

Joint FSF-CGFS Working Group

The role of valuation and leverage
in procyclicality

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Report prepared by a joint FSF-CGFS Working Group¹

Executive summary

This report explores the link between leverage and valuation in the light of the recent experience of market stress. Prior to the crisis, traditional balance sheet measures of leverage did not give an unambiguous signal of higher risk during the boom years of 2003–07. While balance sheet leverage increased at European banks and US investment banks, and for the household sector in many countries, there was not a widespread increase for other banks or the corporate sector.

Nevertheless, a break in the trend in leverage seems to have occurred around 2003–04 as leverage and risk started to build up in less visible ways, and this set the stage for the crisis:

- the leverage and risk embedded in structured credit products increased, making traditional measures of balance sheet leverage less meaningful;
- assets held in highly leveraged off-balance sheet vehicles increased dramatically;
- maturity mismatches, and exposure to funding liquidity risk, increased as off-balance sheet vehicles and some large financial institutions funded a growing amount of long-term assets with short-term liabilities in wholesale markets.

Since the crisis broke in mid-2007, part of this build-up of leverage and risk has reversed, at times with disruptive consequences.

Over a longer time period, and as a result of a range of market and regulatory developments, fair value measurement has come to be more widely used for financial reporting purposes. At the same time, mark-to-market valuation techniques have become more widely used for risk management purposes.

Although it was not well understood during the boom, it has now become clear that these two developments – the increase in leverage and risk during 2003–07 and the spread of market-sensitive valuation techniques – are related. While market practices related to market-sensitive valuation techniques have existed for some time, their growth appears to have created a risk to financial stability. In short, these market practices appear to have contributed to an increase in the procyclicality of leverage in the financial system.

This report discusses six market practices:

- Value-at-risk and other market-sensitive risk measures that did not capture “through-the-cycle” volatility.
- Triggers in debt or over-the-counter (OTC) derivative contracts that reduce a firm’s liquidity in times of stress when a trigger based on a market valuation or credit rating is breached.
- Strongly procyclical haircuts on financing transactions and initial margins on OTC derivatives, which have a similar effect of adding liquidity to the market in a boom and draining it in times of stress.
- Upfront recognition of profits on structured products where some risks were retained.

¹ The Working Group is chaired by Jean-Pierre Landau, Deputy Governor, Bank of France.

- Use of mark-to-market valuation practices even for assets where markets have become illiquid, thereby yielding valuations that seemed too low to some and highly uncertain to many, with adverse consequences for firms reporting such valuations.
- Carrying assets and their hedges at fair value as an alternative to hedge accounting.

The reports sets out a menu of policy options that could be considered to mitigate these procyclical mechanisms (see Annex Table 1 for an overview). These include quantitative limits on leverage, steps to support better measurement and pricing of risk through the cycle (in particular funding liquidity risk), and measures to mitigate procyclical effects that mark-to-market valuation may have on incentives and decision-making.

Looking ahead, the procyclical effects arising from the interplay between leverage and valuation need to be assessed from a macroprudential perspective. It appears desirable for regulators and supervisors to get a clear and comprehensive picture of aggregate leverage and liquidity and have the necessary tools to trigger enhanced surveillance if necessary. Suitably constructed leverage ratios may, both as indicators of potential excesses and safeguards against amplification mechanisms, play a role in a macroprudential framework. The proper pricing of funding liquidity risk in the system could be key in preventing a build-up of leverage and maturity mismatches in the future. Valuation and risk measurement methodologies, while keeping as close as possible to market inputs and best practices, should also avoid creating incentives for excessive risk-taking through underestimating the price of risk.

1. Introduction

A number of developments in the global financial system seem to have strengthened the linkages between asset valuation and financial leverage. These include: more marketable assets, especially structured credit products with high “embedded” leverage that are accounted for on a mark-to-market basis, and more leveraged position-taking, both inside and outside the regulated sector (off bank balance sheets – structured investment vehicles (SIVs) and asset-backed commercial paper (ABCP) conduits – broker-dealers, asset managers).

These changes in the financial system and in related market practices seem to have amplified business fluctuations and exacerbated financial instability during the current cycle (“procyclicality”). While procyclical mechanisms are particularly disruptive during periods of market strain, they may encourage excessive risk taking in the expansion phase. Hence, mitigating the procyclical interplay of valuation and leverage appears desirable to enhance the stability of the financial system.

Against this backdrop, the April 2008 *Report of the Financial Stability Forum on enhancing market and institutional resilience*, prepared for the G7, set in train an examination of the forces that contribute to procyclicality in the financial system and possible mitigating options. This work centres on three areas: (1) the Basel II capital accord; (2) loan loss provisioning; and (3) valuation and leverage.

As part of this effort, the FSF and CGFS undertook a joint fact-finding exercise through dialogue with market participants on the interaction between leverage and valuation and its effect on procyclicality under the chairmanship of Jean-Pierre Landau of the Bank of France.² The Working Group on this topic focused its efforts on three particular aspects: the evolution of leverage in the broader economy and the financial system; the relevance of market-sensitive valuation; and procyclical effects arising from risk management and valuation practices.

This report is structured as follows. Section 2 discusses different concepts of financial leverage and documents how measures of financial leverage have evolved over time across financial and non-financial sectors. Section 3 discusses valuation techniques for risk measurement purposes as well as for accounting, and documents the extensive use of fair valuation for financial assets. Certain risk management practices that may lead to procyclicality in leverage are reviewed in Section 4. Section 5 explores how certain fair value practices may lead to procyclicality in leverage either through incentives arising from upfront recognition of profits or by contributing to adverse market dynamics when liquidity evaporates. Policy options to mitigate excessive procyclicality in the financial system resulting from this interplay are then explored in Section 6.

2. Leverage

An entity whose exposure to risky assets exceeds its equity capital is said to be leveraged. Leverage increases a firm's risk exposure in order to generate a higher return on available equity capital. A firm typically takes on leverage by increasing debt to fund the purchase of risky assets.³ A leveraged firm faces a higher risk that its equity capital can be wiped out when outcomes from its exposure to risky assets are unfavourable. Higher leverage magnifies market risk and liquidity risk as leveraged firms may be forced to sell assets in order to reduce exposure under adverse market conditions.

² The dialogue with the private sector included a roundtable discussion with representatives of financial institutions, audit firms and accounting standard setters in December 2008 and bilateral interviews of Working Group members with market participants in Australia, Canada, France, Italy, Japan, Luxembourg, Spain, Sweden, Switzerland, the United Kingdom and the United States.

³ The same risk exposure can be achieved without debt by using derivatives.

Leverage increased at a different pace inside and outside the financial system during the boom years 2003–07. Overall, financial system leverage grew much faster than in the non-financial sectors. But fast-growing leverage inside the financial system affected risk-taking in other sectors as it led to a relaxation of funding constraints and encouraged many households and some businesses in a wide range of countries to increase leverage.

