

APPLYING LESSONS LEARNT FROM DEFICIENCIES IN THE BASEL ACCORDS TO SOLVENCY II¹

Johann Jacobs*

North-West University
johannrgjacobs@gmail.com

Gary van Vuuren+

North-West University
vvgary@hotmail.com

Received: July 2012

Accepted: April 2013

Abstract

Solvency II is the new European Union (EU) legislation that will review the capital adequacy regime for the insurance industry. Considerable progress has been made in the banking sector with the implementation of the Basel Accords (Basel). The implementation of Solvency II, therefore, brings with it an opportunity for the insurance industry to assess the successes, weaknesses and shortcomings experienced by the banking sector's implementation of Basel so as to learn from them and ensure that Solvency II's implementation duplicates the successes and avoids the failures of Basel's. This article critically explores weaknesses and failures of Basel which were exacerbated and/or exploited by the financial crisis of 2007-2010 and provides advice on how these might be mitigated or avoided in the implementation of Solvency II.

Keywords

Basel, banks, regulatory capital, Solvency II, financial crisis, insurance, regulation.

¹ Article from a Ph.D. thesis entitled "*Lessons learnt from the deficiencies of the Basel Accords as they apply to Solvency II*" submitted to the School of Economics of the North-West University, South Africa

***Mr Johann Jacobs** is a Ph.D. student in the School of Economics, North-West University, Potchefstroom, South Africa.

+**Dr Gary van Vuuren** is extraordinary professor in the School of Economics, North-West University, Potchefstroom, South Africa.

1. INTRODUCTION

The insurance sector is yet to implement Solvency II, so an opportunity exists for the insurance industry to review measures, weaknesses and potential shortcomings of the Basel Accords ('Basel') in order for them to learn from these and ensure that the implementation of Solvency II will, as far as possible, compensate for these. When referring to the Basel Accords, this article refers to all the Basel Accords, including Basel III, although it is important to keep in mind that Basel III was not yet in force at the time of the financial crisis.

Although banks and insurers differ in many ways ranging from their economic functions and services offered, operating models, balance sheet structures, and indeed their regulatory regimes, this article illustrates that the fundamental principles of Basel and Solvency II are fundamentally the same which allows for such a study. The objective of this article is therefore to explore the weaknesses and failures of the Basel Accords which were highlighted and/or exploited by the financial crisis of 2007–2010, while attempting to consider the extent to which such failures and weaknesses may have been included in Solvency II.

Section 2 provides a brief literature study on the history and development of Basel and Solvency II as well as similarities in their principles and objectives.

Section 3 briefly describes the contributing factors of the financial crisis which are related back to Basel in an attempt to identify seven major weaknesses and/or failures of Basel that were highlighted by the crisis. Each of these are then discussed from a Basel perspective (including new measures introduced under Basel III to address each of the weaknesses and/or failures), while relating each back to Solvency II to gain an understanding of whether these weaknesses are prevalent in Solvency II before Section 4 provides a short conclusion.

2. A BRIEF HISTORY OF AND SIMILARITIES BETWEEN BASEL AND SOLVENCY II

Financial regulation has developed over the past 40 years for the banking and insurance industries and resulted in Basel III ('Basel') and Solvency II respectively, which are the most recent sets of regulations for each of their respective industries. The development of these two sets of regulations took place in two completely separate streams while also being conducted by different bodies. This section provides a brief history of the development of Basel and Solvency II respectively before highlighting the two major principles which are similar in both.

2.1 Basel

During the early 1980s the Basel Committee on Banking Supervision (BCBS) became concerned that the capital ratios of the main international banks were deteriorating just when international risks, particularly those in comparison with heavily indebted countries, were growing (Styger & Vosloo, 2005).

The result was a broad consensus on a weighted approach for the measurement of risks for both on- and off-balance-sheet activities and the identification of the need for a multinational accord for the implementation thereof (Styger & Vosloo, 2005). This led to the development of the first accord entitled 'International Convergence of Capital Measurement and Capital Standards' (Bank for International Settlements (BIS), 1988). Over subsequent years and as a

result of developments and innovations in financial markets and instruments, an amendment was included to the 1988 Accord in 1996 which was designed to incorporate market risk to the original Accord (Dowd, Hutchinson, Ashbey & Hinchliffe, 2011:8). The BIS (2007:3) adds that the refinement of this proposal concluded in the release of the comprehensive version of the new accord in June 2006 – ‘International Convergence of Capital Measurement and Capital Standards’, or the Basel II Accord (BIS, 2006). The financial crisis that shook global financial markets from 2007 highlighted some of the major shortcomings of Basel II and led to the BCBS adding supplementary requirements and measures to what was set out in Basel II in an attempt to address these. This became known as Basel III which began to be implemented in a phased approach from 2011-2019 in its entirety with different phases for liquidity and capital ratios, respectively (BIS, 2011).

2.2 Solvency II

Solvency II is the new European Union (EU) legislation that will review the capital adequacy regime for the insurance industry (European Insurance and Re-insurance Federation (CEA), 2007). The current solvency requirements were introduced in the 1970s and introduced capital requirements for insurers by setting out capital requirements for solvency margins (CEA, 2006:10). The first sets of insurance regulations were introduced in 1973, 1979, 1988, and 1992 (EU, 1973; EU, 1979; EU, 1988; EU, 1992). Meanwhile, risk-based capital systems were being introduced in the 1990s in the USA, Canada, Australia, Japan, and Singapore and the European Commission embarked on a review of all insurance regulations for the 20-year period up to and including the third Directive (Sandström, 2007).

The outcome of the working group was a report titled ‘Report: Solvency of Insurance Undertakings’, or the ‘Müller Report’ whose main conclusion was that the insurance system that was created in 1973 and 1979 had proved itself based on empirical evidence of financial difficulties occurring in insurers in the EU. From that, in principle, it was concluded that there was no need to revise it completely (Müller, 1997). Following the findings and suggestions set forth by the Müller Report, 2002 saw the introduction of the new Directive which later became known as Solvency I, in which the necessary adjustments were adopted (EU, 2002).

During the review process that led to Solvency I in 2002, certain weaknesses were identified that called for further reform in a report titled: ‘Prudential Supervision of Insurance Undertakings’ or the ‘Sharma Report’ (Sharma, 2002) and ultimately Solvency II.

