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Comparison of the Regulatory Approach in Insurance and Banking in the Context of Solvency II

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0. Executive Summary

Risk-based financial supervision is different for Banking and Insurance. Business models are different, risks are different and thus regulatory measures are also different. But this does not mean that systems cannot learn from each other. This paper identifies the key differences between Banking and Insurance regulation which are, *inter alia*, that

- Solvency II is broader than Basel II/III
- Mismatch and funding risk is appreciated more in Solvency II than in Basel II/III
- The Solvency II capital definitions appear to be much more stringent than the corresponding Basel II/III definitions

The twin towers of banking are capital and funding, whereas the twin towers of insurance are capital and risk. As a strategy in the current European crisis, applying actuarial financial management techniques to banking could be a key consideration in increasing confidence in the ability of banks to realistically quantify and judge all risks.

1. Introduction

The purpose of this paper is to help insurance actuaries, regulators and other interested parties with a knowledge of Solvency II understand similarities and differences between the regulatory frameworks applying to banks and insurance companies. The paper includes detailed analysis of the regulatory requirements for the banking sector and discusses key areas of overlap or divergence from Solvency II.

The paper is split into four sections dealing with the concepts behind the frameworks, the evolution from Basel II to Basel III, stress tests and finally a summary of the challenges for banking regulation in the context of the current sovereign debt crisis. There is also a list of references and an appendix detailing the Basel II/III framework.

The paper is a by-product of a wider discussion within the Groupe Consultatif about the impact of sovereign debt risk to financial institutions. It was first drafted by a Sub Working Group of the Groupe Consultatif and was then taken over by the Investment and Financial Risk Committee where the paper was finalised.

2. Concepts behind Basel II/III and Solvency II

- 2.1. Basel II/III was designed as principle-based but in an environment where there was a low threat of enforcement. Solvency II is also principled based but has an attendant credible threat of enforcement.
- 2.2. Solvency II is broader than Basel II/III in that it is a total Balance Sheet approach incorporating assets and liabilities whereas Basel II/III concentrates on Credit, Market and Operational risk.
- 2.3. One of the key criticisms of Basel II is that it has been seen as contributing to the last financial crisis, through the calculation of risk-weightings methodology. One of the key components of Basel II was to increase the amount of capital banks had to hold against riskier assets. Extremely low-risk assets, meanwhile, could be held with very little or even no capital. Risk, moreover, was calculated primarily by reference to the rating assigned by one of the recognised ratings agencies. The consequence of this Basel II reform was to discourage banks from lending to risky enterprises, and to encourage the accumulation of apparently risk-free assets. This was a primary contributor to the structured finance craze, as securitisation

was a way to "manufacture" apparently risk-free assets out of risky pools. What brought banks like Citigroup and Bank of America to such difficulty wasn't direct exposure to sub-prime loans, but exposure to triple-A-rated debt backed by pools of such loans, debt which turned out not to be risk-free at all.

Initially Basel II was designed with the primary aim of achieving capital efficiency for banks. The changes in banking that led to the subprime crisis hinged, in large part, on three closely linked developments coupled with the regulation. These were:

- (i) the huge growth in derivatives;
- (ii) the decomposition and distribution of credit through securitisation;
- (iii) the formidable combination of mathematics and computing power in risk management.

This led to an over-reliance on models at the expense of judgement. A global situation emerged in banking where there was also poor visibility as to where risk exposure lay.

Basel II/III is models focused. However, post the subprime crisis, the emphasis on banking regulation has turned towards resilience.

Model based regulation implies a strong requirement for reliable, comprehensive through-the-cycle historic data, which is a challenge for many banks.

The management tool for assessing all risks is Enterprise Risk Management; however the extent to which this is understood and implemented can be questioned.

For insurers, who, on the whole, have a stronger history of modelling and data collection, Solvency II continues the reliance on models, which are now formally structured along the lines of the Basel II/III models. However, the limitations of the regulation as it applies to any one insurance company or risk category can be addressed by using the insurer's own model, subject to approval, and by the requirement to carry out the Own Risk and Solvency Assessment. The Basel II/III equivalent is to allow the bank judgement around certain parameters in the models (also subject to approval) and to supplement the three requirements of Basel II/III (Credit, Market and Operational Risk) with a Material Risks Assessment, which is a catch-all assessment of the remainder, usually in the format of a general commentary. Given the stronger history of comprehensive, all-risks modelling by insurance companies and actuarial judgement applied to model outcomes, it is likely that insurers are in a far stronger position from a comprehensive risk management perspective notwithstanding that both methodologies stem from the same approach.

Basel II/III is only designed to evaluate risk occurring in the next year, whereas Solvency II incorporates a run-off out over future years via the Risk Margin.

- 2.4. In banking the term mismatch of debt can be highly skewed. Banks lend out money on a ten year loan and fund this largely through 3 month money. They may then have to roll this over (refund) forty times before the end of the term of the loan at the market rates prevailing at the time and unknown at the time of pricing. For example, banks lent out billions in tracker mortgages which guaranteed that over the full term of the mortgage that the pricing to the customer would only vary with the ECB rate leaving the banks themselves exposed to the risk of higher costs in the money markets when refunding to maturity. Money market rates quickly rendered these highly loss making. Other products have limited scope for repricing and this is further compounded now by the greater political influence of governments on banks that have been bailed out. A key issue in banking has been such proliferation of short-term debt issued to support illiquid long-term assets, but in addition much of it issued beneath the regulatory radar in highly leveraged 'shadow' banks. Basel II/III includes the quantification of off Balance Sheet assets but not shadow banks and it is still not a total Balance Sheet approach (as Solvency II is) with only Credit, Market and Operational risk

being explicitly considered. It does not consider the risk due to funding explicitly. In the 1950s, liquid assets were typically 30% of British clearing banks total assets (Treasury Bills and Short Term Government Debt). Now they are of the order of 1% of liabilities. No reserves need be held for this risk. The so-called twin towers of banking are capital and funding and they are inextricably interlinked, which greatly increases risk and the urgency of risk management.

Insurance is funded by upfront premia, giving insurers strong operating cash flow without the requirement for wholesale funding. With Solvency II, there would appear to be a much greater appreciation of matching even with the advent of fair values. The total balance sheet approach puts a very specific focus on the profile of assets in relation to liabilities. The approach is all-risks and much more comprehensive and integrated in its financial risk management and measurement. It takes a much more economic approach considering both sides of the balance sheet.

Basel II/III aside, there is now increasing interest on the part of the IMF and the Financial Stability Board, a global club of regulators, on the mismatch of the maturities of banks' assets and liabilities, the connections between banks and the rest of the financial system, including non-bank financial firms.

- 2.5. In the days when banks (and their customers) could not rely on governments to save them, they carried huge buffers to protect themselves against losses and drops in confidence. In the late 19th century a typical American or British bank had an equity buffer (i.e. core capital) equivalent to 15-25% of its assets. As recently as the 1960s, British banks held more than a quarter of their assets in low-risk, liquid form, such as cash or government bonds.

