies is promoted by critical processes of information, ISO / IEC 27001 rule becomes more important because it allows to identify and consider the risk to which information systems, assets or services of the companies are exposed, with the purpose of identifying and selecting suitable appropriate controls to protect information (De Freitas, 2009).

ISO / IED 27001 can be appreciated as a whole programme that combines risk management, security management, administration and accomplishment. It helps company to ensure that suitable people, process and systems are in their place, and to ease a proactive approach to manage the security and risk (Benner, 2007).

3.2.3. ISO 31000 Guide

In November 2009, the International Organization of Standardization published ISO 31000:2009 Guide (Risk Management – Principles and guidelines) that states a reference frame designed to explain the elements of a program of efficient risk management. The reference frames previous to ISO 31000:2009 include COSO methodology, ERM and AS / NZS 4360 Risk Management Standard. Unlike them, ISO Rule provides a simplified guide of reference about the principles and processes of management risk although it is not certifiable.

With the implementation of ISO 31000, the organization is able to clearly define the terms[88] related to Risk Management that are applicable in order to remove the obstacles in the fulfillment, audits and business duties; to review continually the

processes that are related to the control of risk so as to identify improvement soon; to make the organization aware of the importance of risk management to all groups of interest of the organization; and finally, to identify and assess uncertain events that promote a positive impact within the organization; by this way, ISO 31000 Rule becomes a valuable management tool for the organization because it helps mitigate risk and increase the positive impact for the organization.(Lizarzaburu E, 2011)

That is to say, the rule will help professionals in the field of risks so as to define terminology clearly, to state formal processes, to understand the context of efforts and to consider the inherent opportunities in risk. Although this first version does not help to develop practical tools of risk management, their scope is complete in relation to the description of risk that can lead to the implementation of a program of risk management.

To sum up ISO 31000 allows:

- **To achieve an agreement about the definitions within a group of terms related to risk management**: this terminology is provided by the Guide ISO 73:2009 - Risk Management – Vocabulary[89] whose information will help to remove the idiomatic obstacles that exist among fulfillment, audits and business duties.

- **To review processes related to risk control**: It is likely that many of the processes described in ISO 31000 Rule are already part of the program of risk management but it is possible that the rule provides recommendations for their revision and identify opportunities of improvement.

- **To set practices of risk management in the appropriate context**: to understand the importance of risk management in the organization, their context must be identified in an internal and external background which implies strategy, then management, information systems and culture.

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[88] ISO Guide 73:2009 Risk Management – Vocabulary (http://www.iso.org/iso/iso_catalogue).

[89] ISO Guide 73:2009 Risk Management – Vocabulary (http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_detail_ics.htm?csnumber=44651)

- **To consider risk as potentially positive or negative uncertainty (upward and downward risks):** This is specially complicated in areas of operative risk but processes and definitions that provide to ISO 31000 can be used to assess uncertain events or circumstances that may affect business objectives positively. The process of taking this into practice can take much longer but it is the best way that risk management becomes a valuable tool for decision making more than just mitigation of the loss or fraud.

However, the great obstacle that organizations face when implementing ISO 31000 consists of translating their concepts in tools, methodologies and processes that are appropriate for the organization for implementing the guide. Organizations must identify the most important risks. It is rather a complex duty for organizations if appropriate methodology has not been clearly defined and can be understood for future. It is important not to make their applicability difficult when identifying and assessing new possible scenarios that may affect the organization positively or negatively (Lizarzaburu E, 2011).

3.3. Project Management

Many researchers (Fox and Waldt, 2007; Schoen et al., 2005, Lytras and Pouloudi, 2003) have analyzed the development of planning techniques for Project management. One example is the Critical Path Method (CPM), the Project Evaluation and Revision Technique (PERT) created in 1950, and the introduction of Gantt chart of Henry Gantt in 1958.

On the whole, according to Soderlund (20039, the historic development in the Project Management (PM) implies that the Project Management is "a method of solving specific problems of delimitation or group of activities by the use of several types of techniques and methods" (Karapetyan & Otieno, 2011).

In 1976, the first organism of Project management was set up in the United States by PMBOK Guide of Project Management Institute (PMI). Since then, the PMBOK Guide has been a guide for practices of project management and emphasizes on time, cost and scope; and the use of

focus of systems (Jugdev, 2004). Similar associations have been developed in several countries such as the International Project Association (IPMA), Association of Project Management (APM) among others.

