SciencesPo. GEM Groupe d'Économie Mondiale

Policy Brief
October 2008

The Basel Capital Adequacy Framework Should Be Reconsidered

Paul Atkinson

Copyright ©2005 by the Groupe d'Economie Mondiale de Sciences Po (GEM).
All rights reserved.
197 boulevard St Germain 75007 Paris
Tel: 331-4549-7256. Fax: 331-4549-7257
http://gem.sciences-po.fr

The Basel Capital Adequacy Framework Should Be Reconsidered

Abstract

The Basel capital adequacy framework that has guided bank regulation and supervision for nearly 20 years deserves serious attention when the world turns to reform of financial market regulation in response to the current crisis which originated with US sub-prime mortgages and structured products. It has been unhelpful and should be reconsidered in favour of a framework which leads financial groups to hold higher levels of capital and gives greater weight to the benefits of portfolio diversification as a means of managing risk. A well –designed capital adequacy framework should provide both more restraint against excess and more of a buffer to absorb losses when they emerge. The Basel framework has not only performed poorly in these regards but it creates too many incentives that work in the opposite direction, favouring high leverage and heavy concentrations on favoured asset classes, notably residential real estate lending. The experience of four major financial groups that have been prominent in the recent turmoil, reviewed in an Annex, illustrates the general softness of the Basel framework.

Paul Atkinson is a Senior Research Fellow at the Groupe d'Economie Mondiale de Sciences Po. Formerly he was a senior official of the OECD specialising in macroeconomic, industry and enterprise policies. Helpful comments, discussion and suggestions from Phil Barry, Adrian Blundell-Wignall, Roderick Deane, Patrick Messerlin, Ivan Mortimer-Schutts, Kumiharu Shigehara and Bryce Wilkinson on earlier drafts are gratefully acknowledged. The views expressed, however, are those of the author alone, not Sciences Po, and all errors and omissions remain his responsibility.

The Basel Capital Adequacy Framework Should Be Reconsidered

Policy Issue: The Basel capital adequacy framework that has guided bank regulation and supervision for nearly 20 years has not prevented the current crisis in financial markets and may have even contributed to it. Its ratings-based approach, built around "risk-weights" deemed appropriate for each asset class, should be reconsidered in favor of an approach that gives greater weight to portfolio diversification and, in doing so, demands more capital.

Introduction and main conclusions

Notwithstanding popular rhetoric citing insufficient regulation as the cause of the current global financial crisis, financial markets operate in an environment shaped by a complex regulatory framework. Perhaps the most important single element of this framework is the Basel capital adequacy framework. Although this was intended to encourage prudent lending, its incentives may have contributed to the current turmoil by reinforcing the other forces at work. At best, its failure to act as more of a restraint on excess and to provide more of a buffer against losses than it has done raises questions as to its usefulness.

This brief provides some background and context to this issue, gives an overview of the Basel framework as revised in 2004 and argues that some of its key features warrant review and reconsideration. Tables setting out the main elements of the Basel framework are shown in Annex 1 and Annex 2 reports the experience of several financial groups prominent in the current global financial crisis that originated with problems with sub-prime mortgages and structured products in the United States. The main reasons for reconsideration are:

- The Basel framework is not sensitive to portfolio diversification. Its system of risk weights which are fixed regardless of the size of exposures encourages regulatory arbitrage to economize on capital by shifting credit from high risk weight categories to low ones.

- Resulting incentives to allocate credit toward securities firms, residential real estate mortgages and rated securities have facilitated and may have contributed to the excesses that have led to the current turmoil.

- The framework does not, in reality, require banks to hold much capital. It allowed just 12 major international groups to increase their assets by around $7.5 trillion during 2003-06 backed by less than $215 billion, or 2.8%, in higher equity capital. At the same time these groups were able to return more than $300 billion to shareholders.

- This does not seem to have triggered any meaningful restraint by the supervisory system to reinforce capital adequacy until after the crisis broke. Indeed, based on the experience of the four financial groups

reviewed in the annex, the excesses appear to have gathered pace from the end of 2006 until the crisis broke in July 2007 and market discipline took over from supervisors.

Background and present context

In 1988 the Basel Committee on Banking Supervision issued "International Convergence of Capital Measurement and Capital Standards"[1] to serve as a basis for national supervisory rulemaking, regulation and implementation processes as they apply to banks operating internationally. It had two central objectives:

- To encourage/require banks to maintain enough capital to ensure that losses would be absorbed by shareholders without leading to systemic problems or requiring public support to prevent such problems; and

- To level the competitive playing field internationally by providing for a reasonable degree of harmonization of regulatory and supervisory frameworks, notably as they apply to capital adequacy, across countries.

In 2004, in light of experience and new developments in financial markets, a *Revised Framework* was issued (widely known as "Basel II") and is in the process of implementation in most advanced countries[2]. While revisions are extensive, they mainly relate to ways to permit banks to rely more on empirically based judgments of rating agencies or their own internal analysis of credit risk. But the general framework underpinning the original accord is retained. And while the framework formally only applies to banks operating internationally efforts to ensure policy coherence have ensured that it has served as a basis for supervisory policies toward a wider range of institutions.

Nearly 20 years since the Basel framework was introduced global financial markets are in turmoil. Too much credit has been allocated on too easy terms to residential real estate, especially but not exclusively in the United States. Too much of this has been "securitized", often in conjunction with other types of credit and packaged into "tranches" of varying seniority, to create opaque "structured products" that have been sold widely around the world[3]. As US property prices have fallen and delinquencies on low quality ("sub-prime") mortgages have risen, liquidity in the markets for these products has substantially dried up. As the prospect of large losses became clear, while means of evaluating the losses or identifying who is exposed to these losses and by how

[1] The document, often referred to as "Basel I", can be obtained from the Bank for International Settlements' website (www.bis.org).

[2] *Basel II: International Convergence of Capital Measurement and Capital Standards: a Revised Framework – Comprehensive Version*, June 2006, also available at www.bis.org.

[3] A good exposition of the securitization process, including an explanation of the various terms, can be found in Adrian Blundell-Wignall, "Financial Market Implications of Recent Structural Product Problems", *Financial Market Trends*, OECD, November 2007.

much have not been available, contagion spread throughout the system. By September 2008 credit markets in much of the world had substantially frozen up

Between July 2007 and September 2008, when the turmoil became an outright crisis following the bankruptcy of Lehman Brothers, write-downs exceeding $400 billion were announced by major US and European investment and commercial banks. This figure is rising rapidly as financial institutions report their third quarter results. Market discipline has been applied to the financial sector with great force since July 2007: by mid-March 2008, $700 billion was erased from the market capitalization of 26 major US and European banking groups[4], a figure which subsequently rose to more than $830 billion in July. Several institutions ceased to operate independently on a normal basis[5], CEO and other high level executives lost their jobs during this period and wider retrenchment in the sector was already under way.