Over time governments have supplied more protection against disaster. First came liquidity support by central banks; deposit insurance followed; in the latest crisis governments have given all creditors a blanket implicit guarantee. As a result, banks capital buffers have fallen. Going into the crisis, some Western institutions' core capital was 3% of their assets or less, and less than a tenth of those assets were liquid. Government support may also have given banks an incentive to grow much bigger, so that most European countries now underwrite banking systems several times larger than their GDPs.

Such extensive government guarantees render redundant the normal laws of companies' capital structure, which dictate that high leverage and over-reliance on short-term borrowing are an extremely high risk combination. A bank can operate with almost no equity, safe in the knowledge that it will still be able to borrow and raise deposits cheaply, because creditors know they are guaranteed. Furthermore, if a bank knows the state will always provide liquidity if markets dry up, it has a big incentive to rely on short-term borrowing (which is typically cheaper than long-term funds). It follows that if banks in a state-backed system are to have safety buffers, the state must determine their thickness and quality.

The role of capital in a bank is nevertheless to act as a buffer against future, unidentifiable, even relatively improbable losses, whilst still leaving the bank room to recover or organise an orderly winding down. The preferred definition in the context of credit risk management and capital management is unexpected loss. The expected outcome is compared with the mean of all possible outcomes and unexpected loss is measured by the standard deviation of the outcomes.

A key issue has been the misalignment of incentives. Banks deemed 'too big to fail' have nestled under an implicit guarantee. Sensitivity to risk was dulled by 'the Greenspan put'; banks would be bailed out with lower rates and liquidity support if needed. In the Basel II/III context, this overrode Basel II/III. Regardless of output or risk profile, large banks had a guaranteed buyer.

Regulation for all is now moving towards macroprudential concepts, which regulates banks in consideration of risks to the whole system or economy.

2.6. One key difference between how insurers and banks are managed can best be illustrated by considering the Income Statement of a financial institution that is composed partly of an insurance company and partly of a bank. The example used is that of Irish Life and Permanent Financial Statements 2010.

This illustrates that, at a high level, the structure of a bank Income Statement is:

Net Interest Income
 (Admin Expenses)
 (Depreciation and Amortisation)
 (Provisions for Impairment)
(Taxation)
 Profit

The insurance company income line is structured as:

Premiums (net of reinsurance)
 Investment Return
 Change of shareholder value of inforce business
 (Claims net of insurance)
 (Change in liabilities)
 (Admin Expenses)
 (Depreciation and Amortisation)
(Taxation)
 Profit

If we then attempt to map the bank income statement to the current structure of insurer statements, the following emerges:

<u>Bank</u>	<u>Insurer</u>
_____	-> Change in value of inforce business
Net Interest Income	-> Premiums (net of reinsurance)
+ Investment Return	
(Admin Expenses)	-> (Admin Expenses)
(Depreciation and Amortisation)	-> (Depreciation and Amortisation)
_____	-> Change in liabilities
(Provisions for Impairment)	-> (Claims net of insurance)
<u>(Taxation)</u>	-> <u>(Taxation)</u>
Profit	-> Profit

If we consider that per banking regulation, Provisions for Impairment may only include provisions in respect of existing business that has already gone impaired (i.e. the equivalent for a life insurer of the sum at risk net of reinsurance in respect of death claims incurred), it is clear that the two lines in the insurer Income Statement that do not have an equivalent on the bank statement are the Change in the Value of Inforce Business and the Change in Liabilities; in other words the two lines in the statement that deal with future financial risk measurement.

Basel II/III assumes that Expected Loss will be covered off by loan loss provisions of the bank.

Under Solvency II, the valuation of the Technical Provisions, on a best estimate basis, which are the probability weighted average of future cash flows, discounted using the risk-free term structure and the Risk Margin designed to calculate the margin required by a third party to take over the entire future obligation both ensure that expected future liability is covered by assets before consideration of capital which is to be held over and above this.

The requirement to distinguish between expected and unexpected losses applies only to those banks that have elected to use the IRB Approach to credit risk.

The objective of IFRS is to ensure that the financial statements adequately reflect the losses that are incurred at the balance sheet date, whilst Basel II/III's objective is to ensure that the lender has sufficient provision or capital to support its expected losses over the course of the next 12 months and support any unexpected credit losses. The IRB Approach is based upon a long run average twelve month probability of default and the bank's most conservative estimate of 'loss given default' across an economic cycle. IFRS clearly states that it is an incurred loss model and Basel II/III is about expected and unexpected losses. Expected Loss and Incurred Loss (or even including Incurred But Not Reported Loss) are unlikely to be the same. By definition, an incurred loss at the balance sheet date is one where the trigger event that gives rise to an impairment loss has already happened whereas an expected loss is one that is anticipated, irrespective of whether the trigger event has taken place at the balance sheet date. Basel II/III defines default as the obligor being 90 days past due on the obligation whereas IFRS refers to actual breach of contract, technically one missed capital or interest payment. On the face of it, IFRS is more conservative but in fact Basel II/III takes into account all default that are likely to occur in the next twelve months while IFRS only recognises impairments incurred up to the balance sheet date. This is adjusted for in the regulation, somewhat crudely, by comparing the Basel II/III expected loss calculation with the amount of provisions made. Any shortfalls (where Expected Loss exceeds the total provision) must be deducted from capital (50% from Tier 1 and 50% from Tier 2) and any 'excesses' (where the total provision exceeds the Expected Loss) may be eligible as Tier 2 capital. The methodology should of course be internally consistent with the Unexpected Loss calculated and for which capital is held consistent with the Expected Loss, not a different measure.

Under Solvency II, these measures are fully consistent.

- 2.7. Under Basel II/III there is a heavy reliance on Credit Agencies ratings. Credit Ratings can often be out of date and sometime grossly inaccurate. i.e. Lehman Brothers had A rating from Standard and Poors when it opened bankruptcy. The alternative is to use IRB methods (Internal Rating Base Approach), however these use static recovery rates or alternatively a very simplistic set of correlations. At present correlation matrices and recovery rates do not consider the stochastic element that may impact the recovery rates in a specific sector, region or individual institution. Additionally IRB methods are not revised with the frequency needed in the present financial climate.

By contrast, the stronger practice of stochastic modelling coupled with the Own Risk and Solvency Assessment of Solvency II is less likely to result in such limitations.

- 2.8. Counterparty risk is a key risk in banking. Asymmetries caused serious issues in the vast OTC derivatives market where even large dealing firms lacked the information to determine the consequences of others failings. Losses on contracts linked to Lehmans turned out to be modest but nobody know that when it collapsed in September '08, causing panic.

Under Basel II/III, counterparty risk is part of the judgement that banks make without guidance. It can form part of the Material Risks Assessment but there is no guidance or industry standard on how to complete this.

Basel II/III is based on the premise of VaR which has a one year time horizon for market risk. This makes it difficult to judge the exposure to tail risks built up eg. by sellers of swaps on CDOs.

