The Basel III Capital Framework: a decisive breakthrough

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Introduction

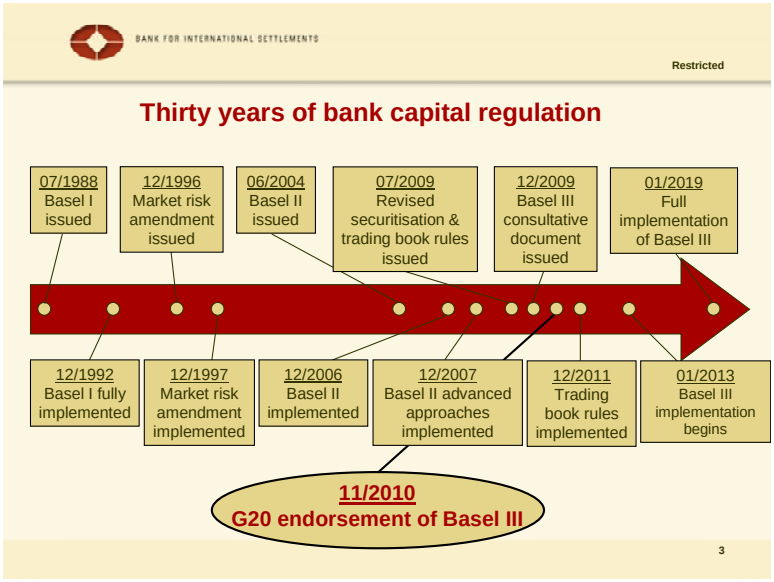
Ten days ago, the Basel III framework was endorsed by the G20 leaders in South Korea. Basel III is the centrepiece of the financial reform programme coordinated by the Financial Stability Board.[2] This endorsement represents a critical step in the process to strengthen the capital rules by which banks are required to operate. When the international rule-making process is completed and Basel III has been implemented domestically, we will have considerably reduced the probability and severity of a crisis in the banking sector, and by extension enhanced global financial stability.

The title of my intervention, "The Basel III Capital Framework: a decisive breakthrough", sounds like a military metaphor, which may be surprising in the context of a speech on banking regulation. But indeed, the supervisory community had to fight a fierce battle to require more capital and less leverage in the financial system in the face of significant resistance from some quarters of the banking industry.

I will highlight nine key breakthroughs in Basel III, from a focus on tangible equity capital to a reduced reliance on banks' internal models and a greater focus on stress testing, that will increase the safety and soundness of banks individually and the banking system more broadly.

[1] This speech was prepared together with Jason George and Eli Remolona, and benefited from comments by Robert McCauley, Frank Packer, Ilhyock Shim, Bruno Tissot, Stefan Walter and Haibin Zhu.

[2] *Basel III: towards a safer financial system,* speech by Mr Jaime Caruana, General Manager of the BIS, at the 3rd Santander International Banking Conference, Madrid, 15 September 2010

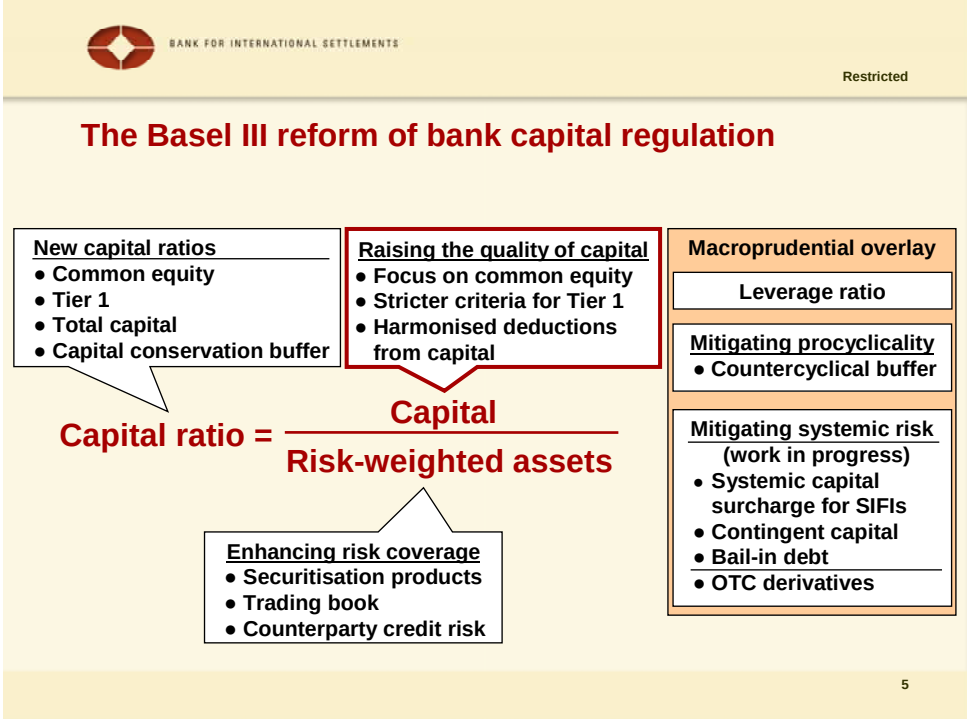


To understand the importance of the Basel III reforms and where we are headed in terms of capital regulation, I think it is instructive if we briefly look back to see where we have come from.

Basel I, the first internationally agreed capital standard, was issued some 22 years ago in 1988. Although it only addressed credit risk, it reflected the thinking that we continue to subscribe to today, namely, that the amount of capital required to protect against losses in an asset should vary depending upon the riskiness of the asset. At the same time, it set 8% as the minimum level of capital to be held against the sum of all risk-weighted assets.

Following Basel I, in 1996 market risk was added as an area for which capital was required. Then, in 2004, Basel II was issued, adding operational risk, as well as a supervisory review process and disclosure requirements. Basel II also updated and expanded upon the credit risk weighting scheme introduced in Basel I, not only to capture the risk in instruments and activities that had developed since 1988, but also to allow banks to use their internal risk rating systems and approaches to measure credit and operational risk for capital purposes.