Since Lehman Brothers filed for bankruptcy on 15 September 2008, contagion has spread the crisis throughout the financial and economic system. Major government rescue packages running globally into trillions of dollars have been put in place to support and recapitalize financial institutions. As of late October, most major equity indices worldwide are around 40% or more off their 2007 highs, oil and commodity prices have fallen sharply, many emerging markets have been hit by the crisis and economic activity appears to be slowing sharply in much of the world.

Basel framework: overview

The *Revised Framework* begins with a core concept: a distinction between "expected" and "unexpected" losses. Reasonably "expected" losses in any given year can and should be managed by, for example, pricing policies or through provisioning. But supervisors want a buffer in the form of capital to be held for "unexpected", or occasional peak, losses which exceed these expected levels in order to (i) limit insolvencies; (ii) absorb losses that could activate explicit or implicit government guarantees; and (iii) ensure confidence in the financial system.

Since for all banks to hold enough capital to serve as a buffer for hypothetical large and infrequent losses would be economically very inefficient, a sensible balance must be found between the costs and benefits of holding capital. The *Revised Framework* is intended to identify a balance that holds bank insolvencies to an acceptable level within a framework that can be applied reasonably

[4] See Adrian Blundell-Wignall, "The Subprime Crisis: Size, Deleveraging and Some Policy Options", *Financial Market Trend*s, OECD, Paris, vol.2008/1, No.94.

[5] The US Treasury assumed control of Fannie Mae and Freddie Mac, government sponsored enterprises which guaranteed around half of outstanding US mortgages, and committed to provide equity if necessary. Northern Rock (a UK bank specializing in real estate finance), Bear Stearns (a US investment bank) and IndyMac (a US thrift institution specializing in real estate finance) all ceased to operate as independent institutions.

uniformly across countries so as not to be a significant source of competitive inequality among internationally active banks.

The *Revised Framework* is based on "three pillars", the first of which is to define minimum capital requirements as a buffer for unexpected losses. The second pillar of the framework is the supervisory review process, in which discretionary judgment can be applied as necessary to modify mechanical calculations under the first pillar. The third pillar is market discipline, which will operate so long as meaningful amounts of capital are at risk. These three pillars are intended to be mutually reinforcing.

The great bulk of the *Revised Framework* is devoted to deriving the various formulas and parameters needed to calculate minimum capital requirements under the first pillar. It:

- defines "total risk-weighted assets" on the basis of a complex system of risk-weighting that applies to three types of risk: credit, market and operational;

- defines "regulatory capital"; and

- requires that the ratio of regulatory capital to risk-weighted assets be no lower than 8%.

To determine "total risk-weighted assets" contributions for credit, operational and market risk are calculated separately and added together. For market and operational risk, capital requirements are identified directly and multiplied by 12.5 (i.e. "grossed up" by the reciprocal of 8%) in order to arrive at their contribution to total risk-weighted assets. This ensures that they yield the calculated requirements when multiplied by 8%. For credit risk, the contribution to the total is the sum of all assets each weighted by its appropriate risk-weight. To "…broadly maintain the aggregate level of minimum capital requirements…" during the transition to Basel II the Committee also envisaged applying a scaling factor to the credit risk term. This was to be based on parallel calculations, i.e. under old and new frameworks, and was estimated in July 2006 to be 1.06.[6]

"Regulatory capital" includes a number of items which are classified into "Tiers". For the purposes of this brief it is sufficient to note that Tier 1 capital consists, at first approximation, of shareholders' funds *net* of goodwill and must account for at least half of regulatory capital, or 4% of total risk-weighted assets.

---

[6] *Revised Framework*, op. cit, para. 84 and footnote 12. In mathematical terms, if MRK is minimum required capital and TRA is total risk-weighted assets, MRK = .08 TRA where

$$TRA = \{12.5(OR+MR) + 1.06 \text{ SUM } [w(i)A(i)]\}$$

and OR and MR are, respectively, minimum requirements for operational and market risk; and w(i) and A(i) are the credit risk weight for, and the amount of claims in, asset class "i". OR, MR and w(i) are all determined by formula, while the A(i) are balance sheet data.

The *Revised Framework* permits banks to choose between two methodologies:

- A "standardized" approach to calculating risk-weights offers banks with limited analytical capacity a degree of flexibility: they can use a "simplified" version which, as under the original Basel I agreement, takes a set of parameters fixed by the Committee as risk-weights; or they may override these by using external (rating agency) credit assessments where these exist as a basis for calculation of risk-weights.

- An "internal ratings-based" approach offers banks with the necessary expertise the option of calculating more "risk sensitive" weights using their own analysis. These must meet certain conceptual standards while having regard for differences in supervisory and accounting systems across countries. This approach can only be chosen with the explicit approval of a bank's supervisor.

Basel framework: the Pillar 1 risk-weight system in more detail

An overview of the risk-weights on which capital requirements under the Basel framework depend is reported in Annex 1. Those applying under both the original Basel framework and the new standardized approach are summarized in Table A1.1. Some illustrative risk weights under the internal ratings-based approach are provided in Table A2.2. Points to note:

Direct claims on-balance sheet

All approaches to defining risk-weights generate wide variation in weights which depend on the classification of the credit. The large differences in these risk-weights create strong opportunities for a form of regulatory arbitrage: banks can "free up capital" by shifting portfolio exposure from high risk-weighted assets to lower risk-weighted assets. In this regard, the favored position of the securities firms that have played a large role in the current turmoil is striking: the low risk weight (20% under Basel I) attached to claims on them has meant that they have not faced a market-based cost of capital on the same basis as other non-banks.

It is notable, too, that the shift from Basel I to Basel II will, for the most part, also "free up capital", notably as regards residential mortgages and retail lending[7], since the risk-weights mostly come down. In the United States possible reductions in capital requirements for mortgages were estimated to range as high as 90%[8].

[7] The scale factor incorporated in the formula for minimum capital requirements should work to limit this, but it seems too small. See, for example, the discussion of Northern Rock in the Annex 2.
[8] See FDIC, "Basel II and the Potential Effect on Insured Institutions in the United States: Results of the Fourth Quantitative Impact Study", *Supervisory Insights*, 12 June 2005.

The internal ratings-based approach is the main innovation of Basel II, which has not been formally in effect until very recently. It allows greater sensitivity to the probability of default for any given type of loan but it does not mitigate the wide differences in risk-weights across loan characteristics observed with Basel I and either version of the standardized approach. It does, however, imply that different banks can treat the same loan differently, since default probabilities will be based on each bank's individual assessments. It also introduces large differences across banks subject to different regimes and generally favors those able to qualify for the internal ratings-based approach by providing great scope for using lower risk weights.

