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Valuation challenges in a changing environment

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In many respects, the current crisis is about valuation. To be sure, factors underlying and affecting the crisis are many. Yet, what is particularly striking is that uncertainty about the true value of complex financial instruments (structured products) undermined global markets' confidence, raised uncertainty about counterparties' risk positions, and lead to contagion across asset classes, markets, and regions.

Not surprisingly, the crisis has revived a complex discussion on how financial instruments should be reported under accounting standards. Still, valuation is not solely about accounting, as the crisis showed dramatically. Sound valuation is central to internal risk measurement and management, capital requirements, solvency analysis, and more broadly, financial stability. As such, it is critical both as an input for the smooth functioning of financial markets and institutions, as well as an output from financial systems in their role of allocating capital efficiently across the economy. In other words, valuation issues are at the heart of today's modern, market-based, and risk-sensitive financial systems.

As a presentation of this new issue of the Banque de France *Financial Stability Review*, this overview does three things. It first describes in broad terms the extent to which valuation frameworks have been put to the test by the recent crisis. It then highlights that the performances of valuation regimes are linked to those of markets. Finally, it identifies consistency, incentives, and the procyclicality of valuation frameworks as the main issues to be considered.

1| Valuation frameworks in testing times

1|1 Prior to the crisis

The valuation frameworks in place at the time the crisis hit last year were the legacy of major efforts, made over the past decade or so, to improve risk measurement and financial reporting for financial institutions, as well as solvency regulations for regulated entities. In many respects, these efforts were extensively informed, if not driven, by the experience with previous crises, an experience which goes as far back as the bond crisis in the early 1990s, and which includes landmark episodes such as the Japanese housing and banking crisis or the Long-Term Capital Management (LTCM) collapse.

Improvements in risk management, financial reporting and solvency regulations have largely been concomitant and mutually-reinforcing. One could conjecture that, had they not occurred, the dislocation that took place last year would very likely have had even greater consequences.

Indeed, the widespread use of sophisticated risk measurement and management methods across the financial industry has raised risk sensitivity and risk awareness in the system. Since the mainstreaming, in the mid-1990s, of risk metrics based on value-at-risk methodologies (VaR), financial institutions have significantly improved their capacity to identify, value, and manage the various risks they hold in

their balance sheets. Over time, the range of available measurement techniques has widened; stress-testing has become more commonplace; integrated management processes have been set up together with dedicated governance structures. It is certainly not fortuitous that those firms which were using a broader range of risk measures and had disciplined risk management processes and governance are also those which avoided significant unexpected losses in the current turmoil.[1]

In parallel, the move to mark-to-market accounting in financial reporting has fostered transparency and a more timely recognition of risk exposures, and has contributed to sharpening market discipline. The logic underpinning this change is basically that accurate and meaningful financial statements need to reflect the value at which balance sheet items could be bought or sold in current transactions between willing parties. This, in turn, enables market participants, investors and supervisors to gain a better insight into the actual risk profiles of financial institutions.

More risk-sensitive solvency regulations have also fostered better market discipline and sound risk management practices. A first decisive step was achieved when risk sensitivity was introduced in prudential regulations in 1996. The new Basel II framework will further expand this approach by ensuring that minimum capital charges are more closely responsive to changing risks faced by banks, enhancing supervision of actual practices and contributing to better market disclosure.

1|2 A test

The crisis is a major test for all valuation frameworks. It originated from the uncertainty about the valuation of complex structured credit products, concerns about the reliability of ratings, opacity of actual risk exposures and the robustness of counterparties' risk assessment. Based on the experience gained thus far, the results of the test are fourfold.

First, at the firm level, the crisis revealed major difficulties in valuation practices in some financial institutions. Not only did the events confirm that, when faced with tail events (*i.e.* shocks that exceed recent or historical standards), most credit risk and market risk valuation models fail to produce estimates commensurate with market reality. These shortcomings were sometimes compounded by insufficiently robust, comprehensive and disciplined risk valuation processes. In this respect, excessive reliance on ratings for structured products, an overoptimistic assessment of liquidity risk, the dangerous reliance on a single source for prices or on primary market valuation as guides for fair value accounting, an insufficiently broad range of valuation tools, the use of outdated market data inputs and volatility estimates are among the most significant problems revealed by the turmoil.

Second, the crisis also revealed that unclear, uneven or inadequate disclosure of risk exposures compounded uncertainty, fuelled market illiquidity and contributed to depressing asset values. This was most obvious for off-balance sheet vehicles, which were used by regulated entities to offload risks, thereby creating an undue sense of reduced exposure. Problems associated with insufficient disclosure were also patent with respect to valuation practices themselves. The uneven, barely comparable disclosures made by financial firms about how they were valuing complex products and the margins of error surrounding these points estimates, especially as markets became illiquid, magnified uncertainty about the location of risks in the system and contributed to bringing some markets to a halt and spreading risk aversion across otherwise well-functioning funding markets.

Third, the crisis also exposed the need to clarify some accounting notions that are key to valuing complex assets at market price. Experience has shown that, for instance, financial firms could make substantially different interpretations of what accounting standards meant by "active market" and "distress sale". When the market functioning is impaired, market participants have to make subjective judgments. This could lead to a wide dispersion of estimated values for fairly similar instruments,[2] which only adds to uncertainty.

Fourth, the crisis also hints at some system-wide implications of the interplay between firm-level valuation practices, financial reporting standards and solvency regulations. The sharp falls in asset prices,

1 *See Senior Supervisors Group (2008).*
2 *See Clerc (2008), in this issue, presents a telling graph that plots the changes in the dispersion of market values for selected US asset-backed securities (ABS).*

in particular structured and securitised products, combined with the solvency regulations and internal risk management at regulated financial institutions gave rise to endogenous market price dynamics that sustained or amplified the initial shocks. Indeed, given accounting standards, as a result of the growth in securitisation and the rise in the volume of marked-to-market instruments, falling market values showed up more directly and prominently in balance sheets, putting pressure on profit and loss and/or on equity. These dynamics, together with involuntary balance sheet expansion (*e.g.* as credit lines to structured investment vehicules –SIVs or conduits– were activated and as risk exposures initially planned to be sold had to be warehoused) meant that regulated financial institutions had to raise capital and/or sell assets, thus further depressing market value. Clearly, many of the dynamics at play are part of the natural, and desirable, rebalancing process following the financial market excesses prior to the crisis. Yet, from a macro-financial perspective, the question can be raised whether valuation frameworks or the interactions among them are not contributing to making this process unduly disorderly and costly for the economy.

2| VALUATION AND MARKET PERFORMANCES

2|1 Market-based valuation frameworks are as good as market performances

Valuation frameworks, when based on market prices, are contingent upon the existence of market values for financial instruments. For instance, value-at-risk techniques are largely contingent upon the existence of reliable and relevant past market data to estimate the potential loss at a given confidence level. So are capital requirements, since they too rely on VaR measures. And obviously, so is fair value accounting. Beyond their differences, both the IFRS standards and the US Generally Accepted Accounting Principles (GAAP) standards require that instruments not held to maturity be reported at fair value. Both approaches recommend estimating such fair value according to market circumstances and depend on market data inputs.

Yet, preconditions for markets to exist or to reflect underlying fundamentals may not be met at all times and in all circumstances. Because they suffer from frictions due notably to asymmetric or non-verifiable information, financial markets are far from being perfect and complete.

First, as evidenced in the case of complex structured products, market prices may not exist for each and every asset at all times. When assets are tailored to the specific needs of an investor, as was the case for a range of asset-backed securities (ABS) collaterised debt obligations (CDOs), they are hardly traded. Prices given by one-time or sporadic trading in shallow markets may not qualify as "fair" market values.

Second, even when assets are traded in active markets, their prices carry with them the imperfections of the market in which they are traded. Jumps in market value –typically for assets that are traded over the counter– can be driven by liquidity shocks rather than by fundamental changes. In other words, prices may not reflect future payoffs, but rather cash available in the market for buyers.[3] This is most likely to happen when markets are under stress. Also, under stress, uncertainty affecting prices tends to become endogenous. In illiquid markets, marking assets to market value means that "the value of my assets depends on the price at which others have managed to sell their assets".[4] As a consequence, shifts in market participants' beliefs, notably about others' risk exposures, lead them to take actions that may precipitate price dynamics. In the extreme, this means that market price discovery is disrupted as market participants are subject to the "Millenium Bridge wobble" syndrome,[5] *i.e.* they all react in the same way and markets become one-sided.

Third, market imperfections are not neutral for the performance of risk models. Indeed, most models assume that market participants are sufficiently atomistic and have sufficiently different risk preferences so that, in the aggregate, their actions are essentially random and no one of them can have a

3 *See Allen and Carletti (2006).*
4 *See Plantin, Sapra and Shin (2008) in this issue.*
5 *See Danielsson and Shin (2002).*

sustainable impact on market prices. In other words, risk models fail to take into account that actions based on risk measures influence the latter. Put in general terms, "a risk model breaks down when used for regulatory purposes".[6] This shortcoming of risk models becomes especially obvious in times of crisis when market participants are prone to carrying out similar trading strategies,[7] bringing default correlation matrices out of line with market reality.

2|2 Market imperfections, valuation frameworks, and second-best solutions

Presumably, market failures contributing to valuation problems could be corrected through targeted public policies. And indeed, some policies are aimed at correcting imperfections. For instance, accounting standards are instrumental in bridging financial and risk information gaps. They ensure that well-defined, comparable financial statements allow users to better gauge the risk profile of financial institutions. In addition, fair valuation ensures that financial statements are sensitive to price signals, thereby overcoming inefficiencies associated with historical accounting of financial instruments. By providing such information to investors, fair value accounting contributes to market confidence, while leaving it to investors to determine the appropriate risk premium.

Still, when designing policies to address market imperfections, it is important to bear in mind some lessons from second-best theory. First, the fact that there is a market failure does not necessarily mean that it stems from a market imperfection. It could also result from inadequate and inconsistent public policies. Second, before addressing a market failure through public intervention, policy-makers need to be reasonably confident that public intervention is superior compared to other options, *i.e.* that it is welfare-improving. Third, when there is more than one imperfection, removing only one of these may not necessarily lead to an improved situation. On the contrary, it could even be that it exacerbates the costs associated with other imperfections and, overall, reduce welfare.

Put in concrete terms, and given the experience gained thus far, it is very likely that addressing valuation issues will require more than a narrow set of policies. Quite to the contrary, it will hinge on a comprehensive approach based on corrective policy responses that are mutually consistent and mutually reinforcing. It is therefore very encouraging that each policy-making body engaged in the resolution of this crisis stands ready to consider the externalities and unintended consequences associated with measures under its own purview. In many respects, this is what the Financial Stability Forum (FSF) work is about.

3| Policy issues

When considering the nature and the mix of measures required to fix valuation problems evidenced by the crisis, two broad policy questions stand out: are existing valuation frameworks consistent? What incentives do they create for financial institutions and are they procyclical?

3|1 Consistency

Since existing valuation frameworks serve different purposes, it is not surprising that they exhibit differences in the way they value financial instruments. Yet, such differences add to the complexity of risk oversight, prudential supervision, and to difficulties in understanding financial statements. They give rise to consistency problems across valuation frameworks as well as over time in their implementation.

The lack of a shared understanding of several key accounting notions used for mark-to-market asset valuation increases the risk of financial reporting inconsistency across firms and over time. In this crisis, in the absence of well-established definitions about when markets stop to qualify as "active markets", or what "an observable market price" or "distress sale price" is[8] financial institutions were left to use their own judgement as to whether, and when, to move from one mark-to-market valuation method

6 *Danielsson (2002) who restates Goodhart's law (1975) which is: "any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes."*
7 *See Danielsson (2008) on the limits of risk models under stress.*
8 *Matherat (2008) in this issue.*

to another. As it appears, some institutions may have chosen to move to mark-to-model valuation at the early stage of the crisis in order to escape sharply discounted prices prevailing in markets at that time. A direct consequence of inconsistent valuation practices is that investors, counterparties, and regulators were not in a position to have a reliable view of financial institutions' relative risk profiles.

Also, accounting standards may not be aligned with sound risk management practices at the firm level or with prudential regulations. Indeed, accounting standards may not allow practices that come down to adjusting fair value estimates to account for model, input, data or parameter uncertainty. This wedge between internal and prudential risk assessments on the one hand, and disclosed figures on the other, increases information asymmetry and uncertainty in periods of stress.

Progress is underway to reduce differences and inconsistencies. One important case is the treatment of off-balance sheet vehicles. The widespread use of off-balance sheet entities, to a great extent motivated by the very low capital charge called for under the Basel I framework, gave rise to an unwarranted belief that associated risks had been disposed of completely. Yet, discrepancies between *de jure* and *de facto* risk perimeters were a major contributing factor to the credit market dislocation. Differences with respect to consolidation and disclosure rules applicable to off-balance sheet vehicles were a considerable source of opacity about the risks they posed to financial institutions during the turmoil. The full implementation of Basel II is likely to reduce arbitrage opportunities. Also, consolidation and de-recognition issues are now listed in the program of the relevant standard setting bodies to ensure convergence between the US GAAP and the International Financial Reporting Standards (IFRSs).[9]

3|2 Incentives and procyclicality

Contemporary market dynamics are driven by the interplay between falling asset prices, mark-to-market accounting, (unintended) leverage, and the subsequent need to raise capital or sell assets to comply with solvency requirements. It is well-known that financial systems go through asset price boom and bust cycles.[10] In practice, this may be a defining feature of financial systems compared to other economic sectors.[11] To put it another way, cyclicality within financial systems is not a problem *per se*, as long as it mirrors changes in fundamentals. Consequently, not all asset price bubbles necessarily elicit a specific policy action.[12] Similarly, that valuation frameworks capture such changes in a timely fashion is positive as it fosters rebalancing in risk-taking, together with the buffering of capital when needed. This is predicated on the fact that market price changes are driven by fundamentals and are not the consequence of valuation measurements or incentives arising out of valuation frameworks.

Whether valuation frameworks are adding "excess" volatility to financial statements and –indirectly through the actions they underpin– to market prices has been a major, and divisive, topic of discussion and investigation for policy makers for many years. A summary of the state of play on this matter could be as follows. Fair value and risk-sensitive solvency regulations are viewed as the right approach in circumstances where financial instruments have easily available market prices. Besides, fair value accounting induces *ex ante* discipline in financial institutions' risk and capital management. Yet, in adverse market conditions, marking to market, together with solvency regulations, may generate a feedback loop from expectations of market price changes to portfolio and balance sheet adjustments. This may reinforce price volatility and exacerbate financial distress. Conversely, alternative accounting approaches, including those based on amortised historical costs, are not clearly superior, not least because they tend to delay the recognition of impaired assets.

Noting that valuation rules may not be optimal for all instruments in all market circumstances does not mean that they should be changed in the midst of a crisis. Indeed, this would amount to valuation forbearance, precisely as market price disinflation is taking place. It would raise some moral hazard problems (privatisation of gains in upturns,

9 *Tweedie (2008) in this issue for further details.*
10 *See Kindelberger (2000).*
11 *See Borio (2008).*
12 *Mishkin (2008), in this issue, offers a perspective on this question.*

socialisation of losses in downturns).[13] Rather, this implies that valuation policies need to be shaped so as to set the right incentives throughout the economic cycle. "The seeds of the problem were planted in good times. It was then when leverage and excessive risk was accumulated, and therefore the specifics of fair value accounting and implementation that may shape incentives in good times also need to be revised".[14] In particular, accounting and prudential rules should be structured so as to support best risk management and disclosure practices in both upturns and downturns.

As far as risk management is concerned, the crisis also shed lights on the less visible discussion about the impact of VaR-like techniques on market price dynamics. Because such techniques are used not only for risk measurement, but also for risk control decisions –position limits, covenant triggers, margin calls–, some observers have argued that these techniques could have unintended procyclical consequences.[15] Simulation-based analyses suggest that the narrower the range of VaR techniques used for risk management decisions across the industry, the more likely it is that resulting investment decisions will be similar, and, consequently, that market movements become self-reinforcing. In other words, standardisation in risk management against the backdrop of mark-to-market accounting may reduce diversity in investment strategies across market participants, a situation which may be sub-optimal from a financial stability perspective.[16]

Against this background, an interesting avenue for research about adjustments to valuation frameworks is to assess whether or not they promote diversity in risk-taking behaviour across a range of market circumstances. In practice, financial stability may benefit from the existence of valuation and accounting rules that are more sensitive to differences in investment horizons.

13 *Rochet (2008), in this issue, argues more generally that making capital requirements contracyclical so as to offset the procyclical effect of accounting and solvency regulations would be harmful for banks' incentives.*
14 *Caruana and Pazarbasioglu (2008) in this issue.*
15 *See International Monetary Fund (2007).*
16 *Persaud (2008) in this issue. Also, interestingly, this is also hinted at by financial industry representatives. The Counterparty Risk Management Policy Group (CRMPG), which brings together representatives from the financial industry, notes that "large integrated financial intermediaries typically attempt to optimise performance subject to liquidity, rating agency, regulatory capital, accounting, and other parameters. This can encourage behaviour which, taken across an industry as a whole, can prove highly procyclical. This is particularly the case given industry participants' tendency to mirror each other's trading strategies, and their requirement to unwind positions on a simultaneous basis during periods of market stress" – CRMPG III, p. 89.*

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Should financial institutions mark-to-market?

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There has been a spirited debate about the merits of mark-to-market accounting for financial institutions for some time now. Many argue that market prices provide the best estimate of value available and should always be used. However, others suggest that in times of crisis market prices are not a good reflection of value and their use can lead to serious distortions. This article explains the circumstances where market prices do reflect future earning power and those where market imperfections imply that they do not. We suggest that in financial crisis situations where liquidity is scarce and prices are low as a result, market prices should be supplemented with both model-based and historic cost valuations. The rest of the time and in particular when asset prices are low because expectations of future cash flows have fallen, mark-to-market accounting should instead be used.

NB: We are grateful to Alessio De Vincenzo for helpful conversations on this topic.

There has been an extensive debate in recent years on the advantages and disadvantages of moving towards a full mark-to-market accounting system for financial institutions such as banks and insurance companies. This debate was initiated with the move of the International Accounting Standards Board (IASB) and the US Financial Accounting Standards Board (FASB) to make changes in this direction as part of an attempt to standardise accounting standards across countries. The debate has two opposing views. On the one hand, mark-to-market accounting has the advantage of reflecting the true (and relevant) value of the balance sheets of financial institutions and therefore of allowing regulators, investors and other users of accounting information to better assess the risk profile of financial institutions. On the other hand, mark-to-market accounting is thought to lead to excessive and artificial volatility. As a consequence, under this accounting system the value of the balance sheets of financial institutions may be driven by short-term fluctuations in the market that do not reflect the value of the fundamentals and the long-term values of assets and liabilities.

If financial markets operated perfectly in the way that the models used by financial institutions usually assume, then mark-to-market accounting would indeed be best. In this situation, market prices accurately reflect the future earning power of assets. If the market value of an institution's assets falls below the market value of its liabilities then it will not be able to meet all of its obligations. Mark-to-market accounting will indicate this shortfall to regulators, investors, depositors and other interested parties and they can take action accordingly.

Many people have argued that financial markets are effectively perfect and complete. However, in times of crisis it appears that they do not work in the way that they would if this was the case. This notion is a very old one. Bagehot (1873), for example, suggested that in response to crises central banks should value bank collateral weighting panic and pre-panic prices as market prices are not accurate measure of values in those circumstances. A more recent illustration of the malfunctioning of market prices was provided a decade ago by the demise of Long-Term Capital Management (LTCM). This was a hedge fund that made convergence trades. These involved finding securities whose returns were highly correlated but whose prices were slightly different. The fund would then short (*i.e.* borrow) the one with the high price and use the proceeds to go long in the one with the low price. The convergence trades that LTCM took included the sovereign bonds of European countries that were moving towards European Monetary Union, and on-the-run and off-the-run US government bonds. Since the price differences were small the strategy involved a large amount of borrowing. For example, at the beginning of 1998, the firm had equity of about USD 5 billion and had borrowed over USD 125 billion. In the first two years of the fund's existence it was extremely successful and earned returns for its investors of around 40 percent. However, 1997 was not as successful with a return of 27 percent which was about the same as the return on equities that year.

On August 17, 1998 Russia devalued the rouble and declared a moratorium on about 281 billion roubles (USD 13.5 billion) of government debt. Despite the small scale of the default, this triggered a global crisis with extreme volatility in many financial markets. Many of the convergence trades that LTCM had made started to lose money as the flight to quality caused prices to move in unexpected directions and to diverge from discounted expected future cash flows. By September 22, 1998 the value of LTCM's capital had fallen to USD 600 million. The Federal Reserve Bank of New York coordinated a rescue whereby the banks that had lent significant amounts to LTCM would put USD 3.5 million for 90 percent of the equity of the fund and take over the management of the portfolio. The Federal Reserve Bank of New York justified its action of facilitating a private sector bailout of LTCM by arguing that if the fund had been liquidated many prices in illiquid markets would have fallen and this would have caused further liquidations and so on in a downward spiral.

The current crisis that started at the end of July 2007 provides yet another illustration of the fact that markets are imperfect and prices do not reflect fundamentals. Some banks have had to write down the AAA-rated super senior tranches of collateralised debt obligations (CDOs) by as much as 30 percent[1] due to a fall in their market prices. If this change in price was due to deterioration in fundamentals then

1 *See Tett (2008).*

it would be necessary to believe that the ultimate percentage loss would be 38 percent. This would be justified, if, for example, three quarters of households with subprime securitised mortgages would default and price falls would continue. This seems, however, implausible given that none of the AAA-rated tranches have yet defaulted and, as the Bank of England also estimated, there should not be any future default in AAA-rated subprime mortgage-backed securities (MBS), even with a continued decline in US house prices.[2] This suggests that factors other than future discounted cash flows are driving prices. Still, because of the use of fair value accounting, financial companies around the world have been hit by more than USD 300 billion in writedowns and been forced to raise more than USD 260 billion from outside investors since last year, according to analysts at the Bank of America.[3]

What are the market imperfections that led to such large fluctuations in prices in situations such as the Russian Crisis of 1998 and the current crisis? In our paper entitled "Mark-to-market accounting and liquidity pricing",[4] we analyse the effects of using mark-to-market accounting when financial markets are imperfect. The main insight is that in times of financial crisis the interaction of institutions and markets can lead to situations where prices in markets do not reflect future payoffs but rather reflect the amount of cash or liquidity available to buyers in the market. If mark-to-market accounting is used, then the volatility of asset prices directly affects the value of banks' assets. This can lead to contagion and force banks into insolvency even though they would be fully able to cover their commitments if they were allowed to continue to operate until the assets mature. In contrast, if historic cost accounting is in use, this problem does not compromise the solvency of banks as it does not affect the accounting value of their assets. Thus, historical cost accounting may prevent crises which would occur under mark-to-market accounting.

The result that mark-to-market accounting can be distortionary and generate "artificial" contagion is due to imperfections in the supply of liquidity. In a world of perfect and complete markets risk management can easily ensure that the bank or intermediary has the correct amount of liquidity in every situation. With perfect and complete markets it is possible to use a full set of derivatives and other securities (or equivalently dynamic trading strategies) to ensure liquidity is received from counterparties in every situation when it is needed; or in technical terms, in every state of the world.

In contrast when markets are imperfect because they are incomplete, liquidity provision is achieved by selling assets in the market when the liquidity is required. Asset prices are determined by the total available liquidity or in other words by the "cash in the market". It is necessary that some financial institutions hold liquidity and stand ready to buy assets when they are sold. They are no longer compensated for the cost of providing liquidity in each and every state as with complete markets. Instead the cost must be made up on average across all states and this is where the problem lies.

The providers of liquidity have the alternative of investing in high return, but less liquid, long assets. There is an opportunity cost to holding liquidity since this has a lower return than the long assets. In order for financial institutions to be willing to supply liquidity they must be able to make a profit in some situations. If nobody held liquidity then when banks and intermediaries sold assets to acquire liquidity their price would collapse to zero. This would provide an incentive for some institutions to hold liquidity since they can acquire assets very cheaply in these situations. In equilibrium prices will be bid up to the level where the profit in these situations where banks and intermediaries sell is sufficient to compensate the providers of liquidity for all the other situations where they do not use the liquidity and simply bear the opportunity cost of holding it. In other words asset prices are low in the situations where there is an aggregate shortage of liquidity and some banks and intermediaries need liquidity.[5]

An important aspect of this analysis is that the low asset prices that occur in situations where there is a shortage of liquidity do not require there to be informational problems. However, it is certainly the case that informational problems exacerbate the falls

2 *See Giles and Tett (2008).*
3 *See Guerrera and Hughes (2008).*
4 *See Allen and Carletti (2008).*
5 *See Allen and Gale (2007) for a full account of this.*

in price. If buying institutions, in addition to bearing the opportunity cost of holding liquidity, need to expend significant resources to evaluate the assets they are purchasing, equilibrium prices will be even lower. Now prices must be low enough to cover in addition the cost of due diligence. This is particularly important for securitisations of subprime mortgages and is consistent with the large fall in their prices in the current crisis. Finally, if there are problems of adverse selection, this will further exacerbate the necessary discount the assets trade at.

Based on these arguments mark-to-market accounting has significant drawbacks. As many have argued it leads to large changes in financial institutions' balance sheets that are not justified by the fundamentals. These changes do not reflect an inability to meet future commitments and so do not reflect insolvency. When historic cost accounting is used these problems are avoided to a large extent. However, historic cost accounting also has drawbacks. In particular, if price changes do reflect fundamentals then historic cost accounting is not desirable and mark-to-market is superior.

A good example where historic cost accounting failed where mark-to-market would probably not have done is the Savings and Loan Crisis in the United States in the 1980's. Here the fall in the prices of the assets was due to a collapse in the fundamentals. The fall in oil prices meant that the expected future cash flows from many properties in Texas and other oil-producing states fell drastically. These price falls were not due to temporary liquidity factors of the type discussed above but instead were permanent. In this case historic cost accounting allowed banks to hide the extent of their problems for a significant period of time. Mark-to-market accounting would have led to a much quicker recognition and resolution of the problem.

This contrast between situations where asset prices are low because of liquidity factors and where they are low because of lower expected cash flows is at the center of the debate over the advantages and disadvantages of mark-to-market accounting *versus* historic cost accounting. The problem is that neither system is perfect. Each works in some circumstances but not in others. Both sides have validity in the arguments that they make.

How can the problem be solved? A recent report of the Institute of International Finance also argues that marking-to-market can create a downward spiral in asset prices and artificially transform a liquidity problem into a solvency one. According to the report, one way to solve the problem is to allow banks to value instruments using their own models or book value when markets are disrupted; and to give banks the possibility to move assets from trading books onto banking books, where assets are "held to maturity" and mark-to-market rarely applies.[6] The report has the merit that it stresses once again the difficulty and the problems linked to the use of mark-to-market in disrupted markets. The problem with this suggestion, however, is that it leads to a potential moral hazard problem if banks are allowed to "park" volatile risky assets from the trading books in the banking books till market conditions are restored to normal.

What in our view is of crucial importance is to provide the users of accounting information such as regulators and investors with the information that allows them to understand at a deeper level what is happening and how this should affect their actions. Mark-to-market values are useful and should certainly be disclosed. However, there needs to be additional information to allow users to identify the extent to which falls in asset prices are due to market conditions such as liquidity factors and the extent to which they are due to changes in discounted expected future cash flows. If the users of accounting information can distinguish between these factors they will be in a much better position to decide how to proceed. This is also in line with the suggestion of the Bank of England that auditors need "authoritative guidance" on the application of fair-value accounting rules when market prices are dislocated from fundamentals values.[7]

What information that is easily available can be used for this purpose? The IASB promulgates the International Financial Reporting Standards (IFRSs) that apply to all listed European Union/European Economic Area companies. The FASB determines Generally Accepted Accounting Principles (GAAP) and these together with Securities and Exchange Commission (SEC) regulations determine the way that companies in the United States report their results. The approach of both for determining the

6 *See Mackintosh (2008).*
7 *See Giles and Tett (2008).*

fair values of financial instruments as outlined in IFRS 7 and FAS 7 are similar. However, the latter is more specific.[8] It specifies three levels. Level-one valuations, which are to be used if available, are based on observable prices in liquid markets. Level-two valuations are based on prices on nearby dates or prices of very similar instruments. These are to be used if level-one valuations are not available. Finally, level-three valuations allow the use of theoretical valuation models. For example, for MBS, these might involve assumptions concerning default rates and loss ratios. These model-based valuations require disclosure of the model assumptions. They are used when level-one and level-two valuations are not available.

These three valuation methods should give very similar results most of the time. In such cases there is no point in disclosing anything other than level-one valuations based on observable prices in liquid markets as is currently done. In times of crisis, though, the different methods can give very different values. The example above during the current crisis of the 30 percent fall in the market prices of AAA-rated super senior tranches of CDOs is one where model-based valuations using plausible assumptions would give significantly higher values.

Rather than the current approach of only using level-three valuations when level-one and -two valuations are unavailable, an alternative would be to also report level-three valuations if they differ significantly from level-one (or level-two) valuations. One possible threshold for triggering the reporting of both valuations would be a difference of 5 percent, for example. In such circumstances, it may also be helpful to report historic cost values, since these are more objective than level-three valuations given they do not require extensive assumptions. The reporting of multiple values would alert regulators, investors and other users to the fact that they need to investigate more carefully what is happening in the markets where prices are determined. This will allow them to use better judgment as to whether the banks and other financial institutions are insolvent or not and to investigate more thoroughly whether the institutions are able to meet their future obligations. In case they are, regulators should probably practice a form of "forbearance" in that they should allow banks not to fully write down the value of their assets according to market conditions, in order to avoid artificial volatility and its consequent solvency impairment. This would help to eliminate the procyclicality problem implied by fair value accounting as there would be no need for banks to raise further capital.

In conclusion, we have argued that both sides in the debate of mark-to-market versus *historic cost accounting have merit. Mark-to-market works well and reflects the true underlying situation most of the time. However, in crisis times when there is a shortage of liquidity, mark-to-market values do not reflect future earning power and cannot be used to assess the solvency of financial institutions. The crisis starting in late July of 2007 has provided some examples of this. In these circumstances market prices are driven by liquidity provision incentives and not fundamental values. In such cases historic cost accounting can provide a better indication of true value. However, historic cost accounting has the drawback that it misses drops in value that are caused by deterioration in the discounted expected cash flows as the proponents of mark-to-market accounting suggest.*

Our solution to this problem is to adapt mark-to-market accounting using easily available information. When model-based valuations based on plausible assumptions differ by more than (say) 5 percent from market based valuations, both types of valuation together with traditional historic cost valuations should be provided. This will signal to the users of information that they need to be careful to identify what is going on in the markets. This is not a perfect system but it is practical and it will be an improvement over the current one.

8 *See International Monetary Fund (2008), chapter 2, annex 2.1.*

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Setting the right framework for modern financial markets
Lessons learned from the recent crisis

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The current financial crisis is a watershed event that will require comprehensive action by the financial industry to restore confidence in financial institutions in general and the market for structured credit products specifically. The originate-and-distribute model will survive, but will undergo modification and will require banks to upgrade their operations. An improvement in risk management (both in approach and process) is the most important area, with additional focus on liquidity management and derivatives markets infrastructure. Regarding valuation issues, reform efforts must recognise that this is not "just" an accounting issue. Changes must respect the benefits of fair value accounting, but, at the same time, address the issues of illiquid markets, procyclicality and consistency between accounting standards.

For more than a year now, global financial markets have been in the grip of a crisis that already ranks amongst watershed events in financial history. Reflecting this, the crisis has triggered a fundamental and wide-ranging review of every part of the financial system, spanning the entire range from supervisory structures and financial regulation to market infrastructures, from banks' risk management processes to their business strategies. Indeed, looking at the long lists of recommendations which have been produced as lessons learned by both the official and the private sector, it is no exaggeration to claim that no stone has been left unturned. Considering the severity of losses suffered by many financial institutions and the widespread loss in confidence within the financial system, nothing less is warranted. Yet, at the same time it will be important not to throw out the baby with the bathwater: financial innovations such as securitisation and structured credit products must be improved upon, not eliminated.