2.3 Two major similarities between Basel and Solvency II and their relevance to this study

It should be stated from the start that banks and insurers operate in completely separate worlds in terms of economic functions they fulfil as well as products and services provided, balance sheet structures, and operating models. Al-Darwish, Hafemann, Impavido, Kemp and O’Malley (2011) and CEA (2010) provide useful discussions and descriptions of these differences between banks and insurers. Basel and Solvency II share some similarities in terms of the principles upon which they are based, these being that:

- Both are based on a similar three-pillar approach. The pillars are meant to be mutually reinforcing in order to create a comprehensive regulatory framework for the banking and insurance industries respectively. In both cases the three pillars are further based on the

same principles where Pillar 1 describes minimum capital requirements and their calculations; Pillar 2 involves a supervisory review process and internal capital adequacy requirements calculations; and Pillar 3 involves itself with enhanced transparency, public disclosure, and market discipline (BIS, 2006:6; Lloyds, 2010:8; and van Duffel, 2008:9); and

- Both set out to achieve the same broad objectives, namely levelling the playing fields between institutions, providing worldwide financial stability, protecting depositors and policyholders, promoting improved risk management, and being more risk-sensitive (CEA, 2006:5; EU, 2009:3; Horcher, 2005:257; Koch and MacDonald, 2006:312; Lloyds, 2010:4; Sandström, 2007:12; van Roy, 2005:7).

The remainder of this article is based on these fundamental regulatory principle similarities while differences in calculation methods and other technicalities such as balance sheet structures, capital compositions, and operating models between banks and insurers are ignored.

3. DISCUSSION

In 2007, the financial world was shocked by events that continued for years where financial institutions failed, had to be bailed out by taxpayers and/or had to be taken over by other financial institutions. By looking back at the causes and consequences of these events, it may be possible to identify weaknesses in Basel that contributed to or exacerbated the crisis while considering that the same weaknesses may have been carried over into Solvency II, as it is broadly based on the same principles that underpin Basel, as were highlighted in Section 2.3.

Although Solvency II has not been implemented or tested, the weaknesses discussed here serve as a warning taken from lessons learnt when Basel was severely tested during the financial crisis.

Following the financial crisis, the Financial Crisis Inquiry Commission (FCIC) published a report that highlighted all the contributing factors to the crisis in detail, two of which were 'failures in financial regulation and supervision' and 'failures in corporate governance and risk management' (FCIC, 2011:xviii). Many of the contributing factors are interrelated, but seeing as regulatory failure was recognised as one of the contributing factors to the financial crisis, the following obvious weaknesses from Basel can be identified:

- international regulatory standards do not necessarily work;
- the pro-cyclicality of capital and capital requirements;
- the assumption that micro-prudential regulation will achieve macro-prudential objectives;
- the potential for an overreliance on financial models;
- potential incentives to 'cheat';
- failures in Pillar II disciplines; and
- overreliance on credit ratings agencies (CRAs).

Some of these weaknesses contributed directly or indirectly to the crisis and are subsequently discussed while also attempting to illustrate the relevance that these weaknesses might have for Solvency II.

3.1. International regulatory standards

Two of the major objectives of Basel were to 'level playing fields in international banking' and 'promote international safety and soundness in the banking sector' (Koch & MacDonald, 2006; Van Roy, 2005). The achievement of these objectives was sought through the introduction of minimum capital adequacy ratios.

From a safety and soundness perspective, strong arguments exist in favour of international regulatory standards, one of them being that, as a result of globalisation and technological advances, banks' operations and exposures are intertwined to such an extent that it is preferable to have a standard regulatory base to work from. Because a bank is directly exposed to the failure of a bank in a faraway jurisdiction, it provides some level of comfort to know that the bank in the foreign jurisdiction is subject to the same capital requirements as this one (Atik, 2011).

The second argument is that, by introducing minimum capital adequacy standards, all banks compete from the same regulatory cost base and, therefore, compete on equal footing or level playing fields. Previously, banks with weaker safety nets could hold less capital and, in doing so, grow at a faster pace than banks with higher capital requirements in that they could attract deposits and funding at lower rates.

Although flexible, a capital adequacy approach to achieving level playing fields introduces a variety of complications as capital adequacy is not the only source from which banks in foreign jurisdictions may enjoy a competitive advantage. There are country-specific characteristics and macroeconomic factors that give certain banks and/or markets a competitive advantage over others. Three arguments why this may be this case are:

- Macroeconomic factors. Every country has its own unique macroeconomic characteristics, challenges and objectives that make it more challenging to adopt global regulatory standards. Standardised regulations might not be reflective of domestic market conditions and it might not tie in with a country's overall macroeconomic, social and/or political policy objectives; or the implementation costs associated with adopting an international regulatory standard might simply be too high.
- Domestic regulatory environments. The extent of countries' own specific regulatory considerations depends on many factors, including the liquidity and maturity of markets, possible barriers to entry into markets, volatility of and vulnerability to external shocks, etc., which all affect the extent to which global regulatory standards can be adopted. This relates to the next point.
- The cost of capital may differ between countries. The major assumption of Basel introducing capital adequacy requirements to level playing fields between banks from a cost perspective was that the cost of capital between countries is the same. This assumption holds true only when global financial markets are fully integrated, which is not the case. Despite globalisation and regulatory advancements, financial markets remain segregated and large imbalances that prevent markets from integrating completely exist.

Despite these arguments, with the introduction of Basel III, the principle of having a global regulatory standard for banking remains.

Since Basel and Solvency II have the same objectives, and although they are entirely different frameworks, these same arguments as to why an international regulatory standard for insurers

will never completely level playing fields and achieve its objectives are valid when considering Solvency II, including country-specific macroeconomic factors, certain domestic regulatory nuances, and differences in the cost of capital between countries, as mentioned above.

In fact, the introduction of Solvency II potentially introduces new factors that should be considered, such as that the treatment for the same risks in Basel III might differ completely from their treatment under Solvency II (Al-Darwish et al., 2011). It firstly opens a greater possibility for regulatory arbitrage, but it will also give certain companies distinct advantages over others depending on their legal structures. There has been an increase in the so-called bancassurance industry, or simply put, financial institutions that offer both banking and insurance products and services over recent years (Center for Insurance and Financial Planning (CIFP), 2007). Bancassurance companies may find that they will save on capital requirements, giving them a competitive advantage over banks and insurers (ECB, 2007:35), although the introduction of Basel III attempts to address such arbitrage opportunities. For different reasons there can never truly be harmonised standards across banking and insurance institutions, but the differences in these regulations open many opportunities for financial groups. There are many ways for financial institutions to move into bancassurance, including through mergers, acquisitions, joint ventures, etc. (CIFP, 2007). Changing a company's legal structure is by no means a trivial exercise, but the introduction of Solvency II may well see an increase in mergers and acquisitions as companies prepare to take advantage of the differences in regulations, although, as mentioned, the introduction of Basel III attempts to address such arbitrage opportunities. Such increased mergers and acquisitions also introduce their own risks into the financial system.