What could more broadly be referred to as Basel III began with the issuance of the revised securitisation and trading book rules in July 2009, and then the consultative document in December of that year. The trading book rules will be implemented at the end of next year and the new definition of capital and capital requirements in Basel III over a six-year period beginning in January 2013. This extended implementation period for Basel III is designed to give banks sufficient time to adjust through earnings retention and capital-raising efforts.



In my remarks today I will try to illustrate the fundamental change introduced by Basel III, that of marrying the microprudential and the macroprudential approaches to supervision. Basel III builds upon the firm-specific, risk based frameworks of Basel I and Basel II by introducing a system-wide approach. I will structure my remarks around these two approaches and, in so doing, will demonstrate how ***Basel III is BOTH a firm-specific, risk based framework and a system-wide, systemic risk-based framework.***

I. Basel III: a firm-specific, risk-based framework

Let us look first at the microprudential, firm-specific approach, and consider in turn the three elements of the capital equation: the numerator of the new solvency ratios, ie capital, the denominator, ie risk-weighted assets, and finally the capital ratio itself.

A. The numerator: a strict definition of capital

Regarding the numerator, the Basel III framework substantially raises the quality of capital. Basically, in the old definition of capital, a bank could report an apparently strong Tier 1 capital ratio while at the same time having a weak tangible common equity ratio. Prior to the crisis, the amount of tangible common equity of many banks, when measured against risk-weighted assets, was as low as 1 to 3%, net of regulatory deductions. That's a *risk-based* leverage of between 33 to 1 and 100 to 1. Global banks further increased their leverage by infesting the Tier 1 part of their capital structure with hybrid "innovative" instruments with debt-like features.

In the old definition, capital comprised various elements with a complex set of minimums and maximums for each element. We had Tier 1 capital, innovative Tier 1, upper and lower Tier 2, Tier 3 capital, each with their own limits which were sometimes a function of other capital elements. The complexity in the definition of capital made it difficult to determine what capital would be available should losses arise. This combination of weaknesses permitted tangible common equity capital, the best form of capital, to be as low as 1% of risk-weighted assets.

In addition to complicated rules around what qualifies as capital, there was a lack of harmonisation of the various deductions and filters that are applied to the regulatory capital calculation. And finally there was a complete lack of transparency and disclosure on banks' structure of capital, making it impossible to compare the capital adequacy of global banks.

As we learned again during the crisis, credit losses and writedowns come directly out of retained earnings and therefore common equity. It is thus critical that banks' risk exposures are backed by a high-quality capital base. This is why the new definition of capital properly focuses on common equity capital.

The concept of Tier 1 that we are familiar with will continue to exist and will include common equity and other instruments that have a loss-absorbing capacity on a "going concern" basis,[3] for example certain preference shares. Innovative capital instruments which were permitted in limited amount as part of Tier 1 capital will no longer be permitted and those currently in existence will be phased out.

Tier 2 capital will continue to provide loss absorption on a "gone concern" basis[1] and will typically consist of subordinated debt. Tier 3 capital, which was used to cover a portion of a bank's market risk capital charge, will be eliminated and deductions from capital will be harmonised. With respect to transparency, banks will be required to provide full disclosure and reconciliation of all capital elements.

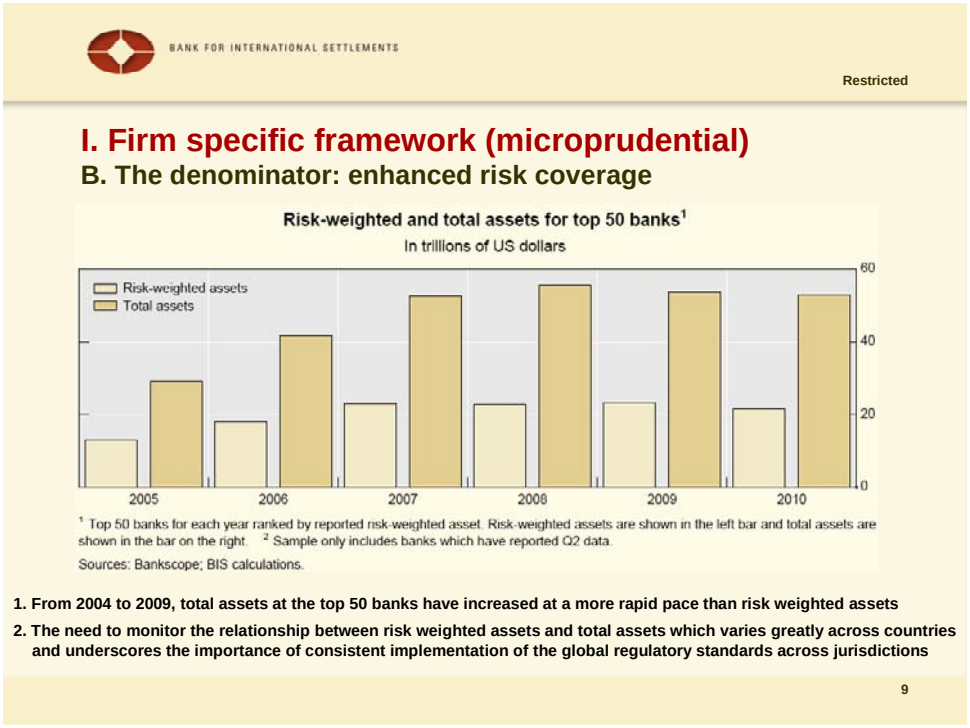
The overarching point with respect to the numerator of the capital equation is the focus on tangible common equity, the highest-quality component of a bank's capital base, and therefore, the component with the greatest loss-absorbing capacity. This is the first breakthrough in Basel III.

B. The denominator: enhanced risk coverage

Regarding the denominator, Basel III substantially improves the coverage of the risks, especially those related to capital market activities: trading book, securitisation products, counterparty credit risk on OTC derivatives and repos.

In the period leading up to the crisis, when banks were focusing their business activities on these areas, we saw a significant increase in total assets. Yet under the Basel II rules, risk-weighted assets showed only a modest increase. This point is made clear in the following chart showing the increase in both total assets and risk-weighted assets for the 50 largest banks in the world from 2004 to 2010. This phenomenon was more pronounced for some countries and regions than for others.