Within schools Project Management suggested by Bredillet (2007, 2008), the evolution and influence of PM is shown in other management disciplines. Bredillet points out that there is a need to classify research trends in project management to current developments in PM as for example; knowledge bodies, certification programmes and educational programmes can act as a source of value creation for the organization. All the different views on project management represent heterogeneity and the need of application of different tools and techniques. Depending on the school meets the needs of the project best; it is chosen the appropriate PM approach.

Thus, the concept of project management changes over time and becomes a specialized form of management as well as other functional strategies. It is used to achieve business objectives within a defined budget program. The essence of project management is to support the implementation of the competitive strategy of an organization to provide a desired result (Milosevic, 2003). Compared to the traditional stereotype, the recent literature recognizes project management as a key business process (Jamieson & Morris, 2004).

This approach defines an organization as a process rather than a function or matrix and describes project management as one of the key business processes that enable companies to implement systems that increase value. Therefore, when organizations link their projects to business strategy, are better able to achieve their organizational goals (Srivannaboon, 2006).

The focus of the PMI Project Management identifies the elements of project management that organizations must match with their business strategy to manage risks appropriately. PMI defines a project as a temporary effort carried out to create a product, service or result.

Table 3. SUMMARY OF THE 9 SCHOOLS OF THOUGHT OF PROJECT MANAGEMENT

School	Metaphor	Central Idea	It became known	Key Analysis Unit (Bredillet, 2010)
Optimization	Project as machine	Analysis of the components of the project, planning and programming. (Anbari et al, 2008) Optimizing project results using mathematical methods (Bredillet, 2010).	At the end of the 40s	Time
Modeling	Project as mirror	Organizational factors, behavioral and political issues that affect projects. Use of systems for projects modeling. (Bredillet, 2008c).	Hardware Systems: In the middle of the 50's./Software Systems: In the middle of the 90's	Time, cost, performance, quality, risk, etc.
Government	Project as Legal Entity	Client-Employer relationships, transaction costs within the project management, program and portfolio (Anbari et al,. 2008).	Contracts: In the early 70's/ Management: In the middle of the 90's	The project, participants and management mechanisms.
Behavior	Project as a Social System	Leadership, communication, teamwork and human resource management, virtual team, multicultural issues.(Bredillet, 2008d).	Human Resources Management: In the early 2000	People and work teams
Success	Project as Business Objective	Success factors and criteria of projects, satisfaction of the interest groups and reasons for project failure (Bredillet, 2008d).	In the middle of the 80's	Success criteria and factors
Decision	As Computer Project	Information processing during the project life cycle, methods of estimation of cost and time realistic (Bredillet, 2008e).	At the end of the 80 decade	Information on which decisions are made
Process	As Algorithm Project	Find the right path towards fulfilling the vision; analyze them for the optimization of the main processes (Bredillet, 2008e).	At the end of the 80 decade	The project, its processes and threads
Contingencies	As Chameleon Project	Distinguish the types of projects to adapt management processes of appropriate projects; match capacities with strategy (Anbari, et al., 2008).	Early in the decade of 90	Factors that differentiate projects
Marketing	Project and Advertising	Analysis of the needs of individual interest groups, internal and external marketing projects (Anbari, et al., 2008).	Group of interest: In the middle of the 90's/ Board of Directors: In early 2000	Commitment of interest groups in projects and project management

Source: Karapetyan, A. y Otieno, R. (2011). A Study of Knowledge Management Challenges in Project Management: Case of Start-up Projects in Swedish Incubators, University essay from Umeå universitet
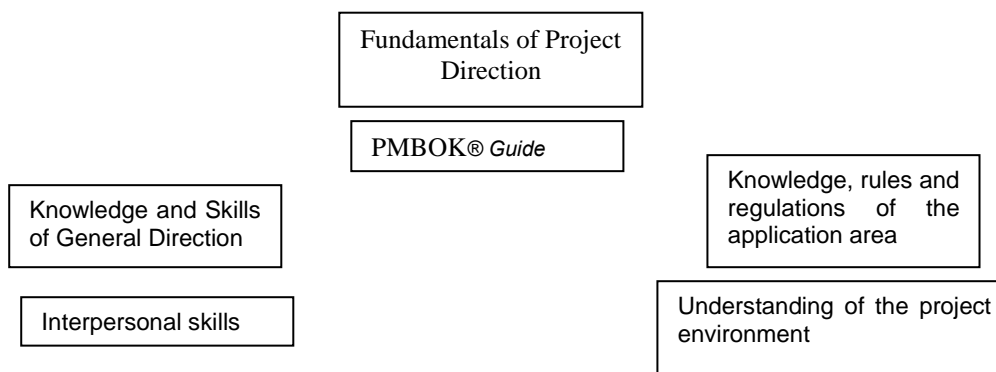
3.3.1. General Concepts[90]

PMI defines a project as a temporary endeavor carried out to create a product, service or result.