2.1 Difficulties in measuring leverage

Balance sheet leverage is measured as the ratio of total assets on balance sheet to equity. This gross balance sheet leverage is widely used as it requires only readily available data. Balance sheet leverage can be refined by taking into account off-balance sheet exposures, but it has fundamental limitations as a risk measure because it does not adjust for the risk of the assets, nor does it capture risks from derivatives.⁴ Netting rules in accounting standards also affect balance sheet leverage. Balance sheet leverage under the International Financial Reporting Standards (IFRS) will typically be higher than under US generally accepted accounting principles (GAAP) for the largest dealer banks.⁵

Alternative measures of leverage adjust for risk. The inverse Tier 1 capital ratio takes risk into consideration by risk-weighting assets and including capital for market risk.⁶ Another risk-adjusted measure of exposure, though not strictly a leverage measure, is the ratio of trading book value-at-risk (VaR) to equity.

There are important risks that measures of leverage do not capture. None of these measures reflects funding liquidity risk, which depends on the degree of asset-liability maturity mismatch. The liquidity characteristics of the assets being held can also have a bearing on the risk of a leveraged position.

2.2 Non-financial sector leverage

Household sector leverage

Household credit has expanded rapidly in many industrialised countries during the past decade or so. This has been particularly marked in countries with booming housing markets, including the United States, the United Kingdom, France, Spain and several smaller advanced economies. Correspondingly, the stock of mortgage debt has risen considerably in these countries. The increase in gross household sector leverage has been particularly pronounced in the United Kingdom and the United States (Graph 1).⁷ Part of the increase in household sector leverage has been funded by banks through securitisation activities but another significant part has remained in banking books.

Corporate sector leverage

Leverage in the corporate sector is volatile and tends to move in tandem with global economic cycles. There is little evidence of a widespread and material build-up of leverage in the corporate sector during the run-up to the current financial market crisis (Graph 2). Aggregate leverage in the corporate sector has fallen in many industrial countries since 2003.

⁴ See the report of Counterparty Risk Management Policy Group I (1999), which discusses various measures of leverage.

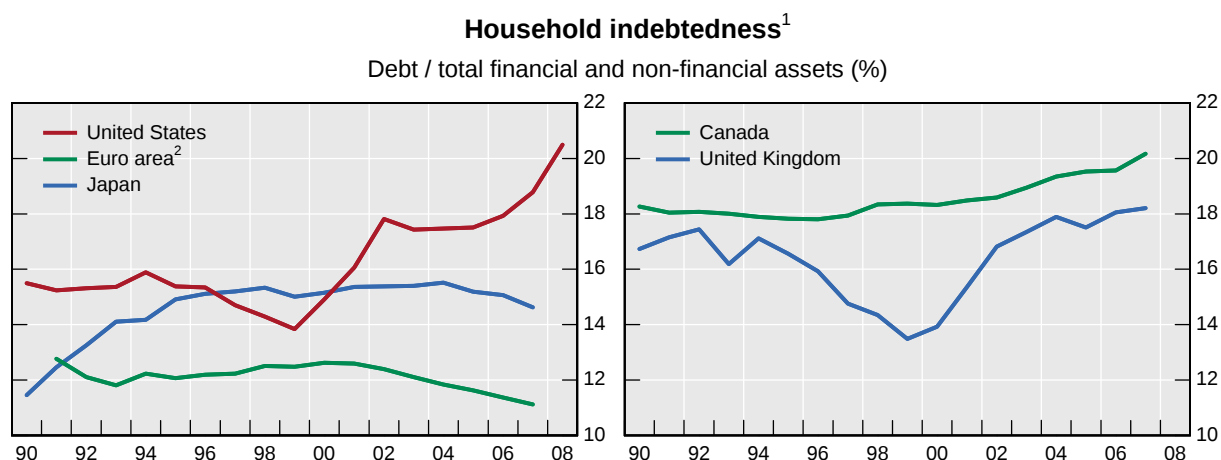
⁵ For example, a greater degree of netting is permitted under US GAAP than IFRS for OTC derivatives and repurchase transactions.

⁶ The Tier 1 capital ratio is the core regulatory equity capital of the bank divided by risk-weighted assets held on-balance sheet.

⁷ The leverage measures discussed in this section are balance sheet measures (usually gross balance sheet leverage).

But private equity and leveraged finance mergers and acquisitions increased during the boom, resulting in leverage increasing outside of publicly traded firms.⁸

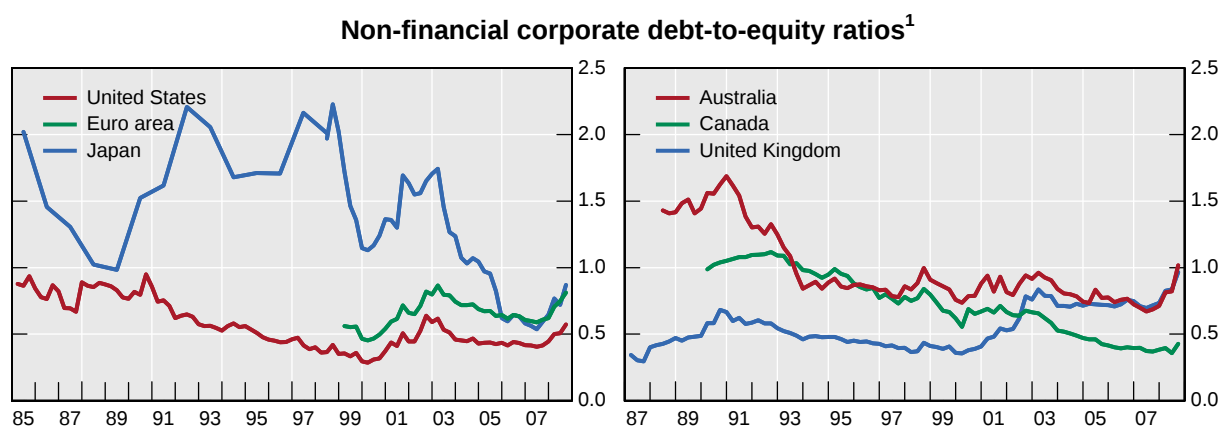
Graph 1



¹Data for 2007 for Japan, Germany and Italy on non-financial assets are estimated using the growth rate of the previous year. 2008 data for the United States refer to the third quarter. ²Weighted average of France, Germany and Italy based on 2005 GDP and PPP exchange rates.

Sources: OECD, *Economic Outlook*; US Flow of Funds; Datastream; national data.

Graph 2



¹Based on flow of funds data; for Japan, annual data up to 1998, quarterly data thereafter.

Sources: Datastream; national data.

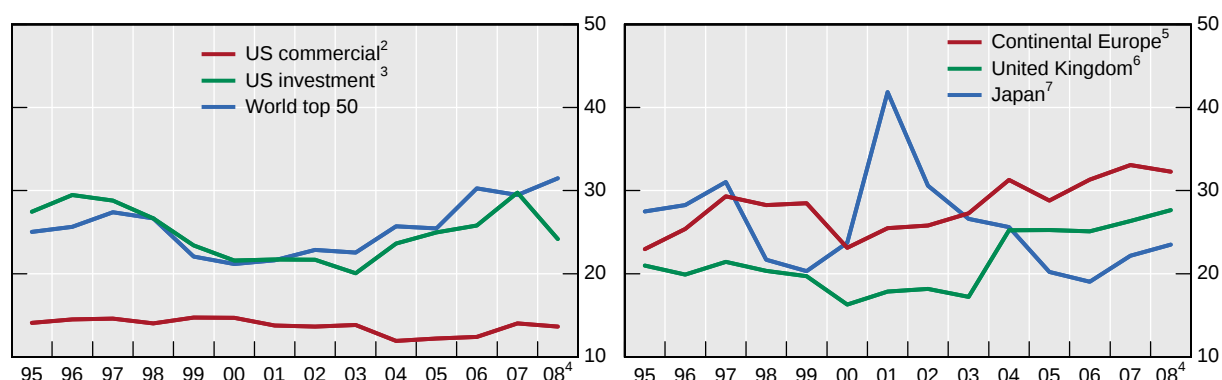
2.3 Bank leverage

For European banks and US investment banks, balance sheet leverage began to increase steadily around 2003 (Graph 3). However, the peak levels of this measure of leverage reached in 2007 were not greater than those reached in past cycles. In contrast, for US commercial and Japanese banks, aggregate balance sheet leverage did not increase (or even fell) over this period. However, the dispersion of leverage among commercial banks has increased since 2003–04 in a wide range of countries.⁹

⁸ See CGFS, *Private equity and leveraged finance markets*, July 2008.