Under Solvency II, 'credit risk' is the counterparty risk of banking terminology. It is treated explicitly with its own capital requirement. In practice, it relates to reinsurance.

- 2.9. Performance in financial services is usually judged relative to rivals or to an industry benchmark, encouraging banks to mimic each others risk taking, even if in the long run it benefits no one. 'As long as the music is playing you've got to get up and dance.'

Both Basel II/III and Solvency II are based on an individual company's risk profile. However, this is being countered now by macroprudential regulation, which regulates each company in consideration of the system as a whole eg. calibration under QIS 5 has been intensified.

Insurance policies are generally long-term with controlled outflows, traditionally enabling insurers to act as stabilisers to the financial system. This was because:

- their relatively limited size meant there would not be disruptive effects in the financial markets
- an insurance insolvency develops slowly and can often be absorbed by, for example, capital raising, or, in a worst case, an orderly wind down;
- the features of the interrelationships of insurance activities mean that contagion risk would be limited.

Indeed, during the financial crisis, insurers maintained relatively steady capacity, business volumes and prices. However, insurance companies tend to be regarded less as shock absorbers than heretofore. Banks and insurance companies grew increasingly interdependent through the boom in derivatives and computer-driven equity tracking. Another bond was cross-ownership. At the start of the crisis, financial firms held large quantities of each others common and hybrid equity. Such tight coupling of components increased the danger of non-linear outcomes, where a small change has a big impact.

These risky dynamics were caused not only by complexity but paradoxically by homogeneity. Banks, insurers and hedge funds bought massive amounts of debt securities to try to reduce risk through diversification; but the ingredients were similar – leveraged loans, American mortgages etc. From an individual perspective, it looks sensible. But for the system as a whole, it concentrated risk as reflected in their returns.

The old supervisory framework assumed that if the 100 largest banks were individually safe, the system was too. But the crisis has shown that even well managed firms, acting prudently in a downturn, can undermine the strength of all. The Financial Stability Board, an international group of regulators, is trying to co-ordinate global reforms in areas such as capital.

International co-ordination between regulators will improve. It could see a re-introduction of Group Solvency II provisions within the next ten years, where one regulator regulates all of the companies within a group.

- 2.10. Basel II gave banks a lot more wriggle room to determine their own risk weights under the IRB Approach, which carries a moral hazard risk. Many of the assets on the balance sheet of RBS were categorised in a way that required no capital against them. The FSA reconstructed RBS's balance sheet using new rules (known as Basel III) that give banks far less scope to massage numbers and found that actual capital was only about 2% of assets.

How RBS calculated its numbers is an illustration against giving banks too much discretion in calculating key ratios that are relied upon by investors and providers of credit. Basel 1, the original set of international

capital standards, forced banks to apply strict risk weightings and required them to hold more capital against risky assets (commercial real estate loans, for instance) than against relatively safe ones (such as residential mortgages). Basel II allowed more latitude. RBS took advantage of this, for instance by setting the confidence interval at 96%. Most others in the industry applied a 99.9% standard.

In the bank's trading book the shortage of capital should have been plain to see. According to the FSA:

Only £2.3bn of core tier 1 capital was held to cover potential trading losses which might result from assets carried at around £470bn on the firm's balance sheet. In fact, in 2008, losses of £12.2bn arose in the credit trading area alone (a subset of total trading book assets). A regime which inadequately evaluated trading book risks was, therefore, fundamental to RBS's failure. This inadequacy was particularly significant for RBS, given that the purchase of ABN AMRO significantly increased RBS's trading book assets. RBS was allowed by the existing regulations to substantially increase its trading risk exposure counterbalanced only by a small increase in capital buffers available to absorb loss.

This also illustrates the fact that the definition of Tier 1 capital under Basel II is quite lax. Many of the equity-like instruments allowed were really debt. In effect, the fine print allowed banks' common equity, or "core" Tier 1, the purest and most flexible form of capital, to be as little as 2% of risk-adjusted assets. By comparison the Solvency II capital definitions are much more stringent.

There is a sense that the Basel II/III regulations can be viewed by banks as a hurdle to clear in the most efficient possible manner but without engagement of the principles of prudential risk management. For example, some banks, having gained approval for IRB models, then found that as experience developed that the change in parameters dictated by the underlying data resulted in higher Risk Weighted Assets under the IRB Approach than under the Standardised Approach. This resulted in a switch back to the Standardised Approach, a move which was also granted approval by regulators. National regulators have a clear interest in state-owned or state-recapitalised banks passing regulatory hurdles. This is less likely to occur in the insurance industry.

- 2.11. Operational risk tends to be similar between Basel II/III and Solvency II in that it becomes in effect a fixed percentage of a key exposure.

Under the Standardised Approach to operational risk the capital charge is the sum of specified percentages of banks' gross income or loans for eight business lines. Under the Advanced Measurement Approach to operational risk, the most sophisticated option of Basel II/III, subject to the satisfaction of more stringent supervisory criteria, banks estimate the required capital with their own internal measurement systems.

- 2.12. The Basel II Accord has been criticized for potentially causing procyclicality and intensifying rather than reducing systemic crises. The accord requires banks to increase their capital ratios when they face greater risks. Unfortunately, this may require them to lend less during a recession or a credit crunch, which could aggravate the downturn. The regulations have been criticised as causing the harmonisation of investment decisions during crises with the consequence of destabilising rather than stabilising the financial system. A similar criticism has been directed at fair value accounting rules.

Unlike banking, in insurance the major sources of potential procyclicality are to be found in the financial markets: equities and default risk for bond issuers. In a downturn, the increased likelihood of breaches of the capital requirement might lead insurance companies to sell equities and bonds, exacerbating the market trend.

3. Evolution to Basel III

The Appendix gives details of the changes for this new regulation, which will be implemented between 2013 and 2019.

3.1. Basel III cost

Based on the BIS' own research, these increases in capital requirements should lead to a substantial reduction in the frequency of financial panics, at a minimal cost to growth. The rules are to be phased in over an extended period. The first rules will take effect in 2013 with the entire set of standards in place by the end of the decade.

Basel III has been criticised for not addressing the risk weighted asset issue. Since it did not change this risk-weighting, Basel III effectively doubles down on Basel II. Banks will need to hold more common equity than ever—against their risk-weighted assets. That massively increases the incentive to find low-risk-weight assets with some return, since these assets can be leveraged much more highly than risky assets. Lending to AA-rated sovereigns still carries a risk-weight of zero. So one result of Basel III could be to encourage banks to increase their lending to sovereigns at the margins of zero-risk-weight status.

Nomura estimates that compliance with the new Basel III rules, plus an additional surcharge on globally important banks, could leave European lenders, Britain's included, needing to raise more than 100bn euro. In theory banks have until 2019 to raise this amount and much of it could come from profits over the next few years. However, investors are pressing banks to reach those levels sooner. On top of this requirement is the extra capital banks need to absorb losses from a recession or the debt crisis.