THE REAL BACKGROUND TO THE CRISIS

The financial crisis that is plaguing global financial markets has a background in the real economy. The importance of this is often seriously underestimated in comparison with the causes that lie directly within the financial sector itself and that are usually held out as being primarily responsible for the crisis. In fact, as any major financial crisis, it is the result of the confluence of several factors. But there can be no doubt that the US real estate market is at the epicentre of the crisis and is pivotal for its course: neither can the crisis be understood without understanding events in the US housing markets, nor can financial stability return without their stabilisation. It must be borne in mind that, given the size of the US mortgage debt market (USD 13 trillion), even a comparatively small change in asset values quickly translates into enormous losses in the financial system (*e.g.* USD 650 billion for a 5% change in asset values). The reality is that the United States has been in the worst real estate recession ever since the burst of the bubble that had led to a doubling of real estate values between 2000 and 2006. Prices have fallen more than 15% from their peak and are likely to fall further. Already, many borrowers are not able to service their debt and many more will not be able to do so once teaser rates and variable interest rates are reset; thus, default rates will rise further. As a consequence, financial stability will only be restored if and when the crisis in US real estate markets is resolved.

It should be pointed out that some of the rise in US building activity and real estate valuations was, and still is, fundamentally justified given the favourable demographic development in many US states. However, house price developments eventually went beyond what was justified by fundamentals alone. Essentially, what fuelled house price developments beyond sustainable levels were two factors: first, the global liquidity glut that preceded the crisis and, second, financial innovation.

The liquidity glut in turn was the result of, on the one hand, a US monetary policy that was too loose and has been mirrored in many emerging market countries that peg their national currencies to the dollar. On the other hand, many emerging markets, especially those in Asia, have a structural savings-investment gap, with surplus funds being invested in US financial assets, thereby driving down yields in the United States. Abundant liquidity and underpriced risk prompted individuals and companies to leverage up. This has been particularly visible in the drastic increase in household indebtedness in many countries, especially the United States. As a mirror image on the investor side, the consequence of low nominal interest rates in the United States –and, spreading from there, worldwide– was a search for yield, as investors tried to meet their (nominal) performance targets. Low interest rates, in conjunction with low inflation rates and low market volatility of real as well as financial variables, led to a period of unusually benign financial markets in general and historically low default rates in particular. This environment dulled risk consciousness and led some to take on risk that, in retrospect, was underpriced. It also encouraged some investors to indulge in maturity transformation and regulatory arbitrage: structured investment vehicles (SIVs) issued asset-backed commercial papers (ABCPs) to finance investment in mortgage-backed securities and structured credit products, in effect transforming an abundance of cheap short-term liquidity into longer-term credit investments. This model depended on a continuation of the liquidity glut and a resilient housing market.

The real-estate bubble would not have been as pronounced as it was without the financial innovation

which made available increased volumes of cheap credit to a wider pool of potential property owners. This was particularly true for the enormous expansion of market segments which hitherto had been niche markets –the subprime and Alt-A segments. Financial innovation also allowed a general increase in the loan volume *via* securitisations, which were then placed with investors worldwide. In principle, this spreading of risk is a good thing as it avoids risk concentrations in any given national financial system. Indeed, from a US point of view it is undeniably favourable that the blow to the US economy from the housing recession is being cushioned by the fact that some of the pain is borne by foreign investors. However, the scale of the US housing bubble led to the build-up of enormous exposures worldwide to the US real estate market, directly and indirectly through the securities built on these assets, and to serious imbalances in the financial system. These were compounded by deficiencies in the origination process, the structure of financial markets and the risk management approaches of many investors.

VALUATION ISSUES: FAR MORE THAN AN ACCOUNTING ISSUE

While the above-mentioned factors can be regarded as the causes of the crisis, other factors aggravated it, once the chain of events was set in train. In this context, a considerable controversy has broken out in the aftermath of the crisis, whether fair value (or mark-to-market) accounting can be blamed for deepening the crisis. Fundamentally, of course, mark-to-market has a procyclical effect by definition. Consequently, the controversy should usefully be concentrated on the question of whether this effect is materially important (especially in a crisis situation) and, if so, what can be done about it.

The more extensive use of fair value accounting reflects, of course, the changing nature of banks' business models, which led to a greater focus on the dynamic management of risk portfolios. This in turn led to an increasing share of trading and tradable assets, including the strong growth of hedging instruments. Historical cost accounting proved inadequate for these developments. Fair value accounting has, by now, become the norm for assets held for trading or available for sale. In fact, for Deutsche Bank, at year-end 2007, 76% of assets and 51% of the liabilities on our consolidated balance sheet were carried at fair value. Furthermore, modern risk management and fair value accounting go hand-in-hand, as risk hedges would not be feasible without fair value accounting. Similarly, without fair value accounting, it would not be possible to calculate value-at-risk (VaR) as well as economic and regulatory capital for market risk.

This importance of valuations for risk management tools demonstrates the wider benefits of fair value accounting. It acts as an early warning system, where losses show up in banks' profit and loss accounts, before they materialise in the real economy. It provides a clearer picture on the positions and risks and increases the transparency for investors and counterparties. Thus, mark-to-market imposes stricter discipline on banks' risk management and improves market discipline. Conversely, in the case with historical cost accounting, banks must own up to the full consequences of past investment decisions and, if need be, are forced to take remedial action. Fair value accounting is therefore not neutral, but has a direct, beneficial impact on banks' actions.

Against this background, we need to address a fundamental question that, in my view, has not yet been given sufficient attention: given the fact that ever larger parts of banks' balance sheets have become more tradable and given that the originate-and-distribute model will survive this crisis, how can we define an accounting regime that is suitable, consistent and meaningful for tradable and non-tradable assets? Or, to focus on the crucial question: how can we define accounting rules for the borderline between these two categories? There is widespread consensus that fair value accounting is the best accounting rule for all tradable assets. At the same time, not every asset a bank holds is liquid and many probably never will be (or, possibly, should be in the interest of financial stability) and for those assets traditional accrual accounting will continue to be the right regime. The difficult case, however, is the borderline area between these two categories represented by assets that may fall into either category and where a bank may choose to shift assets between held-to-maturity and the trading book depending, for example, on market circumstances and the bank's risk appetite. For these cases, consistent accounting rules need to be defined for moving assets between the banking and the trading book. It goes without saying that corresponding regulatory requirements relating to capital and liquidity would

also need to be defined in a way that simultaneously paid due regard to financial stability and did not restrict banks' ability to alter their risk-return profile unduly.

To some extent, this issue is already on the table of the accounting boards (Financial Accounting Standards Board –FASB and International Accounting Standards Board –IASB), as the crisis has revealed a need to align the respective rules in the International Financial Reporting Standards (IFRSs) and US Generally Accepted Accounting Principles (GAAP) accounting frameworks on shifting assets between accounting categories. But like the procyclicality of fair value, this issue needs to be seen not just as an accounting issue, but as a financial stability issue as well. It is thus essential for central banks which are the protectors of financial stability, to become involved. The debate is complicated by a third issue that comes into play: banks use internal models and proprietary data to value structured credit products. If these products were to have a future, this needs to change. Valuation models have to follow generally accepted accounting rules and the underlying price data has to become available to all market participants. It is not by accident that equity derivatives, which are easily as complex as structured credit products, have been much less affected by this crisis. The rules to calculate indexes are well-known and the equity market enjoys a sophisticated infrastructure to provide underlying price information.

Risk management:
comprehensive approach needed

It would, of course, be inappropriate to suggest that the weakness of the US mortgage market, and the shortcomings of structured products or fair value, were the only deficiencies leading to the current crisis. In truth, in many banks, advances in risk management had not kept pace with financial innovation. Moreover, many banks had concentrated their efforts on implementing Basel II. The Basel framework, however, focuses on assets held in the banking book. In contrast, the current crisis concerns assets that were often held in the trading book or even in off-balance sheet structures. When prices dropped precipitously or the market liquidity for the assets suddenly evaporated, banks were forced to hold on to –and to fund– assets that were expected to be sold on to other investors.

In fact, it is necessary to clearly distinguish between two groups of banks: the first group, which includes Deutsche Bank, is represented by banks that applied the "originate-and-distribute" model properly. Proper application means that a bank ensures that:

- there is due diligence of underlying credit quality;

- its structured credit portfolio is a function of client demand;

- that junior and first-loss exposures are fully and effectively hedged or sold.

At Deutsche Bank, the average pre-crisis turnover time for structured credit products was 60-90 days. This stands in contrast to the second group of banks that instead, took the risk back on through the back-door by investing in these assets or by providing back-up lines for off-balance sheet vehicles (SIVs, conduits) that invested in these assets.

The difference between the two groups can be seen clearly by the size of the losses that they suffered. The former group got caught by the unexpected freezing of the markets and thus experienced warehouse risk –but the losses were thereby limited to the amount of flow business in any given period of time and to the price declines experienced between origination and resale. In contrast, the latter group was exposed with the full nominal value of their exposure.

It also turned out that the latter group of banks often suffered from significant deficiencies in corporate governance. Common themes included observations that risk management was not sufficiently independent, IT systems were incomplete and could not aggregate risks on a group-wide basis, and top management failed to effectively communicate the bank's risk appetite to the entire institution. Similarly, too many institutions had "outsourced" parts of their risk management, *i.e.* relied excessively on the judgement of rating agencies rather than performing their own due diligence.

Albeit to varying degrees, both groups suffered from deficiencies in their risk models and their stress testing. Most banks assumed that hedges would work even under stressed circumstances. Increasingly however, indices became traded in their own right

(as they retained their liquidity) and de-linked from the underlying assets. Having seen the wild gyration of the ABX indexes, which were often used to hedge exposure to residential mortgages, it became quite clear that there is a significant basis risk between the index and the underlying mortgages.

There were also deficiencies in current liquidity management. Here, too, the scenarios employed for stress tests were not extreme enough, which resulted in an underestimation of the amount of liquidity needed and an overestimation of the degree of liquidity of assets held for this purpose. In several institutions, the internal pricing of liquidity was not strict enough and potential demand on liquid funds therefore not priced in sufficiently when risk positions were taken; often this was the result of liquidity risk management not being integrated adequately into overall risk management. Again, banks such as Deutsche Bank, where the management of credit, market, operational and funding/liquidity risk was fully integrated already well before the crisis unfolded, have reaped the benefits of these efforts.

With so many deficiencies, a big *mea culpa* from the financial industry is therefore necessary. However, as in any crisis, there were developments which would have been extremely difficult to foresee. Prior to the crisis, there were no indications that assets classes such as leveraged buy-outs (LBOs) and residential mortgage-backed securities (RMBSs) or RMBS and commercial mortgage-backed securities (CMBSs) were strongly correlated based on the respective fundamental drivers for these asset classes. However, correlations between these (and other) asset classes did increase strongly as the crisis struck simply due to the fact that these assets were held by the same ABCP-financed vehicles. As markets seized, SIVs and conduits were unable to roll-over their funding and the assets rapidly lost in value as fire sales became necessary to raise liquidity. These factors led to simultaneous declines in the prices of assets that are fundamentally uncorrelated. Specifically, leveraged loan commitments, held for resale in the secondary markets, fell dramatically in value, despite being entirely uncorrelated with US housing markets. These loan products are essentially illiquid with price discovery normally occurring during syndication and being based on related market prices and cash flow analysis of relevant parameters. However, with markets disappearing, originators as well as investors had no guide-posts to draw upon and some prices fell well below those implied by models and fundamentals.

There is a broader message to be heeded here: more research needs to be carried out on liquidity risk in a market-based financial system. There is still a gap in our understanding of market dynamics in times of market illiquidity. While this is understandable, prior to this crisis, it seemed beyond reasonable credibility that liquidity could ever evaporate across almost all market segments. But this is nonetheless a serious omission. All existing risk models, all pricing models are essentially based on the implicit assumption that meaningful price signals are available on a continuous basis. Should it turn out that this assumption can no longer be sustained in the modern financial system, an entirely new approach to modelling correlations, market dynamics and stress scenarios would be needed.

REMEDIES: THE BLUEPRINTS ARE AVAILABLE –AND LOOK SIMILAR

Restoring confidence in financial markets will require a concerted, targeted and all-encompassing effort –but this will not happen by itself. The financial crisis has caused a widespread loss of trust in the financial system. Banks do not only have to rebuild their capital and strategies, but also the trust of investors, counterparties and depositors. True, financial institutions, as a matter of principle, do not favour ever-increasing regulation; yet, the business of financial institutions vitally depends on the preservation of financial stability and the general public's trust of the financial system. Given that regulation is necessary to sustain (or rebuild) capital and trust, banks would be well-advised to help frame these rules.

The loss of trust is especially pronounced in the markets for structured credit products. Many observers predict that the crisis will lead to a permanent demise of complex financial instruments, especially structured credit products, which many claim to lie at the heart of the crisis. However, just as the 1929-32 US stock market crash did not lead to the extinction of shares as an asset class and just as the emerging market crisis of the late 1990s did not lead to the permanent disappearance of emerging market asset, structured credit products will survive this financial crisis albeit probably in modified form.

At Deutsche Bank, we have, over the years, already developed the components necessary to successfully operate the originate-and-distribute model and to withstand even difficult market environments, such as the current one. In my view, these components are:

• integrated and independent risk management;

• full use of risk transfer, and robust underwriting and risk monitoring standards;

• comprehensive stress testing that complements traditional risk measures (value-at-risk –VaR, economic capital);

• effective and consolidated management of capital, funding and liquidity.

Contrary to what is occasionally argued these days, structured credit products are not inherently problematic. But these products are not sufficiently transparent and market infrastructure has not developed in line with the rapid growth of these markets. Collective action by market participants has failed to address these issues in time. If the financial industry does not manage to rectify matters quickly, now, we should not be surprised to see the public sector intervene. This would probably result in tighter regulation and fewer market-based structures but banks will have no one to blame but themselves.

Investors will only return to the markets for structured credit products when confidence returns. In a way, the situation is comparable to the events of the Great Depression, when a lack of transparency on company accounts aggravated the Dow's fall. It was only after the establishment of the Securities and Exchange Commission (SEC) in 1934, which set mandatory standards for the disclosure of listed company's accounts, that confidence could be restored, as investors were then able to assess the quality of companies' assets and evaluate share prices accordingly.

Similarly, today, market participants, with the help of the public sector, will need to establish mechanisms and ways to restore confidence in the markets, especially those for complex structured credit products. First, there is a need to build an infrastructure that reduces settlement risk by means of automation and netting. Standardisation will also play a role. Second, there is a need to increase transparency by pooling data on transaction volumes and prices. Originators need to disclose sufficient data on the underlying assets so as to enable investors to perform their own due diligence rather than to passively rely on third-party assessments, such as those of rating agencies. Current experience in those markets shows that transparency indeed makes the difference: while many banks find it difficult to place such products with investors, some succeed in doing so, because they provide comprehensive and credible information on the performance characteristics of these products and on the risks in the underlying portfolios. This allows investors to make their own analysis and make an informed investment decision.

As discussed above, though, the deficiencies revealed by the crisis are not limited to the area of structured credit products. Rather, a whole range of issues needs to be addressed by the private and the public sector. Fortunately, neither the financial industry nor public authorities are starting from scratch here. Indeed, many of the required reforms had already been set in train before the crisis struck as the following examples illustrate.

• The international banking community had already worked intensively on the issue of liquidity management well before the crisis struck. Already in spring 2006, the Institute of International Finance (IIF) had published principles for better liquidity management; and there is consensus that banks that had already implemented these recommendations have fared better than those that did not.

• Similarly, governance for risk management is a major, –though still underestimated– part of the Basel II accord, namely in the shape of the Internal Capital Adequacy Assessment Process (ICAAP). This underlines the commonly-held view that, had Basel II already have been implemented in 2006, the fall-out from the crisis would have been less severe.

• In an initiative prompted and coordinated by the Federal Reserve Bank of New York, major investment banks have worked jointly on reducing backlogs in the confirmation of trades in credit derivatives and on the greater automation of trade confirmations.

• In the European Union, financial supervisors had already taken first steps towards a more systematic

approach in the supervision of large and complex cross-border financial institutions.

Against this background, it is hardly surprising, but nonetheless augurs well that the three major, recently released reports, which list recommendations on how to enhance the functioning and resilience of financial markets, share a lot of common ground. Thus, the IIF's Committee on market best practices, the Counterparty Risk Management Group ("Corrigan III report") and the G7's Financial Stability Forum (FSF) all put governance and the processes for risk management at the heart of their recommendations. It is also remarkable and a testament to improved international cooperation, as well as an alignment of philosophies, that all three reports put emphasis on principles-based regulation, on international coordination, on close relations between the private and the public sector and display a preference for self-regulation over prescriptive measures.

As regards risk management, all three reports emphasise that financial institutions need to develop a risk culture that is commensurate with their business model and that is effectively transmitted from top-management to the entire organisation. There is also a large overlap in their recommendations in terms of the improvement of stress testing, better liquidity management, the management of off-balance sheet exposures, and the integration of quantitative and qualitative risk measures. Moreover, the reports are united in the belief that a comprehensive approach to risk management also needs to address product development and new product approval with a view to a life-cycle approach in assessing the risks inherent in complex financial products. Finally, all three reports touch upon the issue of compensation noting that there is a need to formulate principles that align compensation structures with long-term profitability and the risk appetite defined for the institution.

Moving beyond risk management *sensu strictu*, all three reports share the view that the above-mentioned problem of defining appropriate rules for the valuation of illiquid assets requires urgent attention. They are united in stressing the need for and the virtues of greater transparency, especially the detailed disclosure of exposures and the provision of more information on complex financial transactions. Again, our own experience shows that this can provide tangible, monetary benefits: our loan exposure management unit was able to place structured credit transactions, including first loss exposures, even in difficult market conditions. Due to the high level of transparency we provide on the pricing mechanism and underlying performance, investors never lost their confidence in the collaterised loan obligations (CLOs) that securitise Deutsche Bank's German mid cap exposure.

Given the differences in their composition, mandate and background, it is not surprising that there are also areas where the focus of reports deviates. Thus, for example, the "Corrigan III"-report devotes a substantial part of its recommendations to the infrastructure for over-the-counter (OTC) derivatives trading, focusing on the creation of a central counterparty (CCP) and the establishment of technologies to confirm and settle trades and determine exposures rapidly. In turn, only the IIF and the FSF reports give recommendations on rating agencies urging them to address potential conflicts of interest, to improve the ratings process and to increase transparency on rating methodologies.

Finally, given the prominent role that liquidity issues have played in the crisis, it hardly comes as a surprise that the role of central banks receives prominent coverage in the reports. In an effort to calm markets and prevent a spillover of financial market turmoil into the real economy, central banks injected substantial amounts of liquidity into the financial system. The professional and timely action by central banks certainly had a calming effect on financial markets. However, reflecting the global nature of the crisis, there is a well-justified call for closer international coordination as well as an alignment of central banks' instruments and policies for the provision of emergency liquidity. The question is also being raised as to what is the appropriate role of central banks in financial supervision, duly recognising the potential for creating moral hazard issues. On a related issue, the recent crisis period has also rekindled the debate on whether central banks should take into account asset price bubbles more proactively when setting monetary policy. True, it is difficult to say with

any certainty whether instances of unusual price dynamics constitute a bubble and undoubtedly, central banks will be blamed if they try to prick such bubbles. Yet, considering the economic dislocation that is caused by the bursting of the bubbles –such as we are witnessing today– there is, in my view, a strong case for central banks to act pre-emptively to stave off greater damage in the future.

Financial markets are at the heart of modern economies and there can be no doubt that the financial innovations seen over the last two decades have contributed positively to increasing the underlying growth rate of the global economy. In particular, the greater tradability of financial assets and financial risk has increased the amount of capital available as well as the efficiency of capital allocation. However, as the current financial crisis has painfully made clear, such a market-based financial system is less tolerant to weaknesses and mistakes; it therefore requires a sound financial infrastructure and highest standards for risk management both in financial institutions and in the work of financial supervisors and central banks.

Above all, this will require:

• an accounting regime that gives reliable, meaningful and consistent signals to all market participants and supervisors;

• adequate recognition for the central role liquidity plays in a market-based financial system and corresponding tools in the hands of financial institutions and central banks for dealing with liquidity risk;

• a financial market infrastructure that inspires confidence through full transparency on products and prices.

In addition, macroeconomic policy, especially monetary policy, must pay more attention to financial stability issues, naturally with a global perspective. A tall order? No doubt– but the blueprints for this are on the table; it will be up to the financial industry and the public sector to jointly take the right decisions.

Revisiting valuation practices throughout the business cycle: some symmetry is needed

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The current crisis exposed weaknesses in the application of accounting standards and gaps associated with the valuation of financial products. During the upturn, the revaluation of assets, build-up of off-balance sheet claims, and booking of unrealised gains obscured risk exposures taken by financial institutions. But as we have learned, when the cycles turn, the downward trends and uncertainties in the value of assets may lead to negative dynamics that may exaggerate the trough of the cycle. This is generally accepted, but we need to be more symmetrical in our approach: increasing valuations in the upturns can also create the incentives, through more profits, compensations and dividends, to purchase more of the appreciating assets and thereby exacerbate the peak. All this raises legitimate questions regarding the role of risk management systems, accounting standards and regulations in creating adequate incentives and conveying information on a financial entity's risk profile throughout the business cycle. More fundamentally, it raises questions about whether marking-to-market provides the necessary objective representation or may contribute to mispricing of risk during upturns and injecting artificial risk during downturns and thus distorting the information value of prices.

Changing accounting standards at the height of the crisis would risk adversely impacting investor confidence and should be avoided. Furthermore, fair value accounting is the direction to go, but going forward, there is a need to revisit the implications of accounting standards on behavior and incentives, especially during good times, with a view to making possible adjustments to current accounting practices. Inconsistencies of accounting standards with best risk management practices and prudential norms can be very expensive for financial stability. Governance and risk management within financial institutions need to be improved, and supervisors should scrutinise more carefully internal processes and controls, as well as valuation and stress testing methodologies.

NB: The views expressed herein are those of the authors and should not be attributed to the IMF, its Executive Board, or its management.

Until mid-2007, global financial markets were characterised by low premia on financial assets which emboldened investors to venture down the "credit ladder" in search of higher returns. While the coming of a correction should not have been a surprise to anyone, several factors have contributed to turning a correction into a financial crisis. These include:

• lax underwriting standards, risk management failures, and compensation schemes that may have encouraged excessive risk taking;

• weaknesses in structured product design and pricing at origination, including lack of transparency about underlying risks of structured products, and shortcomings in modeling and valuation of such products;

• lack of investor due diligence and herding behavior, including weaknesses due to the inability to assess risks as investors accumulated their experience only during good times;

• and the collective failure to understand the magnitude and implications of the leverage accumulated by a wide range of institutions using existing and innovative financial mechanisms. The combination of a highly leveraged financial system and a sudden lack of confidence in the valuation of assets has proved to be quite harmful.

This article refers to two different but interrelated topics, valuation of financial instruments and fair value accounting. The current crisis exposed weaknesses in the implementation of accounting standards and gaps associated with the valuation of financial products. The role of these weaknesses in the financial crisis should not be exaggerated, but they have been important enough to require a thorough analysis of their impact. Current practices of marking-to-market, combined with inadequate valuation and risk management models, may have contributed to inefficiencies both by mispricing risk during the upturn and by injecting artificial risk premia during the ensuing downturn, and thus distorting the information value of prices. The abnormally tight market liquidity conditions during the crisis intensified discussions on the role of fair value in contributing to its severity.[1] While much effort is being devoted to improve valuation practices under market stress, the central thesis of this note is that a symmetrical treatment is needed. The seeds of the problem were planted in good times. It was then when leverage and excessive risk was accumulated, and therefore the specifics of fair value accounting and its implementation that may shape incentives in good times also need to be revisited. This note aims to contribute to this much-needed policy debate.

Changing accounting standards in the midst of the crisis would risk adversely affecting investor confidence and should be avoided. Fair value accounting should be maintained –alternative techniques have their own shortcomings. However, there is a need to revisit the implications of existing accounting standards on behavior and incentives, especially during good times, with a view to making possible adjustments. A strengthening of accounting standards to take into account their implications throughout the business cycle is needed to help eliminate or at least substantially reduce inconsistencies with best risk management practices and prudential norms. Prudential supervisors have a significant role to play and should scrutinise more carefully internal valuation processes and controls, as well as pricing and stress testing methodologies– especially during the upturn. All this makes it critical for regulators, accounting standard setters, and the industry to join forces to better align the supervisory, risk management and accounting guidelines. This is essential to safeguard financial stability.

VALUATION PRACTICES:
IMPLICATIONS THROUGHOUT THE BUSINESS CYCLE

The main objective of accounting standard setters is to ensure that financial statement information is measured in a way that is clearly defined, economically meaningful, comparable across entities, and adequately disclosed. The financial statement information seeks to provide an understanding of a firm's value and the economic risks and potential rewards that it faces. This is a formidable task, especially for the financial

1 *See Shin (H. S.) (2007).*

sector, given the globalisation of the financial industry, rapid innovation, and the ever-increasing complexity of the instruments used. Furthermore, credit decisions and the allocation of capital depend on an assessment of firms' profitability, liquidity and solvency which are contained in published financial statements.

Historical cost accounting measures financial assets and liabilities at their origination value. This can lead to inefficiencies as adjustments are not made for subsequent changes in market value. Let us consider the value of an asset throughout a business cycle. During the upturn, the historical cost valuation may lead to an undervaluation of the asset, and conversely during the downturn the asset may be overvalued. Of particular concern for financial stability has been the distorting of incentives during the downturn as the reductions in the true economic value of assets could be masked. It is commonly felt that had accounting reflected underlying market values, the difficulties of US savings and loan institutions would have been recognised and addressed earlier, and perhaps at lower fiscal cost.[2]

In response to the shortcomings of historical cost accounting, an alternate approach seeking to more accurately reflect market valuations, fair value accounting, has been introduced. Fair value seeks to provide a measure of the economic value of a transaction that is understood by interested stakeholders. In the United States, the accounting guidance clarifies that fair value is an exit price, representing "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date". International Financial Reporting Standards (IFRSs) defines fair value as the "amount for which an asset could be exchanged between knowledgeable willing parties in an arm's length transaction".

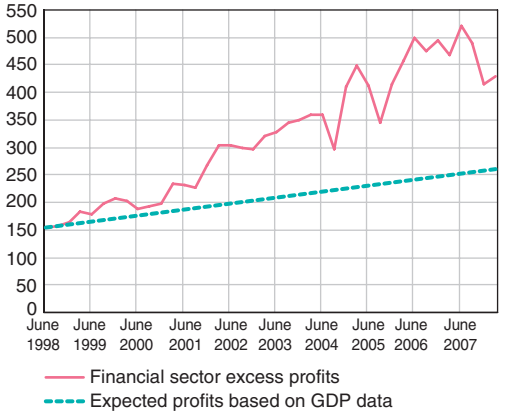
Let us now consider the value of an asset throughout the business cycle using fair value accounting. Marking-to-market assumes that financial markets are efficient and provide the best method to value a specific financial asset. Under normal conditions, fair market valuation should meet its objective of providing information about a bank's true risk profile and promote market discipline. However, markets are subject to uncertainties and cyclical changes.

2 *See Michael (2004); Jackson and Lodge (2004).*

To the extent that there are market tendencies to overshoot the underlying value of an asset both during upturns and downturns, the measured "fair" market value may diverge from the underlying economic value of an asset. In the upturn, asset price bubbles may be started by excess liquidity in the markets, which could then be compounded by remuneration and other incentives of market participants. This may lead to procyclical, self-reinforcing, and self-extending "write-ups." These valuation gains could lead to an increase in bank profits (see Chart 1) and capital, which in turn, through leveraging, could lead to further expansion of assets and liabilities either directly on their balance sheet or indirectly *via* specialised investment vehicles, and so on.

Why would such an expansion go unchecked? The upward revaluation of assets reflected in bank profits may lead to pressures on bank management to distribute dividends, including unrealised gains on the assets on banks' balance sheets. Because there is evidence that managers may try to produce smooth earnings per share, even if the initial change in market value was justified by changes in fundamentals, management might distort their choice of projects in ways that will amplify these changes. Under these conditions, there may be little incentive for shareholders, uninsured depositors and other debt holders to identify the risk exposures taken by financial institutions and put pressure on bank management to take corrective action at an early stage.

Chart 1
US financial sector profits versus expected profits based on GDP growth
(USD billions)



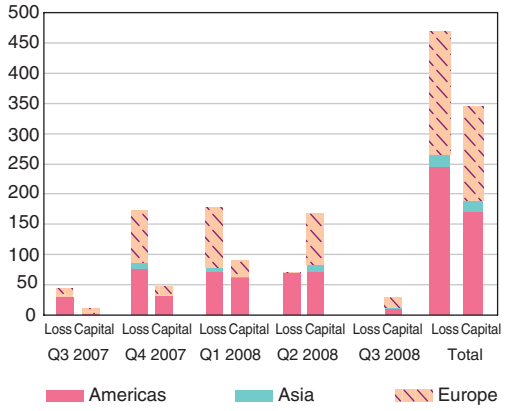
Source: Deutsche Bank.

It could be argued that in the upturn leading to the present crisis, liquidity risks were not properly taken into account. As a result, part of the recorded profits could have been liquidity risk premia that should have been provisioned. An analysis of how these risk premia have behaved throughout the cycle may help to identify the need for some adjustments in valuations to mitigate any overvaluations in future cycles.

When the cycle turns, the downward revaluation of assets may be rapid and severe (see Chart 2). The use of fair value accounting from the beginning of the cycle could itself exacerbate the overshooting of prices on the upside and therefore lead to a sharper fall during the downturn. Fair value reflects the sum of all the risks the market assigns to the asset, including credit and liquidity risks. However, markets are not always sucessful in pricing risks appropriately, and thus the fair value will reflect any overreaction of the market's assessment of these risk components. This is in part due to the fact that valuations "need to reflect current conditions and incorporate adjustments for risk, including liquidity, which other market participants would use to price the financial instruments".[3]

Accounting frameworks require professional judgment in determining the mechanisms for fair value, including the use of unobservable inputs in cases of the absence of an active market for an instrument. Such judgment

Chart 2
Losses/writedowns and capital raised by banks in the downturn
(USD billions)



Note: Writedowns and credit losses for 2008:Q3 have not yet been fully reported.

Source: Bloomberg LLP.

3 *See Ernst and Young (2007).*

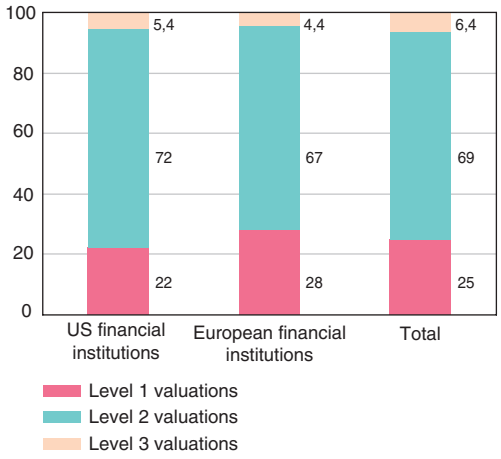
allows the possibility of different outcomes for similar situations, which in times of market uncertainty may compound the risk of illiquidity (*Global Financial Stability Report*, April 2008). The interaction of fair value with specific covenants or triggers can further compound market illiquidity by leading to sales, margin calls or additional collateral requirements. As forced sales are triggered, fair valuations need to be applied across a number of portfolios even when there is no intention or need to sell at the full amount of the liquidity-induced discounts. This can further reduce financial institutions' supply of assets available for liquidity operations.