[3] Tier 1 capital is loss-absorbing on a "going concern" basis (ie the financial institution is solvent). Tier 2 capital absorbs losses on a "gone concern" basis (ie following insolvency and upon liquidation).



For global banks the enhanced risk coverage under Basel III is expected to cause risk-weighted assets to increase substantially. This, combined with a tougher definition and level of capital, may tempt banks to understate their risk-weighted assets. This points to the need in future to monitor closely the relationship between risk-weighted assets and total assets with a view to promoting a consistent implementation of the global capital standards across jurisdictions.

Risk weighting challenges

Let me now focus for a moment on the challenges of getting the risk weights right in a risk-based framework.

Many asset classes may appear to be low-risk when seen from a firm-specific perspective. But we have seen that the system-wide build-up of seemingly low-risk exposures can pose substantial threats to broader financial stability. Before the recent crisis, the list of apparently low-risk assets included highly rated sovereigns, tranches of AAA structured products, collateralised repos and derivative exposures, to name just a few. The leverage ratio will help ensure that we do not lose sight of the fact that there are system-wide risks that need to be underpinned by capital.

The basic approach of the Basel capital standards has always been to attach higher risk weights to riskier assets. The risk weights themselves and the methodology were significantly enhanced as we moved from Basel I to Basel II, and they have now been further refined under Basel III. Nonetheless, as the crisis has made clear, what is not so risky in normal times may suddenly become very risky during a systemic crisis. Something that looks risk-free may turn out to have rather large tail risk.

Focusing a bit more on exposures with low risk weights, let me cite a few examples to illustrate the difficulty of getting the risk weights correct.

- Sovereigns: the sovereign debt crisis of 2010 has shown that the zero risk weight assumption for AAA and AA-rated sovereigns under the standardised approach of Basel II did not account for the dramatic deterioration in the fiscal and debt positions

of major advanced economies. These exposures are still considered as low-risk but certainly not totally risk-free.

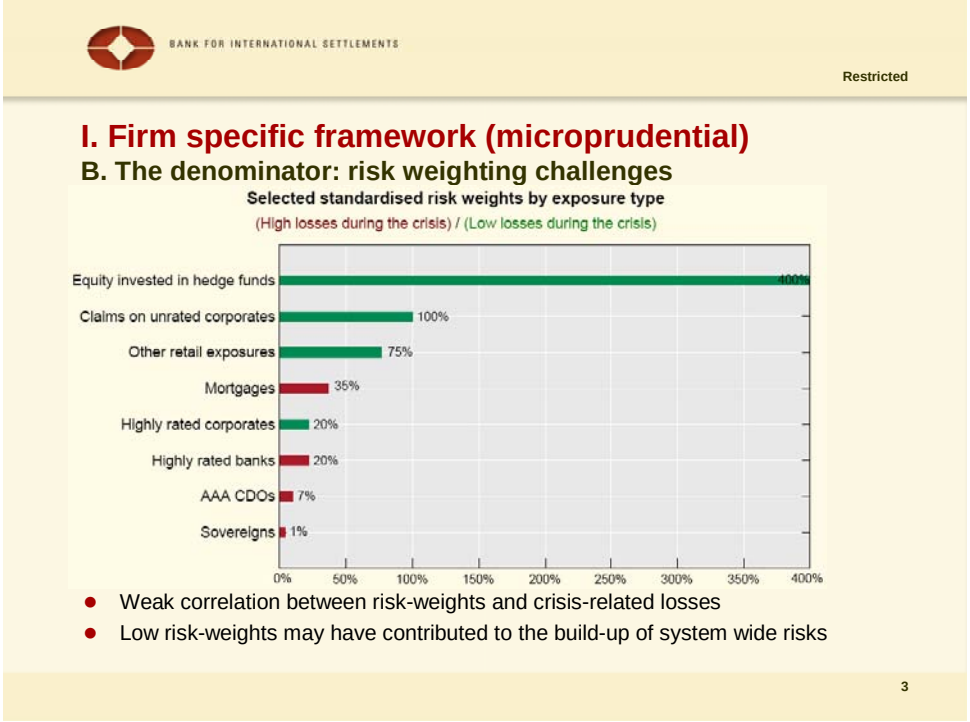
- OTC derivatives (under CSAs) and repos: the Lehman and Bear Stearns failures demonstrated that the very low capital charge on OTC derivatives and repos did not capture the systemic risk associated with the interconnectedness and potential cascade effects in these markets.
- Senior tranches of securitisation exposures: financial engineering produced AAA-rated tranches of complex products, such as the super-senior tranches of ABS CDOs. These proved much more risky than what would be expected from a AAA exposure. The preferential risk weight of 7% for those super-senior tranches was too low, and the risk weight has now been raised to 20%.

For assets with medium risk weights, one could cite the following examples:

- Residential mortgages: 35% risk weight under the standardised approach. For highest-quality mortgages: 4.15% risk weight (IRB approach)
- Highly rated corporates: 20% risk weight under the standardised approach. For best-quality corporates: 14.4% risk weight (IRB approach)
- Highly rated banks: 20% risk weight (standardised approach)

For assets with high risk weights, the following examples can be considered:

- HVCRE (high volatility commercial real estate)
- Mezzanine tranches of ABS/CDOs
- Hedge fund equity stakes: 400% risk weight
- Claims on unrated corporates: 100% risk weight



The chart above shows how different asset classes fared during the crisis. Relative to their Basel II risk weights, equity stakes in hedge funds, claims on corporates and some retail

exposures experienced modest losses during the crisis. By contrast, mortgages, highly rated banks, AAA-rated CDO tranches and sovereigns inflicted rather heavy losses on banks.

These cases show that there is a rather weak correlation between risk weights and crisis-related losses during periods of system-wide stress. Moreover, we have also discovered that low risk weights can lead to an excessive build-up of system-wide risks. Recognising this problem, the Basel Committee has now introduced a backstop simple leverage ratio, which will require a minimum ratio of capital to total assets without any risk weights. I will come back to this later.