3.2 Capital requirements are inherently pro-cyclical (and a weak cornerstone)

Financial regulation is inherently pro-cyclical in nature and it was known that the use of capital as Basel's cornerstone could exacerbate this weakness (Danielsen, Embrechts, Goodhart, Keating, Muennich, Renault & Song Shin, 2001). In other words, capital tends to be less scarce when times are good, but that, when most needed in tough times, it tends to be even scarcer than usual and hard to come by. In a sense it is contradictory to what a regulatory capital regime such as Basel aims to achieve, as capital is the primary protective barrier against unexpected losses when times are tough. Atik (2011) adds that this problem is compounded further in that when banks do need to raise capital, it will be during tough financial times when the cost of capital would have been driven upward simply because it will then be scarcer, while the other way to raise capital, i.e., the selling of assets, would be as difficult because banks will then be attempting to sell them when asset prices are depressed already.

This is essentially exactly what happened from a capital point of view during the years building up to the crisis and during the crisis itself. In the years preceding the crisis when macroeconomic conditions were favourable for growth and capital expansion, capital was used on expansion projects and also in the origination of new credit assets while still being able to service their capital and generate handsome profits. With the occurrence of the financial crisis, asset and capital values adjusted downward quite dramatically and banks were left over-leveraged based on asset originations that took place in preceding years, while they also had to scramble to raise new capital and attempted to sell assets at heavily deflated prices, highlighting the procyclical nature of capital requirements.

Ideally, capital requirements should be anti-cyclical (Dowd et al., 2011). Although the pro-cyclical nature of capital requirements and their potential weakness were well-known long before the implementation of Basel II (Gordy & Howells, 2004), the BCBS has, subsequent to the crisis, attempted to make its capital requirements more anti-cyclical by introducing so-called forward-looking provisioning, capital conservation and liquidity ratio requirements as part of Basel III. Despite the introduction of these new supplementary measures, the fact is that the basis for regulation remains capital requirements that will remain pro-cyclical along with any additional buffers required. Repullo and Saurina (2011) found that the additional capital buffers introduced under Basel III might even exacerbate the pro-cyclical nature of capital requirements and suggest a rule-based smoothing of capital requirements based on gross domestic product (GDP) growth. Capital as the cornerstone of regulations, and not necessarily its inherent pro-cyclical nature, can even be considered as a weakness upon which Basel has been based.

Capital requirements imposed by regulators on insurers differ from those imposed on banks, yet the instrument of regulation, i.e., capital, is the same and the characteristic of it being pro-cyclical remains valid.

Solvency II does have a short enabling control in place to take into consideration specifically the pro-cyclical nature of equity prices under its market risk module (EU, 2009). It is, however, not nearly enough to compensate for the pro-cyclical nature of capital as an instrument. This is an inherent feature of capital and the only way to truly compensate for its inherent characteristic is to use another instrument with completely different characteristics or other supplementary instruments.

For now though it seems that the global standard of regulation relates to a 'capital standard' and that it will continue for the foreseeable future. Until such time that another standard is adopted, the pro-cyclical nature inherent to capital will remain a major weakness of global regulatory regimes.

3.3 Assuming that micro-prudential supervision will achieve macro-prudential goals

The underestimation of systemic risks was mentioned as one of the causes of the financial crisis and one of the major deficiencies inherent in a regulatory framework such as Basel is that it assumes that the micro-prudential regulations and requirements it introduces will achieve macro-prudential goals and even systemic stability as stated by one of Basel's main objectives. This weakness also relates to the cyclicity of capital requirements in that this characteristic of capital is determined by macro-factors which should be taken account of (Hanson, Kashyap & Stein, 2011). The financial crisis partly emphasised the growing need to have macro-prudential regulatory measures in place along with the current micro-prudential measures (Davis & Karim, 2009).

As stated above, if banks across different jurisdictions are subject to the same individual regulatory capital requirements, it does contribute to a perceived improvement of a safety net. While capital requirements strive to be risk-sensitive and to reflect closely the true risks that banks are exposed to, it simply does not show potential risk build-ups across an industry – and even less so across borders. This point is accentuated by the fact that prior to the economic crisis banks were well-capitalised and stress tests showed that banks had sufficient capital to withstand large shocks (Mohan, 2009). The BCBS has now recognised the role that financial

leverage and liquidity risk played in the crisis and attempts to address these concerns with the new measures in Basel III. Despite this, it will still not be able to provide meaningful information on a macro-level, as the measures introduced by Basel III seemingly attempts to address this weakness by again introducing micro-prudential measures on individual institutions through limits, ratios, capital requirements and incentives in order to achieve systemic stability. Although these measures are well-intended and might add some resilience to individual banks to be able to withstand financial shocks better, micro-prudential measures on their own will find it difficult to insulate the financial system from excessive leverage that may be found anywhere in the financial system as a whole (Hanson et al., 2011).

As with Basel, Solvency II will rely on individual measures and requirements on insurance companies while setting out to achieve its goal of greater policyholder protection which, in broader terms, translates to an improved safety net perception and ultimately greater financial stability.

The financial crisis revealed that to some extent, although imposing regulatory requirements on individual institutions might have useful benefits, it cannot be assumed that a system is as strong as its weakest parts. In addition, Basel has reactively taken measures to address this weakness by introducing new requirements in Basel III while Solvency II has seemingly not reviewed this potential weakness, as it will be based on the same principle.

While not discounting the usefulness of micro-prudential regulatory measures and the principles that a system is only as strong as its weakest link, regulators run the risk of getting lost in the details and losing sight of the bigger picture. Banking and insurance regulators should therefore adopt a holistic approach to regulation where the stability of the entire financial system is monitored, i.e., macro-prudential regulation, and be aware of other macro-financial and political indicators for macro-prudential surveillance, such as international capital flows, exchange rate movements, lending policies and practices, distance to defaults, financial system value-at-risk (VaR), etc. Davis and Karim (2009) further argue that micro-prudential regulatory requirements might have the consequence of creating intricate webs of risk exposures and that the current regulatory regime is missing a so-called forth Pillar: Macro-prudential regulation. Regulators must find a means of monitoring systemic risks along with the micro- or institution-specific factors specified in Basel and Solvency II. The macro-financial and political indicators referred to do not imply using aggregated figures of non-additive measures such as capital requirements, leverage ratios and capital buffers across the banking sector, for example. Until such time that regulators adopt a more macro-prudential approach, this weakness will remain.