It should also be noted that fair value accounting is applied more extensively to financial assets than financial liabilities. This may produce accounting volatility that can disguise or distort the underlying economic substance. For example IAS 39 prevents the valuation of demand deposits at a value less than their face value, even if a significant portion of these display the economic characteristics of a term deposit. Furthermore, the application of fair value accounting on liabilities such as debt issued by an entity may lead to counter-intuitive effects in the event of a credit down-grade as this would produce notional profits for the entity (producing gains when the valuation of liabilities worsens). This is of particular concern when a deterioration in a bank's own credit worthiness, and the subsequent decline in value of own debt, results in profits and a false sense of improvement in the bank's equity position. It also raises prudential concerns and raises significant issues about the economic interpretation of this contradiction in a bank that is an ongoing concern.

IMPLICATIONS OF MODELING UNCERTAINTY

Fair value hierarchy prioritises the inputs to valuation techniques used to measure fair value. According to US GAAP, level 1 valuation requires observable prices for the same instrument in liquid markets. When observable prices are unavailable for the valuation date, level 2 valuation allows the use of prices on nearby dates, or the use of arbitrage-type valuation models that use the observable prices of other financial instruments or available indices. For instruments for which levels 1 and 2 valuations inputs are not available, level 3 valuation allows

Chart 3
Fair value hierarchy
Aggregate fair value hierarchy – combines assets and liabilities (end 2007)
(%)



Source: Fitch Ratings.

the use of theoretical valuation models that use as inputs various relevant fundamental parameters ("mark-to-model" approach). As the chart shows, the use of levels 2 and 3 is quite significant.

As valuation moves from market prices to mark-to-model valuation, fair value accounting becomes less transparent and increasingly dependent on judgment, model assumptions and parameters, posing reliability challenges to which markets, particularly under distress, are sensitive. These "subjective" aspects of fair value accounting may accentuate the severity of the crisis by compounding market illiquidity or price spirals if they increase uncertainty around valuations.

In summary, weaknesses in models have also contributed to distorted valuations that may have reinforced market dynamics. However, it should be kept in mind that different market participants with similar models have behaved differently, indicating that failures in governance structures that support risk management and different assessments by management regarding market direction were also important.

Consolidation of off-balance sheet entities under stress

During the lead-up to the present crisis, several financial institutions seem to have not properly assessed the contingency risks which led to unexpected claims on their liquidity positions. In some cases, the consolidation of off-balance sheet claims were due to reputational concerns while in some others these claims represented contractual obligations and should have been consolidated in the first place.

As both accounting and supervisory rules govern consolidation, common principles need to be established. While Basel I did not adequately cover asset securitisation, Basel II attempts to provide a comprehensive framework to capture the associated risks. In particular, for securitisation exposures, the "clean-break" criteria must be met and the supervisor has to be satisfied that risk transfer has taken place. It should be noted that both International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB) have moved promptly to address the underlying issues by substantially amending the relevant standards for consolidation and derecognition.

Need for policy dialogue and suggestions for moving forward

There are many factors that contributed to the dynamics of this crisis and it is likely that the procyclicality of fair market valuation is one of them. However, this does not validate the calls for abandoning fair value accounting during the downturn. After all, there were no such calls during the upturn. Changing accounting standards in the midst of the crisis could adversely affect investor confidence and should be avoided.

The main thesis of this article is that there is a need to enhance current accounting practices as part of a desirable set of reforms to strengthen financial systems. The amendments should not be restricted to the downturn or to illiquid conditions in markets, but rather consider the dynamics throughout the cycle, with a particular focus on the upturn. Otherwise, there may be a risk that in the upturn, valuations could be exaggerated and financial institutions may record as profits what in reality are risk premia that should be provisioned. This could distort the representation of the condition of the financial institutions as well as create incentives that could exacerbate the subsequent upturn. Thus in both up and down cycles, fair value accounting should be structured so that it

contributes to good risk management and ensures that financial statements include adequate disclosure of methodologies, valuations and volatilities such that inherent uncertainties are well understood.

Going forward, there is a need for a policy dialogue between the accounting standard setters, the financial industry, and supervisors. Given the systemic implications of financial institutions, it is critical for these three stakeholders to join forces to better align risk management practices, supervisory regulations and accounting guidelines. While arriving at a final solution will require further work, the following principles could provide a direction to the debate.

A fair "fair value" with enhancements

The amendments to current accounting standards should take into account their implications on incentives and the information available for the asset. They should aim to contribute to, or at least should not impede, better risk management by financial institutions as well as promote better regulation.

The debate about proper valuation has been often framed in terms of reality and prudence. The present crisis has led to questions about the representation of "reality" by current valuation practices. It can be argued that these practices were not only less prudent than desirable, but led to a misrepresentation of the real risk profile and the performance of financial institutions. To the extent that assets and profits have been overvalued in good times, wrong incentives were created, leading to sharper declines in values and returns in bad times. As a result, in the medium term, shareholders, management, creditors, and regulators were not well-served.

Balance sheet volatility arising from fair value accounting raises new challenges to ensure the maintenance of adequate capital buffers. Such buffers need to be considered through the cycle, augmenting the capital position during boom cycles to withstand the burden on capital that stems from economic downturns, reflected in the enhanced risk of asset deterioration, rising loan delinquencies, lower recovery rates, and more difficult funding conditions. However, it is often stated that creating buffers to deal with expected liquidity or credit risks could distort "the reality".

To some extent, this reflects a tension between the accountant approach to financial instruments valuation, the prudential approach, and the risk management approach. Usually this tension was mitigated by prudential regulators trying to accommodate some prudence within the limits allowed by the accounting rules, by accounting standard setters introducing minor changes in the standards, and by banks trying to exercise their risk management within the limits of the prudential and accounting rules. The crisis has shown that these partial solutions are not good enough, that much is at stake, and that it is necessary to resolve the tensions between valuation approaches across risk managers, accountants, and prudential supervisors and regulators, so as to ensure that accounting frameworks do not unduly contribute to potential financial instability.

All this suggests that a consideration of a fair value should not only use the last transaction price but also the information available about its price volatility and its evolution through previous cycles. Given the doubts that can surround valuations, fair value estimates should be supplemented by information on a financial instrument's price history, the variance around the fair value calculations, and management's forward-looking view of asset price progression and how it will impact the institution's balance sheet. Taking into consideration these elements would enhance fair values and represent better the actual financial situation of a firm. It could also close the gap with risk management practices and get much closer to the prudent valuation that financial stability requires. All this information, under an objective framework, can be used to make these adjustments an integral part of the fair value process. Adjustments could be in the form of statistically supported cushions that reflect actual risks contained in the portfolio.

Enhanced role of prudential supervisors

The role of prudential supervisors in reviewing the valuation and accounting of financial instruments has been always a thorny area, leading to a wide range of different supervisory practices. Some argue that some aspects of the valuation of financial products are accounting issues in which supervisors should not interfere, but instead ask for adjustments in their prudential domain. These may include increasing regulatory capital requirements, scrutinising more

carefully internal processes and controls, as well as pricing and stress-testing methodologies. However, true and fair accounting rules are sometimes not supportive for applying forward-looking valuation and risk management principles. Both elements are important for prudential supervisors. Therefore it seems that one of the lessons is that convergence towards principles-based accounting is warranted, including a more active and better recognised role by supervisors in the valuation methodologies and provisioning of financial institutions.

Broader understanding

To further strengthen current valuation practices, there is a need to better understand the implications of accounting standards on incentives and on the behavior of financial institutions through the cycle and in stress conditions. However, one-time adjustments will not likely to be sufficient. There is a need to make continuous efforts to understand and analyse the dynamics of the business cycle and the implications of financial innovation, as part of the noise and uncertainties in financial markets may be transferred to valuations and balance sheets more rapidly, and intensify the implications for solvency and more broadly, financial stability. Better knowledge about the transmission channels will enhance the understanding of, and sensitivity to, risks. From the point of view of financial stability, rapid evolution of events and accompanying market and balance sheet adjustments can lead to rapid changes in the solvency situation of financial institutions. This calls for mandating deeper analysis and stipulating higher standards in risk management.

Better information and disclosure

Better information and disclosure is needed in several areas: the risk profile of the institution; the risk management process and governance of valuations; and a more comprehensive presentation of the adjustments and models used for valuation especially in complex financial products. Banks should also provide better disclosure on instrument-level sensitivity analysis (which would provide estimates of the effects of events that impact liquidity and volatility in various markets), at least for their largest exposures to structured instruments. US GAAP has no requirements for sensitivity disclosure for fair valued instruments. IFRS 7 (Financial Instruments: Disclosures) contain basic sensitivity analysis for general classes of risk but not for specific classes of assets.

An international dimension

Finally, there is a need for cross-border consistency for the accounting frameworks as well as between the accounting and regulatory frameworks. In globalised financial markets, the differences in approaches to deal with the issues discussed in this note are significant. This in itself is a weakness of the system. It burdens unnecessarily the risk management process of financial institutions and it may jeopardize the cross-border consistency that the global financial stability requires.

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Valuation and fundamentals

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"It is no longer possible to value fairly the underlying US ABS assets", BNP-Paribas, 9 August 2007

The aim of this article is not to provide a comprehensive overview of the financial crisis that began a year ago. This has already been done quite extensively and in a neat way, in particular by Borio (2008), Brunnermeier (2008), Crouhy et al. *(2008) and Calomiris (2008) among others, who all describe and analyse the numerous triggers and mechanisms through which the crisis unfolded and spread to the main developed financial markets. Instead, we would like to focus on what we believe is one of the core issues of this crisis and which has not been addressed yet: valuation.*

Valuation is at the interplay between market dynamics, economic behaviour, accounting standards and prudential rules. The multiple, and even systemic –as far as the current episode is concerned– interactions between all these elements, associated with the inability of market participants to value complex financial instruments in illiquid/stressed markets, have resulted in a financial meltdown that is already considered by many observers as the worst financial crisis since the Great Depression.

NB: *This article was written by Laurent Clerc (Financial Stability Directorate), with contributions from Nathalie Beaudemoulin (General Banking System Supervision Directorate of the General Secretariat of the Commission bancaire), Cédric Jacquat (Financial Stability Directorate), Vincent Legroux (Market Operations Directorate), Jean-Stéphane Mésonnier (Research Directorate), Lionel Potier (Macroeconomic Analysis and Forecasting Directorate) and Anne-Marie Rieu (Middle Office). The author would like to thank Jean-Charles Rochet for useful comments.*

This article reflects the opinions of the author and does not necessarily express the views of the Banque de France.

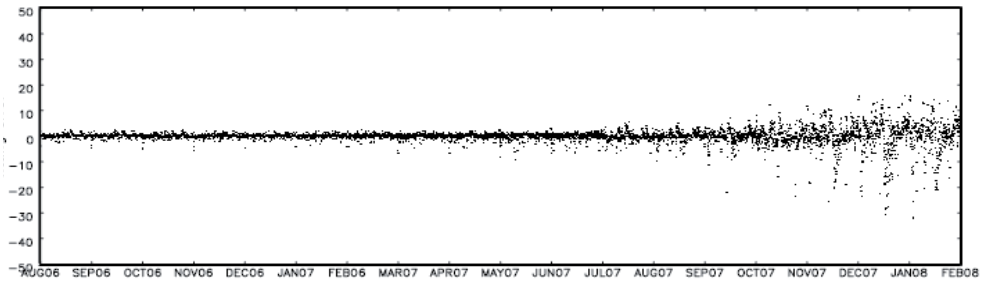
In a recent contribution, Perraudin and Wu (2008) estimate term structures for asset-backed securities (ABSs) tranches. They run a regression of the residuals in the credit spread fits to see how the individual ABS of a particular rating category deviate from the market's average pricing for that category. This result is presented in Chart 1 below, which plots the prices of AAA-, AA- and A-rated US fixed home equity loan ABS, relative to the average corresponding rating issue. Chart 1 shows an amazing constellation of valuations for these financial instruments, the dispersion of which has been increasing since July 2007.

This chart illustrates the fact that, since that date, no one probably knows how to properly value these assets. The direct consequence of this uncertainty regarding asset valuation has been a general distrust between counterparties. This distrust has already resulted in: a breakdown in the most liquid markets, such as commercial paper markets since August 2007; a durable impairment in the functioning of the inter-bank markets; growing concerns about the accuracy of the results disclosed by big financial institutions, leading to increased volatility in financial companies' share prices and to a significant and durable tightening of their funding conditions.

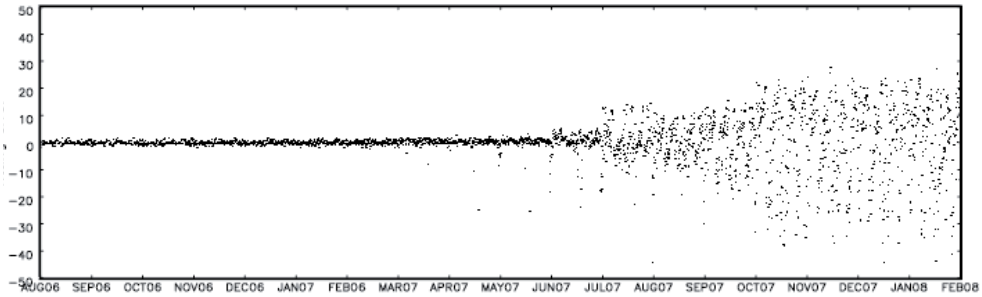
The most striking feature of the current turmoil is that credit losses have remained rather limited so far. According to available estimates, credit losses

Chart 1
Rated home equity loan ABS tranches
(Y-axis: fitting error)

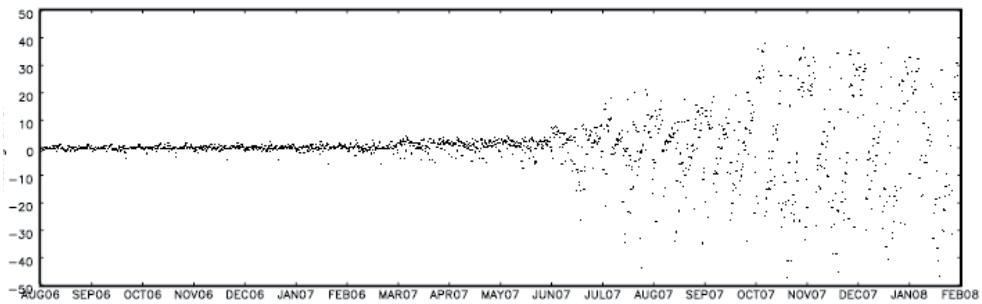
AAA–



AA–



A–



Source: Perraudin and Wu (2008).

amounted to around USD 50 billion at the end of July 2008. By contrast, total write-downs represented something like USD 425 billion at the same date, *i.e.* about 90% of the total losses registered in the banking sector. But there is obviously a large amount of uncertainty surrounding the latter figures, as most exposed assets are pretty hard to value in the current juncture. This is what the current crisis is really about: valuation. And this issue has not been addressed yet.

The paper is structured as follows. We first review the conditions that led to the built-up of the financial imbalances at the root of the current crisis episode and try to set out the fundamental role of valuation and risk management techniques. The second section of the paper analyses the uncertainties stemming from valuation issues. Section three finally concludes and presents some policy recommendations to address some of these valuation issues.

1| RISK MANAGEMENT AND THE DYNAMICS OF THE VALUATION CRISIS

1|1 The build-up of financial imbalances

Empirical evidence shows that banking crises and real estate housing bubbles tend to be correlated in a remarkable number of instances. The current episode is no exception. It is rooted in the usual combination of historically low interest rates, monetary and credit expansion and booming asset prices. In addition, it has been fuelled by the build-up of global financial imbalances. The resulting excess saving in emerging countries was re-intermediated into the industrialised world by the banking system, in particular in the United States, in a context of global assets' shortage.[1] Declining issuance of government bonds in the United States led this excess demand for assets to be invested in US asset and mortgage-backed securities (MBSs), in particular those issued by government-sponsored enterprises (such as Fannie Mae and Freddie Mac). These products, in particular collateralised debt obligations (CDOs), were very attractive since they were providing higher yields compared to corporate bonds with the same rating and were supposed to be less exposed to the default of any of their components.

The build-up of both domestic and global imbalances was amplified by a double difficulty regarding:

- the fair valuation of assets (*e.g.* housing –see Box 1– and exchange rates);
- risk discrimination.

The conjunction of these two elements in a context of imperfect credit markets first gave rise to an amplification effect known as the financial accelerator mechanism.[2] Credit market imperfections influence the nature of financial contracts and create a wedge between the cost of internal and external financing. This is due to the inability of lenders to monitor borrowers without cost. As a result, cash flows and borrowers' net worth become crucial in determining the cost and the availability of finance. Due to information asymmetries, external finance is more expensive than internal finance, especially if it is un-collateralised. On housing markets, rising house prices increase the value of the collateral (the house) as well as the ability for the borrower to take on more debt as his net worth increases. This process feeds on itself: rising asset prices lead to credit expansion which fuels asset demand, thereby raising asset prices, and so on and so forth. This mechanism explains the spectacular decline of US households' savings rate and the correlative rise of their leverage.

In addition, rising asset prices encourage banks to lend directly to the real estate sector for two main reasons: first, both the expected return on the bank's portfolio of real estate assets and the economic value of its capital increase; second, as the collateral value of real estate assets increases, the risk of losses on the existing loan portfolio declines. It is then possible for banks to lend more without increasing the probability of bankruptcy.[3] At some point however, the tendency to underestimate the probability of a collapse in real estate prices is exacerbated.

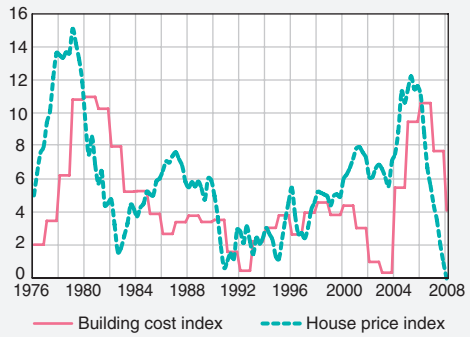
1 *See Caballero (2006).*
2 *See Fisher (1933); Bernanke* et al. *(1999).*
3 *See Herring and Wachter (2002).*

Box 1

Identifying a housing bubble

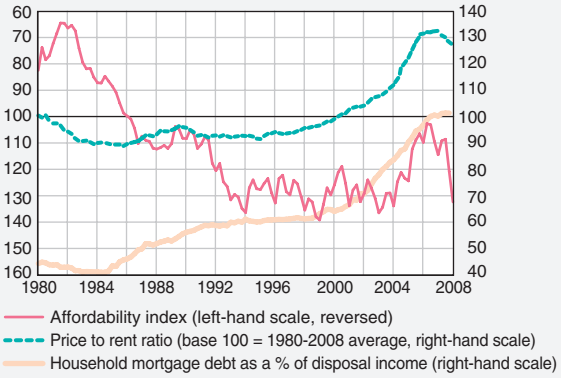
The recent pattern of house prices in the United States has caused many to believe that a bubble had formed on the housing market in the 2000-2005 period and is currently in the process of deflating. Nationwide house prices, measured by the OFHEO index, increased by an average of 8% year-on-year in 2000-2005 in nominal terms and 5.5% in real terms. In comparison, they rose by an average of 2.8% in 2006-2007 in nominal terms and were virtually flat in real terms. Bubbles are notoriously difficult to identify, and regarding US housing, available data do not unanimously point to a disconnection between observed prices and their fundamentals. On the supply side for example, building costs have accelerated, especially in 2004 and 2005, due to rising prices on selected commodity markets (steel, aluminium) and accelerating labor costs in the construction sector, resulting from shortages on the market for qualified workers. This feature may have pushed the supply curve rightwards, prompting the rise in house prices and putting downward pressure on the quantity of new homes. Besides, significant developments on the demand side (low interest rates and dynamic disposable income) contributed to sustain activity and added to inflationary pressures on the housing market. Housing affordability indicators,[1] which measure the degree to which a median-income household can afford the mortgage payments on a median-price home, have remained above 100 since 1991, suggesting that the median family earned more than the necessary income to qualify for a conventional loan covering 80 percent of a median-priced existing single-family home. Although the affordability index fell from 2004 to 2006, it remained fairly close to its long term average during the entire period.

House prices and building cost index
(year-on-year growth rate, %)



Sources: Turner construction, Office of Federal Housing Enterprise Oversight (OFHEO).

Affordability index, price-to-rent ratio and household mortgage debt



Sources: National Association of Realtors, OFHEO, Bureau of Labor Statistics, Federal Reserve, Bureau of Economic Analysis.

*However, other indicators do point to significant misalignments in house prices. Housing debt, expressed as a percentage of disposable income, increased from 65% in 2000 to 101% in 2007. Some of this increase is attributable to a surge in households' participation in the residential property market, which is consistent with the increase in the ownership ratio (*i.e. *the proportion of households who own their homes as opposed to renting). Nevertheless, a significant share of this increase cannot be accounted for by changes in households' preferences, nor by an increase in financing opportunities resulting from innovations on the mortgage market. The increase in the debt to income ratio also highlights that households became increasingly dependant on their property value to service their debt. It may also simply reflect the fact that the increase in current house prices was largely due to purchases based on economic agents' expectations of higher prices in the future, in other words, the formation of a bubble.*

This assessment is confirmed by the developments of the price-to-rent ratio, which measures the average cost of ownership (price) compared to the average income that is received by the owner (rent). This ratio, which is similar to the price-to-earnings ratio for stock markets, displayed a sharp rise from 2002 and was more than 30% higher than its long term average in 2006, suggesting that investors were expecting sharp increases in future rents, especially in certain areas characterised by overoptimistic medium-run demographic projections (California, Florida).

1 The most commonly-used affordability index is published by the National Association of Realtors. It is defined as:

$$100 \times \frac{\text{Median family income (monthly)}}{\text{Qualifying income}} = 100 \times \frac{\text{Median family income (monthly)}}{\text{Median price of existing homes} \times 0.8 \times \dfrac{\text{Interest rate}/12}{1-\left(\dfrac{1}{1+\text{Interest rate}/12}\right)^{360}} \times 4 * 12}$$

NB: Box prepared by Lionel Potier (DG-Research and International Relations).

This can lead to "disaster myopia",[4] a situation in which banks take on greater exposures relative to their capital position but, simultaneously, become more vulnerable to a disaster.

1|2 Risk management and valuation

The governance of risks within companies, the greater involvement of boards of directors in setting risk exposure, better reporting of various kinds and measures of risk, relying on more rigorous models as well as on the generalisation of value-at-Risk (VaR) methods have greatly improved the management of risks over the last decade.[5]

However, most of the risk management techniques rely on core assumptions that turned out to be not fully satisfied in the period preceding the crisis and then led to a mispricing of risks, evidenced by a protracted period of historically low credit spreads and low volatilities on the credit markets.

The VaR, which measures the expected loss of a portfolio under normal circumstance, assumes normal distribution[6] and thus may not accurately take into account "fat tail risk".[7] It is also sensitive to market condition, and in particular low volatilities.[5] Low volatilities lead to a reduction in the VaR that frees capital and enables financial institutions to increase their holdings of risky assets. As these VaR measures have generalised and are implemented in the same fashion at the same moment, their macroeconomic impact is likely to have increased the pro-cyclicality of financial systems. This affects in turn the covariance structure and the volatility of returns (excess demand for some risky assets leads to an increase in price of risky assets across the board).

In addition, financial acceleration is exacerbated in the context of the "originate-to-distribute model", which represents a major structural shift in the financing of the economy over the last decade. In such a business model, loan issuers may have few incentives to ensure loan viability since they expect to transfer credit risks to other investors. This type of moral hazard problem is even stronger when loans are originated by non-regulated entities. In the next step of the securitisation chain, the buyers of the loans that intend to repackage them into complex credit instruments have little incentive to scrutinise the quality of the acquired assets. One reason is that the ultimate buyers are mainly guided by the credit rating of the underlying assets. Thus, asymmetric information plagues every step in the process and provides a powerful source of contagion.[8]

As far as risk management is concerned, the securities produced along the securitisation chain are backed by assets, in general the underlying pool of credits, in order to overcome information asymmetries. And the price of these assets ultimately depends upon house prices. As long as house prices rise, the mortgage can be refinanced into a lower or teaser rate period loan. Since the losses arising from delinquent loans are not borne by the originators who had sold the loans to arrangers, the former do not really care about issuing loans at below fair value. The securitisation process continues as long as the net present value of the repackaged loans can absorb the losses.

This is where financial innovations come into play. In response to increased demand for financial assets, there has been a boom in new products in recent years, in particular collateralised debt obligations (CDOs) of ABS, which have so far accounted for the bulk of reported write-downs. The above-mentioned positive net present value stems from the fact that CDOs finance their purchase of high yield bonds, such as BBB-rated mortgage-backed bonds, by issuing AAA-rated CDO bonds paying lower yields. In this set-up, it is therefore crucial that senior CDO bond tranches be given an AAA-rating. To achieve this goal, the trust issues bonds that are partitioned into tranches with covenants structured to generate the desired credit rating so as to meet investors' demand for highly rated assets.[9] The collateral's cash flows are allocated

4 *See Guttentag and Herring (1984).*
5 *International Monetary Fund (2007).*
6 *In a provocative paper, Danielsson (2008) illustrates the high degree of uncertainty in risk forecast by quoting a Goldman Sachs chief financial officer who declared: "We are seeing things that were 25-standard deviation moves, several days in a row" (Summer 2007). Danielson reports that under normal distribution, such an event happens with probability 10^{-140} years (to be compared to the estimated age of the universe 10^{10} years).*
7 *See Landau (2008).*
8 *See Ashcraft and Schuermann (2007).*
9 *Many investors are restricted to invest in assets with certain ratings (e.g. AAA for money market funds, investment grades for many pension funds).*

to the bond tranches so that the senior bonds get paid first and the equity tranche last. In these structures, senior bonds generally get accelerated payments in case of stress or bad events on the collateral's pool and an insurance purchased from a monoline may also be used to ensure such AAA-rating.[10] This technique can be repeated in order to create CDOs squared, mixing MBSs and CDO tranches. Rating agencies therefore play a crucial role in this process:[11] investors rely on their rating to comply with their investment guidelines or restrictions; they help the CDO trusts to structure their liabilities and then rate the products. The rating process of structured products involves determining credit enhancement, which corresponds to the amount of losses on the underlying collateral that can be absorbed before a given tranche absorbs any loss.

A final component is the implementation of new accounting rules for the valuations of structured finance products. Although there are subtle differences between the International Financial Reporting Standards (IFRSs), which apply in particular to European Union companies with listed securities, and the Generally Accepted Accounting Principles (US GAAP), implemented by US companies, both have a presumption of fair value for any financial asset that a financial institution is not committed to hold to maturity.[12] In determining fair value, both accounting standards prescribe a hierarchy of methodologies, starting with observable prices in "active" markets and then moving to a mark-to-model approach for those assets traded in less liquid markets and involving non-observable data.[13] The spread of the "originate-to-distribute" model and the growth of credit risk transfers through securitisation have increased the share of banks' mark-to-market balance sheets. Indeed, most holders of structured financed products want to continue to be able to sell these products before maturity. Both accounting standards contain provisions for the recognition of fair value changes in the income statements or directly on the balance sheet to equity. This establishes a direct link from fair value accounting to banks' regulatory capital, which can facilitate the balance sheet leveraging when asset –and in particular house– prices rise.

1|3 Dynamics of the valuation crisis

The interplay between all these elements explains why –by contrast with other banking crises– the current episode has been characterised by a sharp and very fast correction, directly impacting banks' balance sheets through impressive write-downs, with many institutions then forced to raise external capital and/or sell assets.

Asset fire sales creates additional problems when, on top of capital constraints, banks also face short-term funding pressure. As described by Kashyap *et al.* (2008), it may give rise to an "asset-fire externality" as the liquidation of assets by a bank directly impacts the balance sheet of another bank, which holds the same assets, as the mark-to-market prices of these assets will go down too. This in turn may create pressure on that second bank's capital and force it to liquidate some positions.

The securitisation chain broke down at its weakest link: the subprime market. For those already fragile households, the situation worsened when the Fed decided to tighten its monetary policy, increasing their real mortgage debt service burden. Rating agencies' practice of making the rating of subprime credit stable throughout the cycle led them to increase the amount of credit enhancement as economic conditions started to deteriorate.

The ABX index, which is used to value ABS, declined gradually at the beginning of 2007 before falling sharply after July 2007 (See Box 2). Within a few weeks, rating agencies engaged in massive, and largely unexpected, downgrades impacting directly on banks' balance sheets. The ratings of monolines came rapidly under pressure too. The problem is that when a monoline is downgraded, so are the papers it has insured. Moreover, monolines are counterparties to credit derivatives held by financial institutions. They have also sold insurance to protect senior tranches of CDOs. Under fair value accounting, the holders of such downgraded bonds have to mark them down. This has a direct impact on their capital. For those investors required to hold only AAA-rated assets, this in turn implies

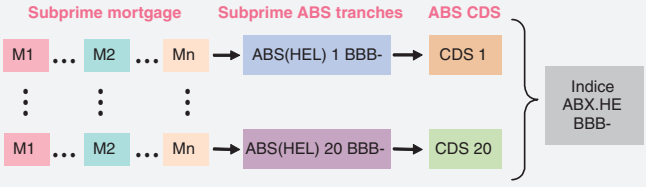
10 *See Crouhy* et al., *2008.*
11 *Calomiris (2008) reports that rating agencies assumed unrealistically low expected losses on subprime MBSs prior to the crisis. Based on the loss experience of 2001-2003, in a context of an already booming housing market, assumed expected losses rose to a level he refers to as the "6% solution" in 2006, whereas realised losses on this cohort are now projected to be several times this figure.*
12 *See Matherat in this issue of the* Financial Stability Review.
13 *See Box 3.*

Box 2

ABX Indices as a valuation reference for subprime markets

The ABX Index played a major role during the crisis. It became an important reference point for valuations of exposures to CDOs of ABS. Trading began in 2006 and indices were renewed every 6 months. The ABX index was rapidly a great success: it allowed investors to express a macro view of the home equity ABS sector by either taking a long or short position in the form of a CDS and to have various relative value strategies. It was also used to manage risk and to take advantage of any temporary pricing discrepancies.

Example of an ABX index for a given rating (BBB-)

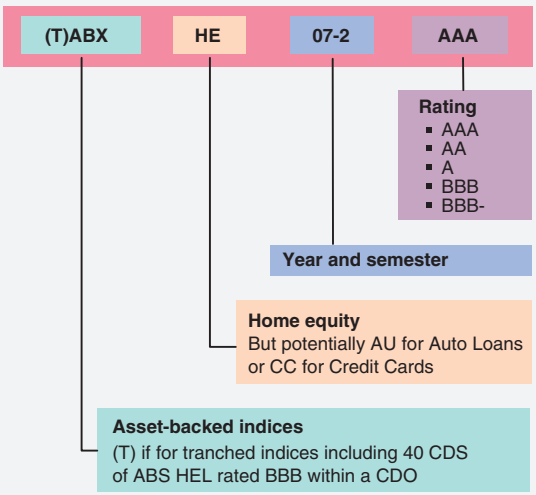


How does it work?

The ABX index is composed of a pool of CDS indices, with 20 ABS of home equity loans (HEL) as underlying assets. These are then divided into 5 other series in accordance with their ratings. Four series are currently outstanding: 06-1, 06-2, 07-1 and 07-2.

An investor who wants to take synthetic exposure to the index pays the protection buyer the difference between the quoted price multiplied by the notional amount and the current factor of the indices. The insurance conditions are pre-determined for the indices buyer (seller of protection) and indices seller (buyer of protection) before the launch of the new series: monthly coupon, maturities, asset pool. When an index is launched, CDSs within the index are equally weighted in terms of notional amount. Then, the index is quoted and traded. In this way, the quote in relation to par gives the value of underlying bonds compared to their initial notional value.