The trading book and securitisations

Two areas the crisis has revealed as needing enhanced risk coverage are the trading book and securitisations. Here capital charges fell short of risk exposures. Basel II focused primarily on the banking book, where traditional assets such as loans are held. But the major losses during the 2007–09 financial crisis came from the trading book, especially the complex securitisation exposures such as collateralised debt obligations. As shown in the table below, the capital requirements for trading assets were extremely low, even relative to banks' own economic capital estimates. The Basel Committee has addressed this anomaly.

BANK FOR INTERNATIONAL SETTLEMENTS

Restricted

Trading assets and market risk capital requirements[1]

In per cent, year end

	Trading assets to total assets[2]		Market risk capital requirements to total capital requirements[3]	
	2009	2006	2009	2006
Bank of America	8	10	...	...
Citigroup	18	21	7	4
Goldman Sachs	40	40	...	...
JPMorgan Chase	20	27	...	...
Wells Fargo	3	1	...	...
Banco Santander	12	20	7	...
BNP Paribas	38	48	4	...
Commerzbank	26	14	5	2
Credit Agricole	23	31	2	6
Deutsche Bank	16	32	9	4
ING Bank	13	22	2	...
Société Générale	19	35	4	4
Barclays	14	29	14	10
HSBC Holdings	18	18	5	9
Royal Bank of Scotland	38	23	12	6
Standard Chartered	13	5	9	4
Credit Suisse	32	36	8	5
UBS	17	37	6	6
Nomura Holdings	45	36	47	...
Mitsubishi UFJ	14	6	2	2

[1] Comparability of figures may be limited due to differences in reporting and accounting standards and mergers and acquisitions during the recent financial crisis. At year-end, for Japanese banks, at March of the following year. [2] Trading assets as reported by each bank. [3] According to the Basel Committee on Banking Supervision standards.

Source: Banks' annual reports.

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The revised framework now requires the following:

- Introduction of a 12-month stressed VaR capital charge;
- Incremental risk capital charge applied to the measurement of specific risk in credit sensitive positions when using VaR;
- Similar treatment for trading and banking book securitisations;
- Higher risk weights for resecuritisations (20% instead of 7% for AAA-rated tranches);
- Higher credit conversion factors for short-term liquidity facilities to off-balance sheet conduits and SIVs (the shadow banking system); and

- More rigorous own credit analyses of externally rated securitisation exposures with less reliance on external ratings.

As a result of this enhanced risk coverage, banks will now hold capital for trading book assets that, on average, is about four times greater than that required by the old capital requirements. The Basel Committee is also conducting a fundamental review of the market risk framework rules, including the rationale for the distinction between banking book and trading book. ***This is the second Basel III breakthrough: eradicate the trading book loophole, ie eliminate the possibility of regulatory arbitrage between the banking and trading books.***

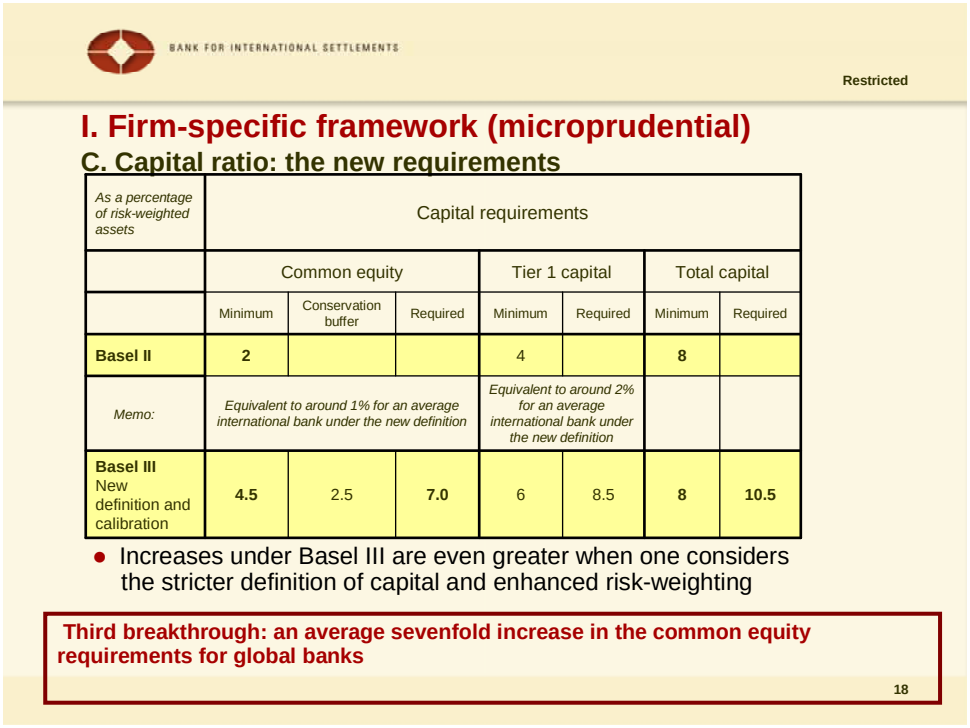
Counterparty credit risk on derivatives and repos

The Basel Committee is also strengthening the capital requirements for counterparty credit risk on OTC derivatives and repos by requiring that these exposures be measured using stressed inputs. Banks also must hold capital for mark to market losses (credit valuation adjustments – CVA) associated with the deterioration of a counterparty's credit quality. The Basel II framework addressed counterparty credit risk only in terms of defaults and credit migrations. But during the crisis, mark to market losses due to CVA (which actually represented two thirds of the losses from counterparty credit risk, only one third being due to actual defaults) were not directly capitalised.

C. Capital ratios: calibration of the new requirements

With a capital base whose quality has been enhanced, and an expanded coverage of risks both on- and off-balance sheet, the Basel Committee has made great strides in strengthening capital standards. But in addition to the quality of capital and risk coverage, it also calibrated the capital ratio such that it will now be able to absorb losses not only in normal times, but also during times of economic stress.