Off-balance sheet items

Basel II aims to create more neutral incentives as regards off-balance sheet exposures, which are converted to balance sheet equivalents by "credit conversion factors (CCFs)". These CCFs are similarly very varied, depending on the type of exposure, and create arbitrage opportunities. Notably, exposures unconditionally cancelable by the bank without prior notice carry a CCF of 0%. Other CCFs range up to 100%. Risk weights are applied to the converted amounts.

Structured products

The treatment of structured products under Basel II depends on a number of parameters. Under the standardized approach investments in securitized assets (not shown in Table A1.1) are treated like corporate exposures so long as they carry an investment grade rating (BBB- or above). The better junk ratings can carry a 350% risk-weight and exposures rate B+ or below and unrated securitizations must be deducted fully from capital. Where banks use the internal ratings-based approach for the type of underlying exposures being securitized, risk weights depend on external ratings where these are available (examples provided in Table A1.2). These weights range from as low as 7% for AAA-rated "senior tranches" to various weights above 100% for securities with junk ratings and, as in the standardized approach, exposures B+ and below must be deducted totally from capital. Originating banks may exclude securitized exposures in certain circumstances which, in spirit, require that the risk be fully transferred. Other exposures are in effect merely off-balance sheet and hence require a CCF, in most cases 100%.

Basel framework: key features to be reconsidered

Regulatory arbitrage drives capital out of the system

As noted above, large variations in risk weights (and CCFs) encourage regulatory arbitrage which reduces capital requirements as portfolios are weighted toward favored asset classes. As total risk-weighted assets decline as a share of actual total assets, i.e. the size of the balance sheet, the leverage that a given amount of

capital can support under the regulations rises. This creates incentives to increase leverage, i.e. lending without additional capital backing, return capital to shareholders, or both. The end result can be very low levels of equity backing for the balance sheet, even if widely reported "regulatory ratios" appear substantial.

From the perspective of today's financial market turmoil the most striking features of this weighting system are:

- Banks and regulated securities firms faced very low risk-weights under Basel I and, so long as investment grade credit ratings (BBB- or above) are maintained, this will continue under Basel II. This not only allows such institutions privileged access to wholesale market funding but it permits the providers of such funding to lend with minimal impact on their own capital requirements;
- Residential mortgages, which have constituted the underlying assets in many of the asset backed securities that have been at the root of the crisis, have been strongly privileged under all versions of the Basel framework;
- Banks originating securitizations have great scope to reduce their risk-weighted exposures or to exclude them altogether; and
- Under the internal ratings-based approach of Basel II senior tranches of securitized claims rated BBB+ or above carry low risk weights (7 to 35%).

This system clearly provides incentives and great scope for channeling credit to home mortgages, many of them funded in wholesale markets and eventually securitized, with very little equity capital backing.

Recent developments must be viewed in the context of the transition that is still under way as Basel II is fully implemented. Parallel calculations under both old and new rules began in 2006 but, formally, Basel I remained in effect until 2007 in Europe. In the United States final rules to implement Basel II were not agreed until November 2007. In view of the potentially large changes arising from the shift to the internal ratings-based approach under Basel II, the *Revised Framework* provides for transition "floors" that limit the immediate reduction in minimum capital requirements arising from the shift. In practice, since the *Revised Framework* has been available since June 2004 both supervisors and bank management have been able to take account of future options and requirements soon to become effective and to adapt accordingly.

The practical result of these incentives is evident from Table 1. Balance sheets expanded rapidly during the 2003-06 period, in most cases much faster than equity (again excluding goodwill), lowering the equity backing for their assets. In absolute terms, the companies covered increased their assets by around $7.5 trillion over the four year period while backing this with less than $215 billion, or around 2.8 % , in equity capital. Off-balance sheet commitments, whether related to securitized assets or otherwise, are not reflected in these figures.

At the same time, the ease of maintaining adequate levels of regulatory capital led many banks to behave as though their equity positions were excessive. Given

the choice between retaining cash to add to Tier 1 capital by building equity and returning it to shareholders as dividends or through share buybacks and retirements, most of the major financial groups included in Table 1 returned more to shareholders than they retained. The 12 groups as a whole returned $318 billion to shareholders over the four year period, a sum that exceeds the $250 billion that the US Treasury intends to inject as capital into major US banks as part of the current US rescue plan.

Table 1: Use of Cash by Major Financial Groups, 2003-2006

($ billion; figures in brackets are percentage increases in levels from end-2002 to end-2006)

Financial group	Cash returned to shareholders (1)	Increase in equity, net of goodwill		*Memo*: Increase in total assets, net of goodwill
US Groups				
Bank of America	65	31	[79]	745 [115]
Citigroup	56	27	[44]	780 [73]
JP Morgan Chase	25	36	[106]	556 [74]
Merrill Lynch	19	17	[86]	392 [88]
Morgan Stanley	13	12	[60]	590 [112]
Wachovia	22	10	[48]	338 [102]
Wells Fargo	21	14	[68]	131 [39]
European Groups				
Barclays (2)	13	3	[11]	1214 [148]
Credit Suisse	15	13	[86]	266 [32]
Deutsche Bank	19	6	[19]	546 [49]
HSBC	23	35	[101]	932 [126]
UBS	27	9	[36]	1011[88]
Total for 12 groups	318	213	[62]	7501 [85]

(1) Cash dividends *plus* share repurchases except for continental European groups, for which net share retirements are used.
(2) 2004-2006 for cash returned.

Source: 10K regulatory filings, as compiled by E*Trade Financial Corporation.

Annex 2 reviews the experience during 2007 of four groups that have been prominent in the turmoil: two large diversified groups included in Table 1 (Citigroup and Merrill Lynch) and two smaller groups whose exposures have been more concentrated on real estate (E*Trade Financial and Northern Rock). These suggest that, if anything, the excesses evident from Table 1 gathered pace during the first half of 2007, i.e. until the crisis broke.

Insensitivity to portfolio diversification encourages excessive exposure to favored asset classes

The economic foundations of the derivation of the risk-weight formulas are based on a specific mathematical model developed by the Committee[9] which is subject to the restriction that it be *portfolio invariant*. This means that the capital required as backing "for any given loan should only depend on the risk of that loan and must not depend on the portfolio it is added to"[10]. Thus risk weights can be derived from external judgments, and are often referred to as "rating based". The purpose of the portfolio invariance restriction is to "fit supervisory needs"[11]. This certainly has great advantages:

- It reduces complexity by allowing the analysis to focus on the specific loan or investment while avoiding the need to take account of portfolio composition or how it influences that composition.

- It reduces the calculation of minimum regulatory capital to a simple additive process once risk weights have been determined.

- It allows the framework to apply to a wide range of countries and institutions, which facilitates agreement in a highly political context.

However, this restriction has a cost: it involves building a system for the calculation of capital requirements that systematically fails to reflect the importance of diversification as an influence on portfolio risk. Thus the minimum capital requirements associated with any type of loan due to credit risk simply rise linearly with the holding of that asset type, regardless of the size of the exposure. Appropriate diversification is simply assumed.