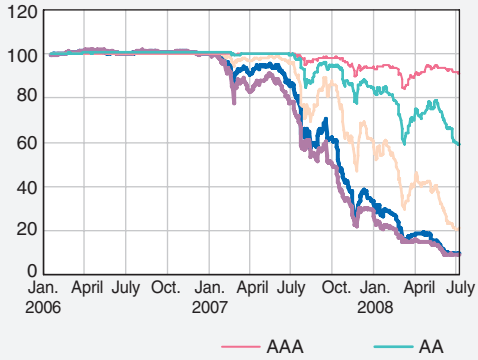
ABX home equity indices at par



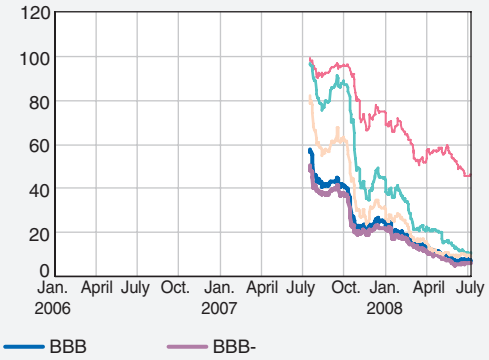
ABX home equity indices quote/par

(as a %)

ABX.HE 06-1



ABX.HE 07-2



AAA — AA — A — BBB — BBB-

NB: Volume on the first trading days was reported to be about USD 10 billion. But the activity declined significantly. Two main series are interesting: the AAA (senior ones) and the BBB ones (the closest to the speculative grade).

- ***The ABX.HE 06-1 AAA*** *series started to decline at the beginning of July 2007 (approximately 6 months after the issuance) at a relatively slow pace. The decline was more sudden and significant with the ABX.HE 07-2, reaching 46% in July 2008.*
- ***The ABX.HE 06-1 BBB*** *series posted the most rapid and impressive fall. On 27 February it stood at 77% (the ABX.HE AAA series was then at 100%). The ABX.HE 07-2 BBB collapsed to 5.81% on 9 July 2008.*

NB: ABX indices can also be measured using spreads.

Source: JP Morgan.

.../...

Why has it played such a major role in the current crisis and why is it criticised now?

ABX.HE indices were widely used by banks to value their portfolios of mortgage-backed securities, as a proxy for the underlying mortgage market. However, several of this index's limits were disregarded. First, it is a synthetic index, whereas the US subprime market is mainly a cash market. Second, it only includes 20 deals and is therefore not representative of the whole market (while the corporate CDS index is more diversified containing 125 credit references). In addition, the ABX.HE index includes the most liquid and high-quality assets, which may initially have led to an overvaluation of prices on the underlying housing market.

During the turmoil, the ABX.HE index became illiquid and thus had a direct impact on the valuation of banks' structured assets. Prices dropped, forcing banks to pass write-downs onto their portfolios valued at fair value. In addition, as this index was very vulnerable to speculative movements, it could no longer be used as a protection tool.

Normally, the index roll should have taken place in January 2008 but it was postponed because not enough subprime RMBS were issued in the second half of 2007 to fill a new index. As a result, ***the future of the ABX is called into question****.*

NB: Box prepared by Cédric Jacquat, Mathieu Gex and Camille Lafond (DG-Operations, Financial Stability Directorate).

selling the downgraded bonds, thus exacerbating their price decline.

These developments raise the issue of the valuation of complex structured finance products, such as ABS CDOs. The size of the downgrades on these products show that the assumptions concerning recovery rates and correlated defaults of pool assets as well as the models used to price these assets[14] were clearly flawed, or in other words, that CDOs were overvalued. As an illustration, the lack of good models for default correlation led many rating agencies to calibrate them to credit default swap tranches.[15]

Consequently, the current correction process may be interpreted as an attempt by the market to uncover the true or equilibrium value of the underlying assets. But given the complexity of the assets involved, the lack of market liquidity for some of these assets and the relative inaccuracy of the existing pricing models, this process of price discovery might be long-lasting.

2| VALUATION UNCERTAINTY

In a fair value accounting framework, under normal market conditions, exotic products involving complex formulas (options on equity baskets, options on hedge funds,…) and products involving illiquid assets or products with volatile liquidity (corporate bonds, CDOs of ABS,…) are usually difficult to value. The market turmoil has significantly worsened the situation.

Due to the lack of liquidity, an increasing number of instruments that were held for trading and therefore previously valued through market prices (price at origination, trading price for similar transactions…) or with data that were deemed to be observable (generic credit spread, indices provided by consensus pricing services…) became valued through valuation models using significant unobservable inputs. This led to a reclassification of assets under US GAAP from level 1, to level 2 and then level 3 (See Box 3), the amount of which increased by 40% in the first quarter of 2008 according to some estimates by Goldman Sachs. But the greater reliance on marking-to-model, which is more subjective, further amplified the uncertainty surrounding the valuation of these instruments. Moreover, as argued by Borio (2008), financial institutions may have had an incentive to rely more on marking-to-model so as not to recognise the distressed prices prevailing in the markets. This feeds back into the market turmoil as it increases the potential disagreement between lenders and borrowers over the valuation of collateral and reduces both market and funding liquidity.

According to accounting standards (IFRS and US GAAP) it is possible to revert to modelling techniques only in the absence of market prices or if transaction prices observed in the market result

14 *See, for instance, Fender and Kiff (2004).*
15 *See Duffie (2007).*

Box 3

Accounting rules regarding financial instruments
Classification and valuation

IAS 39 defines four categories of financial instruments. The classification in each category is essentially based on the management intent, which creates a certain level of consistency between the accounting treatment and risk management practices. The classification choice is made at inception. Transfers between categories are strictly defined and some reclassifications are not permitted (those held for trading instruments cannot be reclassified under IFRS).

• Instruments classified as held for trading are those for which there is an evidence of a recent pattern of short-term profit taking. Held-for-trading instruments are valued at their fair value through the profit and loss account. An instrument can also be designated at fair value ("fair value option") notably if the use of this option eliminates or reduces an accounting mismatch that would otherwise arise from measuring assets and liabilities on different bases.

• Loans and receivables and securities classified as held-to-maturity instruments are valued at amortised cost, which is more or less the historical cost minus cumulative amortisation and impairment losses. The impairment losses that results from a deterioration in the situation of the counterparty's situation are booked in the profit and loss account. The fair value of these instruments is disclosed in the financial statements.

• Available-for-sale assets are non-derivatives financial assets that are not classified in the other categories. They are valued at fair value but the latent gains and losses are recognised in a separate line in equity, not in the profit and loss account. However, if the decline in fair value results from the deterioration in the counterparty's situation, of the counterparty, an impairment loss is booked in the profit and loss account.

Instruments classified as held for trading, designated at fair value or classified in the available for sale category are valued at fair value. IAS 39 defines the fair value as "the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction". In practice the definition of the fair value and the way it can be determined (and the so-called levels of fair value hierarchy) are very similar in US GAAP (SFAS 157).

IAS 39 and SFAS 157 provide a fair value hierarchy linked to the parameters used to estimate the fair value of a product. The fair value of an instrument is in priority its quoted price in an active market (the transaction price). In the absence of such quoted market prices, an entity establishes fair value by using a valuation technique that incorporates a maximum of market inputs and minimises entity-specific inputs.

	Definition
Level 1	Quoted prices for identical instrument in active markets
Level 2	Use of valuation inputs –other than quoted prices– that are directly or indirectly observable on the market (market corroborated inputs: interest rate curve, swap rate, etc.)
Level 3	Valuation techniques incorporating non-observable data (expected cash flows developed using entity's own data, etc.)

The objective of the valuation technique is to establish what the transaction price would have been on the measurement date in an arm's length exchange motivated by normal business conditions. The valuation technique should therefore reflect the current market conditions at the measurement date including the relative liquidity of the market and other risks such as the counterparty risk. Firms also need to assess the model uncertainty and reflect this uncertainty in an appropriate adjustment to the value of the instrument. Periodically, firms should calibrate the valuation technique and test for its validity using prices from any observable current transactions in the same instrument or based on any observable market data. However, the transaction prices or the market data used to calibrate the model should result from an orderly transaction between going concern/willing market participants. It should not be the price of a forced transaction, involuntary liquidation or distress sale.

Under IAS 39, the profit at inception (day one profit[1] on structured/innovative products) cannot be recognised in P&L when the fair value relies on unobservable data (level 3 of the fair value hierarchy). In such circumstances the amount of the day one profit may not be fully reliable. Reliability is one of the qualitative characteristics that make the information provided in financial statements useful to users under IFRS framework. Under SFAS 157, the day one profit can be immediately recognised in any cases.

1 *Day one profit is the difference between the price of the transaction and the fair value of the transaction.*

NB: Box prepared by Nathalie Beaudemoulin (General Banking System Supervision Directorate).

from forced transactions, involuntary liquidations or distressed sales. Until now the international auditing profession[16] has considered that it would not be appropriate to disregard observable prices in an active market even if the market is relatively thinner or illiquid as compared to previous periods unless the entity can demonstrate that observed transactions are fire sales or distressed sales. However, in practice, there has been some room for interpreting the extent to which market-observed trades should be used as the basis for fair value under FAS 157 or IAS 39. Therefore, some differences were observed between institutions' valuation practices, especially at an early stage of the crisis. Later on, differences have emerged regarding the valuation of level 3 assets.

Specific valuation challenges have arisen with respect to ABSs backed by US subprime mortgage positions (RMBS, CDOs of RMBS…). Before the crisis, those instruments were valued through mark-to-market valuation based on a combination of primary markets, traded prices observed on secondary markets and on prices inferred from the CDS referencing the ABX indices. Due to the liquidity shortage on the primary and secondary markets, most of the banks decided to develop and deploy proprietary models to value those instruments. Those models are based on a cash flow analysis which incorporates a large number of assumptions and inputs related to the underlying mortgages (credit losses, assumed prepayment rates, estimated housing price changes, loan-to-value ratios, etc.). Cash flows also often depend on the future values of the collateral (or the future rating of the collateral) thereby creating an additional layer of complexity. Banks that previously relied on a narrow range of information sources (such as credit ratings) faced greater difficulties to estimate those data under significant time pressure. Moreover, the soundness of the modelling techniques has not been proven given the fact that they have not usually been tested during a long period and due the lack of available data on a full cycle period.

Financial institutions also encountered difficulties regarding the assessment of the liquidity risk, and more fundamentally of the uncertainty in the valuation process. According to accounting standards, the objective of a valuation technique is to establish what the transaction price would have been on the measurement date. Therefore, the unobservable inputs used in the valuation process have to reflect the bank's assumptions of what inputs market participants would use in pricing the instrument. The valuation techniques must be calibrated and tested using prices from any observable current market transactions in the same instrument or based on any observable market data. As a result, a number of firms have used pricing indices (ABX) to reflect the market's assessment of the liquidity and risk premium of ABS. It should be noted that this approach is consistent with the valuation practices in place before the crisis, since ABX was commonly used to value ABS and considered by banks as an "observable" input. However, the use of ABX has raised concerns about the liquidity of this index and its relevance since it is based on a narrow range of deals that may not properly represent the firm's ABS holdings. From a general point of view, the crisis has highlighted questions about the reliability of data provided by consensus pricing services and quotations from brokers when they are not supported by actual trades.

Moreover, the valuation of those products is non-linear with respect to the cumulative losses. Since they are subject to significant discretion, the values are not directly verifiable and comparable among firms. In addition, the complexity of the payoff structure implies a high sensitivity of the resulting valuations to the inputs and parameter assumptions which may themselves be subject to estimation errors and model uncertainty.[17] And the higher the complexity, the higher the model risk. Though banks can assess valuation uncertainty through stressing of model inputs and then adjust the valuation to account for some risks, accounting standards do not necessarily allow them to do so for reported figures. This means that some of the risks, even when there were assessed for prudential needs, were not always reflected in the determination of fair values under existing financial reporting standards. As a result, uncertainty surrounding the valuation of complex

16 *Center for Audit Quality (gathering main US audit firms), Measurements of fair value in illiquid (or less liquid) markets, 3 October 2007. Global Public Policy Committee (gathering main international audit firms), Determining fair value of financial instruments under IFRS in current market conditions, 13 December 2007.*
17 *See, for instance, Basel Committee on Banking Supervision (2008).*

and illiquid instruments may have contributed to impairing market confidence.

This effect was magnified by the existing scope for variability in the scale and the timing of revaluation announcements –each of increasing gravity– which contributed to growing concerns about the integrity of firms' balance sheets.[18] The inherent limitation of mark-to-model valuation highlights the need for adequate disclosures relating to the uncertainty associated with those valuations. The accounting figures need to be supplemented with disclosures on the valuation methodology, assumptions, valuation adjustments (notably for model risk, liquidity risk, counterparty risk) and sensitivity.

3| SOME POLICY OPTIONS FOR ADDRESSING THE VALUATION CHALLENGES

In order to address the potential weaknesses in valuation standards and practices, several initiatives have already been taken, following the Financial Stability Forum (FSF) recommendations.[19] For example, the International Accounting Standards Board (IASB) has been asked to enhance its guidance on valuing financial instruments when markets are no longer active. To this end, an expert advisory panel was set up in May 2008. One key challenge here is to provide a clear definition of what might be considered as an "active" market. The International Auditing and Assurance Standards Board (IAASB) has also been encouraged to develop stronger fair value auditing guidance (application of ISA 540).[20]

As regards valuation practices, international banking supervisors, *via* the Basel Committee, issued on a paper on 12 June 2008 summarising an initial assessment of valuation practices, key findings and follow-up actions.[21] Additionally the Basel Committee should issue a supervisory guidance on valuation. At the European level, on 18 June 2008 the Committee of European Banking Supervisors (CEBS) issued a report on valuation practices including recommendations related to valuation processes and valuation disclosures.

Most of these recommendations insist on transparency and disclosure (See Box 4). This is indeed appropriate since financial markets, and in particular credit markets, are imperfect due to information asymmetries. In the current context, the valuation of collateral remains a major challenge: as long as some disagreement or dispute exists between lenders and borrowers regarding the value of collateral, the

Box 4

Transparency

The market turmoil has highlighted the fact that transparency is at the heart of market functioning. Market participants should provide adequate and timely financial information to allow a proper assessment of their financial soundness, thereby enhancing market discipline and strengthening confidence in the system as a whole. Market discipline imposes incentives on market participants to conduct their business in a safe, sound and efficient manner. Accounting standards facilitate market discipline by defining the fundamental framework of financial reporting and providing for a minimum level of transparency in the markets for all market participants. Under IFRS (framework for the preparation and presentation of financial statements[1]), the objective of financial statements is to provide information about the financial position, performance and changes in financial position of an entity that is useful to a wide range of users in making economic decisions. The four principal qualitative characteristics that make the information provided in financial statements useful to users are: understandability, relevance, reliability and comparability.

.../...

1 The International Accounting Standards Board (IASB) and the US Financial Accounting Standards Board (FASB) are currently working on the definition of a common conceptual framework, as part of their convergence project. Some documents related to this project are currently under public consultation (Exposure draft on chapters 1 "the objective of financial reporting" and Chapter 2 "qualitative characteristics and constraints of decision-useful financial reporting information").

18 See International Monetary Fund (2008).
19 See Financial Stability Forum (2008).
20 Auditing Accounting Estimates, including fair value accounting estimates, and related disclosures.
21 See Basel Committee on Banking Supervision (2008).

Conversely, accounting standards are necessary, but also not sufficient to assure transparent financial information. Market participants should go beyond those standards to ensure that sufficient and meaningful information is provided to the markets, taking account of financial innovation, market developments and the complexity of their own operations. Therefore the effectiveness of financial information on market discipline depends upon market participants providing in a timely and transparent manner the relevant information.

However, it appears that, at the early stages of the crisis, some financial institutions have failed to comply with those principles. They did not always disclosed basic information, such as the overall size of their securitisation exposures and associated risks or more in-depth information on exposures that are considered to be high risk such as collateralised debt obligations (CDOs), residential mortgage-backed securities (RMBSs) or exposures to monoline insurers. Moreover, the information provided about the valuations of the exposures, the valuation methodologies and the uncertainty associated with these valuations –notably the measure of market liquidity and the sensitivity of the results to the assumptions– was not always sufficient.

*This situation has highlighted the need to improve financial institutions' disclosures practices as well as accounting and prudential disclosures requirements. Financial institutions, auditors and regulators have worked together to improve disclosures requirements. In its report on enhancing market confidence and institutional resilience (7 April 2008), the Financial Stability Forum (FSF) has strongly encouraged financial institutions to make robust risk disclosures at the time of their upcoming mid-year 2008 reports, using the leading-practice disclosures for selected exposures highlighted by the Senior Supervisors Group's (SSG) report. Enhanced quantitative disclosures were therefore expected on involvements with special purpose entities, collateralised debt obligations, exposures to monolines, other subprime and Alt-A exposures, commercial mortgage-backed securities, and leveraged finance. Expansive qualitative disclosures were expected on the valuation methodologies as well as quantitative data related to the main inputs used in the valuation process and the results of the sensitivity analysis. This initiative could enhance comparability between banks' disclosures as accounting requirements allow firms considerable discretion in how they convey information. At the European level, the CEBS (Committee of European Banking Supervisors) has also identified a set of good practice disclosures for activities affected by the market turmoil which are consistent with the FSF recommendations and SSG leading practices and, in some areas, go beyond in that they take a wider view (*i.e. *considering also disclosures on business models, risk management, accounting policies and valuation issues as well as presentation issues). Monitoring of bank disclosures is currently performed by banking supervisors.*

Moreover, IFRS 7 which was implemented for the first time for the 2007 year-end financial statements has significantly enhanced the disclosures related to the financial instruments. This standard requires detailed qualitative and quantitative information on the extent of risks arising from financial instruments, particularly: the methods and assumptions used to determine fair values, whether fair values is determined by prices quoted in active markets or estimated using a valuation technique, the effect of reasonably possible changes in assumptions where valuation techniques are used that are not supported by observable market data. Some additional requirements could be added to IFRS 7 such as asking for quantitative disclosures on the breakdown of all exposures measured at fair value by the different levels of the fair value hierarchy and disclosures on the migration between levels.

The first disclosures prepared under Pillar III –that will be available for most banks by 2009– could also be expected to contribute to significantly increasing transparency as regards risk exposures and risk management, which is essential to rebuild confidence in the "originate to distribute model". Banks will have to provide detailed disclosures regarding securitisations and risk transfer activities. The Basel Committee will issue by 2009 further guidance to strengthen disclosures requirements on securitisation exposures, particularly exposures held in the trading book and related to re-securitisations, sponsorship of off-balance-sheet vehicles, bank's liquidity commitments to ABCP conduits and valuation including the methodologies and uncertainty associated to these valuations.

Proper application by market participants of the accounting and prudential rules as well as recommendations made in different fora is needed to ensure clear, informative and comprehensive disclosures and to enhance market confidence not only in the present context but also in the future after the crisis has ended completely. This implies, in the banks' own interest, that they continuously adapt their disclosures to the evolution of their perception of "high risk" areas for which transparency would need to be improved.

NB: Box prepared by Nathalie Beaudemoulin (General Banking System Supervision Directorate).

lending markets will be impaired: lenders want collateral to limit moral hazard and to engage into a transaction; in the presence of valuation uncertainty regarding the collateral, they keep their cash on hold; borrowers then have to sell their assets, exacerbating their liquidity needs and the fall in asset prices. This in turn may impact on their net worth (or capital in the case of a financial institution), reduce the willingness of lenders to lend and increase the external finance premium. Facilitating price discovery, in particular finding out the "true" value of underlying assets, is therefore crucial. It should help to fix this element of pro-cyclicality in the financial system.

This will require banks to access information about the underlying assets for structured credit transactions, such as complex securitisation and re-securitisation. But even in that case, valuation will not be an easy task: each structure is specific and relies on a collateral pool, which then has to be valued. As mentioned by Crouhy *et al.* (2008), for subprime ABS trusts this implies valuing a pool of several thousand subprime mortgages with different terms and borrower characteristics; for CDOs, it implies the valuation of the bonds issued by ABS trusts and for CDOs "squared" (CDO of CDOs) the valuation of the bonds issued by CDOs.

In addition, the complexity of some products creates model uncertainty. The current episode has evidenced a huge diversity of valuation methodologies across the financial industry and a lack of consensus regarding the valuation of some instruments. To deal with valuation uncertainty, there is first a need for access to some information regarding the model used, the nature of its inputs, in particular un-observables, and the value of the parameters. However, it is unlikely that financial institutions would be completely transparent regarding these elements. The main reason is that this option relies on confidential and proprietary information. And for a financial firm, better valuation models simply provide competitive advantages. An alternative to dealing with model uncertainty is to encourage a "robust control" approach in the vein of R. Cont (2006), who introduces a quantitative framework for measuring model uncertainty.

His measures of model risk lead to a premium for model uncertainty which is comparable to other risk measures and compatible with observations of market prices.

This approach raises another issue: valuation challenges are directly related to both risk management and financial reporting purposes. But the implementation of new accounting standards is not always consistent with risk management at the firm level and prudential rules at the broader level. The reason is that the model risk premium as just mentioned above or the establishment of fair value adjustments for model, input, data or parameter uncertainty to reported figures, and which are essential for both risk management and prudential surveillance, may not be allowed by accounting rules. This creates a wedge between a more or less robust measurement of risk exposures and financial reports which compounds uncertainty. Addressing this issue is here once again not an easy task, as resulting fair value adjustments for whatever kind of uncertainty may introduce another element of discretion in financial statements. However, in the context of a valuation crisis, which impends upon confidence, regulatory forbearance should be avoided. The least that should be made would be to insure greater consistency between prudential and accounting rules so that financial statements are really informative about the true degree of risk exposures.

Finally, the current financial crisis has evidenced the fact that the interaction between new accounting and prudential rules may create an additional source of pro-cyclicality in modern financial systems.

The key element here is that market prices are now at the heart of financial regulation: new accounting rules rely on marking-to-market and prudential ones put the market price of risk at the heart of risk models. An implication is that the volatility observed on market prices immediately affects banks' balance sheets and capital. Therefore, one should allow either more flexible capital requirements to account for this additional source of volatility, which may not be easily manageable from a prudential perspective, or higher capital requirements to account for it.

In this paper, we tried to set out that the current valuation crisis unfolded because the market failed to achieve its two key objectives: the pricing of assets and the discrimination of risks. As long as financial markets will remain incomplete, accounting standards will not be neutral and valuation issues will be a source of pro-cyclicality. In other words, market incompleteness implies unfair valuation.

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Taking into account extreme events in European option pricing

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According to traditional option pricing models,[1] financial markets underestimate the impact of tail risk.

In this article, we put forward a European option pricing model based on a set of assumptions that ensure, inter alia*, that extreme events are better taken into account. Using simulations, we compare the option prices obtained from the standard Black and Scholes model with those resulting from our model. We show that the traditional model leads to an overvaluation of at-the-money options, which are the most traded options, while the less liquid in-the-money and out-of-the-money options are undervalued.*

NB: This article reflects the opinions of the authors and does not necessarily express the views of the Banque de France.

1 *See Black and Scholes (1973).*

The literature on the theory of financial asset pricing is mainly developed by Merton (1973a, 1973b, 1974, 1976), Black and Scholes (1973) and Cox, Ingersoll and Ross (1985a, 1985b). As regards option pricing, the reference model is still that of Black and Scholes (BS) (1973). However, the assumptions of this model are inappropriate and largely rejected by the data. For example, in the initial formulation of the model, the volatility of the rate of return on the risky asset underlying the option is assumed to be constant. This is not verified empirically. In addition, the rate of return of the underlying asset is assumed to follow a normal distribution. Yet, the assumption of a normal distribution of the rates of return on financial variables is largely contested, even rejected, in particular because it underestimates the frequency of extreme events.[2]

In this article, we mainly focus on this last criticism of the Black and Scholes model and put forward an option pricing model for European options based on more realistic assumptions.

Our model fits into the more general framework of discrete-time factor models for financial or physical asset pricing[3] according to the no-arbitrage principle.

Under the no-arbitrage assumption, the price of a financial asset is equal to expected future cash flows discounted by a discount factor representing both risk aversion and preference for the present. This principle implies two types of modelling approaches:

• first, define factors that represent the information held by investors and model the dynamics of these factors;

• second, select a model of the discount factor according to these factors.

In particular, these two elements are used to define the "virtual" dynamics of the factors (the so-called "risk-neutral" dynamics) for which the asset price becomes equal to the expected future cash flows discounted by the risk-free rate.

In this article, we show how these general principles can be applied to calculate the price of a European option. More specifically, one of the key assumptions of the model is linked to the definition of the factor's historical dynamics, which are supposed to be a mixture of Gaussian distributions. This assumption ensures a better modelling of extreme events. To simplify the presentation, we choose a static framework. We show that the model presented here expands on the Black and Scholes model (See Box 1) and enables us to take better account of tail risk. It emerges that at-the-money options are overpriced while in-the-money and out-of-the-money options are underpriced.

1| DEFINITION OF THE INFORMATION SET AND ITS PROBABILITY DISTRIBUTION

In order to price an asset, the investor defines a set of fundamental factors that are likely to have an effect on the price. w_t denotes the value of the factors at date t and $\underline{w}_t$ its historical dynamics.[4] The future cash flows generated by the asset are assumed to depend on the future realisations of these factors.

In the option pricing model presented in this article, the information available to investors at every date is the rate of return on the underlying asset. It is an observable factor for which the historical dynamics can be derived from a sample of observations.

A commonly used –albeit widely contested– assumption is that the rate of return on the risky asset follows a Gaussian distribution.[5] We discuss this assumption and make an alternative proposal.

2 *See Mandelbrot (1962, 1963, 1967); Fama (1965).*
3 *See Bertholon, Monfort and Pegoraro (2006) and Pegoraro (2006).*
4 *This factor can be considered to be the information available to the investor at date* t. *This information may be observable (the yield on an underlying asset, macroeconomic factors), partially or totally unobservable (volatility regimes) by the econometrician.*
5 *See Black and Scholes (1973).*

Box 1

The Black and Scholes model

Assumptions

• *The price of the underlying asset* S_t *follows a geometric Brownian motion:*

$$dS_t = \mu S_t dt + \sigma S_t dW_t$$

where μ *and* σ *are constant.*

The rate of return on the underlying asset, $x_{t+1} = \ln(S_{t+1} / S_t)$ *therefore follows a Gaussian distribution with a mean of* $\mu - \frac{\sigma^2}{2}$ *and a standard deviation of* σ*;*

• *there are no restrictions on short-selling;*
• *no commissions or taxes are charged;*
• *all the underlying assets are perfectly divisible;*
• *the underlying asset pays no dividends;*
• *there are no arbitrage opportunities;*
• *the market operates continuously;*
• *the risk-free interest rate,* r^f*, is constant.*

The Black and Scholes formula

It is used to calculate the theoretical value C_t *of a European option at date* t *with the five following variables:*

• S_t *the price of the underlying asset at date* t*;*
• T *the expiration date of the option;*
• K *the option exercise price;*
• r^f *the risk-free interest rate;*
• σ *the volatility of the price of the underlying asset.*

The relative theoretical price at date t $\left(\frac{C_t}{S_t}\right)$ *of a call option, denoted* c_t *with maturity at* t *and relative exercice price* $\kappa = \frac{K}{S_t}$ *is:*

$$c_t = N(d_1) - \kappa e^{-r^f (T-t)} N(d_2).$$

Similarly, the relative price of a put option is:

$$p_t = \kappa e^{-r^f (T-t)} N(-d_2) - N(-d_1),$$

where:

• N *is the standard normal cumulative distribution function,* $N(x) = \int_{-\infty}^{x} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}u^2} du,$

• $d_1 = \frac{-\ln(\kappa) + (r^f + \sigma^2/2)(T-t)}{\sigma\sqrt{T-t}},$

• $d_2 = d_1 - \sigma\sqrt{T-t},$

More specifically, in the case of a call option at date t with a maturity equal to one period (T=t+1)*, we have:*

$$c_t = N(\tilde{d}_1) - \kappa e^{-r^f} N(\tilde{d}_2),$$

where:

$\tilde{d}_1 = \frac{r^f - \ln(\kappa)}{\sigma} + \frac{\sigma}{2},$

$\tilde{d}_2 = \tilde{d}_1 - \sigma.$

Then, $c_{BS}(\sigma^2, \kappa) = N(\tilde{d}_1) - \kappa e^{-r^f} N(\tilde{d}_2).$

1|1 Stylised facts and limitations of the Gaussian distribution

To illustrate the limitations of the normal distribution assumption, we take a look at the weekly rate of return on the CAC40 between 3 January 1996 and 30 April 2008.

Chart 1 shows the empirical distribution of this rate of return. We first approximate this distribution to a Gaussian distribution $N(\mu,\sigma^2)$. The estimated values of μ and σ^2 are respectively the mean and empirical variance of the rates of return.

The theoretical distribution, thus estimated, provides for an exact reproduction of the observed mean and variance. However, some empirical characteristics of the distribution of returns cannot be reproduced with a Gaussian distribution (see Table 1):

• the empirical distribution tails are thicker than the Gaussian distribution tails: high returns (positive or negative) are more frequent than what the Gaussian distribution would predict. The kurtosis coefficient is thus above 3, which is that of a normal distribution. Furthermore, it has a more acute "peak" around zero and fat tails (see Table 1). Consequently, the theoretical probability of an extreme value occurring is underestimated when the rate of return is assumed to follow a Gaussian distribution;

• the empirical distribution is not symmetrical, unlike the Gaussian distribution: negative returns are more frequent than what the Gaussian distribution would predict. The skewness coefficient is negative for the empirical distribution, reflecting a longer left-hand tail, and equal to zero for the Gaussian distribution.

Chart 1
Empirical distribution of weekly rate of return on the CAC40 and Gaussian distribution
(X-axis: rate of return on the CAC40; Y-axis: probability density)

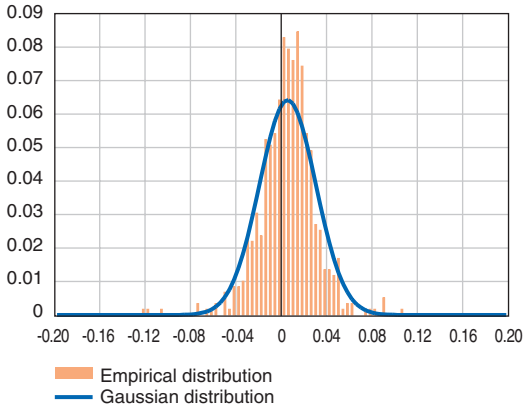


Table 1

	Empirical distribution	Gaussian distribution
Mean	0.13%	0.13%
Standard deviation	2.48%	2.48%
Skewness	-0.41	0
Kurtosis	6.61	3

Note: The mean and standard deviation are calculated relative to the weekly rate of return on the CAC 40 (03.01.96 to 30.04.08).

1|2 Mixtures of Gaussian distributions: definition and interpretation

In the literature, several categories of distributions have been put forward to compensate for the shortcomings of the Gaussian distribution: alpha-stable distributions;[6] finite mixtures of distributions, such as Gaussian mixtures;[7] simple and generalised Student distributions;[8] hyperbolic distributions.[9]

In this article, we focus on the mixture of Gaussian distributions for several reasons:

• it is an adequate proxy for all of the alternative distributions mentioned above;

• its theoretical properties are such as to facilitate manipulations in the framework of a theoretical asset pricing model, such as an option pricing model;

• it is very easy to simulate;

• it enables us to reproduce various characteristics (mean, variance, skewness and kurtosis) observed in the data, including in the simplest case where the mixture only includes two Gaussian distributions.