More European banks may have to be recapitalised by governments. Among the bigger economies, Germany and France are likely to be in a position to raise the cash but Italy and Spain might need help, perhaps from the eurozone's bailout fund. National bank bailouts increase state borrowings relative to GDP, which raises question marks over sovereign credit ratings. There is also the risk that European competition regulators could force recapitalised banks to restructure if they have received state aid worth more than 2% of risk weighted assets. This underlines the need to find a solution to the root cause of the problem, Europe's sovereign debt crisis. There is no amount of capital that banks could reasonably hold that would insulate them from a breakup of the eurozone. The roots of Europe's crisis are different from America's. It is not as much about individual homeowners as it is about entire countries like Greece, Italy and Portugal, whose debts the banks are holding.

European banks over the past three years have not been forced by individual governments to rebuild their capital nearly as much as U.S. banks have. At the end of 2010, the average EU bank had only enough capital to cover 6.5% of its outstanding loans. That was only slightly up from 5.9% at the end of 2007 and still far less than US banks had. On average, the 14 biggest banks in the EU could be wiped out if just 4.3% of their loans went bad.

3.2. Basel 2.5

Basel 2.5 came into force on December 31st 2011 in most European and major world financial jurisdictions. Switzerland applied the rules a year early, and the costs are substantial. Third-quarter figures for Credit Suisse show a 28% increase in risk-weighted assets, and hence capital charges, for its investment-banking activities purely because of Basel 2.5.

Basel 2.5 for the first time charges banks extra capital for the credit risk of what they hold in their trading portfolio (because the crisis showed that markets are not always liquid enough to be able to offload assets).

That includes a charge for the risk that a counterparty goes bust. It also imposes heavy charges on securitised bundles of assets unless the credit risk of each piece of the bundle has an identifiable market price. Banks that have portfolios of trading positions which they reckon offset each other have to convince regulators that their risk models work or face being charged at a cruder, standardised rate.

Basel 2.5 increases complexity. The risk of a trading portfolio must now be broken down into five “buckets”—value at risk (VaR), a measure of how much could be lost in an average trading day; stressed VaR (how much could be lost in extreme conditions); plus three types of credit risk ranging from the risk of single credits to those of securitised loans. For some banks, developing risk models and getting them approved may become too expensive with the result that more complex businesses will be shut down.

4. Stress Tests

The Basel II Accord refers to “stress testing” numerous times and in relation to each of its three pillars. It does not however define what constitutes an effective stress test. In relation to credit risk, descriptions of the sort of scenarios could be included in a stress test. The Accord also makes clear that there needs to be stress testing done in relation to credit risk, liquidity risk in relation to collateral and market risk. Regulators are also required to ensure that institutions conduct rigorous and forward-looking stress testing to identify factors that could adversely affect the bank.

In practice it is likely that many of the stress tests are quite ‘manual’, whereby banks manually project the grade profile of their banking books out over the required five years. From this provisions are estimated and the Risk Weighted Assets pertaining to the forecast grade distribution are calculated. This then forms the basis of the return to the regulator without being informed by forecast modelling or stochastic techniques. No reserves in respect of risk in future years need be held in the current year. Each future year is regarded as discrete. In fact, any adverse scenarios can be ‘managed away’ by assumed management action.

The stress testing methodology initially relied on self-reporting by banks. In 2010 Europe’s stress testers had no power to challenge data submitted by banks. Only national regulators had this privilege. Yet national regulators have a clear interest in state-owned or state-recapitalised banks passing the stress tests and most did. It has been questioned how well bank data was scrutinised. 2011 saw some changes. Data initially submitted by banks were subject to “peer review” by a committee of experts from the European Banking Authority (EBA), a pan-European college of regulators, which is administering the tests. The committee concluded that some banks had been over-optimistic in their self-assessment. In some cases different banks had estimated very different probabilities of default and losses on similar underlying assets. All banks were then asked to resubmit data.

A bigger problem remains. The largest and richest banks can hire the best statisticians to model their data. No individual national regulator, or EBA, has resources to match these banks. It is therefore difficult for regulators to successfully challenge the models they produce.

The basic problem is self-reporting itself. The financial crisis proved light-touch or self-regulation was insufficient to keep banks in check. But it has not changed the inequality of resources and expertise between banks and regulators.

Self-reporting by banks and the soft macroeconomic scenarios envisaged, mean the stress tests cannot be construed as definitive measures of the financial impact on solvency of downside risk. However, the data banks are required to disclose allow market participants to draw their own conclusions. Indeed in 2010 ratings agencies

and the OECD were quick to test the exposure of national banking systems to a sovereign default, even if the stress tests themselves did not consider such an eventuality.

Some critics of the stress tests even concede tougher tests might be counterproductive. If banks fail tests they would immediately face a higher cost of capital. In such circumstances, most would have no option but to seek public support. On the other hand if vulnerable banks pass the tests, they have an incentive to raise capital, dispose of weak assets, and generally strengthen balance sheets.

But other critics of the stress tests argue their softness is making it harder for banks to raise funds anyway. By adding to uncertainty about the health of European banks, rather than coming clean about those worse effected, the stress-test process discourages investment in any of the continent's banks.

In December 2011, the European Banking Authority (EBA) released the results of its updated stress tests showing that European banks needed to raise €115 billion (\$149 billion) in extra capital, mainly to offset a fall in the value of their existing holdings of government bonds issued by troubled peripheral European countries.

The banks with the biggest capital shortfalls are those from Spain, Greece and Italy. Several may have to tap government bail-out funds to raise the capital, creating the circular prospect of governments bailing out their banks that are in turn supposed to bail out the government. Italian banks, for instance, will need €15 billion in additional capital; among them is UniCredit, Italy's biggest bank by assets, which holds some €40 billion in Italian government debt and needs to raise almost €8 billion in capital. Spanish banks need €26 billion. Europe's core has not been spared either. Banks in Germany, the euro area's biggest creditor country, need additional capital and Commerzbank, Germany's second-largest bank, may need to apply for government assistance to fill a €5.3 billion hole in its balance-sheet.

As recently as 2010, banks in peripheral countries were willing purchasers of bonds issued by their own governments. The feeling at the time was that the banks survival was directly dependent on the economic performance of their home countries with the consequence that there was little point in trying to mitigate the risks. Moreover, most peripheral banks have seen their funding costs soar and, in reality, had little choice but to buy government bonds with similarly high yields.

However, in October 2011, the EBA first asked banks to set aside extra capital against the possibility of losses on euro-area government bonds. Banks now fear a requirement to regularly mark to market their holdings and set aside capital if bond prices fall. That would prevent even the most troubled banks from gambling for redemption by taking big bets on bonds.

Banks from richer countries will be even less inclined to help out. Foreign banks have been prepared to take large charges to sell 'toxic' foreign sovereign debt, and are unlikely to repurchase. Governments hoping for a helping hand in bond markets will have to look farther afield than their own fragile banks.