⁹ Net measures of risk, including net over gross leverage, failed during times of illiquid market conditions to adequately capture risks arising from underlying liquidity mismatches and the extent of positions to be hedged.

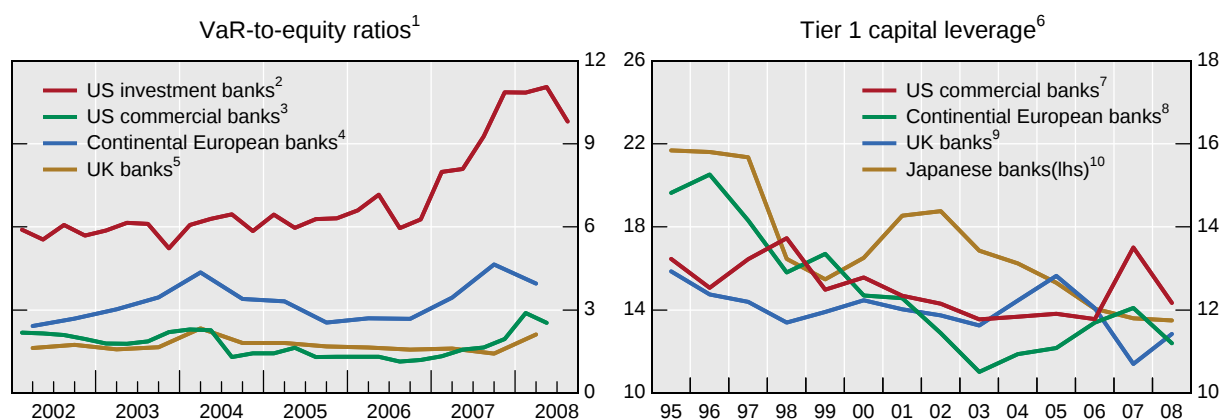
Graph 3
Bank balance sheet leverage ratio¹



¹ Balance sheet leverage ratio (total assets divided by total equities) of individual banks weighted by asset size. ² Bank of America, Citigroup, JPMorgan Chase, Wachovia Corporation, Washington Mutual and Wells Fargo & Company. ³ Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch and Morgan Stanley. ⁴ Latest quarter. ⁵ ABN AMRO Holding, Banco Santander, BNP Paribas, Commerzbank, Crédit Agricole, Credit Suisse, Deutsche Bank, Société Générale, UBS and UniCredit SpA. ⁶ Barclays, HSBC, Lloyds TSB Group and Royal Bank of Scotland. ⁷ Mitsubishi UFJ Financial Group, Mizuho Financial Group and Sumitomo Mitsui Financial Group.

Source: Bankscope.

Graph 4
Risk-adjusted measures of leverage



¹ Annualised trading VaR at 99% confidence divided by total equities weighted by asset size; in per cent. ² Goldman Sachs, Lehman Brothers and Morgan Stanley. ³ Bank of America, Citigroup and JPMorgan. ⁴ BNP Paribas, Deutsche Bank, Société Générale and UBS. ⁵ Barclays, Royal Bank of Scotland and HSBC. ⁶ Reciprocal of Tier 1 capital ratio weighted by assets size. ⁷ Bank of America, Citigroup, JPMorgan, Wachovia Corporation, Washington Mutual and Wells Fargo. ⁸ ABN AMRO Holding, Banco Santander, BNP Paribas, Commerzbank, Credit Suisse, Deutsche Bank, Société Générale, UBS and UniCredit SpA. ⁹ Barclays, HSBC and Lloyds TSB Group. ¹⁰ Mitsubishi UFJ Financial Group, Mizuho Financial Group and Sumitomo Mitsui Financial Group.

Sources: Bankscope; Bloomberg.

Risk-adjusted leverage measures show broadly stable bank leverage until the onset of the financial turmoil. The VaR-to-equity ratio for all groups of banks considered here remained broadly stable or even declined until mid-2006 (Graph 4, left-hand panel). However, for European banks and US investment banks it rose rapidly between mid-2006 to mid-2007, probably reflecting the increase in credit and equity market volatility during that period. The inverse Tier 1 capital ratio reveals a similar picture (Graph 4, right-hand panel), remaining broadly stable or even declining modestly from 2002 until mid-2006. This reflected, with

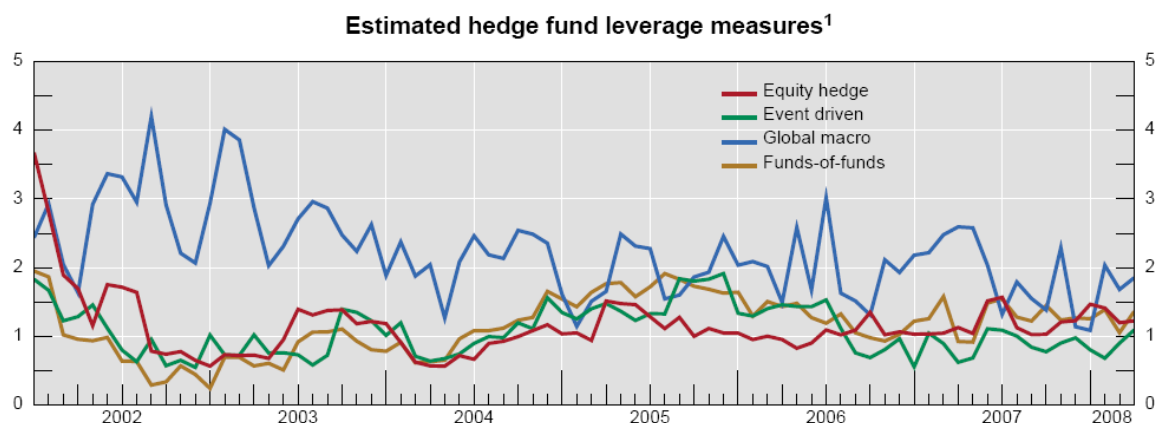
hindsight, that risk weights were perhaps too low, especially for positions in the trading book.¹⁰

In addition to growing credit exposures on banks' balance sheets, off-balance sheet vehicles substantially contributed to the build-up of financial leverage during the current cycle. The fastest-growing segments of the ABCP market were SIVs, collateralised debt obligations (CDOs) and securities arbitrage programmes, all of which were designed explicitly to invest in long-term assets and securities.¹¹ In addition, single-seller ABCP conduits, such as those created to fund warehouses of newly originated mortgages, also grew significantly. By extending credit and liquidity support to these off-balance sheet vehicles, banks were exposed to funding liquidity risk. Measures of bank balance sheet leverage failed to capture this risk. Even so, re-intermediation onto bank balance sheets caused traditional balance sheet leverage to expand, ex post, exactly at a time when banks were seeking to reduce, not increase, risk exposures.