From this definition it can release three essential concepts such as time, the results, the scope and impact.

The Project Risk Management Institute (PMI) suggests through the PMBOK identify the fundamentals of project management, recognized as the result of a summary of good practices.

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[90] De los Ríos, M, Risk Management Plan for the construction of tunnel of upper conduction in hydroelectric Project el Diquís hydroelectric project of Instituto Costarricense de Electricidad, Universidad para la Cooperación Internacional. 2009.

Graph 11. PMI: FUNDAMENTALS OF PROJECT MANAGEMENT

Fundamentals of Project Direction

PMBOK® *Guide*

Knowledge and Skills of General Direction

Interpersonal skills

Knowledge, rules and regulations of the application area

Understanding of the project environment

Source: PMBOK®

The PMBOK ® says that these practices can be applied to most projects and there is consensus about their value and usefulness. However, each project will depend on the way to be implemented, that is why there must be a project management team trained to respond to each project in the best way.

The PMBOK ® divides project direction in 9 areas of knowledge[91] that by integrating management of the project are properly unified to create the Project Management Plan.

One of these areas of knowledge is the Managing Project Risk. Area that is analyzed in the current document. Risk Management consists of six processes: (i) Planning, (ii) Identification, (iii) Qualitative Analysis, (iv) Quantitative Analysis, (v) Planning of Response (vi) Monitoring and Control.

3.3.2. Project Risk Management

Project Risk Management according to PMI is the process of identifying and analyzing risks and response, monitoring and control them.

Among the key concepts[92] within the Project Risk Management should consider: the risk of project or any event or condition that can negatively impact the objectives of a project, the risk event or isolated event that can impact the project in a positive or negative and risk status or situation in which the risk is present.

Related to this, PMBOK defines and identifies six processes of Project Risk Management:

- **Planning and Risk Management**: State the project environment to define approach that will be used to evaluate, analyze the activities of risk management project.

- **Identification of Risks**: Identify risks that may affect the project and document their characteristics. The identification is done by selecting a tool for detection as: Interviews to experts, Checklists, Brainstorming, among others.
- **Risk Qualitative Analysis**: Prioritize risks identified for analysis according to the probability or frequency of occurrence and significance of their impact. From this point, a risk evaluation matrix must be developed obtained from the resulting probability –impact combinations
- **Risk Qualitative Analysis**: Objectively analyze the effect of identified risks according to information from the data collected.
- **Risk Response planning**: Develop strategies according to risk profile of the organization. That is, to choose alternatives to take advantage of opportunities and reduce threats that may be identified in the project.
- **Risk Monitoring and Control**: Tracking identified risks, monitoring residual risks according to the selected controls, identify new risks, execute plans to respond to the risks and evaluate their effectiveness throughout the project life cycle.

Three basic strategies for dealing with risks are defined whose effects could negatively impact the project objectives: avoid, transfer, and mitigate.

4. Discussion and Conclusions

At present and following the change from Basel II to Basel III, the use of standardized methods for handling and monitoring risks is being reviewed by different organizations from the ISO to PMI, which reflects its current importance.

Regarding the level of implementation of standards in different Latin American countries, it has not been reviewed in this research and is important in view of new regulations on the financial international crisis has caused in several regulators.

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[91] Integration Management, Scope Management, Time Management, Cost Management, Quality Management, Human Resource Management, Communications Management, Risk Management and Procurement Management Project.
[92] Project & Process Management Consulting International, Risk Management for Project Manager, PMI, 2008.

While there is concern, from the revision of the degree of penetration of the rules and standards, it is still not high and the companies, especially in emerging countries, must rely on internal database instead of international standards.

The human factor is an important variable in setting internal policies design. Although in this paper we have appreciated a relation of current regulation, their impact on people who are going to implement and facilitators, has not been worked and could be a line of future research.

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