The Basel Committee is well aware of this and envisages that it be dealt with separately under the supervisory review process (Pillar 2). What is important to note here is that the calculation of risk-weights is not affected by the size of an exposure so neither rewards nor penalizes diversification or failure to diversify.

In this regard**,** a notable feature of the experience of the groups reviewed in nnex 2 is that the most diversified of the four, Citigroup, has typically held the highest level of equity backing for its assets (4.1% on 30 June 2007, the eve of the crisis) while the most specialized group with the most concentrated portfolio, Northern Rock, has held the least (2.0% at the same time).

[9] See Gordy, M. B. "A risk factor model foundation for ratings based capital rules", *Journal of Financial Intermediation, No. 12*, 2003, pp.199-232.
[10] See section 3 of *An Explanatory Note on the Basel II IRB Risk Weight Functions* (www.bis.org).
[11] Ibid.

The rules of the Basel framework provide a government stamp of approval and can substitute for management judgment

While the second pillar accords great discretion and authority to supervisors, this can be difficult to use effectively. Supervisors are not auditors and are not participants in the business environment. While they have the authority to obtain any information they need from the supervised institution, they do not necessarily know what to ask for. They are not well paid by the standards of senior bank executives and limited in their access to resources. All of this makes them poorly placed to question the judgment of bank management so long as the objective minimum standards are met. This makes it easy for explicit capital requirements formulas of the first pillar to dominate the supervisory judgment foreseen as part of the second pillar. Yet the mere facts of supervision and compliance with such requirements are easily presented as constituting an official endorsement of bank management (see, notably, the discussion of E*Trade Financial in Annex 2).

At the same time, bank management's judgment must be subordinated to the requirements of the regulatory system and will otherwise be influenced by its incentives. In these circumstances, directors and senior management of banks can be tempted to delegate responsibility for what should be management judgment by treating regulatory requirements as satisfactory targets for which supervisors could be held responsible. Testimony relating to the Northern Rock crisis before the UK Treasury Committee[12] is a case in point:

Mr. Fallon (for the Committee): "Mr. Applegarth, why was it decided a month after the first profit warning, as late as the end of July, to increase the dividend at the expense of the balance sheet?"

Mr. Applegarth (Northern Rock CEO): "Because we had just completed our Basel II two and a half year process and under that, and in consultation with the FSA, it meant that we had surplus capital and therefore that could be repatriated to shareholders through increasing the dividend."

The Revised Framework is pro-cyclical and can exaggerate booms and busts

Any system of capital requirements that relies for its effectiveness on ratios based on fixed coefficients, such as Basel I or the simplified standardized version of the *Revised Framework,* is likely to be pro-cyclical since bank profits are typically pro-cyclical. Rising profits in the upswing usually generate increases in retained earnings and hence Tier 1 capital, and prudent banks, ideally, should use these to build a cushion to see it through the downswing which inevitably follows. So long as banks are guided by fixed ratios, however, this stimulates further balance sheet expansion to avoid a build-up of "excessive" capital. Conversely on the downswing, hence the risk of a "credit crunch" during a slump.

[12] Treasury Committee, "The Run on the Rock", Volume II, 2007, London.

The *Revised Framework* (except under the simplified standardized approach) exacerbates this feature by basing the risk weights on current and historical market prices and default performance, which reflect cyclical developments. This is likely to be true whether weights are based on external ratings by approved agencies or they derive from banks' own internal models and analysis. The result, as Goodhart and Persaud observe, can be that "Market-price-based, risk sensitive models tell banks in the up-cycle that risks have fallen and capital is sufficient for more risk-taking."[13] In simple terms, risk weights are biased downward during the benign part of the cycle. And conversely on the downswing.

The size of this effect, which is over and above any pro-cyclicality generated by Basel I, may not be trivial. In joint comments to the main US bank regulatory agencies on the Basel II "notice of proposed rulemaking", Chief Risk or Financial Officers of four major banks cited 5 independent studies on the impact of the credit cycle on minimum capital requirements in the US. They also cited presentations by 5 US banks to the FDIC in January 2006 about the impact of the cycle on their own requirements.. The estimated variation in minimum capital over the cycle in these 10 studies ranged from 10% to 35%, with the average change being 23%[14].

Capital requirements for banking subsidiaries may not be adequate at group level

The Revised Framework states that it is to be "applied on a consolidated basis to internationally active banks….to ensure that it captures the risk of the whole banking group."[15] Associated discussion makes it clear that all relevant financial market activities of such banks, aside from insurance, should be captured through full consolidation.

As the discussion of Citigroup, Merrill Lynch and E*Trade Financial in the annex suggests, it is not clear that this works well since:

- Wide scope exists for parent groups to maintain high levels of capital in depository subsidiaries by simply shifting funds within the group.

- Parent groups are often less well-capitalized than their subsidiary depository institutions.

- Large balance sheet expansions have occurred at both banking subsidiary and parent group levels without requiring meaningful increases in capital at the parent group level.

[13] C. Goodhart and A. Persaud, "How to avoid the next crash", *Financial Times*, 30 January 2008.
[14] Letter from Citigroup, JPMorgan/Chase, Wachovia and Washington Mutual, 7 February 2007, commenting on the US regulators' notice of proposed rulemaking (NPR) of 25 September, 2006 (Public submission OCC-2006-0035-0007).
[15] *Revised Framework*, op. cit. para. 20-21.

Apparently similar businesses are subject to surprising variations in supervisory arrangements and reporting requirements. For example, Citigroup reports regulatory capital ratios for the consolidated parent group but Merrill Lynch does not[16].

Concluding remarks

The Basel framework appears to be a classic case of regulatory capture. Its stress on capital adequacy to strengthen the soundness and stability of the international banking system is well-placed. But the current crisis makes it obvious that two decades of practice have not matched the promise.

The transition from Basel I to Basel II seems unlikely to help. Basel II's standardized approach offers widespread, if not quite systematic, reductions in risk weights and hence minimum capital requirements. Its internal ratings-based approach offers considerable further reductions in risk weights for many asset classes for those banks able to obtain approval. And within any of these approaches, the system of fixed but differentiated risk weights continues to offer great scope, to quote from Northern Rock's Interim Results for the period ended 30 June 2007, for "adjusting our business model to improve our capital efficiency" (see Annex 2). In other words, to reduce capital requirements by shifting portfolio allocation toward asset classes favored by the regulatory system, such as lending to securities firms and for residential real estate. Since the risk weights under all versions of the framework are fixed parameters, the incentives in terms of capital costs remain the same however large the exposures and concentrated the portfolios become.

These features make it unsurprising that the framework has accommodated such a large flow of credit into residential real estate and structured products. At the same time, the scope for economizing on capital has left the financial system with far too little risk capital to absorb the losses that corrections in the housing market are generating. The contagion that has affected the wider system and the deterioration in the global macroeconomic outlook are unsurprising consequences.