2.4 Hedge fund leverage

Leverage ratios for hedge funds are not readily available. However, data on their investment returns and strategy can be used to draw inferences about their use of leverage.¹² This analysis is most informative in identifying changes in leverage. Estimates of hedge fund leverage do not show a clear increase in leverage and have remained broadly stable since 2003 (Graph 5).

Graph 5



¹ The leverage indicator is estimated using a rolling (24-month window fixed effects) regression of hedge fund returns on a variety of market-based risk factors. It is the sum of the coefficients on these risk factors and is thus a measure of the aggregate sensitivity of hedge fund returns to movements in underlying prices.

Sources: HFR; BIS calculations.

2.5 Embedded leverage

Structured credit products have altered the amount of leverage that can be taken on through on-balance sheet financial instruments without increasing balance sheet leverage. Through pooling and tranching, structured credit instruments can give investors a multiple of the exposure they would otherwise obtain by directly purchasing an asset. For example, the Joint Forum (2005) discussed the leverage embedded in the tranches of a hypothetical CDO

¹⁰ See Basel Committee on Banking Supervision, *Proposed enhancements to Basel II framework*, January 2009.

¹¹ In the United States, the outstanding volume of ABCP rose from \$650 billion in early 2004 to \$1.2 trillion in mid-2007. It subsequently fell to \$720 billion at end-2008.

¹² See P McGuire and K Tsatsaronis, "Estimating hedge fund leverage", *BIS Working Papers*, no 260, 2008.

exposed to a portfolio of corporate bonds.¹³ In that example, the leverage of the junior CDO tranches was around 15 times greater than that of the underlying portfolio, while the leverage of the most senior tranches was between one third and one tenth of that of the underlying portfolio. Re-securitisation compounded embedded leverage (Box 1). A misunderstanding of the risk of structured products, especially CDOs backed by subprime residential mortgage-backed securities, was a key factor in the build-up of risk that led up to the crisis.¹⁴

Embedded leverage depends on the specific characteristics of each structured instrument, which makes it difficult to assess aggregate embedded leverage for one institution or the financial system as a whole. Clearly, the growth in structured products with embedded leverage has made traditional balance sheet leverage less meaningful as a measure of risk.

Box 1

Leverage in structured products and the US housing market downturn

Structured credit products referencing US subprime mortgages exposed investors to much higher leverage and losses than the stress scenario modelling they performed had implied. First, an investment in a subordinated tranche of a subprime residential mortgage-backed security had a leveraged exposure to the underlying subprime mortgage loans (embedded leverage).

Second, re-securitisation compounded the multiplier effect of embedded leverage. For example, mezzanine tranches of mortgage securitisations (which themselves have embedded leverage) were often purchased by CDOs, which in turn issued senior and subordinated tranches, creating additional leverage on top of that embedded leverage in subordinate tranches.

The magnitude of this embedded leverage was estimated by investors with models using assumptions about the likely future path of house prices. Hence, investors could not always be certain about the degree to which their exposure to the mortgage market was leveraged at the time of investment. When delinquency assumptions associated with subprime mortgage securitisations of 2005–07 proved to be far too low, the leverage and losses experienced by investors were much greater than anticipated.

2.6 Funding and maturity mismatches

Abundant market and funding liquidity before the financial turmoil encouraged the build-up of maturity mismatches through short-term borrowing in wholesale markets. One mechanism was the increasing use of repo financing to fund long-term assets. For example, between 2004 and 2007 the size of the repo market more than doubled while the volume of term repos fell substantially. Indeed, the increase in repo financing as a fraction of total assets among major banks and securities firms in 2006–07 largely accounted for growth in overnight repos. A second mechanism was the reliance on short-term debt to fund long-term assets in the US municipal bond market. Through the end of 2007, it became common for US states and local governments to issue long-term bonds that were resold into special purpose vehicles that funded the original securities by issuing short-term floating rate notes. Short-term funding of off-balance sheet vehicles constituted a third mechanism through which maturity mismatches were built up. Funding for these vehicles was primarily secured by issuance of short-term ABCP, which grew rapidly between early 2003 and mid-2007.

These funding maturity mismatches did not affect measured leverage, but increased systemic vulnerability arising from the leveraged positions. In aggregate, the financial system's reliance on short-term funding in wholesale markets increased. When the housing market downturn in the United States became more severe, funding markets became illiquid.

¹³ See Joint Forum, *Credit risk transfer*, Basel Committee on Banking Supervision, 2005, Annex 1.

¹⁴ Joint Forum, *Credit risk transfer: developments from 2005 to 2007*, Basel Committee on Banking Supervision, 2008, <http://www.bis.org/publ/joint21.pdf>.

This caused forced sales of assets, typically in markets that were already under pressure, which reinforced price declines in those securities markets.

3. Valuation

Valuations in financial markets serve as input for financial reporting in accordance with accounting standards (Box 2) and for risk measurement. Market prices are used to value financial assets either directly or through valuation techniques, such as model-based valuation methods that use them as inputs. Because valuations affect reported profits, capital, and risk management measures, they can influence investment decisions.

3.1 Market valuation in risk measurement

Separate from their use for financial reporting, mark-to-market valuation techniques are essential for the risk management of trading portfolios. The market value of a trading position influences decisions on haircuts and margin requirements, and whether certain exposures are to be retained or sold. Valuations also affect measures of price risk, and therefore, position limits for traders and their market-making function.

Box 2

Fair value for financial instruments under accounting standards

Generally, for financial reporting purposes under IFRS, financial assets that are measured at fair value are those held as (a) financial instruments measured at fair value through profit or loss (including derivatives) or (b) assets available for sale (AFS). Financial instruments measured at fair value through profit or loss are those held for trading and any other financial instruments designated by management at fair value (often referred to as the “fair value option”, FVO).

As a result of the mark-to-market process for the first set of instruments, changes in their fair value directly impact firms’ income statements in the period in which they occur. Changes in the fair value of financial assets classified as AFS are recorded directly in equity without affecting profit and loss (other than for impairment) until the financial assets are sold, at which point the cumulative change in fair value is charged or credited to the income statement. In contrast, unless held for sale, loans are typically measured at amortised cost using the effective interest method, less an “allowance” or “provision” for impairment losses. Loans held for sale may be reported in trading or AFS portfolios, or, under US GAAP, in held for sale portfolios (at the lower of cost or fair value). Both IFRS and US GAAP also have categories for held-to-maturity assets which are reported at amortised cost, less impairment.

Financial liabilities of financial institutions are generally reported at historical cost, except for trading liabilities (eg short sales, certain derivatives) and liabilities subject to the FVO.

3.2 The share of fair value assets and liabilities

Bank balance sheets and income statements have been responsive to changes in the fair value of assets held. Available evidence suggests that the share of bank assets measured at fair value has been substantial in recent years. For instance, in the United States, the share of fair value to total assets among bank holding companies ranged from 26% to 30% between 2002 and 2008 (Table 1). In Switzerland, fair value assets accounted for 33% to 45% of total assets between 2003 and 2007.