Both Basel III and Stress Testing results may lead to further recapitalisation of banks.

5. Challenges for banking regulation in the current European crisis

Ultimately, Basel III will only attempt to ensure that individual banks have greater capital reserves to withstand credit risk in the banking book and market risk in the trading book. It does not effectively deal with the interdependence of banks. Whereas traditionally the banking system was viewed as secure if the hundred largest banks were secure, it has now become clear that the banking system is only as strong as the weakest of the banks, particularly in the sovereign risk and European context. Managing sovereign risk in the system would include the following:

- Dealing comprehensively and decisively with the European sovereign debt problem at a political and economic level.
- Looking in depth at the circumstances and mechanisms that could lead to the collapse of the entire banking system and the formulation of continuity planning in such an eventuality. Fundamental change to the entire financial system may result from any such collapse and what this might look like should be considered.

Banks and insurers face the same management of the risk that sovereign debt is increasingly no longer regarded as risk free. Alternatives are limited. For insurers, the key challenge is how to reflect the risk within already relatively sophisticated financial modelling (soon to be transposed in practice to Solvency II). For banks the challenge would appear to be more in the area of formulating comprehensive risk management systems that would allow measurement and judgement of risk so that they are better equipped to recognise when risk levels (from any source) are too high.

Insurers have a clear vested interest in the stability of the banking system (economic and financial risks). Financial management techniques, often standard in the insurance industry, could potentially be usefully applied to the banking industry. The potential benefits are a better understanding and measurement of risk and reserving required. Key strengths insurers may be able to bring to bear are:

- In the European insurance industry, rigorous financial modelling on an all risks basis tends to be standard. There is a strong culture of judgement of risk versus evidence of a more 'arbitrage' approach to banking regulation. Financial modelling techniques could be applied to provisioning, all-risks based solvency modelling, stress testing and operational risk.
- Recognised industry valuation systems that result in a key focus on assumptions and judgement versus a dearth of risk management/profitability systems in banking.
- Stochastic modelling, currently used by advanced insurers, could very usefully be applied to banking to replace the discrete (and often manual) forecasting of banks.
- Judgement of the adequacy of reserves vested in an expert by insurers.

There are other key 'soft' issues that could also be considered e.g.

- As it is ultimately in the interests of all that realistic reserves reflecting all risk exposures are held, consideration should be given to the supports given to CROs to ensure true independence. Consideration at industry level could be given to the supports that are realistically available to a CRO who is under pressure internally to sign off stress test projections that are in all likelihood optimistic rather than best estimate given that a true best estimate would effectively be a statement of insolvency. It would be useful to see an evaluation of how an Appointed Actuary system like in many European countries is judged to have served insurers. Per this system, one person individually and independently signed off that the reserves are prudent and the company is solvent.
- Risk skills and experience in banks.
- Risk culture in banks.
- An assessment of implementation of Enterprise Risk Management in banks.
- Incentives.

A key factor in any resolution must be the restoration of confidence. Applying actuarial financial management techniques to banking could be a key consideration in increasing confidence in the ability of banks to realistically

quantify and judge all risks. Although implementation would likely prove time consuming, it could establish banks on a sounder footing that could avoid a recurrence in the future.

Given that any number of catalysts, which could result in a run on weak economies and result in far-reaching global/eurozone panic, are not currently wholly unlikely, measures to increase confidence are urgent.

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APPENDIX

Basel II

The Basel II Accord (Basel II) was initially published in June 2004 and was adopted by all credit institutions in the European Union in 2008. Regulators in most jurisdictions around the world either plan to or have adopted the Accord. It was intended to create an international standard for banking regulators to control how much capital banks need to put aside to guard against the types of financial and operational risks banks (and the whole economy) face. One focus was to maintain sufficient consistency of regulations so that this does not become a source of competitive inequality amongst internationally active banks. Advocates of Basel II believed that such an international standard could help protect the international financial system from the types of problems that might arise should a major bank or a series of banks collapse. In theory, Basel II attempted to accomplish this by setting up risk and capital management requirements designed to ensure that a bank has adequate capital for the risk the bank exposes itself to through its lending [the Banking Book] and investment banking practices [the Trading Book]. Generally speaking, these rules mean that the greater risk to which the bank is exposed, the greater the amount of capital the bank needs to hold to safeguard its solvency and overall economic stability.

The final version of Basel II aims at:

1. Ensuring that capital allocation is more risk sensitive;
2. Enhance disclosure requirements which will allow market participants to assess the capital adequacy of an institution;
3. Ensuring that credit risk, operational risk and market risk are quantified based on data and formal techniques;
4. Attempting to align economic and regulatory capital more closely to reduce the scope for regulatory arbitrage.

Basel II uses a "three pillars" concept – (1) minimum capital requirements (addressing risk), (2) supervisory review and (3) market discipline.

The first pillar

The first pillar deals with maintenance of regulatory capital calculated for three major components of risk that a bank faces: credit risk, operational risk, and market risk. Other risks are not considered fully quantifiable at this stage.

The credit risk component can be calculated in three different ways of varying degree of sophistication, namely Standardised approach, Foundation IRB and Advanced IRB. IRB stands for "Internal Rating-Based Approach".

For operational risk, there are three different approaches - basic indicator approach or BIA, Standardised approach or STA, and the internal measurement approach (an advanced form of which is the advanced measurement approach or AMA).

For market risk the preferred approach is VaR (value at risk).

As Basel II was phased in by the banking industry the intention was to move from standardised requirements to more refined and specific requirements developed for each risk category by each individual bank. The upside for banks that developed their own bespoke risk measurement systems was that they would be rewarded with potentially lower risk capital requirements. There would be closer links between the concepts of economic profit and regulatory capital.

Credit Risk can be calculated by using one of three approaches:

1. Standardised Approach
2. Foundation IRB
3. Advanced IRB Approach

The Standardised approach sets out specific risk weights for certain types of credit risk. The standard risk weight categories used under Basel 1 were 0% for government bonds, 20% for exposures to OECD Banks, 50% for first line residential mortgages and 100% weighting on consumer loans and unsecured commercial loans. Basel II introduced a new 150% weighting for borrowers with lower credit ratings. The minimum capital required remained at 8% of risk weighted assets, with Tier 1 capital making up not less than half of this amount.

The following is an extract from the regulation under the Standardised Approach to give a sense of the risk weightings and the influence of the ratings agencies.

- **Claims on sovereigns**

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	unrated
Risk Weight	0%	20%	50%	100%	150%	100%

- **Claims on the BIS, the IMF, the ECB, the EC and the MDBs**

Risk Weight: 0%

- **Claims on banks and securities companies**

Related to assessment of sovereign as banks and securities companies are regulated.

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	unrated
Risk Weight	20%	50%	100%	100%	150%	100%

- **Claims on corporates**

Credit Assessment	AAA to AA-	A+ to A-	BBB+ to BB-	Below BB-	unrated
Risk Weight	20%	50%	100%	150%	100%

- **Claims on retail products**

This includes credit card, overdraft, auto loans, personal finance and small business.