To this end, banks will now be required to hold a minimum of 4.5% of risk-weighted assets in tangible common equity versus 2% under Basel II. In addition, the Basel Committee is requiring a capital conservation buffer – which I will discuss in just a moment – of 2.5%. Taken together, this means that banks will need to maintain a 7% common equity ratio. When one considers the tighter definition of capital and enhanced risk coverage, this translates into roughly ***a sevenfold increase in the common equity requirement for internationally active banks. This represents the third breakthrough.***



BANK FOR INTERNATIONAL SETTLEMENTS

Restricted

I. Firm-specific framework (microprudential)

C. Capital ratio: the new requirements

As a percentage of risk-weighted assets	Capital requirements						
	Common equity			Tier 1 capital		Total capital	
	Minimum	Conservation buffer	Required	Minimum	Required	Minimum	Required
Basel II	**2**			4		**8**	
Memo:	*Equivalent to around 1% for an average international bank under the new definition*			*Equivalent to around 2% for an average international bank under the new definition*			
Basel III New definition and calibration	**4.5**	2.5	**7.0**	6	8.5	**8**	**10.5**

- Increases under Basel III are even greater when one considers the stricter definition of capital and enhanced risk-weighting

Third breakthrough: an average sevenfold increase in the common equity requirements for global banks

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This higher level of capital is calibrated to absorb the types of losses associated with crises like the previous one.

The private sector has complained that these new requirements will cause them to curtail lending or increase the cost of borrowing. In an effort to address some of the industry's concerns, the Basel Committee has agreed upon extended transitional arrangements that will allow the banking sector to meet the higher capital standards through earnings retention and capital-raising.

The new standards will take effect on 1 January 2013 and for the most part will become fully effective by January 2019.

D. Capital conservation

A fourth key breakthrough of Basel III is that banks will no longer be able to pursue distribution policies that are inconsistent with sound capital conservation principles.

We have learned from the crisis that it is prudent for banks to build capital buffers during times of economic growth. Then, as the economy begins to contract, banks may be forced to use these buffers to absorb losses. But to offset the contraction of the buffer, banks could have the ability to restrict discretionary payments such as dividends and bonuses to shareholders, employees and other capital providers. Of course they could also raise additional capital in the market.

In fact, what we witnessed during the crisis was a practice by banks to continue making these payments even as their financial condition and capital levels deteriorated. This practice, in effect, puts the interest of the recipients of these payments above those of depositors, and this is simply not acceptable.

To address the need to maintain a buffer to absorb losses and restrict the ability of banks to make inappropriate distributions as their capital strength declines, the Basel Committee will now require banks to maintain a buffer of 2.5% of risk-weighted assets. This buffer must be held in tangible common equity capital.

As a bank's capital ratio declines and it uses the conservation buffer to absorb losses, the framework will require banks to retain an increasingly higher percentage of their earnings and will impose restrictions on distributable items such as dividends, share buybacks and discretionary bonuses. Supervisors now have the power to enforce capital conservation discipline. This is a fundamental change.

II. Basel III: A system-wide, systemic risk-based framework

Overview

Returning to the theme of my discussion, Basel III is not only a firm-specific risk-based framework, it is also a system-wide, systemic risk-based framework. The so-called macroprudential overlay is designed to address systemic risk and is an entirely new way of thinking about capital.

This new dimension of the capital framework consists of five elements. The first is a leverage ratio, a simple measure of capital that supplements the risk-based ratio and which constrains the build-up of leverage in the system. The second is steps taken to mitigate procyclicality, including a countercyclical capital buffer and, although outside a strict discussion of capital, efforts to promote a provisioning framework based upon expected losses rather than incurred losses. The third element of the macroprudential overlay is steps to address the externalities generated by systemically important financial institutions through higher loss-absorbing capacity. The fourth is a framework to address the risk arising from systemically important markets and infrastructures. In particular, I am referring to the OTC derivatives markets. And finally, the macroprudential overlay aims to better capture systemic risk and tail events in the banks' own risk management framework, including through risk modelling, stress testing and scenario analysis.

A. Leverage ratio

In the lead up to the crisis many banks reported strong Tier 1 risk based ratios while, at the same time, still being able to build up high levels of on and off balance sheet leverage.

In response to this, the Basel Committee has introduced a simple, non-risk-based leverage ratio to supplement the risk-based capital requirements. The leverage ratio has the added benefit of serving as a safeguard against model risk and any attempts to circumvent the risk-based capital requirements.

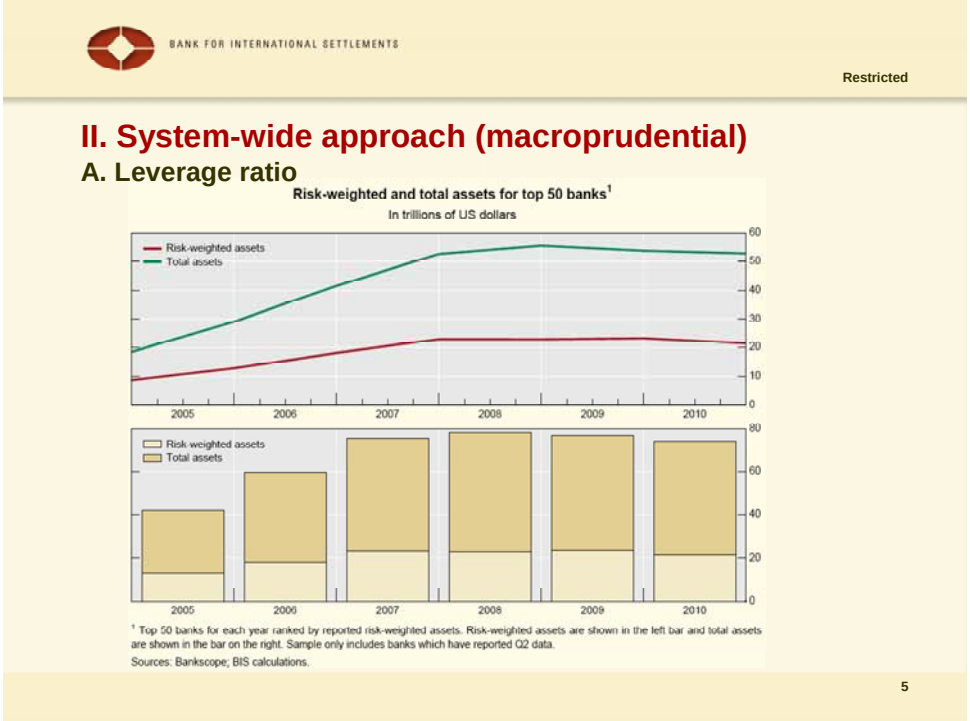
The leverage ratio will be a measure of a bank's Tier 1 capital as a percentage of its assets plus off balance sheet exposures and derivatives.