In 2007, a survey of global banks found that the share of fair valued assets among banks’ total assets ranges from 10% to 55%, with about one half of countries reporting a share in the range of 30–50%.¹⁵

¹⁵ The survey was conducted by the Accounting Task Force (ATF) of the Basel Committee on Banking Supervision; it covered 13 countries and used late-2007 data.

Table 1
Share of fair value assets and liabilities for banks¹

In per cent

	2008	2007	2006	2005	2004	2003	2002
Share of FV assets ²							
France	46.8	46.5	45.5	47.1	-	-	-
Italy	18.0	19.0	21.3	20.9	-	-	-
Japan	24.9	27.0	27.6	28.3	27.6	27.3	24.4
Netherlands	27.5	28.4	30.6	32.4	30.6	-	-
Spain	15.6	17.2	17.8	-	-	-	-
Switzerland ³	29.6	44.8	38.7	35.5	34.8	33.4	-
United States ⁴	30.4	26.9	25.0	24.8	26.0	27.2	26.3
Share of FV liabilities ⁵							
France	34.1	30.1	27.9	29.0	-	-	-
Italy	9.5	9.4	9.4	9.7	-	-	-
Japan	2.2	2.9	1.9	1.8	1.4	1.5	1.8
Netherlands	19.0	15.7	14.2	15.3	13.1	-	-
Spain	5.7	6.6	6.7	-	-	-	-
Switzerland ³	19.5	24.1	17.5	15.1	14.1	13.3	-
United States ⁴	8.0	7.4	4.2	4.0	4.7	4.8	4.5

¹ The numbers are compiled based on information provided by members of the Working Group; figures are based on national GAAP for the United States and Japan, and IFRS for other countries. ² Relative to total assets. ³ Credit Suisse and UBS. ⁴ The observations are based on numbers compiled from bank holding company (BHC) FR Y-9C reports. The BHC asset threshold for required reporting was increased from \$150 million to \$500 million in March 2006. Some BHCs below the threshold may also file reports in certain circumstances. ⁵ Relative to total liabilities.

A number of factors have played a role in the extensive use of fair value assets:

- A larger fraction of credit has been intermediated outside the banking system through securitisation. Assets held on a bank's balance sheet on a short-term basis awaiting securitisation are often accounted for at fair value in the trading book.
- Banks have adopted the fair value option for loans and securities held on a long-term basis to avoid the income volatility that occurs when derivatives used as hedges are fair valued but the hedged loans are not. Hedge accounting provided an alternative mechanism to avoid income volatility, but many large banks limited their use of hedge accounting due to the complexity associated with hedge accounting rules and related documentation requirements.
- In some cases, banks increasingly chose to book credit exposures in the trading book due to lower regulatory capital charges.
- Banks engaged in capital market activities, such as OTC derivatives market-making or prime brokerage, take on short-term exposures that are measured at fair value in the trading book.

4. Procyclical risk management practices

This section documents risk management practices relying on market valuations that appear to have contributed to procyclical changes in leverage.¹⁶

4.1 Value-at-risk and other risk measurement tools

Traditional measures of market risk often fall during a boom since rising asset prices are associated with low volatility. As measures of risk decline, there is an incentive to take on additional risk and leverage. Indeed, the ratio of VaR to total equity of banks fell until mid-2006 (Graph 4, right-hand panel) even though the size of bank trading books rose. Once a cyclical peak is reached, falling asset prices lead to higher asset price volatility and higher measures of VaR, which can trigger a reduction in risk appetite and leverage. If risk measurement tools such as VaR do not “see through the cycle”, procyclicality in leverage can result. Model risk and inadequate historical data on some asset classes can further add to the low risk perception and encourage higher leverage.

Such shortcomings contributed to banks’ losses in the current crisis. Discussing its losses on super-senior ABS CDOs, one bank mentioned that its VaR methodologies relied on the triple-A rating of its super-senior positions.¹⁷ Specifically, VaR was calculated using a historical time series for other triple-A rated positions. Until the third quarter of 2007, this time series displayed very low levels of volatility. As a consequence, even unhedged super-senior positions contributed little to VaR usage. Significant risks materialised on such products subsequently.

4.2 Triggers based on market value or rating

Triggers are contractual provisions that give a creditor extra protection if conditions deteriorate beyond a pre-set threshold. The extra protection can take the form of additional collateral requirements or additional control rights over the borrower’s actions. In the presence of a trigger, market participants allow more debt financing because the trigger makes the debt look less risky. While triggers can effectively protect creditor interests against idiosyncratic shocks, they exacerbate procyclicality when a shock is systemic.

In the recent crisis, SIVs were a leading example of how market value triggers led to procyclical leverage. SIVs funded portfolios of long-term fixed income securities with medium-term notes and ABCP. Credit rating agencies gave debt issued by SIVs the highest ratings, which were based in part on the presence of a market value trigger. If the market value of a SIV’s portfolio fell below a threshold, it would be deemed undercapitalised and would be required to enter a wind-down mode.

The rating agency models assumed that future asset price volatility could be estimated with historical data. As asset price volatility rose in the current market turmoil, investors lost confidence in the SIV rating models and the SIVs became unable to roll over their ABCP and medium-term notes. This loss of confidence occurred despite the fact that SIVs held little subprime-related exposure. However, the leverage of the SIV structure could not be sustained in a market downturn, and they either were forced to restructure on distressed terms or received support from their bank sponsors.

Triggers that require collateral posting in response to changes in credit ratings also make leverage procyclical. For example, insurance company AIG included triggers based on its credit rating in many of its guaranteed investment agreement contracts (which are similar to

¹⁶ This section documents broad international trends in these practices, the relative importance of which may vary across countries.

¹⁷ UBS AG, “Shareholder report on UBS’s write-downs”, 18 April 2008.

issued debt) and its OTC derivative contracts.¹⁸ These triggers required AIG to post significant amounts of collateral upon a downgrade of its credit rating. When AIG was downgraded in September 2008, its liquidity came under stress and it was unable to access enough liquidity to meet collateral calls.

4.3 Haircuts and initial margins

Banks negotiate haircuts on financing transactions and initial margins on OTC derivatives to protect themselves from the risk of a counterparty default. The haircut on a financing transaction is a buffer protecting against default; it is similar to a capital charge. Accordingly, a low haircut is equivalent to high leverage. Available data show that haircuts and margins were low, and leverage was high, leading up to 2007. Haircuts and margins rose substantially in 2008 as deleveraging occurred (Table 2).

Table 2
Typical haircut or initial margin
In per cent

	April 2007	August 2008
US Treasuries	0.25	3
Investment grade bonds	0–3	8–12
High-yield bonds	10–15	25–40
Investment grade corporate CDS	1	5
Senior leveraged loans	10–12	15–20
Mezzanine leveraged loans	18–25	35+
ABS CDOs		
AAA	2–4	95 ¹
AA	4–7	95 ¹
A	8–15	95 ¹
BBB	10–20	95 ¹
Equity	50	100 ¹
AAA CLO	4	10–20
Prime MBS	2–4	10–20
ABS	3–5	50–60

ABS = asset-backed security; CDO = collateralised debt obligation; CDS = credit default swap; CLO = collateralised loan obligation; MBS = mortgage-backed security; RMBS = residential mortgage-backed security. ¹ Theoretical haircuts as CDOs are no longer accepted as collateral.