A further consideration is that the implementation of Solvency II might add some macro-prudential risks to the financial system, whether by way of regulatory arbitrage opportunities or increased mergers and acquisitions although, as mentioned earlier, Basel III attempts to address such potential arbitrage opportunities. These new and unique systemic risks will need to be identified, monitored and managed on a holistic basis and there are already concerns that banks and insurers might be more interconnected than before (Al-Darwish et al., 2011). The European Central Bank (ECB) (2007) echoes this and states that there are growing interlinkages between banks and insurers through bancassurance which may pose a potential threat to the banking system and that the expected longer-term financial stability it will add might come at a cost of short-term financial stability risks.

In addition to adopting a more macro-prudential approach to regulation, banking and insurance regulators should therefore become truly integrated in terms of information shared (across sectors and across borders (Persaud, 2009)), objectives, and activities in order for them to

achieve a truly macro-prudential regulatory framework which would ensure real systemic stability.

This is a major point that should be taken note of and the scale and complexity of achieving this remains unanswered which leaves a potentially alarmingly large risk unaddressed by the current (and seemingly future) approach of regulating financial institutions on a micro-prudential basis.

3.4 Overreliance on financial models

One of the major concerns about Basel II was the possibility of increased model risk (ANZ, 2006). With the unfolding of the financial crisis it became apparent just how excessive the reliance of banks and other financial institutions had become on financial modelling to calculate their capital requirements for market risk (Lall, 2009).

Financial modelling has become a standard of risk management over the past two decades, ever since the introduction of VaR models by JP Morgan in the mid-1990s (Horcher, 2005). Though it undoubtedly has a place in risk management, it seems that financial institutions may have reached a point where too much reliance is placed on the outputs generated by these quantitative models. This may be because of the implicit assumption of Basel and Solvency II that more advanced approaches to risk measurement reflect financial institutions' true risks more accurately (see FIGURE 1), leading to lower capital requirements because the conservativeness of the standardised approaches is removed (Van Duffel, 2008).

Models cannot and should not be considered as anything more than useful tools, as results are subjective and dependent on a wide array of inputs, parameters and assumptions, any of which can be manipulated and/or not be applicable to get the 'best' results (Lall, 2009; Dowd et al., 2011). Outputs generated by financial models, such as VaR numbers for market risk, for example, should always be questioned in terms of parameters, assumptions and data used, because financial models give only hypothetical representations of the real world. VaR models can be used as an example here, they are useful as long as markets are fairly stable with ample liquidity, strong correlations and relationships, and relatively stable volatilities – they tend to unravel completely when there are changes in these parameters (Dowd et al., 2011) and therefore tend to underestimate the probability of extreme events (Lall, 2009). This point on model inputs and assumptions applies to financial models in general and, because of this characteristic, they may contribute to economic destabilisation and even induce crashes when they would not have occurred normally (Danielson et al., 2001). With such model characteristics in mind, financial models as a basis for a regulatory regime may be described as 'flimsy' (Dowd et al., 2011).

As financial models are subjective, it is possible that results are manipulated to support agendas, obtain decisions, or simply to hide true risks from regulators or even committee structures within financial institutions (Al-Darwish et al., 2011). This idea is further enforced in that complicated models are not necessarily more accurate and can be abused for decision-making, making them potentially dangerous instruments (Van Duffel, 2008).

The financial crisis highlighted the complete lack of understanding of VaR-type, or probabilistic financial models, and their weaknesses (Reavis, 2009; Dowd et al., 2011). In addition to the lack of understanding, it also showed that the results of financial models were being used to make decisions on pursuing risk based on the assumptions that these results were sufficient and reliable enough to base such decisions on (Risk and Insurance Management Society (RIMS),

2009). Senior management in financial institutions should therefore have a thorough understanding around financial modelling in order for them to be able to correctly interpret results, question inputs and parameters, and make the correct decisions using financial model results as supplementary information. The same applies to regulators in that they should thoroughly understand financial institutions' internal models in order to grant approval to use them for regulatory capital calculations, but regulators should also be able to understand the results, parameters and assumptions behind them.

The reliance on financial models to fulfil various functions is not limited to banks: insurers have also always relied on financial and other models that essentially supported their businesses to ensure that they remained profitable by modelling pure insurance risks such as mortality risk, longevity risk, morbidity risk, and persistency risk.

The risk of overreliance on financial models under Solvency II is as valid as it is for the banking world under Basel. Solvency II is based on VaR-type calculations to determine its capital requirements while insurers will also be permitted to use their own internally developed models to calculate their risk capital requirements once regulatory approval is obtained. The basis for Solvency II's capital requirement calculations is a probabilistic VaR-type model requiring insurers to calculate their minimum capital requirements (MCR) and solvency capital requirements (SCR) based on a given confidence interval over a given time period. To this end, probabilistic financial models will be used extensively in insurance companies under Solvency II. This introduces the same risks to the insurance industry that were highlighted by the effects that the financial crisis had on banks. The prevalence of the assumption of the accuracy of internal models' results to reflect insurers' true risks is indicated by FIGURE 1, a diagram widely used in Solvency II literature.

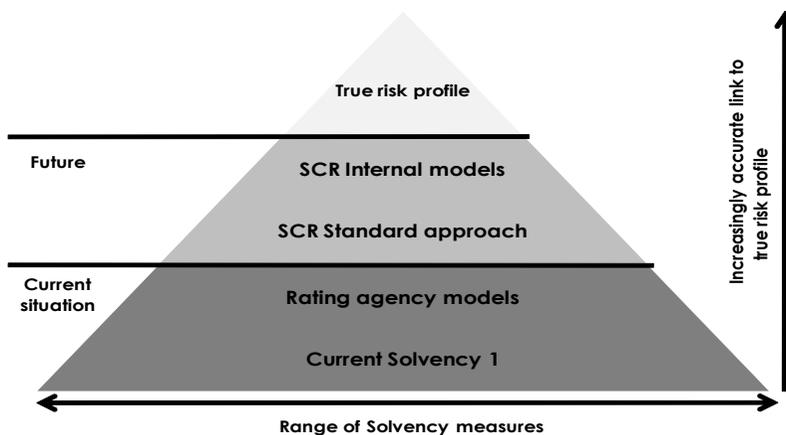


FIGURE 1: Assumption of increasing models accuracy

Source: CEA (2006:5)

The possible overreliance on financial models is not something that can be expected to be addressed by any regulatory measures, so this risk/weakness remains in the future despite the introduction of Basel III and Solvency II. It is something that should be taken note of and considered seriously way ahead of introducing new punitive ratios and measures while such overreliance may still be prevalent. Understanding the input parameters and calculations as well

as interpreting the results of financial models are key for any decision-maker, whether investment banker, risk manager, senior management and/or regulator. In gaining such insights, the impacts of potential future crises might be lessened or even avoided completely if informed decisions are made, while also not inhibiting risk-taking and the opportunities that go with it.