The enthusiasm of large banks for Basel II is understandable, since it provides regulatory approval for reduced holdings of capital and generally favors them over smaller competitors. But the commitment of the senior policy community to the Basel framework is curious. The Chairman of the Basel Committee, Nout Wellink, has acknowledged that "The current financial market turmoil… highlights

[16] In the United States no federal regulator has explicit authority to supervise investment bank holding companies with bank affiliates. For investment banks without US bank subsidiaries supervision is voluntary. Only one has elected such supervision. Since the EU requires consolidated supervision of investment banks with bank subsidiaries the Securities and Exchange Commission created a voluntary program in which the five largest US investment banks agreed to participate. It was in this context that the Bear Stearns collapse occurred in March 2008. For discussion, see Erik Sirri, "Testimony concerning turmoil in the credit markets: examining the regulation of investment banks by the Securities and Exchange Commission" before the *Subcommittee on Securities, Insurance and Investment, United States Senate*, 7 May 2008.

the shortcomings of the Basel I capital regime, which… has contributed in the past few years to the concentration of risk in the banking sector." [17] But rather than call for reconsideration of the approach, he argues " There is a strong consensus that Basel II will put capital regulation on a stronger footing."[18] This consensus that refinement of the existing framework is called for, notwithstanding reduced capital requirements, is indeed reflected in the high weight the Financial Stability Forum gives to timely implementation of Basel II (with some minor enhancements, notably relating to structured products)[19]. More fundamental reconsideration is needed.

Notwithstanding the case against the Basel framework, one should not lose sight of other forces that have contributed importantly to the excesses of the past few years[20]. Interest rates, primary considerations for borrowers, were low for a long time. More cautious monetary policy may therefore have a role to play in avoiding a repetition of recent excesses. Generous up front origination fees and prospective servicing fees also provided important incentives to financial intermediaries and their staffs. More conservative accounting standards that recognize such revenues over the life of a loan rather than immediately adding it to the bottom line could encourage more cautious credit assessments by lending institutions. And, finally, the role of conflicts of interest in ratings agencies who are paid by the issuers of the securities they are rating needs to be addressed.

Perhaps most important, ways must be found to limit counterproductive influences on business behavior that regulatory and political intervention in the operation of the markets can generate. Too often, management responsibility is effectively outsourced as meeting regulatory rules or guidelines, such as Basel requirements, becomes a substitute for exercising judgment. And systematic government support for institutions "too big to fail", effectively privatizing gains while socializing losses, creates incentives that lead to future excesses. Shareholders generally lose badly when government support is required, but ways must also be found to expose the creditors who provide the bulk of funding to failed financial institutions to more risk of loss. In this regard, the decision not to rescue Lehman Brothers may serve as a healthy signal to financial market participants in the longer term.

Whatever changes are made in any of these areas, financial market excesses are always likely in an uncertain world where the future is unknown. A capital adequacy framework that discouraged excessive portfolio concentration might not prevent such excesses entirely, but it would generate corrective forces working to slow them by making continued excess progressively more costly. And in doing

[17] Nout Wellink, "Basel II is sophisticated and sorely needed", *Financial Times*, 10 April 2008.
[18] Ibid.
[19] See the *Report of the Financial Stability Forum on Enhancing Market and Institutional Resilience*, Basel, 7 April 2008 (www.fsforum.org/publications/r_0804.pdf)
[20] See A. Blundell-Wignall and P. Atkinson, "The Subprime Crisis: Causal Distortions and Regulatory Reform", presentation to the *Reserve Bank of Australia Conference 2008: Lessons from the Financial Turmoil of 2007*, Sydney, 14 July 2008.

so it would provide more of a buffer to absorb shocks when market discipline imposes inevitable adjustments. The present framework should be reconsidered with a view to making it: (i) more sensitive to the advantages of portfolio diversification as a means of managing risk; and (ii) demanding of higher levels of capital as a buffer against unexpected losses.

Annex 1: Basel Risk-Weights

Table A1.1: Risk Weights Under Basel I and the Basel II Standardized Approach

Basel I (1988)		***(per cent)***
Most OECD central governments and central banks		0
Other domestic public sector entities		0, 10, 20, or 50 (supervisors' discretion)
Claims on most Multilateral Development Banks (MDBs)		20
Most OECD banks and securities firms (1)		20
Residential mortgages (fully secured)		50
Other, including private sector and commercial real estate.		100
Basel II: simplified standardized approach		
Most OECD central governments and central banks		0
Most MDBs and other public sector entities		0
Most OECD banks and securities firms (1)		20
Residential mortgages (fully secured)		35
Retail lending (2)		75
Other, including corporate exposures and commercial real estate.		100
Basel II: standardized approach based on external ratings		
Central governments and central banks		
Credit rating		
AAA to AA-		0
A+ to A-		20
BBB+ to BBB-		50
BB+ to B-		100
Below B-		150
Unrated		100
Banks and securities firms (1)		
Credit rating	*Maturities <90 day*	*Other*
AAA to AA-	20	20
A+ to A-	20	50
BBB+ to BBB-	20	50
BB+ to B-	50	100
Below B-	150	150
Unrated	20	50
Corporate exposures (incl. insurance companies)		
Credit rating		
AAA to AA-		20
A+ to A-		50
BBB+ to BB-		100
Below BB-		150
Unrated		100
Residential mortgages (fully secured)		35
Retail lending (2)		75
Other, including corporate exposures and commercial real estate.		100

Notes and sources: see bottom of Table A1.2.

Table A1.2: Risk Weights Under the Basel II Internal Ratings Based Approach

Illustrative examples for direct claims in selected asset classes

(Risk weights depend on internal estimates of a loan's probability of default, its loss in the event of default, the bank's exposure in the event of default, in some cases the effective maturity and, for small business exposures, turnover. Examples below are for the case of loans with loss given default of 45% and maturity 2.5 years.)

Corporate Exposures

Probability of default	*Turnover:*	
	EUR 50 million	*EUR 5 million*
0.03%	14.44%	11.30%
0.10%	29.65%	23.30%
0.50%	69.61%	54.91%
1.00%	92.32%	72.40%
5.00%	149.86%	112.27%

Residential Mortgages (fully secured)

Probability of default	
0.03%	4.15%
0.10%	10.69%
0.50%	35.08%
1.00%	56.40%
5.00%	148.22%

Retail Lending

Probability of default	*Qualifying revolving credits*	*Other*
0.03%	0.98%	4.45%
0.10%	2.71%	11.16%
0.50%	10.04%	32.36%
1.00%	17.22%	45.77%
5.00%	54.75%	66.42%

Securitized claims where an external long term rating is available

Credit rating	*Senior tranche*	*Credit rating*	*Senior tranche*
AAA	7%	BBB	60%
AA	8%	BBB-	100%
A+	10%	BB+	250%
A	12%	BB	425%
A-	20%	BB-	650%
BBB+	35%	Below BB- and unrated	Deduction

(1) Securities firms subject to risk-based capital requirements and consolidated regulation. An option not listed here under Basel II standardized approaches is to assign risk-weights one category less favorable than sovereign, subject to certain limits.
(2) Individual or SME, not past due, excluding securities, subject to individual exposure limits.