Source: IMF.

This sharp increase in margins and haircuts on a range of assets exacerbated deleveraging pressures and reinforced the interaction between valuation and leverage. In the light of this experience, the Counterparty Risk Management Policy Group III has called for a “paradigm shift in credit terms”, urging market participants to establish haircuts and initial margins that are stable over the credit cycle.¹⁹

¹⁸ Board of Governors of the Federal Reserve System, “Report pursuant to Section 129 of the Emergency Economic Stabilization Act of 2008: restructuring of the government’s financial support to the American International Group, Inc. on November 10, 2008,” http://banking.senate.gov/public/_files/CongressionalReportRestructuringFinal.pdf.

¹⁹ See the report of the CRMPG III, *Containing systemic risk: the road to reform*, 2008. For a microeconomic foundation of the procyclical properties of haircuts and VaR, see T Adrian and H S Shin, “Financial intermediary leverage and value at risk”, *Federal Reserve Bank of New York Staff Reports*, no 338, 2008.

5. Procyclical valuation practices

This section explores the significance of valuation practices during the last upswing. It also examines how valuation practices may have reinforced adverse market dynamics during the financial crisis.²⁰

5.1 Upfront recognition of profits

Certain valuation practices and accounting treatments may have provided incentives to structure transactions that allowed upfront recognition of profits (the margin on the transaction) even when banks were exposed to the economic risks of the transaction for a number of years. Specifically, upfront recognition of income occurred in certain cases for structured credit products accounted for at fair value even when certain risks were retained by the banks (see Box 3 for examples).²¹

Box 3

Examples of transactions that result in upfront profits¹

Negative basis trades allow market imperfections to be exploited when the yield on a structured credit product exceeds the cost of funding it and buying credit risk insurance. In the years prior to the current crisis, banks funded the purchase of such assets and bought credit protection from monoline insurers. Because accounting treatment would regard the residual risks over the life of the transaction to be small, the excess spread could be booked as an upfront profit. Substantial losses were subsequently incurred as credit adjustments had to be made against monoline exposures.

Leveraged super-senior (LSS) notes offer a yield enhancement by combining the yield on a highly rated structured credit product with the premium received from writing credit protection on a super-senior tranche for a multiple of this amount. By acting as an intermediary, the bank provides market access to investors for whom guidelines disallow selling credit protection. Accounting treatment of this transaction would permit the bank to record the credit spread between the protection it has sold and the protection it has bought from the investor via the LSS note as an upfront profit. While the loss to the investor is capped at the value of the initial note investment, the bank is exposed to risks if losses on the credit protection sold exceed this amount. This type of transaction was common prior to the crisis, and generated material losses for banks.

¹ These examples were provided by private sector participants in discussions with the Working Group.

While the upfront recognition of profit on such transactions is appropriate when all the issued securities are sold into the market and no risks are retained by the bank, it appears less reasonable when the bank retains risk exposure.

More generally, valuation gains in a boom may be attributable to unusually low risk premia in financial markets. This leaves the investor exposed to rising risk premia and possibly growing valuation uncertainty if market liquidity deteriorates. This, in turn, may cause valuation losses that go beyond those resulting from normal cyclical fluctuations in asset prices.

²⁰ This section documents broad international trends in these practices, the relative importance of which may vary across countries.

²¹ Under IFRS, when unobservable market data have a significant impact on the valuation of financial instruments, the entire initial difference in fair value indicated by the valuation model from the transaction price is not recognised immediately in the income statement ("day one" profit) but is recognised over a subsequent period.

5.2 Desire to avoid hedge accounting

Growth in the credit derivatives market has made it easier for banks to attempt to economically hedge their credit exposures. In circumstances where loans or other assets that were being hedged were accounted for at historical cost, income volatility would arise as derivatives were recorded at fair value. One way for banks to reduce this income volatility would be to use hedge accounting for financial reporting purposes. However, the hedge accounting requirements in US GAAP and IFRS are complex and require extensive documentation, and hedges of credit exposures often do not meet the requirements for hedge accounting.²² This has led many institutions to not use hedge accounting techniques but instead report financial assets that were being hedged in trading portfolios or use the fair value option.

Some of these hedges utilising the fair value option became less effective during the crisis when the liquidity of a cash asset declined by more than the liquidity of the derivative used as a hedge. The elevated basis risk contributed to increased income volatility, which subsequently drove some of the deleveraging that took place.²³

5.3 Adverse price dynamics

The extensive use of fair value accounting may have encouraged market practices that contributed to excessive risk-taking or risk-shedding activity in response to observed changes in asset prices. This mechanism became clear at times of adverse market dynamics, particularly as liquidity in financial markets evaporated. When the markets for many credit risk exposures became illiquid over 2007–08, credit spreads widened substantially as liquidity premia grew. Wider spreads drove down mark-to-market valuations on a range of assets. Some fair valued assets that became illiquid were marked down to traded derivative indices. Around 6% of fair valued assets were reported to be illiquid as of end-2007; valuation techniques based on unobservable inputs are required to determine their fair value.²⁴

The extensive use of fair value accounting meant that, across the financial system, these declines in valuations translated into lower earnings or accumulated unrealised losses in the equity account for securities held for sale. Mark-to-market losses eroded banks' core capital, causing balance sheet leverage to rise. Banks sold assets in an attempt to offset the rise in balance sheet leverage, but such sales only pushed credit spreads wider, causing more mark-to-market losses.

6. Policy options

The previous sections of this report highlighted how a range of factors, including procyclical movements in market liquidity and asset prices, have contributed to procyclical movements

²² For example, under IFRS, in order to qualify for cash flow or fair value hedge accounting treatment, the derivative and the hedged item must satisfy, at the inception of the hedge and on an ongoing basis, strict and often complex hedge effectiveness tests. In contrast, when certain criteria are met, under the fair value option both sides of such a transaction would be measured at fair value and the accounting mismatch of "economic hedging" of risk positions could be addressed without applying complex hedge effectiveness tests otherwise required by IFRS. Also, extensive documentation needed to support hedge accounting treatments would not normally be expected when the fair value option is used. US GAAP has similar rules.

²³ For ineffective hedges, such as those that might occur during periods of severe market illiquidity, hedge accounting may have a result similar to approaches subject to fair value accounting since hedge ineffectiveness is reported in profit and loss.

²⁴ These fall under category of Level 3 assets. See IMF, *Global Financial Stability Report*, October 2008.

in leverage. To fully understand these developments, it is necessary to adopt a system-wide view by examining how valuation and risk management techniques affected behaviour and interactions between both financial institutions *and* financial markets. This implies that any discussion of potential policy options must also be considered from a macroprudential perspective. One objective of this set of proposals would be to dampen the procyclicality of market liquidity and asset prices, thereby helping to achieve the macroprudential objective of reducing procyclicality throughout the broad financial system (both institutions and markets).

This section offers a menu of policy options designed to affect incentives and behaviour in ways that would mitigate procyclicality in the financial system. These options fall into two broad categories: (A) direct quantitative constraints on leverage as complementary elements to risk-based leverage; and (B) indirect measures aimed at affecting incentives and behaviour through changes in risk measurement, pricing and financial reporting. In addition, the Working Group also discussed dynamic provisioning (see Box 4) in the context of valuation of risks.