6 *See Mandelbrot (1997); Mittnick and Rachev (1993); Adler* et al. *(1998).*
7 *See Kon (1984); Akgiray and Booth (1987); Tucker and Pond (1988).*
8 *See Bollerslev (1987); Baillie and Bollerslev (1989); Lambert and Laurent (2000, 2001).*
9 *See Barndorff-Nielsen (1994); Eberlein and Keller (1995); Kuechler* et al. *(1999).*

More formally, making the assumption that the distribution is a mixture of two Gaussian distributions amounts to assuming that the random variable x (the rate of return for example) can take on values from two different regimes: regime 1 with a probability of occurrence equal to p and regime 2 with a probability of occurrence of $1 - p$. The probability distribution under regime 1 is a Gaussian distribution, with a mean of μ_1 and a variance of σ_1^2, denoted $N(\mu_1, \sigma_1^2)$. Under regime 2, the probability distribution is a Gaussian distribution with a mean of μ_2 and a variance of σ_2^2, denoted $N(\mu_2, \sigma_2^2)$. Overall, the probability distribution of the random variable x (a mixture of two Gaussian distributions) depends on five parameters, μ_1, σ_1^2, μ_2, σ_2^2 and p. The probability density of the mixture of two Gaussian distributions can be written as:

$$f(x) = pn(x;\mu_1, \sigma_1^2) + (1-p)n(x;\mu_2, \sigma_2^2) \qquad (1)$$

with $$n(x;\mu_i, \sigma_i^2) = \frac{1}{\sigma_i\sqrt{2\pi}} e^{-\frac{1}{2}\frac{(x-u)^2}{\sigma_i^2}},$$

the probability density of a Gaussian distribution with a mean of μ_i and a variance of σ_i^2. This type of reasoning may be applied to more than two regimes, the distribution being a Gaussian distribution under each regime (see Assumption 1 in Box 2).

Another advantage of a mixture of Gaussian distributions relates to its interpretation, which is not always the case with other distributions, such as hyperbolic distributions or Student distributions. For example, in the case of a mixture of two Gaussian distributions, each regime may represent market states with different levels of volatility. The regime with the highest volatility may be interpreted as a financial crisis regime.

We have shown that a Gaussian distribution cannot reproduce the entire empirical distribution of returns (see Chart 1).

To obtain a better estimation of the empirical distribution of the rate of return on the CAC40, we estimate the parameters of the above-mentioned mixture of two Gaussian distributions.[10] The estimated values of the parameters are shown in Table 2. In this example, the probability of being in regime 1, *i.e.* the high-volatility regime, is 0.12.

10 *To do this we use maximum likelihood method.*

Table 2

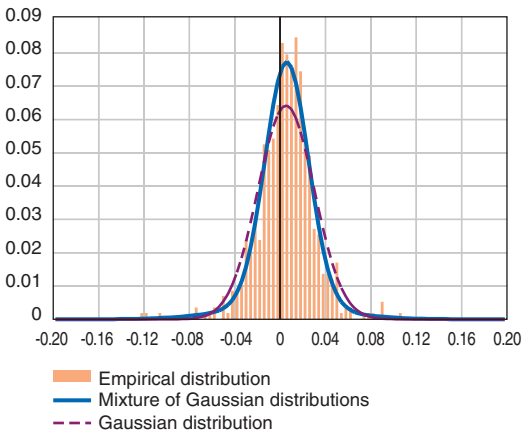
	Gaussian distribution Regime 1	Gaussian distribution Regime 2	Mixture of Gaussian distributions	Empirical distribution
Mean	-0.34%	0.19%	0.08%	0.13%
Standard deviation	4.96%	1.91%	2.96%	2.48%
Skewness	0	0	-0.21	-0.41
Kurtosis	3	3	5.42	6.61

Note: p = *0,12 is the probability of occurrence of regime 1, a high-volatility regime. The mean and standard deviation are calculated relative to the weekly rate of return on the CAC 40 (03.01.96 to 30.04.08).*

In this regime, the volatility is 4.96% and the mean 0.34%, *i.e.* an annualised volatility and mean of 35.7% and -17.7% respectively. This regime may be considered as a financial crisis regime. In regime 2, the volatility and the mean are 1.91% and 0.19%, *i.e.* 13.7% and 9.88% in annualised terms.

Chart 2 shows the empirical data distribution and its approximations *via* the mixture of Gaussian distributions (full line) and the Gaussian distribution (dotted line). The mixture of Gaussian distributions is better able to reproduce the distribution of data. In particular, it provides a better estimate of the tails and asymmetry of the empirical distribution. For example, a rate of return of three standard deviations (extreme event) is observed on average every 24 weeks. This event is forecasted on average every 160 weeks with the Gaussian distribution and on average every 22 weeks with the Gaussian mixture.

Chart 2
Empirical distribution of the rate of return on the CAC 40 and approximation by a mixture of Gaussian distributions
(X-axis: rate of return on the CAC40; Y-axis: probability density)



Box 2

The option pricing model of Bertholon, Monfort, Pegoraro (2006)

Assumptions

• H_1: *the historical distribution of the rate of return on the underlying asset,* $x_{t+1} = \ln\left(\frac{S_{t+1}}{S_t}\right)$ *where* S_t *is the price at date* t *of the underlying asset, is a mixture of* J *Gaussian distributions. Its probability density is given by.*

$$f(x) = \sum_{j=1}^{J} p_j \, n(x, \mu_j, \sigma_j^2),$$

where, for $j = 1,\ldots,J$*:*

– $n(x, \mu_j, \sigma_j^2) = \frac{1}{\sigma_j \sqrt{2\pi}} e^{-\frac{1}{2}\frac{(x-\mu_j)^2}{\sigma_j^2}}$ *is the density of a Gaussian distribution with a mean of* μ_j *and a variance of* σ_j^2;

– $0 \leq p_j \leq 1$ et $\sum_{j=1}^{J} p_j = 1$.

• H_2: *the stochastic discount factor is exponential-affine* $M_{t,t+1} = \exp(\alpha_t x_{t+1} + \beta_t)$.

Results

Result 1: *under assumptions* H_1 *and* H_2*, the stochastic discount factor allows for a unique solution for* (α_t, β_t)*, denoted* (α, β) *that meets the two no-arbitrage conditions:*

$$\begin{cases} E_t(M_{t,t+1} \exp r_{t+1}^f) = 1 \\ E_t(M_{t,t+1} \exp x_{t+1}) = 1 \end{cases}, \text{ and under } H_2: \begin{cases} \exp(r_{t+1}^f + \beta_t) E_t(\exp \alpha_t x_{t+1}) = 1, \\ \exp(\beta_t) E_t(\exp(\alpha_t + 1) x_{t+1}) = 1, \end{cases}$$

where r_{t+1}^f *is the risk-free interest rate between* t *and* t+1 *(known at* t*).*
The first condition is the no-arbitrage condition applied to the risk-free asset. The second is the no-arbitrage condition applied to the underlying asset.

Result 2: *under assumptions* H_1 *et* H_2*, the risk-neutral distribution of the factor is unique; it is also a mixture of Gaussian distributions. Its probability density,* $f^Q(x)$*, is given by:* $f^Q(x) = \sum_{j=1}^{J} \nu_j \, n(x, \mu_j + \alpha\sigma_j^2, \sigma_j^2)$,

where, for $j = 1,\ldots,J$*:*

$$\nu_j = \frac{p_j \exp\left(\alpha\mu_j + \frac{\alpha^2}{2}\sigma_j^2\right)}{\sum_{j=1}^{J} p_j \exp\left(\alpha\mu_j + \frac{\alpha^2}{2}\sigma_j^2\right)}, \quad 0 \leq \nu_j \leq 1, \quad \sum_{j=1}^{J} \nu_j = 1.$$

Result 3: *under assumptions* H_1 *et* H_2*, the theoretical price of a European call option with a one-period maturity is:*

$$c_t = \sum_{j=1}^{J} \nu_j \, \gamma_j \, c_{BS}\left(\sigma_j^2, \frac{\kappa}{\gamma_j}\right),$$

where $c_{BS}(.,.)$ *is the Black-Scholes formula with a period defined in Box 1 and* $\gamma_j = \exp\left(\mu_j + \alpha\sigma_j^2 - r^f + \frac{\sigma_j^2}{2}\right)$.

The mixture of Gaussian distributions is clearly more appropriate for modelling the historical dynamics of the rate of return on the underlying asset. This is the assumption that will be used throughout the paper.

2| DISCOUNTING FUTURE CASH FLOWS GENERATED BY THE ASSET AND APPLICATION TO OPTION PRICING

The fundamental principle underlying the asset price model is the discounting of future cash flows generated by the asset. This raises the question of the discount factor to be used. It may be looked at from two different angles, depending on the "world" one considers. In the "risk-neutral" world, the discount rate is the risk-free rate. In the "real" or "historical" world, the stochastic discount factor is used. We come back to these two approaches to specify the assumptions made in the framework of our model and the links that can be established between the two worlds.

2|1 The historical world: the stochastic discount factor

If the no-arbitrage assumption is verified, there exists a positive random variable that enables us to calculate, at any date t, the price of an asset generating random future cash flows depending on the factors.[11] This variable is called a stochastic discount factor. More specifically, the asset price at date t is equal to the expected future cash flows generated by the asset, discounted by the stochastic discount factor.

If $M_{t,t+1}$ is the stochastic discount factor between t and $t+1$, P_t the asset price at date t, $g_{t+1} = g(w_{t+1})$ the cash flow generated by the asset between t and $t+1$, then:

$$P_t = E_t(M_{t,t+1} g_{t+1}). \qquad (2)$$

The first step of the modelling process has made it possible to define and identify the historical conditional probability distribution of factor w_{t+1}, and therefore that of $g_{t+1} = g(w_{t+1})$. The second step involves doing the same for $(w_{t+1}, M_{t,t+1})$. Once the conditional distribution for $(g_{t+1}, M_{t,t+1})$ has been identified, it is possible to determine either analytically or *via* simulations the conditional expectation of $M_{t,t+1}\, g_{t+1}$ and therefore P_t.

The approach adopted in this article is based on an exponential-affine specification of the stochastic discount factor[12] :

$$M_{t,t+1} = \exp\left(\alpha_t(\underline{w}_t)' w_{t+1} + \beta_t(\underline{w}_t)\right). \qquad (3)$$

In some circumstances, it is possible to determine the coefficients of the linear form, $\alpha_t(\underline{w}_t)$ and $\beta_t(\underline{w}_t)$, in a unique manner, *via* the no-arbitrage condition. The stochastic discount factor is then uniquely defined in the exponential-affine class.

It is necessary to determine coefficients α_t and β_t in order to obtain a complete specification of the form of the stochastic discount factor. By applying formula (2) to the rate of return on the underlying asset on the one hand, and to the rate of return on the risk-free asset on the other, it is possible to derive two so-called no-arbitrage conditions (see Box 2). We can then show that this system produces a unique solution $(\alpha_t\ \beta_t)$, making it possible to obtain a complete specification of the form of the stochastic discount factor according to the historical dynamics of the factors.

2|2 The risk-neutral world

The "risk-neutral" world corresponds to a virtual economy in which economic agents would be indifferent to risk. The expected rate of return on all assets would then be equal to the risk-free rate. As a result, the discount rate would be equal to the risk-free rate. The risk-neutral world is easy to construct using the historical dynamics of the factors and the stochastic discount factor (see Appendix 1).

11 *See Hansen and Richard (1987).*
12 *See Gouriéroux and Monfort (2007).*

2|3 Application to option pricing

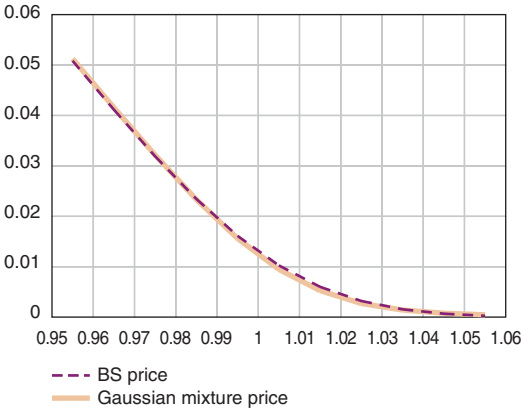
In our model, it is possible to show that, when the historical distribution of factors is a Gaussian mixture and the stochastic discount factor is exponential-affine, the risk-neutral distribution is unique and is also a mixture of Gaussian distributions. This result enables us, *inter alia*, to obtain an analytical and unique formula for the price of an equity option. Indeed, when the rate of return on the underlying asset is assumed to follow a mixture of Gaussian distributions at any date t and the stochastic discount factor is exponential-affine, the option pricing formula is shown to be a linear combination of Black and Scholes-type formulas. The price depends on the means and variances of the Gaussian distributions used in the mixture. In the Gaussian case, *i.e.* if we make the assumption of a single regime, we obtain the traditional Black and Scholes option pricing formulas (see Appendix 2 and Box 2). It is also possible to show that this formula can be applied to options with a maturity of over one period.

3| EXTREME EVENTS AND PRICING: THE CASE OF A EUROPEAN CALL OPTION

In this section, we show, using a numerical example, how incorporating extreme events (such as large variations in the return on risky assets) into a pricing model can have a significant impact on the price of the asset that we are seeking to determine.

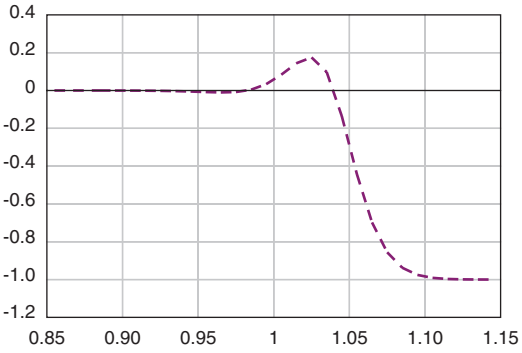
We have seen that the mixture of Gaussian distributions is better able to reproduce the high kurtosis and the negative skewness observed empirically with the series of rates of return on the CAC40. This result is also verified in the risk-neutral world where the Gaussian or mixture of Gaussian nature of the factor distribution is preserved thanks to the exponential-affine form of the stochastic discount factor (see Boxes 1 and 2).

Chart 3
Black and Scholes (BS) price and Gaussian mixture, call option
(X-axis: relative strike; Y-axis: relative price call option)



Let us consider a European CAC40 Index call option (observed over the period mentioned in section 1|1), a residual maturity of one week and a constant risk-free rate r^f = 0,0007 (weekly basis). We compare the price obtained using the Black and Scholes model (see Box 1) with that corresponding to a mixture of two Gaussian distributions (see Box 2). The results, presented in Table 3, show that the Black and Scholes model, by underestimating the frequency of extreme events, results in an overvaluation of at-the-money options ($\kappa \approx 1$, the most traded options on the market) and an undervaluation of both in-the-money options ($\kappa < 1$) and out-of-the-money options ($\kappa > 1$, the least liquid options) (see Charts 3 and 4).

Chart 4
Relative price differential: BS price – Mixture price / Mixture price
(X-axis: relative strike; Y-axis: relative pricing error)



The relative price differential (see Table 3)[13] between the price obtained with a mixture of Gaussian distributions and the price obtained using the Black and Scholes model is interpreted as the revaluation that occurs when tail risk is better taken into account in European call option pricing (move from a Black and Scholes-type model to a Gaussian mixture model). Price differentials are substantial in this example where the maturity is short. These prices differentials would be less significant for longer maturities.

Table 3

	Call option "in the money" $0.85 \leq \kappa < 0.95$	Call option "at the money" $0.95 \leq \kappa < 1.05$	Call option "out of the money" $1.05 \leq \kappa < 1.15$
$\frac{\text{BS price} - \text{Mixture price}}{\text{Mixture price}}$	-0.12%	3.76%	-88.5%

In this article, we put forward a European option pricing model capable of taking into account tail risk. The numerical examples show that a model based on an underestimation of the frequency of extreme events systematically results in an overvaluation of "at the money" options, the most traded on the market. Conversely, "at the money" and "out of the money" options (the less liquid) are undervalued.

For the sake of simplicity, we have used a static model with independent returns and a mixture of two Gaussian distributions. A more realistic model would be a dynamic model[14] in which the conditional time-dependent distribution would always be a Gaussian mixture but with time-dependent parameters. The effect of taking into account extreme events would then depend on the current and past environment in terms of returns and volatility. In this respect, the static model presented here may be considered as reproducing an average effect.

13 *A lag of 0.01 is used for each relative exercise price range.*
14 *See Bertholon, Monfort and Pegoraro (2006).*

APPENDIX 1

From the historical world to the risk-neutral world

The risk-neutral conditional probability distribution can generally be derived from the historical probability distribution and the specification of the stochastic discount factor. More specifically, if $f_t(x_{t+1})$ denotes the historical conditional probability density function of the factor, *i.e.* the distribution of the factor observed in the "real" world, and $f_t^Q(x_{t+1})$ the risk-neutral conditional probability density function of the factor, *i.e.* the distribution of the factor observed in a risk-neutral world, the move from the historical world to the risk-neutral world can be written as:

$$f_t^Q(x_{t+1}) = \frac{M_{t,t+1}}{E_t(M_{t,t+1})} f_t(x_{t+1}), \tag{A1.1}$$

where $M_{t,t+1}$ is the stochastic discount factor.

If P_t^f denotes the price of the one period risk-free asset at date t and by applying the pricing formula (2) to this asset, we obtain:

$$P_t^f = E_t(M_{t,t+1} P_{t+1}^f), \tag{A1.2}$$

where $P_{t+1}^f = 1$.

If we define $r_{t+1}^f = \log\left(\frac{1}{P_t^f}\right)$ the risk-free rate between t and $t+1$ (known in t), we then have:

$$E_t(M_{t,t+1}) = \exp(-r_{t+1}^f). \tag{A1.3}$$

By re-writing the pricing formula (2) using (A1.1) and (A1.3), we obtain:

$$P_t^f = \exp(-r_{t+1}^f) E_t^Q(g_{t+1}),$$

this is the pricing formula in a risk-neutral world.

APPENDIX 2

Price of a European call option with a one-period maturity

Let us consider the case of a European call option with a one-period maturity. $c_t = \frac{C_t}{S_t}$ denotes the relative price of the option at date t (S_t is the price of the underlying asset and C_t the price of the option at date t). Its relative exercise price at $t+1$, denoted κ, is equal to $\kappa = \frac{K}{S_t}$ where K is the exercise price at $t+1$. The relative price of the underlying asset at $t+1$ is equal to $\exp(x_{t+1})$[1]. The future cash flow generated by the option at $t+1$ denoted g_{t+1}, is therefore $\exp(x_{t+1}) - \kappa$ if the option is exercised, 0 if not.

In other words, we have:

$$g_{t+1} = \max\left(\exp(x_{t+1}) - \kappa, 0\right) = \left(\exp(x_{t+1}) - \kappa\right)^+ . \tag{A2.1}$$

The relative price of the option at date t is then:

$$c_t = E_t\left(M_{t,t+1}(\exp(x_{t+1}) - \kappa)^+\right), \tag{A2.2}$$

where $E_t(.)$ is the conditional expectation calculated using the historical distribution (Gaussian mixture). In the risk-neutral world, this is written:

$$c_t = \exp(-r^f) E_t^Q\left((\exp(x_{t+1}) - \kappa)^+\right), \tag{A2.3}$$

where r^f is the risk-free interest rate between t and $t+1$ (known at t) and $E_t^Q(.)$ is the conditional expectation calculated using the risk-neutral distribution. It should be recalled that, under the model's assumptions, the risk-neutral distribution is also a mixture of Gaussian processes.

By calculating the right-hand side of equation (A2.2), we show that the option pricing formula is a linear combination of Black and Scholes-type formulas. This formula depends on the means and variances of the Gaussian distributions used in the Gaussian mixture. In the Gaussian case, *i.e.* if we make the assumption of a single regime, we obtain the traditional Black and Scholes option pricing model (see Box 2). It is also possible to show that this formula can be applied to options with a maturity of over one period.

1 *By definition* $x_{t+1} = \ln\left(\frac{S_{t+1}}{S_t}\right)$ *where* S_t *is the price of the underlying asset at date* t.

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Fair value accounting and financial stability: challenges and dynamics

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Fair value accounting has played a specific role in the current crisis. Its application raises a number of different issues; while some are currently being addressed by the relevant standard setters, others have a more macroeconomic dimension.

As regards the immediate drawbacks of the fair value approach, both standard setters and banking supervisors are working on guidance on how to value financial instruments in times of stress and the appropriate internal processes that should be in place in financial institutions to achieve this.

However, the crisis has also highlighted some more macro-financial issues. In this respect, central banks, thanks to the overview they have of the financial system and their central role in money markets, seem well-positioned to be the guardians of financial stability. In order to play this role, cooperation must be enhanced between central banks, standard setters and supervisors.

NB: The views expressed here represent the opinions of the author and do not necessarily express those of the Banque de France or the Basel Committee.

The turmoil we have been experiencing for the last year has highlighted a number of challenges for central bankers, supervisors and global regulators.

It began as a crisis with very traditional features: the poor underwriting standards of non-regulated entities created poor quality loans that were used in a very complex and lengthy chain of securitisation, whose intermediaries were not able, and even sometimes not willing, to analyse the underlying risks.

What is interesting from a financial stability point of view is that a problem that was specific to the United States spread to the rest of the world through financial markets. Of course, the globalisation of financial systems, which implies greater efficiency of information and financial flows for the best and the worst, has contributed significantly. However, the relationship between liquidity and valuation was a specific feature of this crisis that highlighted challenges related to the impact of fair value accounting on financial stability.

What we have been seeing since autumn 2007 is a negative liquidity-valuation spiral that, partly because of a number of failures over financial disclosures, greatly impacted confidence in the market creating a global liquidity freeze in the interbank market and gave rise to massive downgrades and write downs.

How can we address these challenges and dynamics? Some of them can and are likely to be addressed by relevant standard setters and supervisors. Indeed, much focus has been placed in diverse international fora on those issues in order to improve the situation, enhance confidence and put the market back on track. In addition, financial institutions themselves have made considerable efforts to improve the disclosure of their risks and exposures. It is very likely that this trend will continue and that proposals will be made by market participants with a view to reducing the complexity and opaqueness of financial products.

However, there may also be challenges of a different nature, which are therefore more difficult to deal with. For example, the addition of sound individual decisions does not always make for sound macroeconomic policy at the system's level. Consequently, these issues must be considered from a wider perspective and, in this context, central banks may be well positioned as the guardians of financial stability.

In Part 1|, we will look at the challenges evidenced by the recent turmoil and how they should be addressed, while in Part 2| we will consider the more macroeconomic trends related to fair value accounting.

1| FAIR VALUE ACCOUNTING IN TIMES OF STRESS: CHALLENGES FOR FINANCIAL INSTITUTIONS AND REGULATORS

Under both International Financial Reporting Standards (IFRSs) and US Generally Accepted Accounting Principles (US GAAP) more and more of the assets and liabilities of banks and other companies are to be measured at fair value. Under these two sets of standards, the definition of fair value is not exactly the same but the basic framework is very similar. The objective of fair value accounting is to replicate market prices and is based on the availability of market inputs for valuation. This implies that financial instruments are valued using market prices (if there is a market) or using the market of a similar instrument if there is no market for this specific instrument, or using

Table 1
Fair value hierarchy under IFRS and US GAAP

IFRS – IAS 39	US GAAP – FAS 157
Level 1 = quoted prices in an active market Level 2 = more recent quoted price	Level 1 = market prices
Level 3 = estimation of fair value by reference to similar financial instruments Level 4 = valuation techniques incorporating a maximum of observable data	Level 2 = model prices with observable inputs
Level 5 = valuation techniques incorporating non observable data	Level 3 = model prices with no observable inputs

Note: Following recent discussions with IASB, it seems likely that it will adopt, in the context of the responses to the turmoil, the US hierarchy with three different levels.

model-based valuation techniques (with or without market inputs depending on their availability). All these different inputs determine the different levels in the fair value hierarchy.

The situation that has prevailed since the end of August 2007 highlighted a number of critical issues related to the valuation of financial instruments. This applies to both complex instruments as well as the more traditional ones that became illiquid, making it much more difficult to find market-based prices. As liquidity quickly evaporated in the market for many complex structured products and primary and secondary transaction prices became unavailable, most banks and financial institutions switched from valuation methods based on observable prices or deemed to be observable (indices) to methods that relied more on model-based valuations. In some instances, such model based valuations required the extensive use of unobservable inputs.

1|1 What is an active market?

Under accounting standards, there is no clear definition of what is actually an active market and when and under which condition financial institutions can move from a market price to a model price. Besides, no common understanding, for example, exists of what can be considered as a distressed or forced sale *vis-à-vis* market prices in a rapidly deteriorating environment. This has been a major source of uncertainty in the last months and contributed to put banks' risk management and valuation units under stress.

In other words, the crisis highlights that there is a need for relevant standard setters to clarify some definitions, notably that of an observable market price and, more generally, of an active market.

This may imply identifying a set of factors or accumulation of evidences, that can be used as "proof" that there is no longer an active market. This definition would help financial intermediaries to determine the conditions under which they can move to model prices.

1|2 Valuation and risk management processes in adverse market conditions

The recent crisis also calls into question the capacity of risk management and valuation units to cope with adverse situations. Both the official and the private sector recognises that major risk management and governance shortcomings were exposed during the crisis. Indeed, the situation emphasised the difficulties in estimating fair values due to the lack of liquidity in the market, the complexity of some financial instruments and the shift by some banks to more model-based methodologies which increased the use of unobservable inputs. All these factors strained the capacity of business units and control functions tasked with the necessary verification and validation and led to delays in producing valuations.

Moreover, with the need for "rapid roll-out" of some new valuation models and the extension of other existing models to a broader range of products than originally intended, the usual degree of internal scrutiny was not applied in all cases. Banks that had made earlier investments to develop more rigorous valuation and governance processes, and that had used a diversified range of valuation approaches and information sources, were better positioned to deal with valuation uncertainty when market liquidity dried up.

The crisis therefore clearly showed that guidance is needed on how to value products when active markets do not exist anymore. It also highlights that financial institutions have to develop adequate internal management processes in order to put in place the right expertise for valuation modelling, including the use of a selected and diversified series of inputs.

This requires for example to have a specific team to work on valuation models, another one to review, independently, the models used, to regularly back test and calibrate the results of models in order to check their accuracy, to carry out internal controls of the whole process and to use, wherever possible, a wide diversity of inputs.

1|3 Accounting choices versus business strategies

Part of the valuation uncertainties experienced by financial institutions stemmed from the fact that the prior allocation of assets to the different sets of portfolios have not been made with sufficient due diligence in all cases. In fact, some banks may have paid attention to the consequences of allocating assets to the different books more in terms of profit and loss or capital charge (*e.g.* capital charge in the trading book is lower than that in the banking book) than in terms of the relevant business strategies. Clearly at the time of the crisis, some instruments were allocated to the trading book or fair value option portfolios whereas, given their specific features, they should have been allocated to another portfolio.

As consequence of this regulatory arbitrage, some instruments were not allocated to the right portfolio which exacerbated the inherent complexity of applying risk and valuation models.

Therefore it is important that financial institutions exercise more scrutiny and caution when performing their initial portfolio allocation.

This scrutiny is especially necessary under IFRS since, contrary to what may be possible under US GAAP, the transfer from one portfolio to another is extremely difficult.

Table 2
Portfolio classification for accounting (IFRS) and prudential rules (Basel solvency ratios)

Accounting classification IAS 39	Accounting treatment IAS 39	Prudential classification and solvency treatment
Held for trading	Fair value through profit and loss	Trading book/ market risk amendment
Fair value option		
Available for sale	Fair value through equity	Banking book/ solvency treatment
Loans and receivables	Amortised cost	
Held to maturity		

1|4 Adjustments to valuation modelling

Much of the uncertainty that led to the loss of confidence between market participants was also due to the sudden and massive writedowns that were seen since last summer.

The severity of these writedowns partly resulted from the very high initial levels of valuation. During the upside, financial statements using market prices took at face value the latter, irrespective of the fact that some risks may not have been priced correctly in the market. This contributed to increase balance sheets and fostered further leverage. To put it another way, no adjustments were made, in the upturn, to "observable market prices", although they sometimes appeared overvalued or to underprice true risks. It relates, for instance, to the poor grasp of liquidity risk associated with instruments trading in very thin markets already before the crisis erupted.

Valuation measurement and management processes need to incorporate, in addition to a wide range of inputs, all the relevant adjustments that should be embedded in prices. A major challenge is to ensure that valuation models factor in the whole spectrum of risks even when markets conditions are benign. Were such adjustments are made on an ongoing basis, this could remove a source of procyclicality in accounting rules. Valuations derived from models may be more robust and reliable and asset price cycles may be less pronounced.

Consequently, it seems reasonable to apply, in valuation modelling, and on an on going basis, a list of adjustments to fully take into account all risks that should be embedded in the prices of financial instruments, including, beyond credit risk, model risk and liquidity risk.

1|5 Consistency between accounting/prudential and risk management assessments

These adjustments to valuation modelling may, however, be different from risk management practices which analysis must be, by definition, more forward-looking. For example, stress tests are a risk

management tool and not a valuation adjustment. In an ideal situation, reporting for financial statements, prudential ones and internal management, should be based on the same figures. However, it may not be the case as their respective objectives are not the same. Financial statements should give an information on the value of one entity at a specific point in time in order to give adequate information to investors. Prudential information should provide supervisors with a prudent assessment of the situation of one entity taking into account, for example, expected future losses. At the same time supervisors are reluctant to take into account future gains which explain that they introduced prudential filters (see *infra*).

Above all that, risk management should be even more forward looking as it has to integrate management strategy, capital planning... To summarise, even if, in the three types of assessments, the initial basis is the same (same inputs, same models...), the outputs should be different based on different objectives. The starting point is the accounting assessment which provides a kind of "median view" taking into account the situation "point in time", then the prudential assessment take the same information as the accounting but disregard the "good news" factored in the market price (latent gains) and only takes into account "bad news" (fair value losses). And lastly, if risk management assessment is also starting from the same accounting figures, it should stress current market conditions in order to have a more forward looking approach. These last results should be taken into account in the economic capital allocation and the capital planning of each institution.

Table 3
Assessment hierarchy according to objectives

	Type of assessments		
	Accounting valuation	**Prudential assessment**	**Risk management practices**
Objectives	Provides information about one entity's situation at a point in time	Provides information about one entity risks and its capacity to support them	Provides information about one entity's exposures/ business opportunities
Tools	Financial statements Profit and loss account	Own funds and capital ratio	Internal capital allocation/ strategic decisions

1|6 No more disclosures but better ones

The multiplicity of risk assessment approaches, established on the basis of different requirements –financial reporting, prudential assessment and risk management–, increases the difficulties in understanding financial and risk information. It also makes disclosure to market participants more complex. These layers of complexity, together with balance sheet and profit and loss volatility associated with the increasing use of fair valuation can exacerbate investors' uneasiness as they confront very challenging market conditions, raise uncertainty and undermine confidence.

There is, therefore, a strong and urgent need to improve disclosure and, above all, to enhance the quality content of these disclosures. In doing so, financial institutions should also provide investors with information regarding the uncertainty of valuations especially when the time horizon increases. Financial institutions should improve disclosures about the methodologies, inputs and parameters used as well as about the uncertainly surrounding valuation, for example, by disclosing sensitivity measures.

These disclosures should help market participants to understand better each institution's risk profile. Also, because investors need to assess risk profiles in relative terms, these disclosures must be made with a certain degree of homogeneity in order to help the market, to make meaningful comparisons.

All the above factors illustrate the most immediate drawbacks of the current situation that the crisis has brought to the fore. Following the recommendations of the Financial Stability Forum (FSF), the relevant international fora, namely the Basel Committee on Banking Supervision and the International Accounting Standards Board, are working on these issues in order that the latter improve its recommendations and guidance related to fair value accounting in times of stress, and the former enhance its recommendations for the supervisory assessment of banks' valuation practices.

Many improvements have already been seen regarding disclosures. The FSF provided a template for financial institutions to disclose their risks

and exposures related to the current crisis and most, if not all, G10 supervisors have sought to ensure that banks complied with this requirement. Indeed, some banks have already provided the relevant information.

However, some issues relating to the macroeconomic impact of regulation seem more difficult to resolve. The latter essentially stem from the fact that the addition of sound entity specific measures, when applied in the same way, at the same time, by all market participants, may raise macroeconomic difficulties.[1] These discussions can today be resumed by the question as to whether current accounting and prudential regulations may have procyclical effects. However difficult to determine these procyclical effects may be, central banks seem well positioned to play the role of guardians of financial stability.

In addition to this, new regulations such as fair value accounting blur the traditional frontiers between trading and banking books, risks, and market participants, increasing its financial stability impacts.