Sources: *International Convergence of Capital Measurements and Capital Standards* (July 1988) Annex 2; and *International Convergence of Capital Measurements and Capital Standards: A Revised Framework* (Comprehensive Version, June 2006), Chapter 2 and Annex 5. Both documents are available at www.bis.org

Annex 2: The Basel Framework in Action

A diversified internationally active US bank: Citigroup

Citigroup is one of the world's largest diversified financial groups It has been the leading sponsor of Special Investment Vehicles (SIVs), with much of the collateral underlying $83 billion worth of asset backed securities (ABS) called Collateralized Debt Obligations (CDOs) being related to real estate. Earnings as recently as the June 2007 quarter were very strong but since then Citigroup has announced very large losses related to sub-prime mortgages alone, cut its dividend by 41%, replaced its CEO and, even before the crisis broke in full force in September 2008, suffered a loss in market capitalization of around $160 billion. It sought and obtained large infusions of capital, notably in the form of convertible preferred securities, even before the current rescue package took shape.

The figures reported in Table 1, in the main text above, show that from 2002 until the beginning of 2007. Citigroup generated equity backing of $27 billion, or around 3.5%, of its $780 billion increase in asset holdings. Whether this is adequate can be debated but, in terms of levels, Citigroup was still entitled by regulators to state that it was, during the first nine months of 2007 as well as all of 2006, "well capitalized" under US federal bank regulatory agency definitions[21]. This was true both on a consolidated basis and at the level of the depository subsidiaries, notably Citibank N.A. Table A2.1 shows the resulting financial picture at the beginning of 2007 and how it evolved subsequently:

- The pattern of backing balance sheet expansion with 3-4% equity backing did not persist at the group level during 2007. Only $800 million in equity was set aside to support nearly $470 billion in assets added to the balance sheet during the nine months to 30 September, before falling under pressure of losses (upper panel). Even during the first half, before the write-offs began, the ratio of equity to assets fell sharply.

- In regulatory terms (lower panel) the picture at group level is the same. Tier 1 capital actually fell, even though risk-weighted assets rose by around $200 billion (i.e. by nearly 20%).

- At the level of depository subsidiaries, however, the position remained comfortable with no signs of stress. Both regulatory capital ratios and equity backing for total assets remained reasonably high and stable until September and then rose, even as the crisis deepened, reflecting large capital increases in line with balance sheet expansion.

[21] A US bank holding company is "well capitalized" if its Tier 1 Capital Ratio is at least 6%, its Total Capital Ratio is at least 10% and its "Leverage Ratio", i.e. the ratio of its Tier 1 capital to its total assets, subject to some adjustments, is at least 3%. In addition, it must not be subject to regulatory directive to maintain higher levels. For depository subsidiaries to be "well capitalized" the Leverage Ratio must be higher, at least 5%.

Table A2.1: Citigroup Capital Resources 2006-07
($billion, or per cent where indicated)

	Equity (1)	Total assets (1)	Equity ratio
	Amounts		**(%)**
US depository subsidiaries(2)			
31 December, 2006	59.4	1006	5.9
30 June, 2007	67	1116	6
30 September, 2007	72.4	1215	6
31 December, 2007	80	1232	6.5
Consolidated group			
31 December, 2006	86.4	1851	4.7
30 June, 2007	88.5	2182	4.1
30 September, 2007	87.2	2318	3.8
31 December, 2007	72.4	2146	3.4

	Tier 1 capital		Total capital		Risk-adjusted assets.	
	Ratio (%)	*Amount*	*Ratio (%)*	*Amount*	*Amount*	*Share of total (%)*
US depository subsidiaries(2)						
31 December, 2006	8.32	59.9	12.39	89.1	719	71
30 June, 2007	8.21	67	12.24	99.9	816	73
30 September, 2007	8.22	73.3	12.3	109.6	892	73
31 December, 2007	8.98	82	13.33	121.6	913	74
Consolidated group						
31 December, 2006	8.59	90.9	11.65	123.3	1058	57
30 June, 2007	7.91	92.4	11.23	131.2	1168	54
30 September, 2007	7.32	92.4	10.61	133.8	1262	54
31 December, 2007	7.12	89.2	10.7	134.1	1253	58

(1) Net of goodwill.
(2) Essentially Citibank, N.A. Citigroup's 10Q variously reports figures for "Citibank N.A", "all …subsidiary [US] depository institutions… including… Citibank N.A." and "Citibank N.A. and subsidiaries" while not calling attention to any differences among these, if any. These are treated here as equivalent.

Source: Citigroup, 10Q and 10K regulatory filing, 2007.

- In essence, the $22 billion increase in Tier 1 capital at depository subsidiaries was almost entirely funded by drawing on (or offset by reductions in) Tier 1 capital backing for Citigroup's other activities, which fell from $31 billion to $7 billion during the course of 2007. It thus seems difficult to attach much significance to the "well capitalized" status that prevailed at the level of depository subsidiaries. The increase in total capital, also slower than the increase in risk-weighted assets, reflects a large rise in Tier 2 capital consisting mainly of debt and provisions for loss[22].

[22] An issue not explored here is the usefulness of the whole concept of Tier 2 capital. Subordinated debt is helpful for managing liquidity, but it is hard to see its contribution as a

The scope for "freeing capital" by allocating capital away from high risk-weight assets to low ones is illustrated by the low level of risk-weighted assets relative to the actual total. At mid-2007, these were around 73 percent at the Citibank level and, a much lower, 54 percent at the consolidated group level. It is notable that this implies a very low average risk-weight of 34 percent for assets held outside the depository subsidiaries. Heavy reliance on (liquid but low return) sovereign and inter-bank lending would contribute to this result but significant exposure to residential real estate would also operate to reduce risk-weights while supporting profitability.

Finally, contingent liabilities to take securitized assets on balance sheet because risks had not been fully transferred contributed to Citigroup's problems. Notably, $25 billion of the $43 billion of "super senior" asset-backed CDOs originated by Citigroup, and taken on to the balance sheet during summer 2007, related to the exercise of a "liquidity put" on sub-prime backed commercial paper. It is not clear how much regulatory capital was required against this $43 billion or would have been required after transition to Basel II if it had remained off balance sheet. But even if so, the amounts would presumably been small, especially compared to the eventual $14.3 billion Q4 write-down.