Box 4

Dynamic provisioning

The dynamic provisioning approach uses historical credit loss information over credit cycles to estimate the general provision for homogeneous loan portfolios. Some national authorities argue that this approach does not represent an expected loss model, but rather reflects a collective assessment of incurred loan losses at the balance sheet date based on statistical techniques.

A key feature of dynamic provisioning is that it is designed to reflect credit risks and credit losses that may build up in bank loan portfolios in the boom periods before they become apparent in downturns. These general provisions diminish during economic downturns as losses become associated with specific loans, thus giving rise to specific provisions. The approach includes key disclosures to enhance transparency, and a cap and a floor on the amount of the general provision, for example, in order to avoid excess provisioning in good times that smooth the P&L account. This approach deserves to be studied as part of the consideration of the procyclicality of the financial system.

A separate FSF Working Group has been reviewing the role of provisioning practices in procyclicality, and whether standard setters should review ways to improve the accounting standards for loan loss provisioning, including consideration of fair value, expected loss and dynamic provisioning approaches.

A) Quantitative constraints on leverage

6.1 Leverage ratios and related information needs

A leverage ratio is defined by the total amount of nominal (non-risk-weighted) assets, possibly augmented by certain off-balance sheet items, that a financial institution holds relative to its capital.²⁵ Maximum leverage ratios have been implemented in some countries for many decades, and were introduced recently in Switzerland.

Pros:

- *Transparency.* Leverage ratios are easy to measure and timely.

²⁵ Leverage ratios using indicators which display strong procyclical behaviour, such as gross earnings, could also be considered.

- *Relevance in times of stress.* In circumstances when risk measures become highly uncertain, leverage ratios provide a gauge of the magnitude of exposures an institution has to manage.
- *Complementary indicator.* Leverage ratios can usefully complement risk-weighted capital requirements and act as a check on the viability of individual institutions in extreme circumstances.
- Controls the build-up of leverage during the boom.

Cons:

- Differences in accounting standards and methodology limit their comparability across jurisdictions.
- Binding constraints on balance sheet leverage may encourage regulatory arbitrage through the expansion of off-balance sheet activities. One area of future research might be the coverage of off-balance sheet exposures in regulatory policies.
- Limits on nominal balance sheet leverage may encourage exposure to more risky assets to enhance the return on equity.
- Constant caps on leverage ratios may force banks to deleverage in the downturn of the cycle.

As indicators of potential vulnerabilities, leverage ratios could play the role of a precautionary backstop in macroprudential supervision, for both systemically important financial institutions and the system as a whole. For instance, leverage ratios exceeding certain ranges (at the level of individual institutions or the whole system) could trigger a process of surveillance and review followed, if necessary, by corrective interventions.

Another option could be to use leverage ratios as a tool to link balance sheet adjustments directly to the financial cycle. For instance, minimum capital requirements as implied by a leverage ratio (or the Basel II Tier 1 ratio) could be combined with a long-term target level. Financial institutions would be required to raise buffers to at least this target level in good times and reduce them to the minimum requirement during downturns. Thus, the range between these two levels would provide scope to accommodate countercyclical movements.²⁶

A prerequisite for the effective monitoring of aggregate leverage in the economy by authorities is adequate information. The extent of leverage accumulated over the last years – especially in off-balance sheet vehicles and in the form of embedded leverage – has only recently become apparent. Hence, authorities may consider which information on the positions and activities of financial institutions would be needed to identify such a build-up of leverage.

6.2 Require minimum initial margin for OTC derivatives

Initial margins or upfront premiums for derivatives define the degree of leverage that can be taken through notional exposures.

Pros:

- Raising minimum initial margins and requiring them to be relatively stable over the cycle can limit the build-up of leverage when risk perception is low.

²⁶ The adjustment process within this range could be linked in a non-discretionary manner, for instance, to banks' net earnings or dividend policies.

Cons:

- Implementation costs – especially in the form of enforcement costs – and the ease of evasion loom large.
- Empirical evidence suggests no link between margin requirements and asset price volatility.

Issues:

- The migration of trading of some instruments such as CDS to organised exchanges or central clearing arrangements may help in the monitoring of margining practices.

An alternative way to promote more stable initial margin requirements could be through greater transparency. For instance, by collecting and publishing data on margin levels, supervisors could more easily monitor the stability of margins over the cycle, and market participants would be able to choose appropriate risk levels by comparing prices across products through time.

6.3 *Require minimum haircuts or margins for securities financing transactions*

Minimum haircuts and margins would limit the extent to which haircuts on collateral assets could be competed down during a boom.

Pros:

- Can limit the leverage that can be taken through financing markets and also mitigate disruptive deleveraging pressures from sudden repricing of haircuts.

Cons:

- Might give customers an incentive to favour positions that have enough risk to generate the necessary return when leverage is constrained.
- Enforcing this might require a great deal of supervisory resources.

Again, an alternative would be greater transparency on financing transactions, including supervisory efforts to collect and track data on haircuts.

B) *Risk measurement, pricing and valuation*

6.4 *Promote through-the-cycle measures of market risk*

The procyclical build-up and contraction of leverage could be limited by fostering the use of through-the-cycle measures of risk and taking better account of the increased tail risk resulting from a sudden evaporation of market and funding liquidity. Specifically, VaR could be required to use historical data covering a complete cycle.²⁷

Pros:

- Taking account of tail risk would improve assessment of risk premia and reduce procyclicality in the financial system as a whole.

Cons:

- For trading positions, risk assessments may be slow to register increases in market risk and allow further build-up of risky positions.
- For new financial instruments sufficient historical data may not be available.

²⁷ This has been proposed by the Basel Committee on Banking Supervision: see BCBS, *Revisions to the Basel II market risk framework*, consultative document, January 2009.

As a complementary source of information, the use of forward looking measures of risk and returns (possibly inferred also from past data) could be encouraged.

6.5 Enforce stress tests for new risks or products with limited historical data

Risk assessment on new financial products can be impaired if adequate historical data that capture the risks embedded in the product is not available.

Pros:

- Stress test may better reveal embedded risks in new products that financial engineering on complex financial products may mask in normal market conditions.
- Stress tests can be designed to take better account of systemic risk arising from concentrated exposures.

Cons:

- Capturing new risks in stress tests is challenging: risks related to securitisations and related hedging strategies were not covered in sufficient detail in most stress tests.

6.6 Restrict the use of contractual triggers

The practice of including contractual triggers that kick in when a firm is under stress from declines in market valuations or credit ratings could be restricted, especially for systemically important firms. Supervisors, rating agencies, and internal economic capital models should assume that such contractual triggers will be tripped in a stress scenario. This would lead firms to internalise at least in part the systemic cost of such triggers. As a result, firms will extend less credit and take more collateral in good times and triggers will not destabilise in times of stress, limiting the procyclicality of leverage.

Pros:

- Simple to implement.

Cons:

- Impeding the writing of contingent contracts would be a step away from complete financial markets.
- Probably costly to enforce.

Issues:

- It would be desirable to distinguish between triggers based on systemic risk factors and idiosyncratic risk factors.