For derivatives, regulatory net exposure will be used plus an add-on for potential future exposure. Netting of all derivatives will be permitted. In so doing, the Basel Committee has successfully solved the difficulty resulting from the divergence between the main accounting frameworks. (Bank leverage is significantly lower under US GAAP than under IFRS due to the netting of OTC derivatives allowed under the former. Given that banks may hold offsetting contracts, US GAAP allows banks to report their net exposures while IFRS does not allow netting. As a result, the size of a bank's total assets can vary significantly based on the treatment of this one accounting item.)

The leverage ratio will also include off-balance sheet items in the measure of total assets. These off-balance sheet items, including commitments, letters of credit and the like, unless they are unconditionally cancellable, will be converted using a flat 100% credit conversion factor.

To highlight the importance of the leverage ratio we need look no further than the increase in total assets in the years leading up to the crisis versus the increase in risk-weighted assets. It is obvious that balance sheets were being leveraged, but the risk-based framework failed to

capture this dynamic, as suggested by the following chart depicting risk-weighted and total assets for the top 50 banks.



While some in the financial community are sceptical about the usefulness of a leverage ratio, the Basel Committee's Top-down Capital Calibration Group recently completed a study that showed that the leverage ratio did the best job of differentiating between banks that ultimately required official sector support in the recent crisis and those that did not.

This leads me to the fifth breakthrough: Basel III is a framework that remains risk-based but now includes – through the Tier 1 leverage ratio – a backstop approach that also captures risks arising from total assets. The risk-based and leverage ratios reinforce each other.

For all of these reasons, public policymakers and legislators must resist the intense lobbying effort of the industry to water down the leverage ratio to merely a Pillar 2 instrument. Giving in to this lobbying would increase the exposure of taxpayers to future bank failures and hurt long-term growth over a full credit cycle since sustainable credit growth cannot be achieved through excessive leverage.

B. Countercyclical capital buffer

We have learned that procyclicality, which is inherent in banking, has exacerbated the impact of the crisis. While we will not eliminate cyclicality, what we would like to do is prevent its amplification through the banking sector, particularly that caused by excessive credit growth. This can be achieved through the new countercyclical capital buffer.

As the volume of loans grows, if asset price bubbles burst or the economy subsequently enters a downturn and loan quality begins to deteriorate, banks will adopt a very conservative stance when it comes to the granting of new credit. This lack of credit availability only serves to exacerbate the problem, pushing the real economy deeper into trouble with asset prices declining further and the level of non-performing loans increasing further. This in turn causes bank lending to become scarcer still. These interactions highlight the importance of the banking sector building up additional capital defences in periods where the risks of system-wide stress are growing markedly.

The countercyclical capital buffer not only protects the banking sector from losses resulting from periods of excess credit growth followed by periods of stress, but it helps to ensure that credit remains available during this period of stress. Importantly, during the build-up phase, as credit is being granted at a rapid pace, the countercyclical capital buffer may cause the cost of credit to increase, acting as a brake on bank lending.

Each jurisdiction will monitor credit growth in relation to measures such as GDP and, using judgment, assess whether such growth is excessive, thereby leading to the build-up of system-wide risk. Based on this assessment they may put in place a countercyclical buffer requirement ranging from 0 to 2.5%. This requirement will be released when system-wide risk dissipates.

For banks that are operating in multiple jurisdictions, the buffer will be a weighted average of the buffers applied in each of the jurisdictions in which the bank has credit exposures.

To give banks time to adjust to a buffer level, jurisdictions will preannounce their countercyclical buffer decisions by 12 months.

The introduction of a countercyclical capital charge to mitigate the procyclicality caused by excessive credit growth is the sixth breakthrough in Basel III.

C. Systemically important financial institutions: additional loss-absorbing capacity

As you know, there is considerable work being done by the Financial Stability Board on how to design the best framework for the oversight of systemically important financial institutions, or SIFIs.[4] It is broadly recognised that systemically important banks should have loss-absorbing capacity beyond the basic Basel III standards. This can be achieved by a combination of a systemic capital charge, contingent bonds that convert to equity at a certain trigger point and bail-in debt.

Although the work on SIFIs is incomplete at this time, the Basel Committee has committed to complete by mid-2011 a framework for identifying SIFIs and a study of the magnitude of additional loss absorbency that global systemically important banks should have. Also by mid-2011, the Basel Committee will complete its assessment of going-concern loss absorbency in some of the various contingent capital structures.

What is clear, and this is the seventh breakthrough, is that SIFIs need higher loss-absorbing capacity to reflect the greater risks that they pose to the global financial system. A systemic capital surcharge is the most straightforward, but not the only way to achieve this.

D. Systemically important markets and infrastructures (SIMIs): the case of OTC derivatives

Just as there are systemically important financial institutions, there are also systemically important markets and systemically important market infrastructures. This is clearly illustrated by the case of OTC derivatives. In particular, the Lehman failure demonstrated that the very low capital charge on OTC derivatives did not capture the systemic risk associated with the interconnectedness and potential cascade effects in these markets.

To address the problem of interconnectedness as it relates to derivatives, the Basel Committee and Financial Stability Board have endorsed central clearing and trade reporting on OTC derivatives. Derivative counterparty credit exposures to central counterparty clearing

[4] *Reducing the moral hazard posed by systemically important financial institutions*, FSB Recommendations and Time Lines, 20 October 2010.

houses (CCPs) will continue to have preferential capital treatment, recognising that such an exposure is low-risk, requiring a very low (but non-zero) risk weight (in the range of 1% to 3%) rather than the current zero capital requirement. ***This attempt to address the "too connected to fail" problem represents the eighth breakthrough.***

The higher capital requirements for bilateral OTC derivatives will increase incentives to use CCPs and exchanges. However, central banks and regulators are also working to ensure that the CCP clearing houses are appropriately managed and capitalised, so that we do not create a new concentration of systemic risk.