An internationally active US securities firm: Merrill Lynch

Merrill Lynch was historically a cautious investment bank, concentrating on its brokerage business. Reportedly encouraged by high fees[23], it was increasingly aggressive in creating mortgage-backed CDOs. This has ended badly. After the crisis in structured products broke in July 2007 Merrill Lynch wrote down nearly $25 billion in US sub-prime mortgage-related exposures before agreeing in September 2008 to be taken over by Bank of America.

There was clearly very little restraining force from risk-weighted capital requirements. The figures reported in Table 1, above, indicate that capital backing for new lending was comparatively high (above 4%) and rose pretty much in line with Merrill Lynch's total asset exposure through 2006. But, as Table A2.2 shows, during the first six months of 2007 something changed. As the CDO market weakened, Merrill Lynch reportedly ceased acting as an intermediary and began to take apparently low risk (mainly AAA-rated) sub-prime CDO and mortgage bonds directly onto its balance sheet, which would protect the lucrative

---

buffer against loss. Similarly, it is hard to see how provision for *expected* losses can serve as a buffer against *unexpected* losses.

[23] The discussion here draws from press reports as well as Merrill Lynch regulatory filings and public statements. See in particular Shawn Tully, "Wall Street's Money Machine Breaks Down", *Fortune*, November 26, 2007 which provides an extensive report on Merrill Lynch's problems based heavily on interviews.

Table A2.2: Merrill Lynch Capital Resources, 2006-07
($ billion, except per cent, where indicated)

Consolidated group					
	Equity (1)		**Total assets (1)**		**Equity ratio**
		Amount			**(%)**
Merrill Lynch & Co.					
29 December, 2006	36.6		839		4.4
29 June, 2007	38.5		1073		3.6
28 September, 2007	33.7		1092		3.1
28 December, 2007	31.6		1015		3.1
Regulated banking subsidiaries					
	Tier 1 capital		**Total capital**		**Total asset base**
	Ratio (%)	*Amount*	*Ratio (%)*	*Amount*	*Risk-adjusted*
MLBUSA (US)					
29 December, 2006	9.24	5.5	10.75	6.4	59.8
28 September, 2007	10.19	6.6	11.62	7.5	64.9
28 December, 2007	10.78	6.5	12.2	7.4	60.4
MLB-FSB (US)					
29 December, 2006	8.35	0.9	11.74	1.3	11.3
28 September, 2007	11.74	2.3	15.07	3	20
28 December, 2007	9.22	2	12.11	2.6	21.3
		Regulatory capital			**Total asset base**
		Ratio (%)	*Amount*		*Risk-adjusted*
MLIB (Ireland)					
29 December, 2006		11.06	6.6		60.1
28 September, 2007		10.9	10.3		94.4
28 December, 2007		11.1	10.4		93.5

Note: Actual asset levels for subsidiaries and group regulatory ratios are not available.
(1) Net of goodwill and intangibles.

Source: Merrill Lynch 10K and 10Q regulatory filings, 2006 and 2007.

fee income. In any case, by June 2007, before the big asset write-downs, CDO and US sub-prime mortgage exposure amounted to nearly $43 billion and total assets (upper panel) had increased by around $235 billion (i.e. by 28%). At the same time, equity backing rose by less than $2 billion (i.e. by around 5%). Following the second half write-downs, equity fell below end-2006 levels leaving its backing for a slightly higher level of total assets at little more than 3%.

How could this happen? Merrill Lynch is a "consolidated supervised entity" as defined by the US Securities and Exchange Commission and computes allowable capital and risk allowances on a consolidated basis although it does not report them. Among its many regulated units are two US banks and one based in Ireland, for which Merrill Lynch reports the various ratios and amounts. At the group level, as noted above, only trivial amounts of capital were required to support the enormous balance sheet expansion during the first half of 2007. Yet ratios for the banking units reported in Table A2.2 (middle and lower panels) were not only high but rose during the course of the year. The various measures of capital reported here differ from each other, but this strongly suggests that the

banking units absorbed capital at the expense of non-bank activities, which seem to have required relatively little equity backing.

Two other points should be noted:

- The overall supervisory framework was very tolerant of the rapid increase in portfolio concentration which occurred in early 2007. The $43 billion in sub-prime CDOs and mortgage bonds on the balance sheet at end-June 2007 were more than 100 percent of shareholders' equity (net of intangibles). These were assets that customers had largely stopped buying. They would seem to have involved considerable risk and should have set up corrective forces. But since residential mortgage exposure carries a low risk weight and, when Basel II is in effect, highly rated securities will only carry risk weights as low as 7%, regardless of amount, relatively small amounts of Tier 1 capital seem to have been necessary. The write-downs on this holding amount to half of shareholders' equity (net of goodwill and intangibles) at that time.

- Merrill Lynch displays "well capitalized minimum" amounts prominently next to its reporting of regulatory ratios for its US banking subsidiaries. These minimum amounts, all in the 5-10% range[24], are well above the group's actual ratio of equity to total assets. But since they are well below reported regulatory ratios they call clear attention to the subsidiaries' official status as "well capitalized". Less prominently, it also cites "minimum requirements for its Irish banking subsidiary, again calling attention to its comfortable position as regards regulatory requirements.

*A nationally oriented US financial group: E*Trade Financial*

E*Trade's primary business was originally as an online discount broker operating mainly, but not exclusively, in the US. It diversified its operations to include banking operations, focusing aggressively on residential mortgages and structured products. This has come to grief as E*Trade had to recognize large losses in the third quarter of 2007 and soon afterwards liquidated a $3 billion ABS portfolio at 27 cents on the dollar. During 2008 its shares have traded 75-95% below their level before the crisis and its future as an independent entity is uncertain.

Like Merrill Lynch, E*Trade is subject to capital requirements for its broker-dealer activities by the SEC and, for its banking operations, by federal banking agencies, notably the Office of Thrift Supervision. Its assets are substantially all in the banking subsidiary, see Table A2.3, although it should be noted that the banking

[24] C.f. footnote 21.

Table A2.3: E*Trade Financial Capital Resources, 2006-07
($ billion, except per cent where indicated)

Consolidated group

	Equity (1)	Total assets (1)	Equity ratio
	(Amounts)		**(%)**
E*TRADE Financial			
31 December, 2006	2.12	51.7	4.1
30 June, 2007	2.3	60.9	3.8
30 September, 2007	2.07	62.2	3.3
31 December, 2007	0.9	54.9	1.6

Regulated broker-dealer subsidiaries

	Required capital	Excess capital	Total capital
		(Net amounts)	
31 December, 2006	0.19	0.63	0.82
30 June, 2007	0.2	0.7	0.9
30 September, 2007	0.21	0.74	0.96
31 December, 2007	0.19	0.73	0.92

Regulated banking subsidiary

	Tier 1 Capital		Total Capital		Bank asset base	
	Ratio (%)	*Amount*	*Ratio (%)*	*Amount*	*Amounts*	
					Risk-adj.	*Adjusted total (2)*
E*TRADE Bank						
31 December, 2006	10.27	2.53	10.55	2.59	24.6	41.6
30 June, 2006	10.36	3.55	10.58	3.63	34.3	57.7
30 September, 2007	9.95	3.47	10.55	3.68	34.9	59
31 December, 2007	10.11	3.22	11.37	3.62	31.8	51.8

na: not available.
(1) Net of goodwill.
(2) Total assets *plus* unrealized losses on available-for-sale securities *less* deferred tax assets, goodwill, and certain other intangible assets.