2| FAIR VALUE ACCOUNTING AND FINANCIAL STABILITY: QUESTIONS FOR CENTRAL BANKS AND GLOBAL POLICY MAKERS

2|1 Fair value accounting has led to the blurring of traditional frontiers

THE BLURRED DISTINCTION BETWEEN BOOKS AND THE ISSUE OF CONSISTENCY

Before the widespread introduction of fair value accounting, there was a clear distinction between banks' trading book which was marked-to-market and banks' banking book held at historical cost. Accounting practices were in line with banking strategies and mirrored prudential classification.

This situation also allowed for a better alignement of accounting/prudential and risk management expertise as the first two types of assessments were clearly aligned. In addition, the low volatility of historical cost implies less necessity for risk management to be proactive and gives rise to different types of incentives than marked-to-market. At the same time, the trading book did not raise any concern from a prudential point of view given that this portfolio was restricted to liquid assets, held with a very short term horizon.

This situation can be summarised as follows:

Table 4
Relationships between accounting and prudential classifications

Before IFRS		After IFRS	
Accounting treatment	**Prudential classification**	**Accounting treatment**	**Prudential classification**
Marked-to-market	⇔ Trading book	Fair value through profit and loss	Trading book
Amortised cost	⇔ Banking book	Fair value through equity	Banking book
		Amortised cost	

The current situation raises many challenges for:

- internal management to understand and choose the right portfolio from the outset;

- financial reporting to provide relevant explanations;

- prudential supervisors who decided to "breach the consistency" and create "prudential filters", whose objective is to preserve the stability of prudential capital whose definition would otherwise have been automatically affected. However, these filters are only a partial solution to a likely procyclical effect of fair value accounting as they only apply to fair value through equity (basically available for sale assets) as it would have been too complex to implement filters on instruments at fair value through profit and loss.

In addition to these prudential filters applicable to assets, there is also a systematic filter applicable to

1 *See, for example, the "lessons from Millenium bridge" in the article by Shin, Plantin and Sapra in this issue of the* Financial Stability Review.

Table 5
Prudential filters applicable to available for sale assets (AFS)

AFS assets	Accounting treatment	Prudential filters
Debt	Fair value through equity	Either like loans or like equities
Equity		Recognition in Tier1 of unrealised losses/partial recognition of unrealised gains in Tier2
Loan		No recognition of any unrealised loss/unrealised gain

Objective: Not to affect the current definition of regulatory capital for accounting reasons alone.

the fair valuation of own credit risk on the liability side. The objective there is exclude from the calculation of solvency ratios accounting profits that can be generated from a bank's own debt as soon as its financial situation deteriorates.

Basically, at the same time that it led to blurring the traditional frontiers between books, fair value accounting also made it impossible to align accounting/prudential and risk management assessments.

This situation of increased complexity between accounting and prudential figures may provide incentives for arbitrages and creates a number of difficulties in understanding financial statements. All in all, it does not foster market confidence.

THE BLURRING OF THE FRONTIER BETWEEN RISKS AND ITS CONSEQUENCES IN TERMS OF CAPITAL NEEDS

The application of fair value accounting means that any liquidity or valuation shock immediately affects the level of capital.

The example of the recent crisis is striking in this respect.

What we have seen since last year is a massive wave of recapitalisations (up to USD 302 billion at the end of June 2008 representing nearly 80% of the total write downs and more than eight times the credit losses.

This new trend is directly linked to the application of fair value accounting since the spiral between

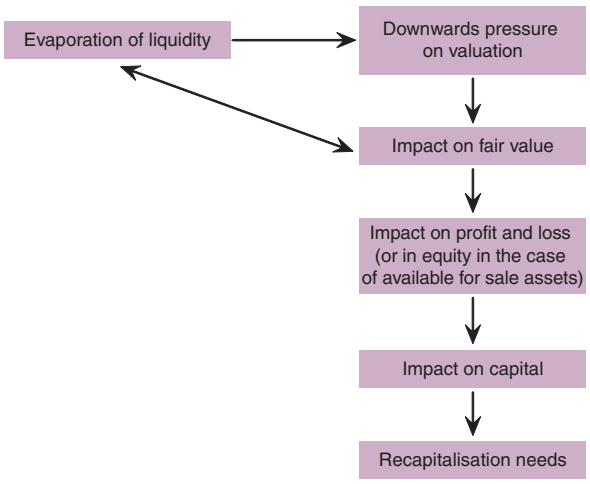
Table 6
Write downs and recapitalisation
(USD billions; recap./total losses in %)

Dates	Write downs	Credit loss	Total	Recap.	Recap./ total losses
2007 27 December	74	23	**97**		
2008 22 January	107	26	**133**		
31	120	26	**146**		
22 February	135	26	**162**		
29	154	27	**181**		
7 March	162	26	**188**		
14	169	26	**195**		
26	182	26	**208**		
1 April	206	26	**232**	136	59
10	216	29	**245**	163	66
21	248	42	**290**	231	80
28	269	43	**312**	231	74
9 May	280	43	**323**	231	71
19	332	47	**379**	266	70
16 June	344	47	**391**	310	79
20	349	47	**396**	302	76

Source: Bloomberg, sample of over 70 international banks.

liquidity and valuation had a direct impact on profit and loss accounts and then on the capital base. Consequently, the introduction of fair value accounting could mean that a liquidity crisis might very rapidly affect capital levels.

Figure 1
The vicious circle of valuation and liquidity and its impact on capital requirements



It should be noted that this trend can easily be reversed. If we reach a point where some investors begin to come back to the market and buy, then we will note upward pressure on liquidity and valuation having a direct impact on profit and loss accounts through unrealised gains, creating additional capital.

In conclusion, the main consequence of accounting rules is that capital comes under strong pressure as its level may be subject to a high degree of volatility. By making the link between solvency risk and other risks more direct, they make the need for financial intermediaries to have a strong capital base even more pressing than before. At the same time, this new volatility may pave the way for banks to have, within their capital base, some flexible instruments that can move in line with accounting requirements. Hybrid or contingent capital –whose level should be carefully monitored given its lower quality than regular capital– could be a solution.

THE BLURRED DISTINCTION BETWEEN DIFFERENT TYPES OF MARKET PARTICIPANTS/ THE USEFULNESS OF CONTRARIANS

The recent crisis erupted against the background of changing financial systems. It is a well documented fact that the range of financial entities or quasi-entities has expanded from traditional regulated (*e.g.* banks) to unregulated intermediaries (*e.g.* hedge funds) to increasingly important "light legal structures" (*e.g.* conduits, SIV, …), which have risk profiles similar to banks' –*i.e.* bearing risk that is generally of a long-term nature and financed short-term–, but do not face the same regulatory constraints. In such two-tier systems, "non-banks" act like banks but without having to adhere to banking regulations (no capital ratio for example, enabling them to increase their leverage) and no compulsory fair value accounting.

Hedge funds do not have to fulfil the same disclosure and transparency requirements. In terms of the level playing field and arbitrage opportunities it is certainly not an optimal situation. However, as far as accounting is concerned for example, some may argue that not having to comply with such accounting requirements enable them to position themselves as buyers in some markets. Clearly, in this case, the diversity of rules enabled some actors to act as contrarians in the market, which may be needed to offset part of the negative impact of herd behaviour.

2|2 What might the macroeconomic impact of fair value accounting be?

One of the most difficult problems to resolve is that the overall application of reasonable individual measures does not always result in a sound macroeconomic framework.

The application of fair value accounting may have a number of different impacts. On the one hand, market price changes impact financial statement faster, thereby adding to volatility. On the other hand, through the quick disclosure of risks, it helps improve transparency. The latter is critical. As a matter of fact, raising transparency was certainly a key objective pursued by regulators and policymakers since the beginning of the crisis.

To provide investors with the possibility of checking, in close to real time, the value of portfolios, fair value accounting assumes however that:

- markets always efficiently price assets and discriminate amongst risks;

- investors do not herd and take their decisions based on all available information.

If this is not the case, fair value does not prevent the development of asset bubbles and may even contribute and exacerbate movements that are out of line with fundamental price dynamics.

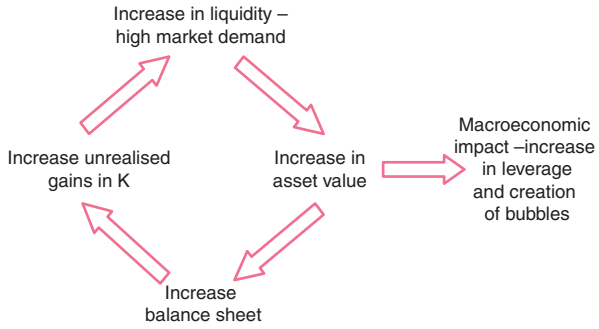
As documented in Adrian and Shin (2008), financial intermediaries adjust their balance sheets dynamically in reaction to asset price movements and do so in such a way that leverage is high during booms and low during busts.

With the recent crisis, the situation and the macroeconomic impact has been even worse since the first development was a forced re-intermediation of loans onto banks' balance sheets due to the reintegration of off-balance sheet SIV exposure that, in addition to fair value losses, put a lot of pressure on capital ratios.

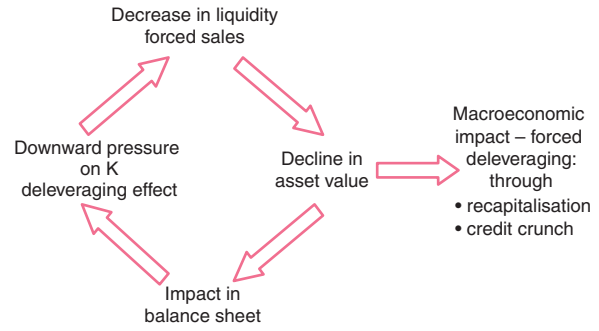
Therefore, and, surprisingly, the initial impact of the current crisis was a "forced" increase in leverage.

Figure 2

a) In good times



b) In bad times



However, after this first development, the financial system is currently experiencing a deleveraging phase. It might be seen as a return to normalcy after a period of high and sometimes excessive leverage, but the consequences for the financial system may be disruptive because of the procyclical nature of leverage.

In other words, financial institutions might be prompted to deleverage more than necessary, especially in an environment where fair value accounting is widely used.

All these issues are clearly among the most difficult ones to address, showing that diversity (of practices, rules, etc.) is needed. This goes against the principle of harmonisation of practices and the search for a level playing field; however, to ensure the smooth functioning of markets, diversity of strategies seems to be key.

REDUCING PROCYCLICALITY IN THE FINANCIAL SYSTEM: THE ROLE OF CENTRAL BANKS

This question immediately raises another one: what exactly is procyclicality? Two situations can be characterised as procyclical: the first is a situation in which a specific regulation amplifies fluctuations in natural cycles. It is a kind of exacerbation of natural trends. It seems to be the situation that we have been experiencing since last year where the evaporation of liquidity on some markets has led to massive write downs.

A second definition may be more problematic from an economic and a financial stability point of view. It is the case where a specific regulation changes the natural economic trend, because, for example, of misaligned incentives. This may be the case, for example, if fair value accounting or other measures, such as the widespread use of VaR modelling for prudential purposes, leads to a shift in business investment/strategies towards short-term horizons. Even if there is no strong evidence of such a shift at this stage, these issues have to be carefully considered by global policy makers

In this context, what can be done and who should do it? In other words, who could act as the guardians of financial stability?

Central banks may be well positioned to do this. In fact, so far, both prudential and accounting rules have favoured a one-entity approach. Accounting rules applicable to one entity provide the market with a true and fair view of the value of that entity. In a similar way, supervisors are in charge of ensuring that there is an adequate level of capital for risks at each entity level.

In this context, the question of who is in charge of the overall allocation of funds at the economy level or the stability of the financial system as a whole, remains open, even, if, in the light of recent events, central banks seem to be in charge of this difficult and dual mandate: monetary stability and financial stability. A first step, in order to do

that, would be to increase cooperation between supervisors, standard setters and central banks in the following ways. Central banks need to know and understand regulation, prudential practices and have access to individual information, while supervisors need to pass on to market participants central banks' assessments regarding financial stability and integrate in their supervisory action macro-prudential safeguards in time of stress (it is the case for example when supervisors ask banks to have a "through the cycle" approach, or to implement dynamic stress testing practices incorporating second round effects). In a similar way, it would be useful to give a more proactive role to central banks or global policy makers in the governance process of accounting standard setters in order for them to be able to understand and incorporate in their standards a more "macro-financial" perspective.

In these "macro-financial" assessments, thanks to their relations with market participants and their role at the centre of money markets, central banks should be able to identify, at an early stage, misalignments of incentives, market dysfunctions and the likelihood of future bubbles or crises. In any event, regulation, be it accounting or prudential, appears to be a "public good" given its likely impact on market participants' strategies and the economy as a whole. In this context, contracyclical measures, in addition to current regulations, such as, for example, in the field of accounting, requiring provisioning more in line with the growth of credit lending[2] could be envisaged from a more macroeconomic perspective.

2 *Such "dynamic provisioning" has been successfully implemented by the Bank of Spain.*

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How should we respond to asset price bubbles?

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This paper examines how economic policy should respond to possible asset price bubbles. Three questions are considered:

• Are some asset price bubbles more problematic than others?
• How should monetary policy respond to asset price bubbles?
• What other types of policy responses are appropriate?

I conclude that asset price bubbles associated with credit booms present particular challenges because their bursting can lead to episodes of financial instability that have damaging effects on the economy. Monetary policy should not react to asset price bubbles per se*, but rather to changes in the outlook for inflation and aggregate demand resulting from asset price movements. However, regulatory policies and supervisory practices should respond to possible asset price bubbles and help prevent feedback loops between asset price bubbles and credit provision, thereby minimising the damaging effects of bubbles on the economy.*

NB: Based on a speech given at the Wharton Financial Risk Roundtable, May 15, 2008. The views expressed here are my own and are not necessarily those of the Board of Governors of the Federal Reserve or the Federal Reserve System. I would like to thank Michael Kiley, Sylvain Leduc, Andrew Levin, Jon Greenlee, Robin Lumsdaine, David Palmer and William Treacy of the Board's staff for their excellent comments and assistance.

Over the centuries, economies have periodically been subject to asset price bubbles –pronounced increases in asset prices that depart from fundamental values and eventually crash resoundingly. Because economies often fare very poorly after a bubble bursts, central bankers need to think hard about how they should address such bubbles. This issue has become especially topical of late because of the rapid rise and subsequent decline in residential housing prices this decade. The recent drop in house prices in many markets around the world has been accompanied by increasing rates of defaults on mortgage loans and home foreclosures. These developments have created hardship for the families who are forced to leave their homes and have disrupted communities; in addition, the developments have contributed to a major shock to the financial system, with sharp increases in credit spreads and large losses to financial institutions. As many have pointed out, the damage to households' credit and the financial disruption have been a drag on the US economy, which has led to a slowing of economic growth and a recent decline in employment.

In this paper, I would like to return to the issue of how we should respond to possible asset price bubbles. I will first focus on the conceptual framework I use to evaluate these issues, based on a core set of scientific principles for monetary policy.[1] My framing of the issues highlights the following three questions:

- Are some asset price bubbles more problematic than others?

- How should monetary policy respond to asset price bubbles?

- What other types of policy responses are appropriate?

My discussion of these conceptual issues is followed by a summary of several historical examples that illustrate the importance of focusing on the principles I have outlined.

1| ARE SOME ASSET PRICE BUBBLES MORE PROBLEMATIC THAN OTHERS?

In order to consider how monetary and other policies should address asset price bubbles, we must first examine how asset prices influence inflation and aggregate economic activity. These influences act through several channels; in particular, asset prices provide signals regarding profitable investments, affect the wealth of households, and influence the cost of capital to firms and households. For example, higher equity prices, whether driven by fundamentals such as lower interest rates or faster productivity growth or by bubble-type factors like "irrational exuberance", boost business investment by lowering the cost of capital and raise household demand by generating increased wealth. Other fluctuations in asset prices act similarly. The resulting fluctuations in resource utilisation lead to changes in inflation.[2]

The influences of asset prices on demand and inflation through traditional wealth and cost-of-capital channels fall directly within the traditional concerns of monetary policy, a point to which I will return shortly. However, not all asset price bubbles are alike, and some bubbles raise issues outside the direct responsibility of monetary policy but within the policy concerns of the broader regulatory framework governing our financial system. In particular, some asset price bubbles can have more-significant economic effects, and thus raise additional concerns for economic policymakers, by contributing to financial instability. Financial history reveals the following typical chain of events: because of either exuberant expectations about economic prospects or structural changes in financial markets, a credit boom begins, increasing the demand for some assets and thereby raising their prices.[3] The rise in asset values, in turn, encourages further lending against these assets, increasing demand, and hence their prices, even more. This feedback loop can generate a bubble, and the bubble

1 *I discuss these principles in detail in Mishkin (2007b, 2007f).*
2 *Of course, asset price bubbles have additional implications for economic efficiency. Departures of asset prices from levels implied by economic fundamentals can lead to inappropriate investments that decrease the efficiency of the economy by diverting resources toward economic activities that are supported by the bubble (for example, see Dupor, 2005). For example, during the bubble in tech stocks in the late 1990s, there was overinvestment in some types of high-tech infrastructure. Similarly, the bubble in housing prices led to too many houses being built. These distortions to activity across sectors of the economy are a drag on efficiency and hence are a matter of concern above and beyond fluctuations in overall economic activity and inflation.*
3 *See, for example, Mishkin (1991) and Kindleberger (2000).*

can cause credit standards to ease as lenders become less concerned about the ability of the borrowers to repay loans and instead rely on further appreciation of the asset to shield themselves from losses.

At some point, however, the bubble bursts. The collapse in asset prices then leads to a reversal of the feedback loop in which loans go sour, lenders cut back on credit supply, the demand for the assets declines further, and prices drop even more. The resulting loan losses and declines in asset prices erode the balance sheets at financial institutions, further diminishing credit and investment across a broad range of assets. The decline in lending depresses business and household spending, which weakens economic activity and increases macroeconomic risk in credit markets.[4] In the extreme, the interaction between asset prices and the health of financial institutions following the collapse of an asset price bubble can endanger the operation of the financial system as a whole.[5]

To be clear, not all asset price bubbles create these risks to the financial system. For example, the bubble in technology stocks in the late 1990s was not fueled by a feedback loop between bank lending and rising equity values; indeed, the bursting of the tech-stock bubble was not accompanied by a marked deterioration in bank balance sheets. But potential for some asset price bubbles to create larger difficulties for the financial system than others implies that our regulatory framework should be designed to address the potential challenges to the financial system created by these bubbles.

2| How should monetary policy respond to asset price bubbles?

In order to think about how central banks should respond to asset prices, we need to first remember the objectives of monetary policy. The ultimate purpose of a central bank should be to promote the public good through policies that foster economic prosperity. Research in monetary economics describes this objective in terms of stabilising both inflation and economic activity. Indeed, these objectives are exactly what is embodied in the dual mandate that the Congress has given the Federal Reserve.[6]

Because of their effects on prices and employment, macroeconomic fluctuations due to asset price movements are a concern for monetary policy makers. However, the macroeconomic consequences of asset price fluctuations are unlikely to have long-lasting and severe consequences for the economy as long as monetary policy responds appropriately. Whether an asset price bubble is occurring or not, as asset prices rise and boost the outlook for economic activity and inflation, monetary policy should respond by moving to a more restrictive stance. After a bubble bursts and the outlook for economic activity deteriorates, policy should become more accommodative.[7] As I pointed out in a paper that I presented at the Federal Reserve Bank of Kansas City's Jackson Hole conference in September, if monetary policy responds immediately to the decline in asset prices, the negative effects from a bursting asset price bubble to economic activity arising from the decline in wealth and increase in the cost of capital to firms and households are likely to be small.[8] More generally, monetary policy should react to asset price bubbles by looking to the effects of such bubbles on employment and inflation, then adjusting policy as required to achieve maximum sustainable employment and price stability.

To be clear, I think that in most cases, monetary policy should not respond to asset prices *per se*, but rather to changes in the outlook for inflation and aggregate demand resulting from asset price movements. This point of view implies that actions, such as attempting to "prick" an asset price bubble, should be avoided.

I take this view for (at least) three important reasons.[9] First, asset price bubbles can be hard to

4 *I have previously discussed the interaction of financial markets and macroeconomic risk (for example, Mishkin, 2007d, 2007e).*
5 *See my earlier remarks on the subject (Mishkin, 2007c).*
6 *The Federal Reserve's congressional mandate is actually couched in terms of three goals: maximum employment, stable prices, and moderate long-term interest rates. However, as I have discussed (Mishkin, 2007a), the mandate is more appropriately interpreted in terms of the dual goals of price stability and maximum* sustainable *employment, and this formulation is what is consistent with stabilising both inflation and economic activity. Mishkin (2008) discusses how the pursuit of price stability can foster maximum sustainable employment.*
7 *Vice Chairman Kohn (2006) presented similar views on the response of monetary policy to asset prices.*
8 *See Mishkin (2007g).*
9 *An additional reason is that many crashes of asset prices which have become associated with asset price bubbles have had very limited affects on the economy. In a paper I wrote with Eugene White (Mishkin and White, 2003), we studied 15 stock market crashes that occurred in the United States from 1900 to 2001 and found that in most cases they were not followed by episodes of financial instability.*

identify. As a result, tightening monetary policy to restrain a bubble that has been misidentified can lead to weaker economic growth than is warranted. In addition, central bank actions to influence asset prices when the central bank is uncertain about the presence or extent of a bubble can interfere with the role of asset prices in allocating resources.[10]

Second, even if asset price bubbles could be identified, the effect of interest rates on asset price bubbles is highly uncertain. Although some theoretical models suggest that raising interest rates can diminish the acceleration of asset prices, raising interest rates may be very ineffective in restraining the bubble, because market participants expect such high rates of return from buying bubble-driven assets.[11] Other research and historical examples (which I will discuss later) have suggested that raising interest rates may cause a bubble to burst more severely, thereby increasing the damage to the economy.[12] Another way of saying this is that bubbles are departures from normal behaviour, and it is unrealistic to expect that the usual tools of monetary policy will be effective in abnormal conditions. The bottom line is that we do not know the effects of monetary policy actions on asset price bubbles.

Third, there are many asset prices, and at any one time a bubble may be present in only a fraction of assets. Monetary policy actions are a very blunt instrument in such a case, as such actions would be likely to affect asset prices in general, rather than solely those in a bubble.

All told, research suggests that monetary policy that does not try to prick bubbles, but instead responds solely to the inflation and aggregate demand outlook, is likely to lead to better outcomes even when bubbles might arise.[13]

3| ARE OTHER TYPES OF POLICY RESPONSES APPROPRIATE?

I would now like to return to the effect of asset price bubbles on the stability of the financial system. As I highlighted earlier, some, but clearly not all, asset price bubbles create risks to the financial system that could have large negative effects on the macroeconomy. As a result, it is important to examine the potential for government policies to address the type of bubble in which there is feedback between asset prices and financial stability. I would like to emphasise the importance of regulatory policy. Monetary policy –that is, the setting of overnight interest rates– is already challenged by the task of managing both price stability and maximum sustainable employment. As a result, it falls to regulatory policies and supervisory practices to help strengthen the financial system and reduce its vulnerability to both booms and busts in asset prices.

Of course, some aspects of such policies are simply the usual elements of a well-functioning prudential regulatory and supervisory system. These elements include adequate disclosure and capital requirements, prompt corrective action, careful monitoring of an institution's risk-management procedures, close supervision of financial institutions to enforce compliance with regulations, and sufficient resources and accountability for supervisors.

More generally, our approach to regulation should favor policies that will help prevent future feedback loops between asset price bubbles and credit supply. A few broad principles are helpful in thinking about what such policies should look like. First, regulations should be designed with an eye toward fixing market failures. Second, regulations should be designed so as not to exacerbate the interaction between asset price bubbles and credit provision. For example, research has shown that the rise in asset values that accompanies a boom results in higher capital buffers at financial institutions, supporting further lending in the context of an unchanging benchmark for capital adequacy; in the bust, the value of this capital can drop precipitously, possibly even necessitating a cut in lending.[14] It is important for research to continue to analyse the role of bank capital requirements in promoting financial stability, including whether capital requirements should be adjusted over the business cycle or whether other changes in our regulatory structure are necessary to ensure macroeconomic efficiency.[15] Finally, in general,

10 *Chairman Bernanke (2002) has discussed this potential problem.*
11 *For example, see the discussion in Greenspan (2002).*
12 *For example, see Gruen, Plumb, and Stone (2005).*
13 *Research supporting this view includes Bernanke, Gertler, and Gilchrist (1999); Bernanke and Gertler (2001); and Gruen, Plumb, and Stone (2005).*
14 *For example, see Kashyap and Stein (2004) and Goodhart (2008).*
15 *Research to date has not reached unambiguous conclusions. See Goodhart, Hofmann and Segoviano (2005); Kashyap and Stein (2004); and Gordy and Howells (2006) for a more thorough discussion of related issues.*

regulatory policies are appropriately focused on the soundness of individual institutions. However, during certain periods, risks across institutions become highly correlated, and we need to consider whether such policies might need to take account of these higher-stress environments in assessing the resilience of both individual institutions and the financial system as a whole in the face of potential external shocks.

Some policies to address the risks to financial stability from asset price bubbles could be made a standard part of the regulatory system and would be operational at all times –whether a bubble was in progress or not. However, because specific or new types of market failures might be driving a particular asset price bubble, some future bubbles will almost certainly create unanticipated difficulties, and, as a result, adjustments to our policy stance to limit the market failure contributing to a bubble could be very beneficial if identified and implemented at the appropriate time.

Earlier, I pointed out that a bubble could be hard to identify. Indeed, I think this is especially true of bubbles in the stock market. Central banks or government officials are unlikely to have an informational advantage over market participants. If a central bank were able to identify bubbles in the stock market, wouldn't market participants be able to do so as well? If so, then a bubble would be unlikely to develop, because market participants would know that prices were getting out of line with fundamentals.

However, although I believe that stock market bubbles might be hard to identify because they are typically not driven by credit booms (which also makes them less harmful because their collapse is less likely to lead to financial instability), when asset prices are rising rapidly at the same time that credit is booming, there may be a greater likelihood that asset prices are deviating from fundamentals, because laxer credit standards may be driving asset prices upward.[16] In this case, financial regulators at central banks and other institutions may have a greater likelihood of identifying that a bubble is in progress; for example, they might have information that lenders have weakened their underwriting standards and that credit extension is rising at abnormally high rates.

The reasoning here suggests that a rapid rise in asset prices accompanied by a credit boom provides a signal that should lead central bankers and other financial supervisors to carefully scrutinise financial developments to see if market failures might be driving the asset price boom. The resulting analysis of financial developments might then lead policymakers to consider implementing policies to address the imperfections behind the market failures and thereby help reduce the magnitude of the bubble.

4| SOME HISTORICAL EXAMPLES

I would like to now turn to a few examples from US history and international experience that highlight the interaction between asset price bubbles, financial stability, and the policy framework.

4|1 The stock market boom of the 1920s

The Roaring Twenties and the onset of the Great Depression present a particularly drastic example. The US economy thrived during the 1920s as new technologies, financial innovations, and improved business practices were introduced and contributed to a general sense of optimism. The stock market experienced a dramatic rise during that decade until it burst during the Great Crash of 1929.

A popular account of that period attributes the stock market boom to easy credit and rising speculation; the period ended with panic selling on Wall Street and triggered the beginning of the Great Depression.[17] According to this view, the Federal Reserve was incorrect in letting the rise in equity prices develop and should have raised interest rates to stem stock market speculation. You will guess from my proposed set of principles for monetary policy that I view this approach as mistaken.

It is first very difficult to assess the extent to which the stock market was driven by nonfundamental

16 *Stock market bubbles can do more harm if stocks are held by financial institutions and these institutions are allowed to include the market value of stocks in their capital base. As described later, this practice was a feature of the Japanese bank regulatory system and is one reason why the collapse of the stock market bubble in Japan helped lead to fragility of the banking system and, as a result, was much more damaging to the economy.*

17 *See, among others, Galbraith (1954) and Kindleberger (2000).*

forces at the time; by some accounts, the stock market bubble started only in March 1928.[18] Nonetheless, the rise in equity prices took a more prominent place during policy discussions at the Fed beginning in 1927, with Board member Adolph Miller pressing fervently for an increase in interest rates to stop the speculative use of credit. This approach was opposed by Benjamin Strong, the influential Governor of the Federal Reserve Bank of New York who feared a negative impact on the economy: "…any effort through higher rates directed especially at stock speculation would have an unfavorable effect upon business…".[19] However, Strong's death in 1928 opened the door for a more restrictive monetary policy aimed at curbing excesses in the stock market, even as signs of economic weakness became visible.

The tightening cycle that ended in August 1929 weakened an already deteriorating economy and paved the way for the collapse of the stock market in October. The Federal Reserve's mistake in attempting to burst the bubble directly was made worse by its refusal to change course rapidly after the market collapsed and the banking system got into trouble. Persisting too long with a tight monetary policy stance allowed deflation to set in, which raised real interest rates to extremely high levels and further depressed growth.

4|2 Japan's asset price boom and the Lost Decade

An asset price bubble also confronted the Bank of Japan (BOJ) with tough decisions starting in the mid- to late 1980s. The extent of the asset price boom in Japan in the late 1980s can be gauged by the fact that the land surrounding the Imperial Palace in Tokyo was estimated to be worth more than the whole of California at that time. Without a doubt, the 1980s was a prosperous decade in Japan with high growth, low unemployment, little inflation, and an envied business model. During that decade, equity prices rose more than 600 percent and land prices boomed more than 400 percent.

Soaring equity and land prices during the 1980s, combined with relatively low interest rates, eased financing conditions for investment substantially.[20] The ratio of bank loans to gross domestic product surged, and investment spending became the main driver of economic activity. Because of financial deregulation, banks' risk-taking behaviour also increased as they channeled more funds to real-estate-related sectors and to small firms, accepting property as collateral.[21] Trusting in a rising real estate market, some banks went as far as lending more than 100 percent of a property's appraisal value.

As at the Fed during the Roaring Twenties, the BOJ was concerned about the rapid rise in asset prices in the mid-1980s and the possibility that a bubble was in progress. In 1989, as asset prices continued to soar and inflation moved upward, the BOJ decided to start raising rates. The stock market collapsed at the beginning of 1990, but land prices continued to rise, and the BOJ kept tightening policy. Monetary policy only gradually reversed course in the summer of 1991 as growth declined and inflation and land prices started to move down. The subsequent decade has been termed "the Lost Decade". During that time, Japan suffered from anemic growth and repeated bouts of very low inflation and deflation.

Japan's experience re-emphasises the importance of regulatory policies that may prevent feedback loops between asset price bubbles and credit provision. Indeed, during the boom, Japanese regulations that allowed banks to take large leveraged positions in equities and to count as capital unrealised gains may have contributed to banks' appetite for equities during the stock market run-up and to financial instability as the stock market collapsed.

After the bursting of the bubble, policymakers did not quickly resolve the fragility of the banking sector, thereby allowing conditions to worsen as banks kept lending to inefficient, debt-ridden, so-called zombie firms.