E. Capture of systemic risk/tail events in stress testing and risk modelling

The crisis highlighted weaknesses of banks' "advanced" risk management based on risk models. These risk models reduced the perceived magnitude of market exposures: very large nominal amounts of exposure translate into very small values at risk through the alchemy of risk management techniques. Value-at-risk (VaR) calculations transform complex and multifaceted risk positions (and hence potentially huge nominal amounts) into a single compressed risk figure. It is therefore critical to understand the limitations of such statistical measures of risk.

VaR shortcomings: the normality assumption

For some time now, global banks have attempted to capture market risk by means of VaR models. During the crisis, these models severely underestimated the tail events and the high loss correlations under systemic stress. The VaR model has been the workhorse for assessing risk in normal markets but it has not fared well in extreme stress situations. Systemic events occur far more frequently and the losses incurred during such events have been far heavier than VaR estimates have implied.

As an example, the VaR is calculated by multiplying the sigma (standard deviation, volatility) of the given financial positions by the size of the positions and by a factor that depends on the specified confidence level. At the 99% confidence level, for example, you would multiply sigma by a factor of 2.33. Under the normality assumption used by most (but not all) VaR models, the probability of large market movements is largely underestimated and, more specifically, the probability of any deviation beyond 4 sigma (ie 4 standard deviation moves) is basically zero. Unfortunately, in the real world, 4-sigma events do occur, and they certainly occur more than once every 125 years, which is the supposed frequency of a 4-sigma event (at a 99.995% confidence level) under the normal distribution. Even worse, the 20-sigma event corresponding to the 1987 stock crash is supposed to happen not even once in trillions of years.[5]

Need for a strong stress testing programme

The VaR failures[6] have led the Basel Committee to encourage banks to supplement this approach with a strong stress testing programme that can better capture tail events and incorporate the systemic risk dimension in banks' risk management. The Basel III framework provides for a bigger role for stress testing in the determination of capital buffers under

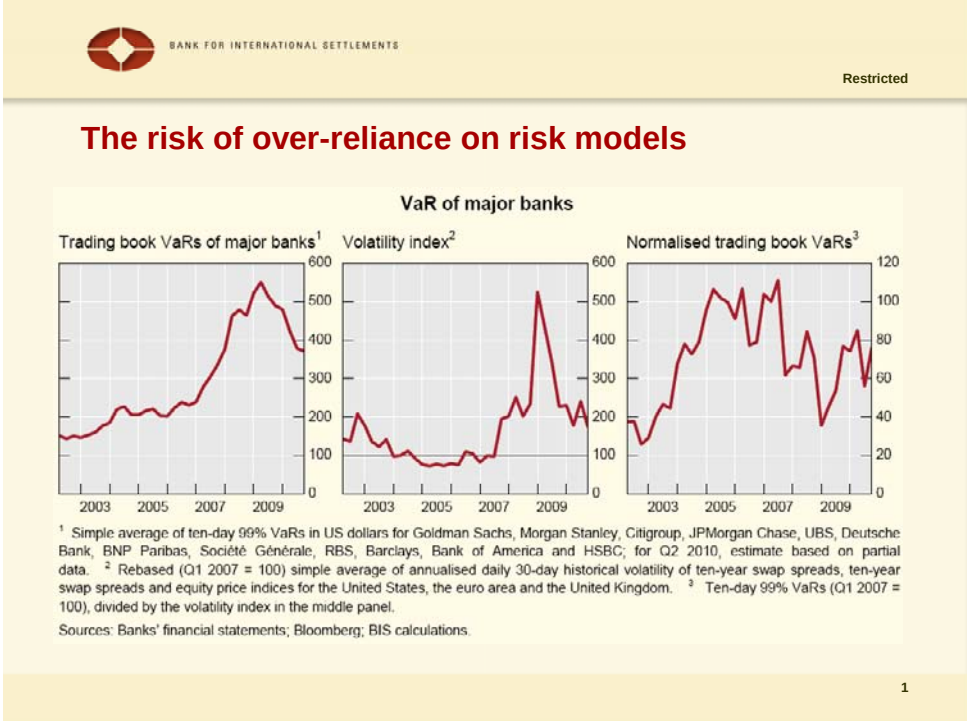
[5] In fact, a 20-sigma event, under the normal distribution, would occur once every "googol", which is 1 with 100 zeroes after it.

[6] In 1996, the Basel Committee had already imposed a multiplier of four to deal with model error. The essential non-normality of real financial market events suggests that such a multiplier is not enough.

Pillar 2. "Stress testing should form an integral part of the internal capital adequacy assessment process (ICAAP)."[7]

Systemic risk capture in banks' risk models

It is now clear that quantitative finance methodologies and internal risk modelling techniques based on normality assumption and historical statistical relationships have failed to capture the extreme events which occur in periods of systemic stress.[8] The backward-looking assumptions about correlations, volatility and market liquidity embedded in banks' risk models did not hold in times of extreme stress. Historical relationships do not necessarily constitute a good basis for forecasting the development of future risks.



The risk of excessive reliance on banks' risk models is further illustrated by the following chart showing how low volatility masked the build-up of leverage in the years preceding the crisis, and how the VaR-based models contributed to complacency.

Supervisors are drawing the lessons from the inability of the advanced risk management techniques to capture tail events. They can no longer excessively rely on banks' internal models. Going forward, supervision of large banks will need to be more intrusive than in the past and supervisors will have to be very prudent in validating banks' internal models.

As shown by Mandelbrot and Taleb,[9] there is a need to distinguish between "mild randomness" (based on measures of uncertainty using the Gauss bell curve, which

[7] Basel Committee for Banking Supervision, *Principles for sound stress testing practices and supervision,* 2009.

[8] "The two most influential mathematical constructs during the period leading up to the crisis (Gaussian copula and VAR) tenaciously refuse to conceive of a world where a rare event of those proportions could even be hypothesised as a distant possibility." Pablo Triana, "Lecturing Birds on Flying", 2009.