6.7 Improve the pricing of funding liquidity risk

Macroprudential supervisors could foster research on funding liquidity risk. In many respects, market liquidity is a public good.²⁸ A better understanding of externalities in funding liquidity risk and the scope for a proper pricing of system-wide liquidity appears to be of key importance as growing maturity mismatches went hand in hand with rising leverage.²⁹ Such

²⁸ Liquidity benefits all market participants and is not spontaneously priced inside the financial system. Unlike other public goods, however, it is not chronically undersupplied. Rather, private provision of liquidity fluctuates according to perceived market conditions and the willingness of intermediaries to take risks on each other. This is why liquidity is highly procyclical, growing in good times and instantly drying up in times of stress.

²⁹ One proposal is to use measures such as CoVaR to capture the degree to which the distress of an institution increases the risk of system-wide distress (see T Adrian and M Brunnermeier, "CoVaR", <http://www.princeton.edu/~markus/research/papers/CoVaR>, 2008).

enhanced understanding would also be important for assessing potential systemic risks from a revival of securitisation markets.

In the run-up to the crisis, banks and other financial institutions had a clear incentive to minimise the cost of holding liquidity. The authorities – supervisors and central bank market operations together – need to counter the transfer of funding liquidity by systemically important financial institutions to the public sector. Pricing aggregate liquidity into investment decisions would go a long way towards better alignment of incentives.

One important first step could be to define robust through-the-cycle measures of funding liquidity risk. Supervisors and central banks could assist assessments of liquidity risk by the private sector by developing and monitoring indicators of systemic funding risk, using such tools as network analysis to observe systemic linkages and estimating the supply of funds coming from the non-bank institutions (money market funds, etc). Assessments should take full account of the potential for market illiquidity or asset price shocks, and of aggregation of risk (eg if a number of institutions rely on backup funding from the same firm). Stress tests to gauge the probability and magnitude of a liquidity crisis in different market environments could also be useful.

6.8 Valuation reserves or adjustments against a fair valued position when data or modelling to support valuation is weak

Under IFRS, valuation adjustments currently include, for example, adjustments for model deficiencies highlighted through calibration of the model, liquidity adjustments and credit adjustments.

Standard setters and supervisors could explore whether firms should be required to hold valuation reserves or to otherwise adjust valuations to avoid overstatement of income when significant uncertainty about valuation exists. For actively traded assets, there is no such issue and therefore no satisfactory alternative to fair value measurement. However, insufficient market depth or reliance on valuation models using unobservable inputs that are difficult to verify may create considerable valuation uncertainty for certain instruments.

One solution could be to partially de-link the valuation process (in mark-to-market) from certain aspects of income and profit recognition when significant uncertainty exists. This would be the purpose of the valuation reserve or adjustment which would act as a “filter” (eg reducing the possibility that initial valuation overstatements might flow into income). The size of the reserve or adjustment could be based on the degree of uncertainty created by the weakness in the data or underlying modelling approach. Increases and decreases in the reserve or adjustment should be fully transparent. How to handle adjustments over the life of an instrument would have to be the subject of future work. Accounting experts and prudential supervisors could explore the trade-offs associated with such a valuation reserve or adjustment approaches as part of financial reporting, prudential measures, or both.

Pros:

- Limits a firm’s ability to book profits initially and over time that are less “reliable” because they are based on weak valuations.
- Incentivises financial activity away from complex, hard-to-value securities.

Cons:

- On a net basis, unless carefully designed, the approach could migrate away from the measurement (fair value) that standard setters and supervisors have thought to be relevant.
- Unless subject to clear guidance and sound internal documentation by firms, it could be challenging for firms and their auditors to validate the size of the valuation reserves.

- If only applied to regulated firms, could encourage these risks to migrate outside the regulated sector.

6.9 *Ask accounting standard setters and systemic risk supervisors to consider possible changes to accounting standards that could decrease the share of credit intermediation that is subject to pressures associated with mark-to-market accounting*

The extensive use of fair value accounting may have contributed to adverse market dynamics, particularly as liquidity in financial markets evaporated. Possible ways to reduce this potential impact include the following:

- Standard setters could consider enhancing the accounting model so that the use of fair value accounting is more limited for financial instruments of credit intermediaries. The International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) have a joint project under way to consider how to best reduce the complexity associated with the accounting for financial instruments under the mixed attribute accounting model. It would be useful for standard setters to consider the concerns and objective noted above as they develop their planned approach to financial instruments.
- Transfers between financial asset categories. The IASB issued a new standard in the second half of 2008 that permits certain transfers between financial asset categories in rare situations (eg from the trading portfolio to loans or held-to-maturity assets reported at amortised cost) and requires disclosures about these transfers. US GAAP has similar rules. Standard setters could review these treatments based on the experiences during the financial crisis to determine whether further refinements may be appropriate, particularly to address periods of severe illiquidity, in a manner that would enhance transparency and not undermine market confidence.
- Simplify hedge accounting requirements. The hedge accounting requirements in US GAAP and IFRS are very complex and require extensive documentation, which has led many institutions to not use hedge accounting techniques but instead report financial assets and related hedges in trading portfolios or use the fair value option, both of which are subject to fair value accounting. Simplifying the hedge accounting rules in a reasonable manner could encourage banks and other companies that manage risk to apply hedge accounting treatments instead of approaches subject to fair value accounting.
- The BCBS could consider ways to use prudential filters or other techniques to reduce the use of volatile fair values for capital adequacy purposes when markets become illiquid or otherwise reflect considerable stress. For example, prudential filters are currently used for capital purposes for certain portfolios subject to fair value measurement (eg for available-for-sale assets and cash flow hedges). However, care would need to be taken to ensure that this approach would not diminish the proper reinforcement of sound risk management practices.

Annex Table 1	
Reference page for policy options	
Market practice	Policy options
Value-at-risk and other risk measurement tools did not properly capture “through-the-cycle” volatility	Market risk • Require VaR to use historical data over a complete cycle • Require stress tests to be used in place of VaR for new risks or products with too little historical data Funding liquidity risk • Define through-the-cycle measures of liquidity risk that firms and supervisors could monitor Credit risk • Use a leverage ratio as a supplement to risk-based capital
Contractual triggers drained liquidity when market value or credit rating thresholds were breached	1. Restrict the use of such triggers for systemic risk factors. 2. Discourage or soften such triggers for systemically important firms. 3. Require more disclosure of triggers.
Haircuts and margins were strongly procyclical	1. Require haircuts and margins to be stable over the cycle. 2. Set a quantitative minimum for haircuts and margins. 3. Collect and publish data on haircuts and margins.
Upfront recognition of profit may have encouraged high volumes of structured transactions	1. Ask standard setters and prudential supervisors to review accounting and capital standards to evaluate approaches for valuation reserves and adjustments to mitigate upfront profit recognition when significant uncertainty exists.
Extensive use of fair value led to adverse price dynamics	1. Ask standard setters and prudential supervisors to review accounting and capital standards for financial instruments to see if there are ways to limit the use of fair value in credit intermediation. 2. Ask standard setters and prudential supervisors to review whether accounting rules can be modified so transfers from fair value to historical cost in times of illiquidity can act as a safety valve, without undermining market confidence.
Fair value was used for certain financial assets because these assets and their hedges were carried at fair value as an alternative to hedge accounting	Ask standard setters to review whether simplification of hedge accounting rules is practicable.

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