Risk weight: 75%

Banks that decide to adopt the standardised ratings approach must rely on the ratings generated by external agencies. Certain banks used the IRB (Internal Ratings Based) approach as a result, which gives more discretion to the individual banks in quantifying the risk weighted assets.

The second pillar

The second pillar deals with the regulatory response to the first pillar, giving regulators much improved 'tools' over those available to them under Basel I. It also provides a framework for dealing with all the other risks a bank may face, such as systemic risk, pension risk, concentration risk, strategic risk, reputational risk, liquidity risk and legal risk, which the accord combines under the title of residual risk. It gives banks a power to review their risk management system.

Internal Capital Adequacy Assessment Process (ICAAP) is the result of Pillar II of Basel II accords

The third pillar

This pillar aims to complement the minimum capital requirements and supervisory review process by developing a set of disclosure requirements which will allow the market participants to gauge the capital adequacy of an institution.

Market discipline supplements regulation as sharing of information facilitates assessment of the bank by others including investors, analysts, customers, other banks and rating agencies which leads to good corporate governance. The aim of the third pillar is to allow market discipline to operate by requiring institutions to disclose details on the scope of application, capital, risk exposures, risk assessment processes and the capital adequacy of the institution. It must be consistent with how the senior management including the board assess and manage the risks of the institution.

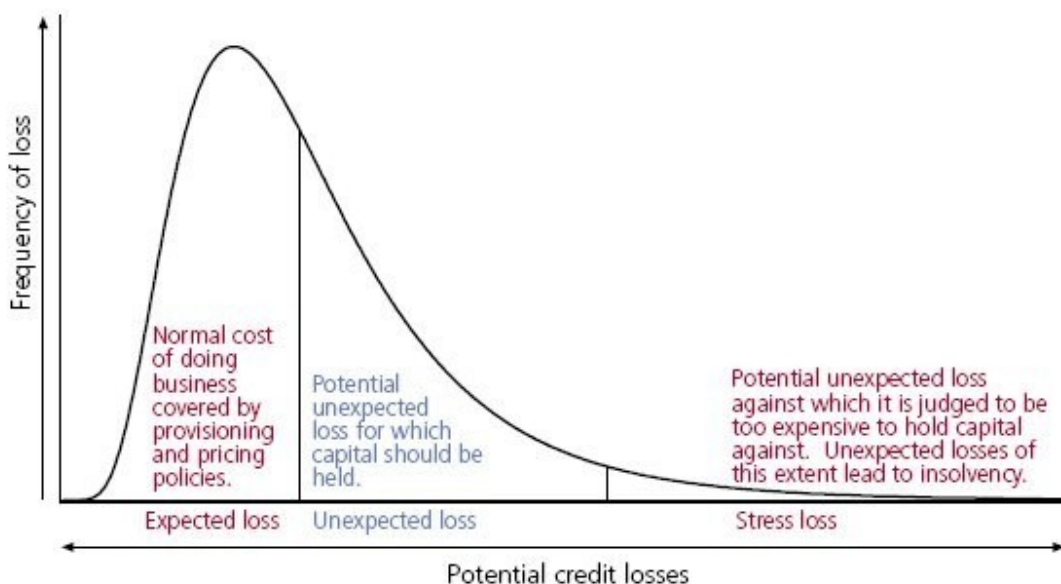
When market participants have a sufficient understanding of a bank's activities and the controls it has in place to manage its exposures, they are better able to distinguish between banking organisations so that they can reward those that manage their risks prudently and penalise those that do not.

These disclosures are required to be made at least twice a year, except qualitative disclosures providing a summary of the general risk management objectives and policies which can be made annually. Institutions are also required to create a formal policy on what will be disclosed, controls around them along with the validation and frequency of these disclosures. In general, the disclosures under Pillar 3 apply to the top consolidated level of the banking group to which the Basel II framework applies.

Credit Risk Detail for IRB Models

The Internal Ratings Based approach is used by many banks in preference to the Standardised Approach.

The risk weights for individual exposures are calculated based on the function provided by Basel II.



Under IRB, the approach taken to credit risk consists of four steps.

1. Calculate the expected loss over a given horizon, for each exposure and for the portfolio.
2. Calculate the volatility of expected loss of each exposure (unexpected loss).
3. Calculate the volatility of expected loss for the portfolio.
4. Calculate the probability distribution of credit loss for the whole portfolio and determine the contribution of each exposure to the capital needed to absorb risk over the given time horizon, at a given confidence level.

The Credit Risk calculation is similar to the value at risk approach to Market Risk: it is the portfolio effect of a maximum likely loss over a given time period at a given confidence level and a bottom up analytical model is used to assess this.

Expected loss is not part of risk, but a cost of doing business. However, it is also a fundamental first step in determining risk capital, as this is defined as the volatility of actual loss either side of the level of expected loss.

In credit risk terms, the expected loss (EL) is the average level of credit loss which is expected from any given exposure or set of exposures over a given time period. There are three components required to assess expected loss and it is calculated as the product of all three components.

1. Probability of Default (PD); the probability that the borrower will default over a one year horizon.
2. Loss given default (LGD): the percentage of the credit exposure which will be lost should a borrower go into default
3. Exposure at Default (EAD): the likely amount of the credit granted outstanding at the time of default.

For a given maturity, these parameters are used to estimate expected loss (EL)

$$EL=PD*LGD*EAD$$

IRB requires banks to disclose PDs, LGDs and EADs within the portfolio (Pillar 3). There are two variants of IRB available to banks: the Foundation approach and the Advanced approach.

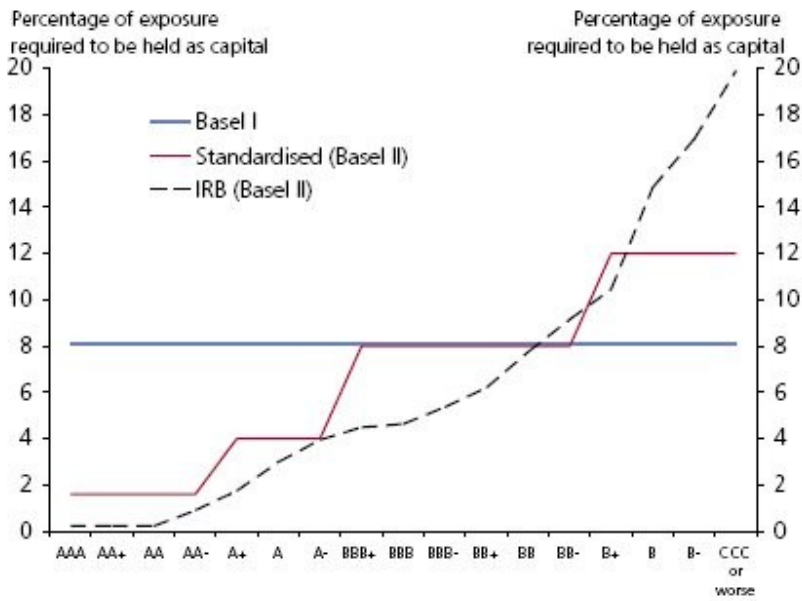
They differ principally in how the three parameters (and the maturity term) can be measured and determined internally. For the Foundation approach only PD may be assigned internally, subject to supervisory review (Pillar 2). LGD is fixed and based on supervisory values: for instance, 45% for senior unsecured claims and 75% for subordinated claims. EAD is also based on supervisory values in cases where the measurement is not clear. For instance, EAD is 75% for irrevocable undrawn commitments. Finally, a single average maturity of 2½ years is assumed for the portfolio. In the Advanced approach all four parameters are determined by the bank and are subject to supervisory review.