3.5 Potential incentives to 'cheat'

As much as Basel II incentivises banks to improve their risk management capabilities by introducing sophisticated internal models approaches that can be used to calculate their regulatory capital requirements, there is also a built-in incentive to 'cheat the system' and the FCIC (2011:xxii) found a systemic breakdown in accountability and ethics to be one of the major reasons for the financial crisis. By attempting to level playing fields between internationally active banks, Basel also unintentionally forces banks to seek out ways in which they can save on capital requirements and be more competitive than other banks, or to conduct regulatory arbitrage (Jones, 2000). Banks are under constant pressure where profits, performance and incentives related to these largely determine corporate behaviour. Shareholders demand performance and banks are under constant pressure to stay ahead of competitors. Banks that are able to save on capital that can, in turn, be used elsewhere in a business to generate higher shareholder returns through increasing the bank's asset base, finance new projects, or returning capital to shareholders in the form of dividends, will have a distinct competitive advantage over their peers (Lall, 2009). One of the major reasons for engaging in regulatory arbitrage is therefore to enhance shareholder value (Jones, 2000).

One of the contributing factors to the financial crisis was banks' attempts to reduce or even bypass capital requirements completely through regulatory arbitrage (Norgren, 2010). Concerns about potential regulatory arbitrage were raised years ahead of the implementation of Basel II and Jones (2000) argued that absent measures to reduce incentives for regulatory arbitrage could potentially even undermine a system of capital requirements. However, banks will constantly look into ways of reducing their capital requirements and/or how to circumvent them to gain a competitive edge over other competitors. It is perhaps necessary to highlight that, although many of these efforts during the financial crisis were reckless and perhaps even unethical, they were in most cases compliant with the letter of the law (Fleischer, 2010). There is an ever-expanding variety of ways of doing so and the financial crisis illustrated some ways of doing so, including:

- structuring of new products: during the financial crisis, banks innovatively used products that had been used in financial markets for years, but new products and complex structures are being developed on a daily basis designed for a variety of purposes, of which reducing capital requirements and enhancing returns are only two (Jones, 2000);
- moving certain transactions off balance sheet: related to the point above, banks moved some of their credit exposures off balance sheet through securitisation vehicles in order for them to save on capital requirements (Dowd et al., 2011);
- pure regulatory arbitrage: again, in an attempt to gain a competitive advantage over competitors, banks employ teams of people with the purpose of exploring how and where exposures can be classified in order for them to save on capital requirements; and
- misrepresentation of information: in order to save capital, banks are indirectly incentivised to calibrate their internal models in ways which would result in lower capital requirements.

This point relates back to the potential overreliance on financial models as well as a lack of in-depth understanding of them.

Much as is the case with Basel for banking, so will be the case under Solvency II for insurers. From an economic performance and profits point of view, insurance companies find themselves under the same pressure as banks to service their capital and provide returns to shareholders and will constantly be looking at opportunities to free up capital to be used elsewhere in the business where it can be employed to generate returns.

A further dimension that Solvency II introduces to this equation is possible regulatory inconsistency between risk treatments and possible costs of capital between Solvency II and Basel (Al-Darwish et al., 2011), which might introduce further regulatory arbitrage opportunities as was indicated in earlier sections.

Prescriptive regulatory regimes will always open one door as soon as they close another and Fleischer (2010) explains that the practice of arbitrage has been taking place for hundreds of years and will continue to do so. Basel III may have attempted to close some of the gaps that were exploited, but by the time Basel III is fully implemented it would already have been 'figured out' and even the new measures would probably be rendered both insufficient and inefficient. The risk in a system that allows for regulatory arbitrage is that it may lead to the understating of underlying risks, as was shown by the financial crisis. However, perhaps an argument can be made that, over the long term, regulatory arbitrage contributes to more effective regulation in that it contributes to identifying gaps in regulations so that regulations can become more 'airtight' over time.

3.6 Failure of Pillar 2 disciplines

The interaction between Basel's minimum capital requirements (Pillar 1), a supervisory review process (Pillar 2) and market discipline (Pillar 3) is one way to pursue the soundness of banks as well as the stability of the financial system. The maintenance of minimum capital levels is the first device for safeguarding bank stability, but it is not sufficient in itself to carry out the regulatory objectives because of certain risks that are not easily quantifiable and/or risks that are not included in Pillar 1 requirements, for example (Van Roy, 2005).

Much has been written about contributing factors to the financial crisis and the weaknesses in Basel that were exploited, but not much has been said about the role that the Pillar 2 discipline was supposed to play. It seems that much of the focus has been on Pillar 1 capital requirements and their calculations and reliance on external events and/or sources as contributing factors to the financial crisis, without considering the failure of the Pillar 2 discipline.

Pillar 2 was intended to supplement and strengthen Pillar 1 requirements where there may have been weaknesses. This paper indicated that such weaknesses may include:

- capital requirements may not be the best (or only tool) to supervise banks;
- potential incentives to cheat based on internal models calculations and regulators' understanding of banks' business and financial models; and
- possible overreliance on financial models and external CRAs.

Pillar 2 was designed to bridge all these gaps in order to complete the Basel framework. In other words, during the financial crisis, even risks that were taken off balance sheet or those that were difficult to analyse should at the very least have shown up in the Pillar 2 processes. It therefore

reflects that, from what Pillar 2 is meant to contribute, it failed during the financial crisis because many of these risks and/or concerns did not seem to come out in this process that is supposed to capture all risks.

In Basel and Solvency II, the Pillar 2 disciplines provide a platform for financial institutions to measure and report all risks that are not captured fully or those are not captured at all to management and to the supervisor. This specific pillar also provides for the calculation of financial institutions' own internal capital requirements that are supposed to cover all the risks through the internal capital adequacy assessment process (ICAAP) and own risk and solvency assessment (ORSA) for banks and insurers respectively.

Furthermore, regulators are given the opportunity through the Pillar 2 disciplines to understand and really question banks' and insurers' business practices, risk management, capital requirements and essentially anything that is not clear from Pillar 1. This understanding and questioning affords regulators immense additional power in that they have the right to obtain much more information from institutions than what is available through the Pillar 1 disciplines, and in that they can impose additional capital charges on institutions depending on their satisfaction of institutions' Pillar 2 information. The contrary, however, also holds, in that this power comes at the price of regulators having to assume more responsibility in making sure that they thoroughly understand each institution's risk management framework, all their risks, financial models, governance structures, economic capital requirements, etc.