On the other hand, Japan's experience does not support the need for preemptive monetary policy

18 *See, for instance, Galbraith (1954) and White (1990).*
19 *See Meltzer (2003, p. 225).*
20 *The stance of monetary policy was relatively easy during the mid-1980s as the BOJ attempted to contain the rapid appreciation of the yen following the Plaza Accord of 1985 and stimulated domestic demand to correct external imbalances.*
21 *Corporate restrictions on funding in the securities market were lifted in the 1980s, which reduced large firms' reliance on banks' loans. Moreover, interest rate ceilings on bank deposits were also gradually removed. See Okina, Shirakawa, and Shiratsuka (2001).*

actions to deflate a bubble, as some commentators have suggested.[22] The tightening of monetary policy during the bubble period does not appear to have led to better economic outcomes. Moreover, the BOJ did not reverse course sufficiently or rapidly enough in the aftermath of the crisis.[23] Research suggests that it was the slow response of monetary policy to the deterioration in the economic outlook and fall in inflation following the bursting of the bubble that contributed to the onset of deflation.[24]

4|3 The recent US experience

As highlighted in my introduction, the issues I have discussed here are especially salient because of the recent experience with house prices in the United States. It is too early to draw firm conclusions regarding all of the factors that have contributed to the rise and decline of house prices and the impact of these developments on our financial system and the macroeconomy. But the Federal Reserve and other government agencies have already begun to address some weaknesses that emerged during this period. For example, problems arose in recent years in the chain linking the origination of mortgages to their distribution to investors through structured investment products like mortgage-backed securities. Underwriting standards became increasingly compromised at origination. In retrospect, the breakdown in underwriting can be linked to the incentives that the originate-to-distribute model, as implemented in this case, created for the originators. Notably, the incentive structures often tied originator revenue to loan volume rather than to the quality of the loans being passed up the chain. This problem was exacerbated by the bubble in house prices: lenders began to ease standards as further appreciation in house prices was expected to ensure that risk was low, and investors failed to perform the research necessary to fully appreciate the risks in their investments, instead relying on further house price appreciation to prevent losses. The interaction between lenders' and investors' views and house prices illustrates the pernicious feedback loop I highlighted earlier.

These problems became apparent only in retrospect, in part, because the growth of the originate-to-distribute model for mortgages was an ongoing innovation in financial markets; as a result, neither the market nor regulators had sufficient information for evaluating the nature of the risks involved. Looking forward, efforts to improve scrutiny of the processes that originators use and the incentives they face, better information for consumers, improved performance of the credit rating agencies, and a number of other reforms that have been recommended by the President's Working Group on Financial Markets will be important in preventing a future bubble like that in the most recent experience –steps highlighted by Chairman Bernanke in remarks earlier this year.[25]

22 *Posen (2003) provides an extended discussion of the reasons why such a reading of the Japanese experience is mistaken.*
23 *For example, see Ahearne* et alii *(2002) and Posen (2003).*
24 *See Ito and Mishkin (2006). The slowness with which the imbalances in Japan's banking sector were addressed was another important factor leading to the deterioration in the economic outlook and deflation after the bubble burst.*
25 *The speech by Chairman Bernanke on April 10, 2008 provides a more detailed description of the market and regulatory failures during this period and the recommendations of the President's Working Group on Financial Markets.*

Let me conclude by reiterating the main points of the analysis here. First, not all asset price bubbles are alike. Asset price bubbles that are associated with credit booms present particular challenges, because their bursting can lead to episodes of financial instability that have damaging effects on the economy.

Second, monetary policy should not try to prick possible asset price bubbles, even when they are of the variety that can contribute to financial instability. Just as doctors take the Hippocratic oath to do no harm, central banks should recognise that trying to prick asset price bubbles using monetary policy is likely to do more harm than good. Instead, monetary policy should react to asset price bubbles by looking to the effects of asset prices on employment and inflation, then adjusting policy as required to achieve maximum sustainable employment and price stability. This monetary policy response should prove sufficient to prevent adverse macroeconomic effects of some types of asset price bubbles.

Third, because asset price bubbles can arise from market failures that lead to credit booms, regulation can help prevent feedback loops between asset price bubbles and credit provision. Our regulatory framework should be structured to address failures in information or market incentives that contribute to credit-driven bubbles. Moreover, we should aim to monitor the health of the financial system overall and ensure that our regulatory approach takes account of risks across institutions that are highly correlated and thus affect the strength of the financial system as a whole.

We have learned many lessons from past experience in the United States and in other countries, and I am confident that continued research in these areas will help us address the new tests that will undoubtedly arise as financial innovation and the evolving structure of our financial markets present new challenges.

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Regulation, valuation and systemic liquidity

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It is a commonly held view that International Financial Reporting Standards (IFRSs), adopted by the European Union in 2005 and by other jurisdictions, compounded the recent financial crisis. Application of the IAS 39 rule that governs loan-loss provisions and extends mark-to-market valuation of assets meant that when credit prices fell sharply in 2007 and assets were revalued using the new lower prices, it triggered a need for institutions to raise capital by selling assets, which pushed prices down further, causing more revaluations and more selling in a vicious circle. Mark-to-market volatility added to this unstable dynamic by keeping new buyers away. Fair value accounting rules are pro-cyclical and can contribute to the systemic disappearance of liquidity.[1] The price of assets if they were to be sold immediately fell substantially below the price of the same assets if they were to be held to maturity or for some time period beyond the crisis. This liquidity premium was no longer a fraction of a percentage point, but tens of percentage points. A number of observers have concluded that mark-to-market accounting should be suspended during a crisis. On its own, I believe this initiative would further weaken incentives for responsible lending in the good times. Nor would it solve the problem in bad times. The pro-cyclical use of market prices is not the preserve of accounting standards –it also lies at the heart of modern financial regulation.

Financial crashes are not random. They always follow booms. Offering forbearance from mark-to-market accounting or other rules during a crisis, yet using these rules at other times, such as during the preceding boom, would promote excessive lending and leverage in the good times. This asymmetry would contribute to more frequent and severe crashes. Second, crises are a time where a rumour becomes a self-fulfilling prophesy, as panic and fear spread. It is, arguably, not the time to generate a rise in uncertainty by changing accounting standards. There is room for a revision to the application of mark-to-market rules, but not a revision based on relying on the messenger's every last word in good times and shooting him in the bad times.

But the mechanisms that lead market participants to greet price declines with sell orders have not all to do with value accounting. Current prices, including spot and forward prices, play an important role in the market risk and credit risk management systems approved by financial regulators. Risk limits and sell orders are triggered in response to a rise in price volatility and/or a fall in price. The very philosophy of current banking regulation –risk sensitivity– is about incorporating market prices into the assessment and response to risk. It should be no surprise that if prices, both prices for current and future delivery, are pro-cyclical, then placing an increasing emphasis on price in the management and regulation of risk, will lead us to systemic collapse. This article examines the role of valuation and systemic liquidity and argues that an approach to how we apply mark-to-market accounting and market prices or risk that is driven more by an economic view can improve the systemic resilience of the financial system.

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1 See A. Persaud and J. Saurina (2008).

FROM BANK FINANCE TO MARKETS FINANCE

The zeitgeist of finance over the last decade was the "marketisation" of banking: the shift from bank finance to market finance.[2] Loans were originated and securitised by banks, rated by agencies and then relocated to investors. A cynic might say that a better description of what went on was regulatory arbitrage. Risks were transferred, on paper at least, from the regulated sector to the unregulated sector.[3] But it is important to recall that bank supervisors, especially in Europe, welcomed the "marketisation" of banking risk. They looked favourably on a process that appeared to distribute risks away from a small number of large and systemically important banks to a large number of investors. In the defense of regulators it should be pointed out that at the time, and not for the first or last time, financial institutions had not proved to be terribly good at managing risk on their balance sheet. In the late 1980s and early 1990s, a US based bank regulator would have had the Latin American debt crisis, the Continental Illinois collapse[4] and the Savings & Loan disaster[5] ringing in his ears, each threatening widespread dislocation if tax payers money were not liberally spent or put at risk.

The marketisation of banking required the greater use of market prices in the measurement and control of bank risks. During quiet or normal times, market-based finance appeared to offer greater liquidity, lower risk premium, and more sophisticated and nuanced risk management.[6] This was also more conducive to increased transparency and frequency of reporting which was viewed as reducing the opportunity for fraud and increasing the opportunity for market discipline to influence bank behaviour. In the minds of bank supervisors all this reinforced the view that "marketisation" was the future of banking –and the future was bright. It is tempting to forget today but the marketisation of banking was not so much a conspiracy of the gnomes of Zurich as the gnomes of Basle. It was part and parcel of the approach to banking embedded in the European Capital Requirement Directive and the new Basle accord on capital adequacy of internationally systemic banks (Basle II).

It would appear the regulators were blinded by this vision of the future. The principal reason why we regulate the banking system over and above standard corporate regulation is because markets fail. When markets failed with respect to credit risk, the pre-eminent role of market price in the measurement, reporting and control of risks, first led, as the price of risk overshot on the downside, to a redoubling of imprudent lending, and later, as the price of risk overshot on the upside, to systemic collapse. Value accounting played a role in that for sure, but the use of contemporary prices of risk was more pervasive than the accounting of losses. If accounting was based on historic costs, but we have bank regulation that incorporates current market prices as an input in risk assessments and spawns market-sensitive risk systems in the operation of banks and in their assessment of lending to others, then the pro-cyclical effects we observed would have been similar. However pleasing it might be, we cannot blame the liquidity crisis entirely on the accountants. We can blame it on a mode of thinking about financial risk that the accountants, bankers and regulators have all followed. There had been warnings before that the marketisation of risks contained a Faustian bargain: greater liquidity, lower risk premia and the appearance of sophisticated risk management in quiet times, at the expense of systemic liquidity when markets were under stress.[7] The gnomes of Basle largely brushed these warnings aside.

2 *I first heard the term, the "marketisation of finance", as well as separately the term "macroprudential" risks from one of the leading experts in this field, Claudio Borio.*
3 *Professor Charles Goodhart makes the important point that one of the problems with the originate, rate and relocate model is that many banks were too greedy to relocate the risks very far and often put them into their own bank sponsored structured investment vehicle (SIV) or hedge fund. Indeed, the collapse of Bear Sterns started with a collapse of a Bear Sterns hedge fund.*
4 *The Continental Illinois National Bank and Trust Company was at one time the seventh-largest bank in the United States as measured by deposits. In May 1984, the bank became insolvent due, in part, to bad loans purchased from the failed Penn Square Bank N.A. of Oklahoma—loans for the Oklahoma and Texas oil boom of the late 1970s and early 1980s.*
5 *The Savings and Loan crisis was the failure of 747 Savings and Loan associations (S&Ls) in the United States in the late 1980s and early 1990s. The ultimate cost of the crisis is estimated by a financial audit of the Resolution Trust Corporation set up to rescue the S&Ls, was around USD160.1 billion.*
6 *One of the problems of Basle 1 was that it did not take a nuanced view of risk, but allocated risk between crudely defined buckets and over time it was felt that banks were "gaming" these distinctions to take more risk than it appeared.*
7 *See Eatwell and Persaud (2008); Persaud (2000).*

One of the consequences of making market prices central to the management and control of risks and capital is that when markets fail and liquidity disappears, the authorities are left with no option but to intervene to set a floor in the market price of assets they would not normally purchase. The marketisation of banking has been associated with a switch in the role of the central bank from lender of last resort, to buyer of last resort.[8] This reason alone is sufficient for the Banque de France and other members of the European system of central banks to pay more attention to the macro-prudential aspects of regulation.

LIQUIDITY PROBLEMS OF THE MICRO-STRUCTURE OF NEW BANKING

The focus of banking regulation has been historically on identifying good practices at banks and making these practices a standard for others to comply with. Protagonists of Basle II oddly boast that it better aligns regulatory capital with what best banks are doing anyway. This patently does not address the social externality. Because of the liquidity transformation and the quasi money of bank deposits, banking is systemic. A focus by banks' on their private interests will lead them to an underinvestment in systemic stability. This is a glaring and damning omission from banking regulation, but it is also a well-traversed subject in the economics literature.[9] What I would like to explore further is the systemic liquidity effects of using market prices in the measurement, reporting, control and trading of risk.

To appreciate the problem it is important to understand that financial market liquidity is not about how big a market is, but how diverse it is. If a financial market has two people in it, but whenever one wants to buy an instrument the other wants to sell it, it is a very liquid market. If a market had one thousand people in it, and they are all using the best practice valuation, risk-management and accounting systems and the same prudential controls based on public credit ratings, so that when one wants to sell an instrument in response to these systems, so does everyone else, it would not be liquid. At any one time there will only be buyers or only sellers; you need both for liquidity. This market is far bigger than the two-person market, yet it is thinner in terms of systemic liquidity.

This is not an unfamiliar result in the literature on markets and systems. Any system in which market participants have the same tastes and use the same information will collapse. Try modeling any market in which the market participants behave as if they are one.

An inclusive financial system has natural diversity in it. A pensioner, a young saver putting aside savings for a distant future, an insurance company and a charitable endowment, all have different investment objectives and different capacity for risks and these should be reflected in different valuation and risk management systems. For example, an illiquid 5-year bond backed by good collateral would be a risky asset for an investor funded with overnight money, but a safe asset for an institution with no cash commitments over the following six years, like a young pension fund. The risk management, valuation and accounting system that the institutions with overnight funding should use, should also be different than the one a long-term investor should use. The trend however for the same transparency, valuation, accounting and risk management rules reduces this natural diversity and increases systemic fragility. Some of the special investment vehicles (SIVs) that were forced to sell assets in the credit crunch, adding to the turmoil, were forced to do so, not because their funding dried up, but merely because they were using the same accounting, risk and prudential rules that the banks used even though they had a different and longer-term funding structure than the bank as a whole.

One of the key lessons of the crisis is that a critical factor in systemic risks is funding liquidity. When the system freezes, those with short-term funding topple over. Those with long-term funding are the system's stabilisers. They are risk absorbers. However, by using common mark-to-market accounting, valuation and risk rules we do not make any distinctions between those with a funding liquidity issue and those without. We do not distinguish between risk traders who are short-term

8 *I was led to this idea by Professor Willem Buiter who was one of the first to write about central bankers becoming buyers of last resort.*
9 *See Persaud (2008).*

and risk absorbers who, as a result of long-term funding liquidity have a capacity for market and liquidity risks. This absence of any distinction at the regulatory and accounting level and therefore the absence of any encouragement of risk absorbers led to the disproportionate growth of risk traders.[10] This has worsened the systemic liquidity and resilience of the system.

The key problem with the originate, rate and relocate model is that risks were transferred to a varied group of investors, who may have structurally different objectives, but through common valuation, accounting and risk systems and prudential controls, they in fact behaved as one investor. We ended up with a greater spread across legal entities, but less diversity. Spreading risk from a few disparate players to a large number of players, who behave homogenously, concentrates risk.

We have highlighted the importance of diversity in financial liquidity, but heterogeneity is also about the quality of lending in a way that casts a poor light on the "originate, rate and relocate model". A good bank is one that lends to those that others do not, because of their superior knowledge of the credit. It is one that does not lend to those that others do, because of their superior knowledge on the credit. The "originate, rate and relocate" model does away with the advantage of superior proprietary, particular, knowledge in the name of common standards. Banking is done using common, public data, and on the basis of public ratings. If banks are not incentivised to know credits well, they will not invest in doing so. Elements of this can be found in problems in the subprime mortgage market.

The trend of common standards is actually championed by the banks under the guise of equal treatment. Their interest is to reduce any advantage others may have in the financial system and allow them to set up investment subsidiaries even though their capacity for long-term investment risk is low. However, if some activities are treated differently by regulators, because they have a different built-in capacity for risk, perhaps through a genuinely different funding structure, then preserving these differences would support systemic liquidity. Equality of treatment would do the opposite. Accounting, valuation, risk management and transparency standards, and the equality of treatment are all generally good, but it must be understood that in some cases there is a trade-off between search liquidity in the good times and systemic liquidity and macro financial stability in the bad times. If standards are a force for more homogeneity in the financial system then we must think again about applying them to everyone.

Liquidity implications of broadening "risk-sensitive" regulation

The crisis has been an occasion for renewed calls for the greater regulation of independent hedge funds and private equity firms. This is especially so in Europe. Our analysis so far points to three issues in consideration of the greater regulation of these institutions. First, "alternative investors" did not play a pivotal role in the crisis. The credit crunch centred on the banks and the banks own in-house investment vehicles. Second, spreading these common rules across from banks to hedge funds, private equity firms, pension and insurance firms and others while continuing to ignore the distinction between risk absorption and risk trading, will make the financial system even less safe. It is within this group of investors that some of those with long-term funding –the natural stabilisers of the financial system– reside.

Where hedge funds and more recently private equity funds contribute to worsening systemic risks is through their use of leverage. Hedge funds and investment banks in general, are far more leveraged than commercial banks.[11] When things go wrong de-leveraging has systemic and contractionary consequences. However, hedge funds do not generally generate leverage on their own. In large part they get leverage from the commercial banks. It is therefore possible to regulate the systemically important part of what these institutions do, by regulating the way commercial banks give them leverage. This would be a far more effective form of regulation of institutions that for a variety of reasons are often domiciled in offshore locations and where their principals are footloose.

10 *See Persaud (2007).*
11 *See Greenlaw, Hatzius, Kashyap and Shin (2008).*

In the 2007/8 credit crunch, one of the systemic issues was that the supply of leverage to non-banks is regulated by the commercial banks, in a homogenous manner, reflecting the way they are regulated. The common rules that turn on and off leverage from the commercial banks to hedge funds, investment banks and private equity firms and the common approach that these rules take to valuing and managing risk is a major source for a reduction in the diversity of behaviour and the increase in financial fragility. (This is also an important example of where mark-to-market risk systems, echoing those being applied on the banks, are driving the instability, rather than fair value accounting systems). Where hedge funds have been a point of stress over the past twelve months it is often as a result of weakness in a market, causing its counter-party bank, using its internal, short-term model of risk and value, to cut leverage to a fund which is then forced to off-load assets on to a weak market, causing more market weakness and more forced sales. This is not a mechanism for reducing risks but spreading risks. The regulation being proposed to extend regulation to these counter-parties of banks is about reinforcing these systemically risky processes not disrupting them.

The solution to these issues is two-fold. First, capital requirements should be counter-cyclical and this should regulate the flow of leverage to bank counter-parties. Second, regulators should resist calls for equal treatment by the banks and make a distinction between those financial institutions, whatever they are called, that have short-term funding, less than 12-24 months say, and those that have longer-term funding. Those with short-term funding would be required to follow bank capital adequacy requirements. Those with long term funding, may receive an exemption from this regime. They will be required to provide disclosures to the regulators that make the regulators comfortable that they do not have a funding liquidity risk, but they are not required to follow the capital regime. Instead they are required to follow a long-term solvency regime that takes into account long-term valuations, but through a level of disclosures about the assets and third party pricing that limits the opportunities for fraud. This would focus regulation on systemic activities and it would incentivise long-term investors to behave like long-term investors.

LIQUIDITY, RISK ABSORPTION AND PENSION FUNDS

There is an understandable instinct that wishes to shield pension funds from risk. But of course pension funds can only generate returns for their members by taking some risk. The issue therefore is not how to stop pension funds from taking risk, but how to support them taking the right risk. It is my contention that regulation is pushing pension funds to take the wrong kind of risk and exposing them to inappropriate danger. In thinking about what the right kind of risk to take is it is important to understand that there has not one kind of risk, but several and that "riskiness" has less to do with instruments and more to do with behaviour.

As we have discussed above, a "risky" instrument held by a bank may be a "safe" instrument if it is held by a pension fund. There are broadly three types of risk: market risk, credit risk and liquidity risk. The way to diversify market and liquidity risk is through time. The way to diversify credit risk is actively across different types of credit. A young pension fund has the ability to earn the market and liquidity premium, but not clearly the credit risk premia. They should therefore invest in high quality credits with poor liquidity or assets with strong long-term prospects but much short-term volatility.

What they should not do is buy highly liquid instruments and low volatility instruments with large credit premia. And yet this is the route they are chased down by accounting and regulatory standards. A pension fund required to match the duration of its assets to its liabilities, mark-to-market its assets, and earn a high yield to limit contributions is inexorably led down the path of buying liquid instruments with poor credit. In buying liquid instruments they are paying up for a liquidity that they do not need and in poor credits they are earning a risk premia they do not have a natural capacity to earn as they do not have ready access to active hedging of credit risks. The person who loses from this unnatural asset allocation, is not the consultant, actuary or manager, but the pensioner.

In a similar vein banks have been pushed towards the wrong kind of risks. A bank has short-term funding. It therefore has little capacity for liquidity

and market risks. However, it has much capacity for credit risks as it is an expert in credit origination and through its origination activity it is able to actively source and hedge across a variety of credit risks. Yet, what do banks do today? They sell their credit risk to pension funds and they fund private equity and hedge funds that are effectively taking liquidity and market risk.

Both of these examples of inappropriate risk taking –pension funds eschewing illiquid instruments and banks pursuing illiquid ones– lead to a net reduction in systemic liquidity. Pensions funds are not there to buy assets that have fallen sharply in price and banks run into trouble in stressful times when they pull lines on private equity and hedge funds that force them to sell assets.

CONCLUSIONS AND A NEW SUPERVISORY FRAMEWORK

The marketisation of banking and the pre-eminent role of market prices provides a coherent system – if you include the necessary intervention of central banks ever so often. Indeed, in the responses to the current crisis from lobby groups for bankers or committees of regulators,[12] there is little sign of an abandonment of this system. A stylised view of the system is as follows. Risks are to be marketised. This requires pricing or rating of debt and debt portfolios and market pricing in value accounting, risk management and banking regulation. This broadens the inclusiveness of finance, which helps to lower risk premia and supports "search" liquidity in quiet times. Search liquidity is the cost in terms of time and price of finding a buyer for a security most of the time when the financial waters are calm and there are no strong, systemic, currents.[13] Some assets exhibit better "search" liquidity than others. But every five to seven years, markets fail. In the crisis, through the role of price in accounting and risk management and even ratings, declines in prices feed further declines in prices. Liquidity disappears. The government is inevitably forced to underwrite risks in the financial sector for some period of time before calm breaks out, markets catch breath, and the cycle repeats itself. Some policy makers argue that the wider benefits experienced for seven years or so[14] outweighs the costs of the year of crisis. There is a legitimate trade-off to consider.

I am not convinced that the trade-off of improving "search" liquidity in quiet times in return for worsening "systemic" liquidity in stressful times is a good idea. Systemic liquidity is the cost in terms of time and price to sell assets at a time of strong systemic currents.[15] Some markets exhibit better systemic liquidity than others. Today developed country financial markets are large, but they offer poor systemic liquidity.

The full consequences of the liquidity crisis, which started in 2007, have yet to be realised as this chapter goes to press. Estimates of the first round effects of losses amount to around USD 250 billion in the middle of 2008 but are likely to climb.[16] And then there are the likely and potentially more serious second round effects. During a surprisingly lengthy period from July 2007 through to July 2008, banks lost confidence in other banks, hoarded liquidity and distanced themselves from each other. It is therefore likely that private individuals will have a lasting loss of confidence in the banking sector, which would lead to a reduced willingness to use financial instruments to save, with negative spillover effects for investment in the productive sectors.

Recall that the housing market boom in the United States and Europe was partly a result of investors eschewing mutual funds after the dotcom bezzle of 1999-2001. It is a measure of public disillusionment with financial markets when real estate agents are more trusted than fund managers. It would be reasonable to expect banks to respond to recent developments with a lower risk appetite and reduced lending which in turn would threaten levels of economic activity more generally. Forecasts of economic growth have been revised sharply lower during 2008. Initiatives to make the benefits of

12 *See, recent reports from the Financial Stability Forum (FSF), representing the views of regulators and the Institute of International Finance (IIF), representing the views of the large banks.*
13 *See Lagana, Perina, von Koppen-Mertes and Persaud (2006).*
14 *It seems more frequent to me. In the space of 20 years I recall the 1988-89 S&L crisis, the 1992-93 EMS crisis, the 1994-95 Tequila crisis, the 1997-98, Asian financial crisis, the 1998 LTCM crisis, the 2000-01, Dotcom crisis, the 2007-08 Credit Crunch.*
15 *ibid*
16 *Public loans and gifted equity capital to Northern Rock alone already amounts to USD 100 billion.*

finance more inclusive will also likely fall victim to this new conservatism. Central banks have also paid a potentially hefty cost in terms credibility.

This litany of woe above does not even include issues of moral hazard as the authorities make necessarily hasty efforts to preserve the financial system. Bad banks as well as good banks are saved by the rising tide of government guarantees. It is alleged that banks are using the opportunity of central bank offers to buy assets to offload bad assets at the central bank while hoarding good assets they would normally repo at the central bank. This is rational private behaviour, but it was not the intention of the emergency liquidity assistance.

There is also the issue of political economy. In 2008, taxpayers are underwriting risks, created by bankers who paid themselves substantial bonuses before retiring. There is resentment that these bonuses were often lightly taxed, offshore. It is understandable therefore that the political response to the credit crunch is partly fuelled by the moral outrage of voters. The clear and present danger going forward is that this, understandable, outrage leads to a regulatory response that is too distracted by the ethical failure of the private sector to deal effectively with the more systemic regulatory failure.[17] The scale of the 2007/8 credit crunch could have been avoided by central bankers and supervisors who had both sufficient information and the necessary instruments to respond, but failed to do so for a variety of reasons. These reasons included an absence of political will, a convenient intellectual entanglement with the prevailing zeitgeist of finance and a general neglect of systemic liquidity.

The current process of regulation is that we begin with the banks and regulate them for holding risk. Regulation is a tax. Like all businesses the banks try to avoid the tax by shifting risks to say, investment banks. So, we regulate the investment banks. Who in turn shift risk to pension funds and insurance companies or SIVs and hedge funds. So we plan to regulate these, but they will only shift risks to some other place. What is the logical conclusion of this game? It is that the system will be heavily regulated, but it will not hold much risk. Risk will instead have shifted and shifted until it has arrived at a spot where it can no longer be seen. This does not strike me as a good model.

We saw an element of this during the current credit crisis. Banks shifted credit risks to off-balance sheet investments where they were not very visible. Basle II correctly addresses off-balance sheet instruments by requiring banks to hold capital against contingent liabilities that may arise from these off-balance sheet instruments. But while this responds to the specific issue of off-balance sheet instruments, it does not really deal with the more general problem that the old distinctions of instruments and institutions are less relevant today. What matters is whether an activity is systemic, not whether it is called a bank or an SIV. Activities where there is a mismatch between funding liquidity and asset liquidity are likely to be systemic, but those that are not can only play a systemically stabilizing role if they are not part of the same regime.

A better model of banking regulation would be based on three pillars.

The first pillar of supervision would be about doing away with distinctions based on legal entities of banks or investors and instead, focusing on risk capacity of activities and systemic risks. In some regards this would be a broader regime –incorporating institutions, off-balance sheet and other investment vehicles not currently regulated– but also a more focused regime. Those institutions with little funding liquidity (like a traditional bank) have little capacity to hold market and liquidity risk and should follow a capital adequacy regime. In calculating risk-adjusted assets under the capital adequacy regime, short-term measures of value and risk, mark-to-market accounting and high standards of transparency would apply. This would be pro-cyclical, but this issue should be addressed explicitly by the second pillar.

Those activities with long-term funding liquidity (like a traditional pension fund or endowment fund) can be exempt from the capital adequacy regime in return for disclosures that satisfy the regulator that this is appropriate and adherence to a new "solvency regime" that allows institutions to use long term measures of valuation and risk

17 *It is argued that this was the fate of efforts in the United States in 2001-2002 to respond to the major corporate accounting scandals, which culminated in the Sarbanes Oxley Act of 2002.*

in determining and reporting their solvency. This approach will be attacked by banks for creating an unlevel playing field, but it seeks to deliberately support the natural diversity in the financial system and supports the systemically beneficial role of risk absorbers.

The second pillar of supervision should be about putting the credit cycle back at the heart of the capital adequacy regime. Capital adequacy requirements should rise and fall with the overall growth in bank assets, not least because measurement of the value and risk of these assets are pro-cyclical. Contra-cyclical mechanisms face tough political resistance and they should be supported with clear rules.[18] They should be formulated closely with the monetary authorities.

The third pillar of supervision is about investor protection. Issues of transparency and disclosure are really about investor protection not liquidity and this means re-emphasizing the depth of disclosure relative to its frequency. Institutions that take in depositors' money should also be required to have some minimum, transparent level of deposit insurance, which is provided privately, in large part. This may serve to reduce the moral hazard of deposit insurance.

These three ideas should form the basis of efforts to reform current banking regulation. This crisis like almost all crises before was associated with embezzlement and fraud, especially in the brokerage of mortgages in the United States and perhaps also in the selling of securities, but even if there were no fraud, the crisis would still have happened. It was an inevitable consequence of modern finance, its regulation and the sad neglect of systemic liquidity by regulators. While there is a limit to what we can do about the ethical standards of bankers, I hope I have shown that there is much we can do to facilitate or destroy systemic liquidity.

18 *See Goodhart and Persaud (2008).*

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Fair value accounting and financial stability

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Market prices give timely signals that can aid decision making. However, in the presence of distorted incentives and illiquid markets, there are other less benign effects that inject artificial volatility to prices that distorts real decisions. In a world of marking-to-market, asset price changes show up immediately on the balance sheets of financial intermediaries and elicit responses from them. Banks and other intermediaries have always responded to changes in economic environment, but marking-to-market sharpens and synchronises their responses, adding impetus to the feedback effects in financial markets.

For junior assets trading in liquid markets (such as traded stocks), marking-to-market is superior to historical cost in terms of the trade-offs. But for senior, long-lived and illiquid assets and liabilities (such as bank loans and insurance liabilities), the harm caused by distortions can outweigh the benefits. We review the competing effects and weigh the arguments.

Accounting is sometimes seen just as a veil leaving the economic fundamentals unaffected. Indeed, in the context of completely frictionless markets, where assets trade in fully liquid markets and there are no problems of perverse incentives, accounting would be irrelevant since reliable market prices would be readily available to all. Just as accounting is irrelevant in such a world, so would any talk of establishing and enforcing accounting standards. To state the proposition the other way round, accounting is relevant only because we live in an *imperfect* world, where markets are not always fully liquid and incentives may be distorted. In such an imperfect world, transaction prices may not be readily available. Even those prices that are available may not correspond to the hypothetical market prices that would prevail in frictionless perfect markets. Therefore, when we debate issues regarding accounting, it is important to be clear on the nature and consequences of the imperfections.

Equally important in any debate in accounting is to be clear on the ultimate objectives of the accounting regime. What is the purpose of accounting standards? Whom should they serve? Should they serve the interests of equity investors? Should they serve the interests of a wider class of investors? Or, should we look beyond investors *per se* to the wider public interest, as for any other public policy issue?

Of course, in practice we may expect wide overlaps between the interests of equity investors, creditors and the wider public interest. However, the distinctions are important in principle, especially where the issues are complex and where our intuitions meet an unfamiliar landscape. In a recent paper,[1] we have provided a formal modeling framework to assess the various issues at stake in the move toward a "fair value" or "mark-to-market" reporting system in which market prices are employed in valuations as much as possible.[2] The purpose of this contribution to the *Financial Stability Review* of the Banque de France is to place our earlier paper in the wider context of the debate on financial stability, and to provide a review of the arguments for and against fair value accounting in this context.

Proponents of marking-to-market argue that the market value of an asset or liability is more relevant than the historical cost at which it was purchased or incurred because the market value reflects the amount at which that asset or liability could be bought or sold in a current transaction between willing parties. A measurement system that reflects the transactions prices would therefore lead to better insights into the risk profile of firms currently in place so that investors could exercise better market discipline and corrective action on firm's decisions.

The accounting scandals of recent years have further strengthened the hands of the proponents of fair value accounting. By shining a bright light into dark corners of a firm's accounts, fair value accounting precludes the dubious practices of managers in hiding the consequences of their actions from the eyes of outside observers. Good corporate governance and fair value accounting are seen as two sides of the same coin.

The US Savings and Loan crisis is a case often cited in this context (see, for instance, Michael –2004). The crisis stemmed in part from the fact that the (variable) interest rates on the S&Ls' deposit liabilities rose above the (fixed) rates earned on their mortgage assets. Traditional historical cost accounting masked the problem by allowing it only to show up gradually through negative annual net interest income. The insolvency of many S&Ls became clear eventually, but a fair value approach would arguably have highlighted the problem much earlier, and have allowed the resolution of the problem at lower fiscal cost. Similarly, the protracted problems faced by the Japanese banking system in the 1990s are also cited as a case where slow recognition of losses on the banks' balance sheet exacerbated the problems.