Unexpected loss is modelled firstly at the individual loan level. This is actually easy to do empirically as there are only two possible states: default, and non-default. The more difficult part with credit risk comes in determining the portfolio effects. Whereas in market risk it is the variety of risk factors and the mathematical complexity of the products which can cause problems, in credit risk it is the level of diversification of the portfolio which is most critical. This is driven by the degree to which borrowers are correlated with each other (through geographic and industry concentration), and the size of the individual exposures (large exposures contribute to an over-proportional degree to the riskiness of the portfolio). These levels of correlation may not be easily visible, or directly observed from past experience. A difficulty in modelling credit risk is the lack of publicly available and historical data.

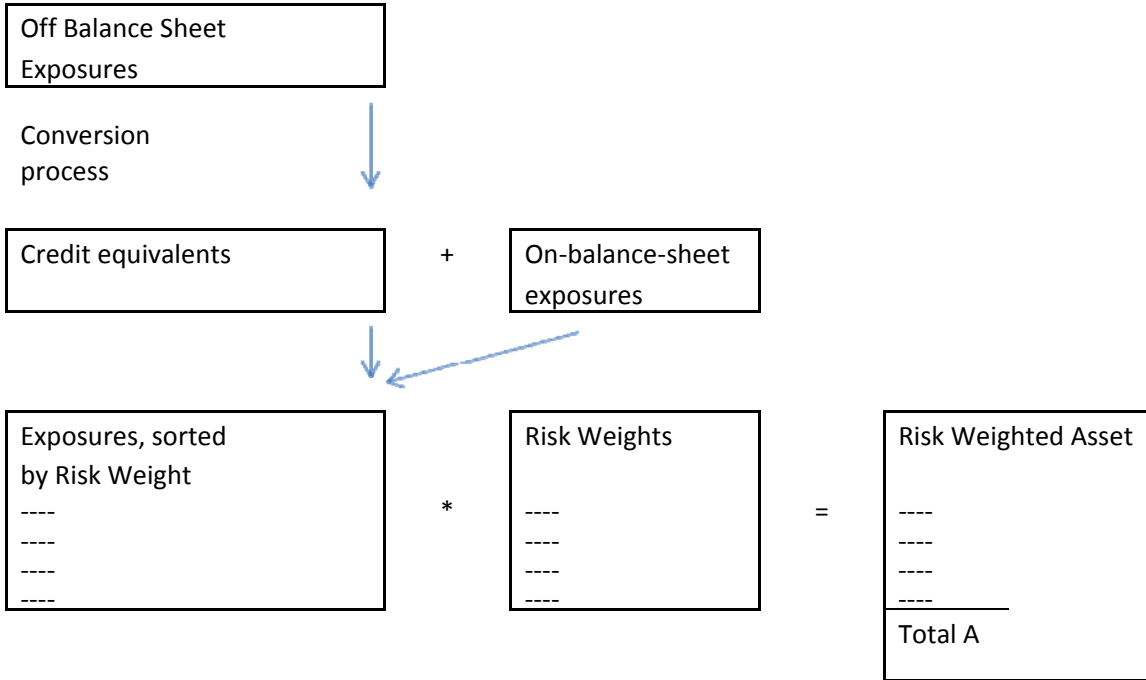
The probability distribution of credit risk tends to be highly skewed. A lot of the time, credit losses are low but occasionally they can be very large indeed. These large losses are often related to downswings in the economic cycle. The shape of the distribution is driven by the level of diversification in the portfolio, with large concentrations to individual borrowers, industries and geographies causing greater skewness. One of the

interesting facets of credit risk is that it is almost impossible to stop diversifying. Even in a large, well-diversified portfolio, some 5% of the exposures may easily account for 20% of the risk. This contrasts with the usual view of diversification in an investment portfolio in equities, where a holding of only 15 or so stocks can provide virtually all of the diversification that is possible in a single market.

The following graph shows the benefits to banks of calculating via the IRB Approach rather than the Standardised Approach.



The following table illustrates how bank capital is calculated and how the capital ratios are constructed and is followed by some comments.



Market Risk Capital					
- FX	x				
- Interest Rates	x				
- Equities	x				
- Commodities	x				
Total	X				

* 12.5 =

RWA Equivalent B

Total Risk Weighted Assets

A+B=C

Eligible Tier 1
Eligible Tier 2 and 3
Deductions

D
E
F

Total Capital

D+E-
F=G

Tier 1 Ratio
Total Capital Ratio

D/C
G/C

Risk Weighted Assets in the Banking Book:

Assets in the banking context are its loans or equivalents. A bank multiplies its asset (including asset equivalents) according to certain percentage risk weightings. These broadly reflect the riskiness of the asset, which broadly reflect creditworthiness. In general, loans to corporations and individuals nearly always carry 100% risk weighting. Loans to banks (including investment banks) within the OECD will carry a lower risk weight (usually 20%) and loans to public sector borrowers (eg. local governments) may take an even lower risk weight. Credits to OECD governments themselves are deemed to be risk free. Residential mortgages are often reduced to a 50% risk weight if they meet certain conditions. The result of all these adjustments is to produce what are known as 'risk weighted assets' which are simply summed.

Market Risk in the Trading Book

As banks have moved more and more away from the traditional credit business into new businesses such as investment banking, they have become more exposed to other risks, chiefly market risk. This refers to the sensitivity of the bank's trading position to changes in the overall levels of financial markets. Market risk covers only the explicit trading book of the bank; the 'mismatch' in interest-rate sensitivities held on the traditional banking book is excluded. In the market risk area, there is no expected loss – the mean value of financial assets is their current market value. Unlike the credit-risk calculation, which produces a RWA number, the market-risk calculation results directly in a capital requirement i.e. it can be compared directly (euro for euro) with the capital required to be held against it. In order to make the two comparable and standardise the calculation, the market risk capital is multiplied by 12.5 (the inverse of 8%) to convert it to a RWA equivalent.

The sum of the credit risk RWA and market risk RWA-equivalent is then compared with available capital and the resulting capital ratios must exceed the minimum 8% target set.