The importance of the Pillar 2 discipline under Solvency II should not be underestimated, and policymakers and insurers should learn from the failure of the Basel II Pillar 2 disciplines and make sure that they receive sufficient attention under Solvency II from the start. It needs to be pointed out that the Pillar 2 disciplines of Solvency II run the risk of being overshadowed by developments under Pillar 1 even before implementation because of a lack of and delayed lower-level guidance from regulatory authorities on how Pillar 2 will work.

The processes around the ORSA and the information that it will generate could fundamentally enhance risk management in insurance companies provided that it is done correctly and accurately. For the ORSA to truly add the value it is intended to, it should receive sufficient attention throughout insurance companies and not just be seen as a compliance exercise.

3.7. Overreliance on CRAs

One of the major findings of the causes to the crisis was that banks relied too heavily on CRAs to obtain ratings for complex products (FCIC, 2011). This point relates back to the one on the overreliance on financial models, but it also includes some implicit ethical and governance concerns. The possible overreliance on CRAs was highlighted when Basel II was in its initial development phases, yet it was one of the factors that contributed to the financial crisis (Daníelson et al., 2001).

CRAs were relied upon to produce ratings for highly structured and complex products while banks themselves could not price them, and the reliance on these ratings by regulators and bank employees points to a failure of corporate governance and risk management principles. It has been argued that CRAs were conflicted in that banks paid them to give ratings, meaning that they had to produce some ratings although they could not have given assurance on their accuracy (Dowd et al., 2011). This, along with a lack of liability of CRAs for providing inaccurate ratings meant that banks conveniently relied on these inaccurate ratings because they could not rate these products themselves, essentially passing the buck to the CRAs (Levitin & Wachter,

2012). Cannata and Quagliariello (2009) provide a discussion on CRAs' interests being conflicted and on methodologies for obtaining credit ratings.

Although CRAs found themselves in a precarious situation, the outcome would not have been any different had banks used their own internal calculation to obtain ratings for these products, simply because no one knew how to rate these 'packaged' loans. The only difference would have been that someone else would have been to blame without truly addressing the methodology of how the ratings were obtained. Although cited by many as one of the causes of the financial crisis, the overreliance on CRAs probably relates more to corporate governance and risk management failures, overreliance of financial models that are simply unable (as yet) to provide accurate ratings on such products (FCIC, 2011; Byun, 2010).

From a Solvency II perspective, and considering current credit risk modelling methodologies, the same arguments that were put forward about the modelling methodologies along with the overreliance on CRAs are valid (Byun, 2010; Al-Darwish et al., 2011). Insurers are, however, in a privileged position regarding the modelling of credit risk in that they have been able to see how credit models and CRAs contributed to the unfolding of the financial crisis and learn from those events. As insurers will use the same credit risk models to determine their own ratings and/or used by CRAs to determine theirs, it is imperative that they are aware of the failures and weaknesses of these models. In particular, insurers should be cognisant of such weaknesses that were highlighted by the financial crisis specifically relating to the modelling of complex credit products. Awareness and understanding of these weaknesses can make insurers more vigilant against an overreliance on modelling results and/or the results given to them by CRAs.

Although the measures introduced in Basel III which will help place less reliance on CRAs' ratings will probably spill over into Solvency II and the insurance world, the modelling aspect will be the same and reliance on results should be measured until such time that credit risk models can offer improved results for complex credit products. It also does not mean that all potential conflicts of interest and moral hazard will be eliminated, meaning that insurers should always question CRA results before making decisions based on them.

4. CONCLUSION

The article aimed at identifying possible weaknesses in the Basel Accords that contributed to and/or were highlighted by the financial crisis.

The contributing factors of the financial crisis are related back to Basel in an attempt to identify seven major weaknesses and/or failures of Basel that were highlighted by the crisis. Each of these were discussed from a Basel perspective (including new measures introduced to address each of them under Basel III) while relating each back to Solvency II to gain an understanding of whether these weaknesses are prevalent in Solvency II.

In each of the seven instances it was found that the specific weakness was present in Solvency II to a lesser or greater extent. Some of the weaknesses that were highlighted raise more questions than answers at this stage while others, such as a definite need for macro-prudential regulation and the pro-cyclical nature of capital as the cornerstone of current financial regulations, calls for potentially significant regulatory reforms. Other weaknesses cannot be addressed by regulatory reform, but there is a need for a better understanding of the workings of financial models while not placing an excessive reliance on them. In addition, there is a need to strengthen Pillar 2 disciplines while ensuring that this is carried out with the necessary urgency

and attention in order to ensure that these disciplines fulfil the role of complementing and strengthening the Pillar 1 requirements, which they set out to do from the outset.

With this in mind, this article aimed to highlight the prevalence of these weaknesses in an attempt to foster awareness among insurers, regulators, and other financial market participants of these weaknesses. The purpose of this is to stimulate thinking and debates around possible solutions to these weaknesses so that corrective measures can be taken to ensure that the exploitation of them and increased interconnectedness between insurers and banks do not lead to a potentially more devastating future financial crisis than the 2007–2010 one.

LIST OF REFERENCES

- Al-Darwish, A., Hafeman, M., Impavido, G., Kemp, M. & O'Malley, P. (2011). *Possible unintended consequences of Basel III and Solvency II*. International Monetary Fund (IMF) Working Paper: WP/11/187. August. [Online] Available: <http://www.imf.org/external/pubs/ft/wp/2011/wp11187.pdf>. (Accessed 15 June 2012).
- Anz. (2006). *Basel II: An Australian banker's perspective*. July. Melbourne, Australia. [Online] Available: <http://www.melbournecentre.com.au/Basel2-Batty.pdf>. (Accessed 24 June 2012).
- Atik, J. (2009). Basel II: A post-crisis post-mortem. *Transnational Law and Contemporary Problems*, 19, February. [Online] Available: http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID1725004_code332621.pdf?abstractid=1725004&mirid=3. (Accessed 17 June 2012).
- Bank for International Settlements, Basel Committee on Banking Supervision (BCBS). (1988). *International convergence of capital measurement and capital standards*. Basel: Switzerland.
- Bank for International Settlements, Basel Committee on Banking Supervision (BCBS). (2006). *International Convergence of Capital Measurement and Capital Standards, A Revised Framework*. Basel: Switzerland.
- Bank for International Settlements, Basel Committee on Banking Supervision (BCBS). (2007). *History of the Basel Committee and its Membership*. Basel: Switzerland. [Online] Available: <http://www.bis.org/bcbs/history.pdf>. (Accessed 4 July 2012).
- Bank for International Settlements, Basel Committee on Banking Supervision (BCBS). (2011). *Basel III: A global regulatory framework for more resilient banks and banking systems*. Basel, Switzerland. [Online] Available: <http://www.bis.org/publ/bcbs189.htm>. (Accessed 4 June 2012).
- Byun, K.J. (2010). The U.S. housing bubble and bust: impacts on employment. *Bureau of Labor Statistics Monthly Labour Review*, 133(12). Washington D.C., United States of America. [Online] Available: <http://www.bls.gov/opub/mlr/2010/12/art1full.pdf>. (Accessed 24 June 2012).
- Cannata, F. & Quagliariello, M. (2009). *The role of Basel II in the sub-prime financial crisis: guilty or not guilty?* Centre for Applied Research in Finance (CAREFIN) Working Paper 3/09. January. Università Commerciale Luigi Bocconi, Milan, Italy. [Online] Available: http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID1330417_code1137091.pdf?abstractid=1330417&mirid=3. (Accessed 18 June 2012).
- C&A see Comité Européen Des Assurances, European Insurance and Re-insurance Federation.