Source: E*Trade Financial 10K and 10Q regulatory filings, 2006, 2007.

figures reflect a merger of some US based broker-dealer operations in early 2007. Thus the consolidated group figures provide a better picture of the groups activities during 2007.

Points to note:

- The regulated banking subsidiary's concentration on low risk-weight residential mortgages and mortgage-backed securities, which accounted for around 70% of interest earning assets at 31 August[25], resulted in risk-adjusted asset totals amounting only to around 60% of the actual banking total at end-September. Given the low regulatory asset base, the banking subsidiary is quite well-capitalized in regulatory terms, particularly as regards Tier 1 capital. Despite the large asset expansion during the first six months of the year, partly reflecting absorption of broker-dealer assets

[25] See " Business Update", 17 September 2007, which was available at www.etrade.com under "Investor Relations", Slide 6.

and before the problems emerged during the summer, capital levels rose in line and (regulatory) capital ratios were stable.

- At the group level the picture is different. Shareholders' equity is not very high and, indeed, is less than the Tier 1 capital in the banking subsidiary alone. At the beginning of 2007 it was just over 4% of total assets but it rose by only $175 million during the first half of the year despite the increase in total assets of more than $9 billion. Following third quarter losses it fell below the start-of-2007 level to 3.3% of total assets.

- The losses on the $3 billion ABS portfolio noted above appear to have been enough to wipe out the bulk of the group's equity, which has required offsetting capital increases. The "well capitalized" status of the banking operation appears to have been an illusion sustained by drawing resources from other subsidiaries or at the group level.

As E*Trade's problems mounted during the autumn analysts began to question the group's survival and suggestions were made that prudent customers should transfer their accounts. E*Trade has responded by reassuring customers, calling attention to the federal insurance that covers their assets in the form of FDIC and SIPC protection. But it has also liberally advertised its status as "well capitalized" under federal regulatory arrangements[26]. Since this endorsement relates only to the banking subsidiary and not to the consolidated group, which appears to remain thinly capitalized, it would seem to be a clear example of compliance with not-very-stringent regulatory standards being publicized as a government stamp of approval.

A European bank specialized in real estate: Northern Rock

While Northern Rock had some international activities, notably on the funding side, it was primarily engaged in residential lending in the United Kingdom. After several years of aggressive expansion, funded heavily by borrowing in the wholesale money markets, it experienced a crisis of confidence during the summer as liquidity dried up and it suffered the first British bank run since 1866. For several months it was supported by as much as GBP 23 billion from the Bank of England, or more than 20% of its total funding at end June 2007, until being taken over by the Treasury.

Table A2.4 reports the key elements of Northern Rock's balance sheet and resulting capital requirements before the crisis occurred. Points to note:

- Northern Rock's portfolio was highly concentrated, as residential mortgages account for the bulk, around 75%, of assets. Since these are favored by

[26] See the "Business Update" cited in the previous footnote, Slides 4 and 17. See also the Press Release "E*TRADE Financial Announces $2.5 Billion Investment led by Citadel", 29 November 2007.

the Basel framework, risk-adjusted assets are only a fraction, around 30% on a Basel I basis and less than 17% under Basel II, of the actual total.

Table A2.4: Northern Rock Capital Resources, 2006-07
(GBP billion, except per cent where indicated)

	30 June, 2007	31 December, 2006
Actual accounts		
Secured residential mortgages	87.4	77.3
Total assets (net of intangibles)	113.4	100.9
Shareholders' equity (net of intangibles)	2.2	2.1
(as percent of total assets)	2	2.1
Risk-adjusted accounts		
Risk adjusted assets (Basel I basis)	33.9	30.8
(as percent of unadjusted total assets)	29.9	30.5
Risk-adjusted assets (Basel II basis)	18.9	17
(as percent of unadjusted total assets)	16.7	16.8
Tier 1 capital (Basel II basis)	2.1	2.2
(Tier 1 capital ratio, in percent)	11.3	12.8
Total regulatory capital (Basel II basis)	3.4	3.3
(Total regulatory capital ratio, in percent)	18.2	19.1

Source: Northern Rock *Annual Report and Accounts, 2006* and *Interim Results for Six Months Ending 30 June, 2007*.

- As a result, a relatively small capital base yielded a Tier 1 capital ratio of 11.3% in June, down from 12.8% in December 2006. In contrast, actual shareholders' equity was only around 2% of assets (i.e. less than 10% of subsequent Bank of England funding) both at end-June 2007 and end- December 2006.

- The very high regulatory capital ratios reflect Northern Rock's approval from the Financial Services Authority (FSA) from 29 June to calculate risk weights using internal ratings under Basel II. This reduced the risk-adjusted asset base from GBP33.9 to GBP18.9, or by 44%. Thus the shift to Basel II freed up large amounts of capital, even on the already thinly capitalized balance sheet. On a Basel I basis, the Tier 1 capital ratio would have been 6.3%, still well above regulatory requirements.

In its discussion Northern Rock noted that its capital requirements reflected Pillar II obligations, i.e. additional capital judged necessary by the FSA, as well as those calculated by formula under Pillar I. This was to cover risks other than credit and operational risks. In the case of Northern Rock it may plausibly have related to liquidity, or funding, risks which arose from the heavy reliance on short-term borrowing to fund long-term mortgages and the risk that external developments could lead the market to dry up. In the event this was the source of the crisis, so FSA judgment was prescient in a qualitative sense. But the

amounts chosen appear naively small given the actual dependence on short-term funding. In its Interim Results[27] management estimated Pillar II capital to be some 40% of total regulatory capital requirements, which would be less than GBP 1.5 billion and far too small to deal with the liquidity problem when it emerged.

Finally, Northern Rock's discussion betrays little awareness of the storm about to hit and is blunt about the advantages of using internal ratings-based risk-weight calculations. A surplus of regulatory capital was anticipated over the coming 3-4 years which would allow reductions in subordinated debt issues (increasing liquidity risks) and permit "capital repatriation" amounting to GBP 300-400 million, or 13-18% of shareholders' equity. In addition, Basle II enabled a review dividend policy, allowing a 30% increase in the interim dividend.

[27] Northern Rock *Interim Results for Six Months Ending 30 June, 2007*. See discussion of "capital management and basle 2".