Eligible Capital:

Tier 1 capital is the core measure of a bank's financial strength from a regulator's point of view. It is composed of core capital, which consists primarily of common stock and disclosed reserves (or retained earnings), but may also include non-redeemable non-cumulative preferred stock. The Basel Committee also observed that banks have used innovative instruments over the years to generate Tier 1 capital; these are subject to stringent conditions and are limited to a maximum of 15% of total Tier 1 capital.

Capital in this sense is related to, but different from, the accounting concept of shareholders' equity. Both Tier 1 and Tier 2 capital were first defined in the Basel I capital accord and remained substantially the same in the replacement Basel II accord. Tier 2 capital represents "supplementary capital" such as undisclosed reserves, evaluation reserves, general loan-loss reserves, hybrid (debt/equity) capital instruments, and subordinated debt.

Tier 3 capital may only be used to cover market risks may be used only at the discretion of the national authorities, and includes only short term subordinated debt that satisfies the following conditions:

- Unsecured, subordinated and fully paid up,
- Have an original maturity of at least 2 years,
- Be subject to a lock-in clause that stipulates that neither interest nor principal may be paid (even when due at maturity) if the bank is below its minimum capital requirement or if such payment makes the bank go below the minimum capital requirement.

Tier 3 capital is limited to 250% of a bank's Tier 1 capital that is required to support market risks.

Each country's banking regulator, however, has some discretion over how differing financial instruments may count in a capital calculation.

The theoretical reason for holding capital is that it should provide protection against unexpected losses. Note that this is not the same as expected losses, which are deemed covered by provisions, reserves and current year profits. Under Basel II, Tier 1 capital is a minimum of 4% ownership equity but investors generally require a ratio of 10%. Tier 1 capital should be greater than 150% of the minimum requirement.

The Tier 1 capital ratio is the ratio of a bank's core equity capital to its total risk-weighted assets (RWA).

As an example, assume a bank with 2 of equity receives a client deposit of 10 and lends out all 10. Assuming that the loan, now a 10 asset on the bank's balance sheet, carries a risk weighting of 90%, the bank now holds risk-weighted assets of 9 (10*90%). Using the original equity of 2, the bank's Tier 1 ratio is calculated to be 2/9 or 22%.

There are two different conventions for calculating and quoting the Tier 1 capital ratio:

- Tier 1 common capital ratio and
- Tier 1 total capital ratio

Preferred shares and non-controlling interests are included in the Tier 1 total capital ratio but not the Tier 1 common ratio. As a result, the common ratio will always be less than or equal to the total capital ratio. In the example above, the two ratios are the same.

Basel III

- Basel III will require the following capital structure:

Calibration of the Capital Framework			
Capital requirements and buffers (all numbers in percent)			
	Common Equity (after deductions)	Tier 1 Capital	Total Capital
Minimum	4.5	6.0	8.0
Conservation buffer	2.5		
Minimum plus conservation buffer	7.0	8.5	10.5
Countercyclical buffer range*	0 – 2.5		

- The minimum common equity requirement has been increased from 2% in Basel II to 4.5%. Common equity is called "core" Tier 1 capital. Tier 1 capital has increased from a minimum of 4% to 6% of Risk Weighted Assets. Basel III also introduces additional capital buffers

- (i) Regulators have agreed on an additional mandatory 2.5% "conservation buffer". Most large banks will likely maintain such a buffer, as falling below it will lead to additional regulatory scrutiny.
- (ii) A discretionary countercyclical buffer, which allows regulators to require up to another 2.5% of capital during periods of high credit growth.

The likely impact is a substantial increase in the common equity reserves banks need to hold.

Other key points are that Basel III introduces a minimum 3% leverage ratio and two required liquidity ratios. The leverage ratio to include assets parked off balance sheet. This is to ensure that the parts of the shadow banking system that act like banks are regulated accordingly. This has happened for investment banks. The Liquidity Coverage Ratio requires a bank to hold sufficient high-quality assets to cover its total net cash flows over 30 days; the Net Stable Funding Ratio requires the available amount of stable funding to exceed the required amount of stable funding over a one-year period of extended stress.

Summary of Proposed Changes

- First, the quality, consistency, and transparency of the capital base will be raised.
 - (i) Tier 1 capital: the predominant form of Tier 1 capital must be common shares and retained earnings
 - (ii) Tier 2 capital instruments will be harmonised
 - (iii) Tier 3 capital will be eliminated.

- Second, the risk coverage of the capital framework will be strengthened.
 - (i) Promote more integrated management of market and counterparty credit risk
 - (ii) Add the CVA (credit valuation adjustment)-risk due to deterioration in counterparty's credit rating
 - (iii) Strengthen the capital requirements for counterparty credit exposures arising from banks' derivatives, repo and securities financing transactions
 - (iv) Raise the capital buffers backing these exposures
 - (v) Reduce procyclicality and
 - (vi) Provide additional incentives to move OTC derivative contracts to central counterparties (probably clearing houses)
 - (vii) Provide incentives to strengthen the risk management of counterparty credit exposures
 - (viii) Raise counterparty credit risk management standards by including wrong-way risk

- Third, the Committee will introduce a leverage ratio as a supplementary measure to the Basel II risk-based framework that is intended to achieve the following objectives:
 - (i) Put a floor under the build-up of leverage in the banking sector
 - (ii) Introduce additional safeguards against model risk and measurement error by supplementing the risk based measure with a simpler measure that is based on gross exposures.

- Fourth, the Committee is introducing a series of measures to promote the build up of capital buffers in good times that can be drawn upon in periods of stress ("Reducing procyclicality and promoting countercyclical buffers").
 - (i) The Committee is introducing a series of measures to address procyclicality:
 - Dampen any excess cyclicality of the minimum capital requirement;
 - Promote more forward looking provisions;
 - Conserve capital to build buffers at individual banks and the banking sector that can be used in stress; and
 - (ii) Achieve the broader macroprudential goal of protecting the banking sector from periods of excess credit growth.
 - Requirement to use long term data horizons to estimate probabilities of default,
 - downturn loss-given-default estimates, recommended in Basel II, to become mandatory
 - Improved calibration of the risk functions, which convert loss estimates into regulatory capital requirements.
 - Banks must conduct stress tests that include widening credit spreads in recessionary scenarios.
 - (iii) Promoting stronger provisioning practices (forward looking provisioning):
 - Advocating a change in the accounting standards towards an expected loss (EL) approach (usually, EL amount := LGD*PD*EAD).

Basel III will require reserves to be held in respect of expected future loss not just those already incurred. This is to be called 'dynamic provisioning'

- Fifth, the Committee is introducing a global minimum liquidity standard for internationally active banks that includes a 30-day liquidity coverage ratio requirement underpinned by a longer-term structural liquidity ratio called the Net Stable Funding Ratio. (In January 2012, the oversight panel of the Basel Committee on Banking Supervision issued a statement saying that regulators will allow banks to dip below their required liquidity levels, the liquidity coverage ratio, during periods of stress.)

The Committee also is reviewing the need for additional capital, liquidity or other supervisory measures to reduce the externalities created by systemically important institutions.