Center for Insurance and Financial Planning (CIFP). (2010). *Bancassurance: Convergence of banking and insurance*. CIFP Knowledge series. [Online] Available: <http://www.cifplearning.com/bancassurance.pdf>. (Accessed 29 June 2012).

CIFP see Center for Insurance and Financial Planning.

Comité Européen Des Assurances, European Insurance and Re-insurance Federation (CEA). (2006). *Solvency II introductory guide*. Brussels: Belgium. [Online] Available: <http://www.cea.eu/uploads/DocumentsLibrary/documents/Solvency%20II%20-%20Introductory%20Guide.pdf>. (Accessed 15 June 2012).

Comité Européen Des Assurances, European Insurance and Re-insurance Federation (CEA). (2007). *Solvency II: understanding the process*. Brussels, Belgium. [Online] Available: http://www.gdv.de/wp-content/uploads/2007/07/PD36_CEA_Paper_engl.pdf. (Accessed 15 June 2012).

Comité Européen Des Assurances, European Insurance and Re-insurance Federation (CEA). (2010). *Insurance: A unique sector – why insurers differ from banks*. Brussels, Belgium. [Online] Available: http://www.insuranceeurope.eu/uploads/Modules/Publications/1277383780_cea-report-insurance-a-unique-sector.pdf. (Accessed 10 June 2012).

Danielson, J., Embrechts, P., Goodhart, C., Keating, C., Muennich, F., Renault, O. & Song Shin, H. (2001). *An academic response to Basel II*. London School of Economics Financial Markets Group and Economic and Social Research Council Special Paper Series, Special Paper No. 130. London, United Kingdom. [Online] Available: <http://www.bis.org/bcbs/ca/fmg.pdf>. (Accessed 23 June 2012).

Davis, E.P. & Karim, D. (2009). *Macroprudential regulation: The missing pillar*. Keynote address at the 6th Euroframe Conference on Economic Policy Issues in the European Union entitled 'Causes and consequences of the current financial crisis, what lessons for EU countries?' 12 June 2009. London, United Kingdom. [Online] Available: http://ephipildavis.com/macprudential_regulation%5B1%5D.pdf. (Accessed 5 July 2012).

Dowd, K., Hutchinson, K., Ashby, S. & Hinchliffe, J.M. (2011). *Capital Inadequacies: The dismal failure of the Basel regime of bank capital regulation*. Cato Institute Policy Analysis No. 681. 29 July. Washington D.C., United States of America. [Online] Available: <http://www.cato.org/publications/policy-analysis/capital-inadequacies-dismal-failure-basel-regime-bank-capital-regulation>. (Accessed 20 June 2012).

ECB see European Central Bank.

EU see European Union.

European Central Bank (ECB). (2007). *Potential impact of Solvency II on financial stability*. July. Frankfurt, Germany. [Online] Available: http://ec.europa.eu/internal_market/insurance/docs/solvency/impactassess/annex-c07_en.pdf. (Accessed 5 July 2012).

European Union. (1973). *Official Journal of the European Union*. First Council Directive of 24 July 1973 on the coordination of laws, regulations and administrative provisions relating to the taking-up and pursuit of the business of direct insurance other than life assurance (73/239/EEC). 23 July. Brussels, Belgium. [Online] Available: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1973L0239:20070101:EN:PDF>. (Accessed 20 June 2012).

European Union. (1979). *Official Journal of the European Union*. First Council Directive of 5 March 1979 on the coordination of laws, regulations and administrative provisions relating to the taking-up and pursuit of the business of direct life assurance (79/267/EEC). 5 March. Brussels, Belgium. [Online] Available: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1979L0267:19860101:EN:PDF>. (Accessed 20 June 2012).

European Union. (1988). *Official Journal of the European Union*. Second Council Directive of 22 June 1988 on the coordination of laws, regulations and administrative provisions relating to direct insurance other than life assurance and laying down provisions to facilitate the effective exercise of freedom to provide services and amending Directive 73/239/EEC (88/357/EEC). 22 June. Brussels, Belgium. [Online] Available: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1988:172:0001:0014:EN:PDF>. (Accessed 20 June 2012).

European Union. (1992). *Official Journal of the European Union*. Council Directive 92/49/EEC of 18 June 1992 on the coordination of laws, regulations and administrative provisions relating to direct insurance other than life assurance and amending Directive 73/239/EEC and 88/357/EEC (third non-life insurance Directive). 18 June. Brussels, Belgium. [Online] Available: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1992L0049:20080321:EN:PDF>. (Accessed 20 June 2012).

European Union. (2002). *Official Journal of the European Union*. Directive 2002/83/EC of the European Parliament and of the Council of 5 November 2002 concerning life assurance. 5 November. Brussels, Belgium. [Online] Available: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2002L0083:20080320:EN:PDF>. (Accessed 20 June 2012).

European Union. (2009). *Official Journal of the European Union*. Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 on the Taking up and pursuit of the Business of Insurance and Reinsurance (Solvency II). Brussels, Belgium. [Online] Available: http://www.lloyds.com/The-Market/Operating-at-Lloyds/Solvency-II/Legislative-developments/~/_media/Files/The%20Market/Operating%20at%20Lloyds/Solvency%20II/Solvency%20II%20Directive.pdf. (Accessed 20 June 2012).

FCIC see Financial Crisis Inquiry Commission.