[9] See Benoit Mandelbrot and Nessim Taleb: "Mild versus wild randomness" in the "The Known, the Unknown and the Unknowable in Financial Risk Management", Princeton University Press 2009.

disregards the possibility of sharp jumps or discontinuities) and "wild randomness". They advocate "a methodology where large deviation and stressful events dominate the analysis instead of the other way around".

In the same spirit, the Joint Forum in its recent report on modelling risk aggregation (2010) recommends that models used for capital adequacy and solvency purposes be improved to better reflect tail events.

Here is the ninth breakthrough in Basel III: supervisors should avoid over-reliance on banks' internal models, and their supervision needs to be more intrusive to ensure that systemic risk and tail events are adequately captured in banks' risk modelling and stress testing.

F. Systemic oversight and Pillar 2

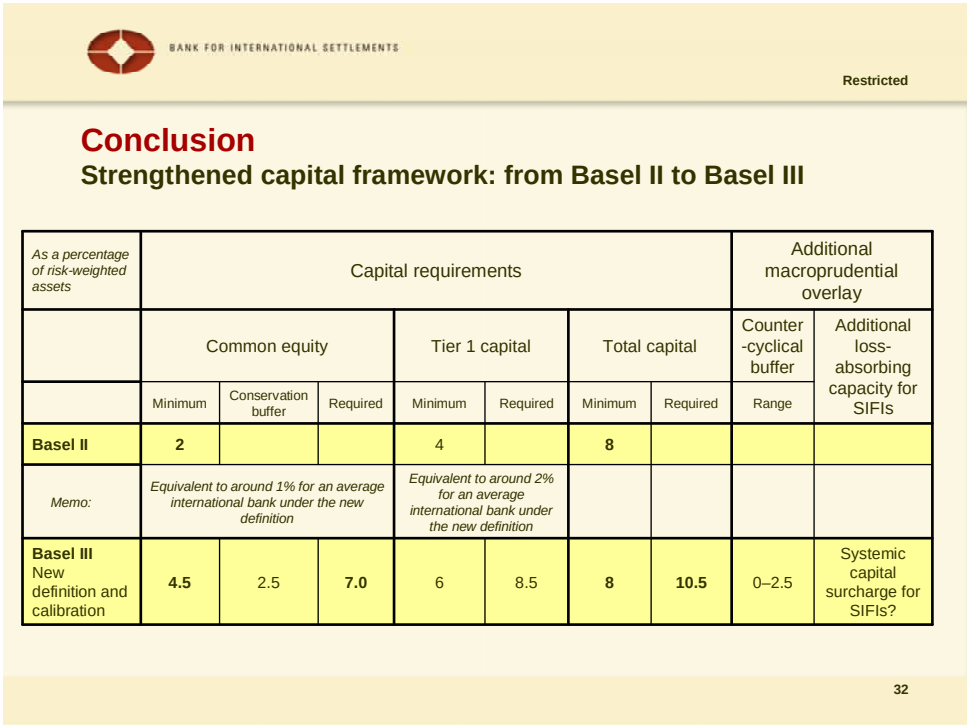
The Pillar 2 supervisory process remains a key element of the Basel III framework and must be rigorously applied in order to support systemic oversight. This application should include the following key components:

- Leverage in the banking system as a whole[10]
- Systemic capital charge on SIFIs
- Countercyclical capital charge
- Interconnectedness via OTC derivatives
- Stress testing and risk modelling addressing tail risks
- Concentration risk; and
- Large exposures

Both the supervisory review process and the banks' own assessment of capital adequacy should incorporate the systemic risk dimension.

Let me recapitulate in this final table below all the elements of the Basel III capital framework including the new macroprudential dimension.

[10] The oversight of the leverage in the banking system as a whole and the firm-specific leverage ratio (which will migrate to Pillar 1 after appropriate review and calibration) will reinforce each other.



BANK FOR INTERNATIONAL SETTLEMENTS

Restricted

Conclusion

Strengthened capital framework: from Basel II to Basel III

As a percentage of risk-weighted assets	Capital requirements							Additional macroprudential overlay	
	Common equity			Tier 1 capital		Total capital		Counter-cyclical buffer	Additional loss-absorbing capacity for SIFIs
	Minimum	Conservation buffer	Required	Minimum	Required	Minimum	Required	Range	
Basel II	**2**			4		**8**			
Memo:	*Equivalent to around 1% for an average international bank under the new definition*			*Equivalent to around 2% for an average international bank under the new definition*					
Basel III New definition and calibration	**4.5**	2.5	**7.0**	6	8.5	**8**	**10.5**	0–2.5	Systemic capital surcharge for SIFIs?

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Conclusion

Let me conclude: Basel III not only enhances the microprudential framework for capital but it also adds a macroprudential approach that is system-wide and systemic.

The nine regulatory breakthroughs that I have outlined in my remarks today will reduce the probability and severity of future financial crises and thus promote higher growth over the long term. In this regard, a report by the Basel Committee[11] estimates that an increase in the banking sector's common equity ratio from 7% to 8% reduces the probability of a banking crisis by at least 1 percentage point. A 1 percentage point reduction in the probability of a crisis in turn produces an expected annual GDP benefit of between 0.2 and 0.6%. These are admittedly rough estimates, but it is clear that there are substantial benefits associated with a better capitalised banking sector.

Going back to my initial military metaphor, a breakthrough is only successful if it is followed up by a phase of exploitation. Similarly, the Basel III breakthroughs will need to be exploited through strong implementation across jurisdictions. As much of the Basel III rule-making process nears completion, the big challenge lies ahead in the rigorous implementation of the new standard.

Thank you for your attention.

[11] *An assessment of the long-term economic impact of stronger capital and liquidity requirements*, Basel Committee on Banking Supervision, August 2010.

Ten days ago, the Basel III framework was endorsed by the G20 leaders in South Korea. Basel III is the centrepiece of the financial reform programme coordinated by the Financial Stability Board.2 This endorsement represents a critical step in the process to strengthen the capital rules by which banks are required to operate. When the international rule-making process is completed and Basel III has been implemented domestically, we will have considerably reduced the probability and severity of a crisis in the banking sector, and by extension enhanced global financial stability. The title of my