Financial Crisis Inquiry Commission (FCIC). (2011). *The financial crises enquiry report: Final report of the National Commission on the causes of the financial and economic crisis in the United States*. 25 February. Washington D.C., United States of America. [Online] Available: <http://www.gpo.gov/fdsys/pkg/GPO-FCIC/content-detail.html>. (Accessed 23 June 2012).

Fleischer, V. (2010). *Regulatory arbitrage*. Legal Studies Research Paper Series, Working Paper Number 10-11. University of Colorado Law School, Denver, United States of America. [Online] Available: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1567212. (Accessed 2 July 2012).

Gordy, M. & Howells, B. (2004). *Procyclicality in Basel II: Can we treat the disease without killing the patient?* Paper presented at the Workshop on Accounting, Transparency and Bank Stability. A joint workshop hosted by the Basel Committee on Banking Supervision, the Centre for Economic Policy Research (CEPR) and the Journal of Financial Intermediation. 17-18 May. Basel, Switzerland. [Online] Available: http://www.bis.org/bcbsevents/rtf04gordy_howells.pdf. (Accessed 30 June 2012).

Hanson, S., Kashyap, A.K. & Stein, J.C. (2011). A macroprudential approach to financial regulation. *Journal of Economic Perspectives*, 25(1). United States of America. [Online] Available: <http://web.williams.edu/Economics/seminars/steinJEP.pdf>. (Accessed 20 June 2012).

- Horcher, K. (2005). *Essentials of financial risk management*. New York: Wiley.
- Jones, D. (2000). Emerging problems with the Basel capital accord: Regulatory capital arbitrage and related issues. *Journal of Banking and Finance*, 24. [Online] Available: [http://directory.umm.ac.id/Data%20Elmu/jurnal/\]-a/Journal%200f%20Banking%20And%20Finance/Vol24.Issue1-2.2000/1460.pdf](http://directory.umm.ac.id/Data%20Elmu/jurnal/]-a/Journal%200f%20Banking%20And%20Finance/Vol24.Issue1-2.2000/1460.pdf). (Accessed 2 July 2012).
- Koch, T.W. & MacDonald, S.S. (2006). *Management of Banking, 6th edition – International Student Edition*. Mason, MI, Thomson South-Western.
- Lall, R. (2009). *Why Basel II failed and why and Basel III is doomed*. Global Economic Governance (GEG) Programme. GEG Working Paper 2009/52. October. University College, Oxford, United Kingdom. [Online] Available: <http://www.globaleconomicgovernance.org/wp-content/uploads/GEG-Working-paper-Ranjit-Lall.pdf>. (Accessed 20 June 2012).
- Mohan, R. (2009). *Global financial crises – Causes, Impact, Policy, Responses and Lessons*. Speech by Dr. Rakesh Mohan, Deputy Governor of the Reserve Bank of India, at the 7th Annual India Business Forum Conference, London Business School. 23 April. London, United Kingdom. [Online] Available <http://www.bis.org/review/r090506d.pdf>. (Accessed 5 July 2012).
- Müller, H. (1997). *Report: Solvency of insurance undertakings*. Report presented at the Conference of insurance supervisory services of the member states of the European Union. [Online] Available: https://eiopa.europa.eu/fileadmin/tx_dam/files/publications/reports/report_dt_9704.pdf. (Accessed 21 June 2012).
- Norgren, C. (2010). *The causes of the global financial crisis and their implications for supreme audit institutions*. Presentation given at the International Organization of Supreme Audit Institutions (INTOSAI) Global Financial Crisis Task Force meeting: Challenges for Supreme Audit Institutions. 12–16 September. London, United Kingdom. [Online] Available: <http://www.intosai.org/uploads/gaohq4709242v1finalsubgroup1paper.pdf>. (Accessed 5 July 2012).
- Persaud, A. (2009). *Macro-prudential regulation: Fixing fundamental market (and regulatory) failures*. The World Bank Group, Crisis Response: Public policy for the private sector, Note number 6. July. Washington D.C., United States of America. [Online] Available: <http://rru.worldbank.org/documents/CrisisResponse/Note6.pdf>. (Accessed 24 June 2012).
- Repullo, S. & Saurina, J. (2011). *The countercyclical capital buffer of Basel III: A critical assessment*. Centro de Estudios Monetarios y Financieros (CEMFI) Working Paper No. 1102. March. Madrid, Spain. [Online] Available: <http://www.cemfi.es/ftp/wp/1102.pdf>. (Accessed 3 July 2012).
- RIMS see Risk and Insurance Management Society Inc.
- Risk and Insurance Management Society Inc. (RIMS) (2008). *The 2008 financial crisis: A wake-up call for enterprise risk management*. RIMS Executive report: The risk perspective. New York, United States of America. [Online] Available: http://www.ucop.edu/riskmgmt/erm/documents/2008fincrisis_wakeupcall.pdf. (Accessed 21 June 2012).
- Sandström, A. (2007). *EU Solvency II – A Non-life Perspective*. Presentation given at CAS Spring Meeting. 19 June. Orlando, Florida, United States of America. [Online] Available: <http://www.slideworld.org/viewslides.aspx/EU-Solvency-II-%E2%80%93-a-non-life-perspective-ppt-2546760>. (Accessed 30 June 2012).

Sharma, P. (2002). *Report: Prudential supervision of insurance undertakings*. Report presented at the Conference of insurance supervisory services of the member states of the European Union. December. [Online] Available: http://ec.europa.eu/internal_market/insurance/docs/solvency/solvency2-conference-report_en.pdf. (Accessed 20 June 2012).

Styger, P. & Vosloo, P.G. (2005). *The Banker's Guide to the Basel II Framework*. The Banking Association South Africa Information Document. December. Johannesburg, South Africa. [Online] Available: http://www.banking.org.za/documents/2005/DECEMBER/InfoDoc_29781.pdf. (Accessed 14 June 2012).

Van Duffel, S. (2008). *Solvency II: A critical view with a focus on risk aggregation*. Lecture given on Risk Aggregation at the Banking, Finance and Insurance Commission (CFBA). 18 September. Brussels, Belgium. [Online] Available: <http://www.x-act-consulting.com/files/cbfa-september-2008.pdf> (Accessed 10 June 2012).

Van Roy, P. (2005). *Credit-ratings and the Standardised Approach to Credit Risk in Basel II*. European Central Bank Working Paper Series No. 517. European Central Bank. Frankfurt, Germany. [Online] Available: <http://www.ecb.int/pub/pdf/scpwps/ecbwp517.pdf>. (Accessed 12 June 2012).