A pre-condition for the application of fair value accounting is that market values are available for the assets or liabilities in question. However, for many important classes of assets or liabilities, the prices at which transactions take place do not match up well to the ideal of the hypothetical frictionless competitive market. Loans are a good example. Loans are not standardised, and do not trade in deep and liquid markets. Instead, they are typical of many types of assets that trade primarily through the over-the-counter (OTC) market, where prices are determined *via* bilateral bargaining and matching. Loans are also packaged and tranched into asset backed securities such as collateralised debt obligations (CDOs). However, such transactions also

1 *See Plantin, Sapra and Shin (2008).*
2 *A (small) selection of literature debating the issue includes Volcker (2001), Herz (2003), Hansen (2004), European Central Bank (2004). See also industry studies, such as the joint international working group of banking associations (JWGBA, 1999), and the Geneva Association (2004).*

take place in OTC markets. Thus, finding the "fair value" of a loan or securitised asset is an exercise in finding the hypothetical price that would prevail were frictionless markets to exist for such assets. Hypothetical prices can be inferred from discount rates implied by transactions prices of related securities, but OTC markets do not conform to the ideal of deep and liquid markets of the frictionless economy. OTC markets are often illiquid, displaying time varying risk premia that depend sensitively on supply shocks. They exhibit low "resiliency" in the sense that transactions prices jump after large supply shocks, with prices recovering only slowly after the shock, consistent with slow absorption of the new supply by investors and intermediaries.

The key to the debate is whether fair value accounting injects excessive volatility into transactions prices –*i.e.* whether marking-to-market leads to the emergence of an additional, endogenous source of volatility that is purely a consequence of the accounting norm, rather than something that reflects the underlying fundamentals. Real decisions would then distorted due to the measurement regime.

1| Lessons from the Millennium Bridge

A good way to highlight the relevant questions is to take an example from outside the world of finance, by drawing on the lessons from the Millennium Bridge in London. Some readers may wonder why a bridge is relevant for accounting policy, but the case of the Millennium Bridge offers a classic case study of exactly the sort of market failure that is at debate in accounting policy.[3]

Many readers will be familiar with the Millennium Bridge in London. As the name suggests, the bridge was part of the Millennium celebrations in the year 2000. It is a pedestrian bridge that used an innovative "lateral suspension" design, built without the tall supporting columns that are more familiar with other suspension bridges. The vision was of a "blade of light" across the Thames. The bridge was opened by the Queen on a sunny day in June 2000, and the press was there in force. Many thousands of people turned up to savour the occasion. However, within moments of the bridge's opening, it began to shake violently. The shaking was so severe that many pedestrians clung on to the side-rails. The BBC's news website has some interesting video news clips. The bridge was closed soon after its opening and was to remain closed for over 18 months.

When engineers used shaking machines to send vibrations through the bridge, they found that horizontal shaking at 1 hertz (that is, at one cycle per second) set off the wobble seen on the opening day. This was an important clue, since normal walking pace is around two strides per second, which means that we are on our left foot every second and on our right foot every second. And because our legs are slightly apart, our body sways from side to side when we walk. Readers who have ever been on a rope bridge will need no convincing from us on this score.

But why should this be a problem? We all know that soldiers should break step before they cross a bridge. The pedestrians on the bridge were not soldiers. In any case, for thousands of pedestrians walking at random, one person's sway to the left should be cancelled out by another's sway to the right. If anything, the principle of diversification suggests that having many people on the bridge is the best way of cancelling out the sideways forces on the bridge.

Or, to put it another way, what is the probability that a thousand people walking at random will end up walking exactly in step, and remain in lock-step thereafter? It is tempting to say "close to zero". After all, if each person's step is an independent event, then the probability of everyone walking in step would be the product of many small numbers –giving us a probability close to zero.

However, we have to take into account the way that people react to their environment. Pedestrians on the bridge react to how the bridge is moving. When the bridge moves from under your feet, it is a natural reaction to adjust your stance to regain balance. But here is the catch. When the bridge moves, everyone adjusts his or her stance *at the same time*. This synchronised movement pushes the bridge that the people are standing on, and makes the bridge move even more. This, in turn, makes the people adjust their stance more drastically, and so on. In other words, the wobble of the bridge feeds on itself. When the bridge wobbles, everyone adjusts his

3 *We draw on the discussion in Danielsson and Shin (2003), who used the Millennium Bridge analogy to discuss a wider range of issues in financial stability.*

or her stance, which makes the wobble even worse. So, the wobble will continue and get stronger even though the initial shock (say, a small gust of wind) has long passed.

What does all this have to do with accounting standards and financial markets? Financial markets are the supreme example of an environment where individuals react to what's happening around them, and where individuals' actions affect the outcomes themselves. The pedestrians on the Millennium Bridge are rather like modern banks that react to price changes, and the movements in the bridge itself are rather like price changes in the market. So, under the right conditions, price changes will elicit reactions from the banks, which move prices, which elicit further reactions, and so on.

Financial development has meant that banks and other financial institutions are now at the cutting edge of price-sensitive incentive schemes and price-sensitive risk-management systems. Mark-to-market accounting ensures that any price change shows up immediately on the balance sheet. So, when the bridge moves, banks adjust their stance more than they used to, and marking-to-market ensures that they all do so at the same time.

The Millennium Bridge example points to the importance of the dual role of prices. Not only are they a reflection of the underlying economic fundamentals, they are also an imperative to action. Prices induce actions on the part of the economic agents, as well as mirror the actions of the economic agents.

It is important here to distinguish volatility of prices that merely reflect the volatility of the underlying fundamentals from volatility that cannot be justified by these fundamentals. If the fundamentals themselves are volatile, then market prices will merely reflect the underlying reality. However, the "artificial" nature of the volatility refers to something more pernicious. When the decision horizon of market participants is shortened due to short-term incentives, binding constraints or other market imperfections, then short term price fluctuations affect the interests of these market participants, and hence will influence their actions. There is then the possibility of a feedback loop where anticipation of short-term price movements will induce market participants to act in such as a way as to amplify these price movements. When such feedback effects are strong, then banks' decisions are based on the second-guessing of others' decisions rather than on the basis of perceived fundamentals. In this sense, there is the danger of the emergence of an additional, endogenous source of volatility that is purely a consequence of the accounting norm, rather than something that reflects the underlying fundamentals. Understanding the nature and severity of such effects is the key to appreciating the nature of the controversy surrounding the fair value reporting standards.

2| HISTORICAL COST *VERSUS* MARKING-TO-MARKET

Plantin, Sapra and Shin (2008) develop a parsimonious model that compares the economic effects of the historical cost and mark-to-market measurement regimes. The fundamental trade-off can be described as follows. The historical cost regime relies on past transaction prices, and so accounting values are insensitive to more recent price signals. This lack of sensitivity to price signals induces inefficient decisions because the measurement regime does not reflect the most recent fundamental value of the assets.

Marking-to-market overcomes this price distortion by extracting the information conveyed by market prices, but in doing so, it also *distorts* this information. The choice is between relying on obsolete information or the distorted version of current information. The ideal of having an undistorted, true picture of the fundamentals is unattainable.

Under the historical cost regime, shortsighted firms find it optimal to sell assets that have recently appreciated in value, since booking them at historical cost understates their worth. Despite a possible discount in the secondary market, the inertia in accounting values gives these short horizon firms the incentives to sell. Thus, when asset values have appreciated, the historical cost regime leads to inefficient sales.

A remedy to the inefficiency in the historical cost regime would be to shift to a mark-to-market regime where asset values are recorded at their current transaction prices. This is only an imperfect solution, however. When markets are only imperfectly liquid in the sense that sales or purchases affect the short term price dynamics, the illiquidity of the secondary market causes another type of inefficiency. A bad outcome for the asset will depress fundamental values somewhat, but the more pernicious effect comes from the negative externalities generated by other firms selling. Under a mark-to-market regime, the value of my assets depends on the prices at which *others* have managed to sell their assets. When others sell, observed transaction prices are depressed more than is justified by the fundamentals, and exerts a negative effect on all others, but especially on those who have chosen to hold on to the asset. Anticipating this negative outcome, a short-horizon bank will be tempted to preempt the fall in price by selling the asset itself. However, such preemptive action will merely serve to amplify the price fall. In this way, the mark-to-market regime generates endogenous volatility of prices that impedes the resource allocation role of prices.

In general, marking-to-market tends to amplify the movements in asset prices relative to their fundamental values, while the historical cost regime injects excessive conservatism. The mark-to-market regime leads to inefficient sales in bad times, but the historical cost regime turns out to be particularly inefficient in good times. The seniority of the asset's payoff (which determines the concavity of the payoff function) and the skewness of the distribution of the future cash flows have an important impact on the choice of the optimal regime.

These effects lead to clear economic trade-offs between the two measurement regimes. In particular, the model of Plantin, Sapra and Shin (2008) generates the following three main implications:

• For sufficiently short-lived assets, marking-to-market induces lower inefficiencies than historical cost accounting. The converse is true for sufficiently long-lived assets.

• For sufficiently liquid assets, marking-to-market induces lower inefficiencies than historical cost accounting. The converse is true for sufficiently illiquid assets.

• For sufficiently junior assets, marking-to-market induces lower inefficiencies than historical cost accounting. The converse is true for sufficiently senior assets.

These results shed some light on the political economy of accounting policy. The opposition to marking-to-market has been led by the banking and insurance industries, while the equity investors have been the most enthusiastic proponents for marking-to-market. For banks and insurance companies, a large proportion of their balance sheet consists precisely of items that are of long duration, senior, and illiquid. For banks, these items appear on the asset side of their balance sheets. Loans, typically, are senior, long-term, and very illiquid. For insurance companies, the focus is on the liabilities side of their balance sheet. Insurance liabilities are long-term, illiquid and have limited upside from the point of view of the insurance company. In contrast, equity is a class of assets that are junior, and (in the case of marketed equity) traded in liquid stock markets. For investors in such assets, marking-to-market tends to be superior. This observation helps to explain why equity investors have been the most enthusiastic supporters of marking-to-market.

The model also highlights the interplay between liquidity and the measurement regime. As the liquidity of the asset dries up, marking-to-market becomes significantly more inefficient than the historical cost regime because strategic concerns overwhelm fundamental analysis. Strategic concerns create procyclical trades that destabilise prices in the mark-to-market regime while strategic concerns result in countercyclical trades that reduce fundamental volatility in the historical cost regime.

3| AMPLIFICATION "ON THE WAY UP"

So far, we have focused on inefficient sales and distortions that occur during periods of market distress. However, it would be important to keep in mind that crises are invariably preceded by a period of excess in the financial markets. Although the clamor for the suspension of marking-to-market is most vocal during periods of market distress, it should be borne in mind that most of the excesses that are being unwound during crises were built up

during the preceding boom period. In short, it is important to identify the distortions "on the way up", as well as the distortions "on the way down".

Financial institutions manage their balance sheets actively in response to price changes and to changes in measured risk. Since market-wide events are felt simultaneously by all market participants, the reactions to such events are synchronised. If such synchronised reactions lead to rises in asset prices and subdued readings on measured risk, there is the potential for a further round of synchronised reactions. Financial intermediaries –the broker dealers and commercial banks– have balance sheets that are leveraged and hence whose net worth is most sensitive to price changes and shifts in measured risk.

Adrian and Shin (2007) show that financial intermediaries react in a very different way as compared to households to shifts in prices and risk. Households tend not to adjust their balance sheets drastically to changes in asset prices. In aggregate flow of funds data for the household sector in the United States, leverage falls when total assets rise. In other words, for households, the change in leverage and change in balance sheet size are negatively related. However, for security dealers and brokers (including the major investment banks), there is a *positive* relationship between changes in leverage and changes in balance sheet size. Far from being passive, financial intermediaries adjust their balance sheets actively and do so in such a way that leverage is high during booms and low during busts. Leverage is procyclical in this sense.

The accounting regime affects the degree to which such procyclical actions led to amplification of the financial cycle. When balance sheets are marked-to-market continuously, changes in asset values show up immediately as increases in the marked-to-market equity of the financial institution, and elicit responses from them. Consider the following simple example, taken from Adrian and Shin (2008). A financial intermediary manages its balance sheet actively to as to maintain a constant leverage ratio of 10. Suppose the initial balance sheet is as follows. The financial intermediary holds 100 worth of assets (securities, for simplicity) and has funded this holding with debt worth 90.

Assets		Liabilities	
Securities	100	Equity	10
		Debt	90

Assume that the price of debt is approximately constant for small changes in total assets. Suppose the price of securities increases by 1% to 101.

Assets		Liabilities	
Securities	101	Equity	11
		Debt	90

Leverage then falls to 101/11 = 9.18. If the bank targets leverage of 10, then it must take on additional debt worth 9, and with the proceeds purchases securities worth 9. Thus, an increase in the price of the security of 1 leads to an increased holding worth 9. The demand curve is upward-sloping. After the purchase, leverage is back up to 10.

Assets		Liabilities	
Securities	110	Equity	11
		Debt	99

The mechanism works in reverse, on the way down. Suppose there is shock to the securities price so that the value of security holdings falls to 109. On the liabilities side, it is equity that bears the burden of adjustment, since the value of debt stays approximately constant.

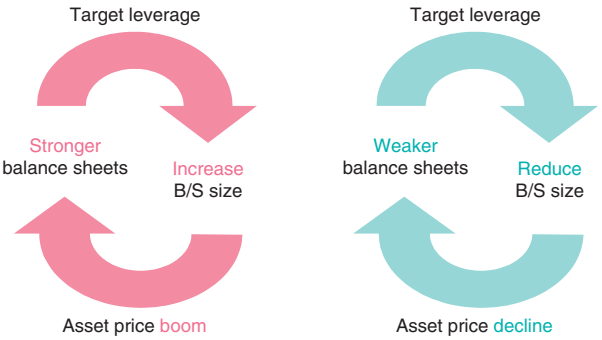
Assets		Liabilities	
Securities	109	Equity	10
		Debt	99

Leverage is now too high (109/10 = 10.9). The bank can adjust down its leverage by selling securities worth 9, and paying down 9 worth of debt. Thus, a fall in the price of securities of leads to sales of securities. The supply curve is downward-sloping. The new balance sheet then looks as follows.

Assets		Liabilities	
Securities	100	Equity	10
		Debt	90

The balance sheet is now back to where it started before the price changes. Leverage is back down to the target level of 10. Leverage targeting entails upward-sloping demands and downward-sloping supplies. The perverse nature of the demand and supply curves are even stronger when the leverage of the financial intermediary is pro-cyclical –that is,

when leverage is high during booms and low during busts. When the securities price goes up, the upward adjustment of leverage entails purchases of securities that are even larger than that for the case of constant leverage. If, in addition, there is the possibility of feedback, then the adjustment of leverage and price changes will reinforce each other in an amplification of the financial cycle.



If we hypothesise that greater demand for the asset tends to put upward pressure on its price, then there is the potential for a feedback effect in which stronger balance sheets (B/S) feed greater demand for the asset, which in turn raises the asset's price and lead to stronger balance sheets. The mechanism works exactly in reverse in downturns. If we hypothesise that greater supply of the asset tends to put downward pressure on its price, then there is the potential for a feedback effect in which weaker balance sheets lead to greater sales of the asset, which depresses the asset's price and lead to even weaker balance sheets.

Bearing in mind the amplification mechanism sketched above, consider the following passage from a commentary published in the *Wall Street Journal* in 2005.[4]

"While many believe that irresponsible borrowing is creating a bubble in housing, this is not necessarily true. At the end of 2004, US households owned USD 17.2 trillion in housing assets, an increase of 18.1% (or USD 2.6 trillion) from the third quarter of 2003. Over the same five quarters, mortgage debt (including home equity lines) rose USD 1.1 trillion to USD 7.5 trillion. The result: a USD 1.5 trillion increase in net housing equity over the past 15 months."

The author minimises the dangers from the USD 1.1 trillion increase in debt by appealing to the marked-to-market value of housing equity. The argument is that when the whole US housing stock is valued at the current marginal transactions price, the increased marked-to-market equity is USD 1.5 trillion. This increased housing equity is seen as an argument against the view that increased debt is leading to an overheating housing market.

If the purpose of the exercise is to assess the soundness of the aggregate household sector balance sheet, then the marked-to-market value of the total US housing stock (assessed at the current marginal transaction price) may not be a good indicator of the soundness of the aggregate balance sheet. Instead, it would be better to ask how much value can be realised if a substantial proportion of the housing stock were to be put up for sale. The value realised in such a sale would be much smaller than the current marked-to-market value. This is one instance in which marking-to-market gives a misleading indicator of the aggregate position.

There is a larger issue. For leveraged financial institutions, the increased marked-to-market equity that results from a boom in asset prices leads to a feedback effect as they attempt to expand lending in order to keep leverage high enough to sustain an acceptable return on equity. The reasoning captured in the *Wall Street Journal* commentary above would be innocuous if financial intermediaries did not react to changes in their marked-to-market equity. However, the fact is that financial intermediaries *do* react to market prices. It is this reaction, and the subsequent feedback effect that leads to the excesses on the way up. Understanding the Millennium Bridge analogy is therefore crucial for understanding the role of measurement systems in promoting financial stability.

4| POLICY OPTIONS

The choice of an accounting measurement regime for financial institutions is one of the most contentious policy issues facing financial regulators and accounting standard setters at the moment.

4 *"Mr. Greenspan's cappuccino", Commentary by Brian S. Wesbury,* Wall Street Journal, *May 31, 2005. The title makes reference to Alan Greenspan's comments on the "froth" in the US housing market.*

Measurement policies affect firms' actions, and these actions, in turn, affect prices. We have compared a measurement regime based on past prices (historical cost) with a regime based upon current prices (mark-to-market). The historical cost regime is inefficient because it ignores price signals. However, in trying to extract the informational content of current prices, the mark-to-market regime distorts this content by adding an extra, non-fundamental component to price fluctuations. As a result, the choice between these measurement regimes boils down to a dilemma between ignoring price signals, or relying on their degraded versions.

Even under the historical cost regime, the accounting measurement for a long-lived asset is based on a historical cost with an impairment measurement regime. Namely, if the fair value of a long-lived asset is below its recorded cost, it is written down toward its fair value. Under a historical cost with impairment regime, our reasoning would predict that the inefficiencies of such a regime would depend on the nature of the impairment of the asset. This is because the nature of the impairment determines how the fair value of the long-lived impaired asset is computed. In particular, suppose the impairment of a loan is due to increased market risk so that the fair value of the long-lived loan is derived using stochastic discount rates obtained from recent transactions of comparable loans. In such a scenario, our reasoning would predict that such a measurement regime would be plagued with the same inefficiencies in the left tail of fundamentals as the inefficiencies in the left tail of fundamentals in a mark-to-market regime. Given that the inefficiencies in the right hand tail of fundamentals would still persist, our model would then imply that a historical cost with impairment regime would be unambiguously worse than a mark-to-market regime. On the other hand, suppose impairment of the loan is due to the deterioration of the credit risk of a specific borrower so that the fair value of such a loan would be derived using a discount rate specific to the borrower rather than relying on discount rates of other similar transactions. In such a scenario, our model would imply that the strategic effect associated with the lower tail of fundamentals in the mark-to-market regime may be weaker or may not even arise at all. Given that the inefficiencies in the right hand tail of fundamentals would still persist, our reasoning would predict that the inefficiencies in a historical cost with impairment would then be qualitatively similar to the inefficiencies in a historical cost regime without impairment.

So far, we have only discussed a "pure" historical cost regime, in which the price of an asset or liability is kept constant over time. Our analysis has emphasised the respective weaknesses of pure historical cost and mark-to-market regimes. However, it opens the door to a more general analysis of the normative implications for the design of an optimal standard. For instance, a measurement regime in which the accounting value of an asset is the average over some interval of time would allow market prices to fully exert themselves over the medium term, but prevent the short-run dynamics that lead to distorted decisions. A measurement regime for illiquid assets that discount future cash flows with discount factors that are an average of past observed discount factors may have desirable properties. In doing so, managers would be confident that fire sales by other firms would have a limited impact on the end-of-period valuation of their assets. This procedure may remove to a large extent the risk of self-fulfilling liquidity shocks that we have emphasised, while also mitigating the absence of price signals in a historical cost regime.

From a system stability perspective, inducing actions that dampen financial cycles are to be desired. Although historical cost accounting has the limitation that recent prices are not taken into account, it does have the virtue that it induces actions that dampen the financial cycle. When the market price of an asset rises above the historical cost of the asset, the manager of the firm has the incentive to sell the asset, in order to realise the capital gain. In other words, when the price *rises*, the incentive is to *sell*. Contrast this with the amplifying response of a market-to-market regime. As we saw above, when balance sheets are marked-to-market, an increase in the price of assets leads to purchases of the asset. In other words, when the price *rises*, the incentive is to *buy more*. It is this amplifying response of marking-to-market that is at the heart of the debate.

Our discussion suggests that the full implementation of a mark-to-market regime may need considerable investigation and care. We would emphasise the importance of the second-best perspective in accounting debates. When there are multiple imperfections in the world, removing a (strict) subset of them need not always improve welfare.

We close with some remarks on governance issues. The accounting standard setters –the International Accounting Standards Board (IASB) and the

US Financial Accounting Standards Board (FASB)– do not see it as part of their remit to consider the overall economic impact of accounting standards. Instead, they see their role in much narrower terms, of ensuring that accounting values reflect current terms of trade between willing parties. However, we have seen that accounting standards have far-reaching consequences for the working of financial markets, and for the amplification of financial cycles. To the extent that accounting standards have such far-reaching impact, the constituency that is affected by the accounting standard setters may be much broader than the constituency that the accounting standard setters have in mind when setting standards. This raises an obvious question. Is accounting too important to be left solely to the accountants? It is difficult to escape the conclusion that the answer to this important question is "yes". Accounting has all the attributes of an area of public policy, intimately linked to financial regulation and the conduct of macroeconomic policy. As such, there may be strong arguments for ensuring that accounting rules play their role in the overall public policy response.

Our paper has attempted to shed light on how the second-best perspective can be brought to bear on the debate on optimal accounting standards, and to provide a framework of analysis that can weigh up the arguments on both sides. Issues of measurement have a far-reaching influence on the behaviour of financial institutions, and determine to a large extent the efficiency of the price mechanism in guiding real decisions.

Accounting would be irrelevant in a perfect world. The fact that accounting is so controversial shows us that we live in an imperfect world. Our task has been to show how the nature of those imperfections speaks to the appropriate policy responses.

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Procyclicality of financial systems: is there a need to modify current accounting and regulatory rules?

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Financial systems have an intrinsic tendency to exacerbate business cycle fluctuations rather than smoothing them out. The current crisis is a perfect illustration of this. Some commentators have argued that the recent reforms to international bank regulation (Basel II) and accounting rules (IAS 39) are likely to increase this intrinsic procyclicality in the future. This article examines whether this accusation is founded and what policy decisions could be envisaged to alleviate this undesirable feature of financial systems.

THE INTRINSIC PROCYCLICALITY OF FINANCIAL SYSTEMS

The subprime crisis is a perfect illustration of the "procyclicality" of financial systems. Relatively small losses[1] on US credit markets in the early summer 2007 have precipitated a major, world-wide confidence crisis in the banking and financial sectors, thereby reducing dramatically the capacity of these sectors to provide financing to households and firms, by far the most important function of financial systems. This phenomenon is by no means specific to the current crisis. Financial history[2] abounds with examples of such financial cycles, with an alternation of credit booms fuelled by "exuberant" optimism during growth phases, followed by dramatic episodes of credit "crunches" triggered by relatively moderate negative shocks but ultimately generating major downturns in economic activity.

In an hypothetical world of perfect (*i.e.* complete and frictionless) financial markets, this should not be the case. On the contrary, financial instruments should in theory be available to insure the real shocks faced by households and firms. For example all the risks confronted by individual economic agents (risks that economists call "idiosyncratic") should be eliminated by diversification. Similarly, macroeconomic shocks should be dampened by financial systems, through an efficient reallocation of risks among economic agents and a better diversification across countries and generations.

In practice however, financial markets are inevitably imperfect.[3] First of all they cannot be complete: many of the individual risks confronted by households and firms are not insurable, because of informational problems that are susceptible of provoking moral hazard and adverse selection. Similarly inter-temporal transfer of risks is necessarily limited by the unavailability (or at best illiquidity) of financial instruments with long maturities. Second, financial markets cannot either be considered as frictionless: direct and indirect transaction costs are not negligible, especially on primary markets. A good illustration of these frictions is the difficulty typically confronted by a financially distressed firm when it wants to issue new securities. In fact, it is often the case that liquidity problems encountered by a firm, even if it is profitable and solvent, degenerate into fundamental difficulties such as credit rationing and sometimes inefficient closure.

These imperfections of financial markets can be alleviated by two mechanisms: financial intermediation and public policy. The modern role of financial intermediaries[4] such as banks and insurance companies is indeed to decrease the transaction costs associated with complex financial instruments and provide indirect access to these instruments for firms (mostly small and medium enterprises) and households. The larger firms, which typically use direct finance, also benefit from financial intermediaries, since these financial intermediaries contribute to improving the functioning of financial markets. In particular they provide certification services for primary markets and increase the liquidity of secondary markets by taking large trading positions that contribute to the elimination of arbitrage opportunities.

Public policy also plays an important role in the reduction of economic and financial fluctuations. Given their unique ability to pledge the income of future generations (through taxation), governments can adopt anti-cyclical fiscal and budgetary policies that might contribute to dampen economic fluctuations. Monetary policy can be also used as a stabilizer: in some countries such as the United States, the mandate of the central bank includes, together with the standard objective of price stability, that of maintaining maximum sustainable employment.[5] Finally, public authorities are supposed to maintain the safety and soundness of the financial systems, through appropriate prudential regulation and supervision of financial intermediaries. But these regulatory/supervisory systems may themselves generate procyclicality. This is the topic we examine in the next section.

1 *See Brunnermeier (2008).*
2 *See Kindleberger (2000).*
3 *We only consider here the two major forms of imperfections, namely incompleteness and the presence of transaction costs. We do not discuss here another form of financial markets imperfection, coming from the fact that the market value of financial assets may sometimes differ substantially from their "fundamental" value (even though this fundamental value is often very difficult to define objectively), creating "bubbles" (when the market value exceeds the fundamental value) or underpricing (in the reverse situation). These divergences create an important drawback in the use of market value accounting for financial institutions. Mishkin (2008) discusses the implications of bubbles for monetary policy.*
4 *The traditional role of banks was to transform the savings of households (mostly in the form of demandable deposits) into corporate and real estate loans. The development of financial markets and techniques (notably securitisation) has largely made this business model obsolete.*
5 *See Mishkin (2008).*

IS PRUDENTIAL REGULATION AN ADDITIONAL SOURCE OF PROCYCLICALITY?

The prudential regulation of banks has two main objectives: protect the deposits of the public and guarantee the stability of the financial system. Since the 1980s, the international harmonisation of prudential systems has been a constant preoccupation of the public authorities of developed countries. In this spirit, the Basel Committee on Banking Supervision (BCBS) has successively produced two sets of regulatory standards (1988, 2004), nicknamed Basel I and Basel II, that were initially intended to apply to internationally active banks of G10 countries. In several regions of the world, these standards have also been adopted by domestic regulators, albeit with some adjustments.

The main component of these standards is a minimum capital requirement: roughly speaking, the ratio of a commercial bank's own funds over a weighted sum of its assets (risk-weighted assets or RWA) should be at least 8%. Effectively, this requirement limits the maximum volume of risky assets that a commercial bank can manage (including in particular the volume of loans it can grant) to a certain multiple (the inverse of the minimum capital ratio, namely 12.5) of its equity capital. The main difference between Basel I and Basel II resides in the weights used for the computation of RWA.

The official justification for such capital requirements is that they provide a buffer against losses that limits the probability of failure of the bank over a certain horizon to some predetermined threshold: this is the value-at-risk (VaR) approach to solvency regulations. Without commenting in detail about the arbitrariness of this criterion of a maximal probability of failure for banks, as well as recalling the major drawbacks of the VaR criterion,[6] it seems reasonable to consider instead that the objective of these capital requirements is rather to preserve banks' incentives to select carefully their assets and to monitor their borrowers, very much in the same way that banks themselves impose a maximum borrowing capacity to their corporate borrowers.

In any case, capital requirements are intrinsically procyclical: banks incur more credit losses during recessions than during booms, which negatively impacts their own funds (the numerator of the capital ratio decreases) and therefore their maximum lending capacities also decreases. Thus Basel I was already potentially procyclical: in effect it was indeed accused of provoking a credit crunch in the early 1990s. But of course Basel II is likely to be much more procyclical, since RWA, the denominator of the capital ratio, will increase during downturns, simultaneously to the decrease in the numerator already mentioned. As explained by Taylor and Goodhart (2004), this is due to the fact that Basel II risk weights incorporate different measures of credit risk (such as the probability of default, PD and the loss given default, LGD) that increase during recessions. Thus the capital required for a given volume of loans is likely to increase during recessions. Several empirical studies validate this presumption. For example Kashyap and Stein (2003) find that three different methods proposed by the BCBS to compute credit risk weights (Standard and Poor's credit ratings, Moody's KMV model and a major international bank's internal credit risk model) all lead to significant increases in capital requirements. However, the precise way in which capital charges are computed also plays a big role. For example Saurina and Trucharte (2006) show that the method used to compute the PD: instantaneously (point in time), *versus* dynamically (through the cycle) has a dramatic impact on the procyclicality of the capital ratio. A dynamic computation method smooths out capital requirements, at the cost of reducing the informational content of capital ratios.[7] The same is true for the computation of provisions for credit losses.[8]

However, most banks hold actually much more capital than the regulatory minimum. This discrepancy between "economic" capital and regulatory capital is due to the fact that banks are also subject to market discipline: shareholders, financial analysts and rating agencies typically require higher capital buffers than regulators. Besides, bank managers often adopt a sound, prospective approach: they hold capital in

6 *Alfred Galichon (2008, personal communication) has found a devastating critique: any portfolio of risks can be sliced in a conveniently designed family of sub-portfolios in such way that the total VaR (at some predetermined confidence level) is exactly zero!*
7 *See Gordy and Howells (2004).*
8 *See Bikker and Metzemakers (2002).*

excess of regulatory minimums, in order to cover losses due to predictable economic downturns. In other words, additional capital buffers should allow banks to maintain a reasonable volume of lending activities even during recessions. This is the point of view defended by Jaime Caruana, the former Chairman of the BCBS: "When banking systems are adequately capitalised, well-managed and risks are correctly assessed within the appropriate time horizon, the financial system becomes more stable, less procyclical, better able to promote sustainable growth, and more resilient during periods of stress".[9]

Thus, even though there is indeed some procyclicality in the minimum capital ratio imposed to banks by Basel II, it is not clear that it will impact dramatically the volume of credit to the economy, given that banks can potentially smooth out the fluctuations of the regulatory ratio through their economic capital buffer. Moreover, Basel II accords also include two other "pillars": regulatory action and market discipline. The former (pillar 2) can mitigate the procyclical effects of the capital ratio (pillar 1) if regulators can impose additional capital charges to the banks that would hold insufficient economic capital. The latter (pillar 3) may have more ambiguous effects, given that more transparency is often synonymous of more volatility. This is also the case for IAS 39, the new International Accounting Standard that imposes market value accounting for financial derivatives and for the assets that are part of the banks' trading books. Many commentators have pointed out the risks of market value accounting especially during periods of crisis. For example Plantin, Sapra and Shin (2008) show that when assets sales by financial intermediaries are forced by binding liquidity or leverage constraints, the changes in the market price of these assets do not reflect any new information about fundamentals, but rather the variations in the aggregate liquidity of the financial firms that are susceptible of purchasing these assets: this is what Allen and Carletti (2008) call "liquidity pricing". In this context, fair value accounting performs badly, especially if assets are long-lived, illiquid and senior, which are precisely the characteristics of the majority of banks' assets.

Even though Basel II and IAS 39 will introduce some additional procyclicality in the minimum capital requirements of banks, it is not clear that the impact on bank lending will ultimately be sizable: this remains to be established by facts rather than presumptions. Moreover, even in the case where this additional procyclicality is indeed confirmed by empirical studies, it would be a big mistake to compensate it through regulatory forbearance, i.e. *making target capital ratios (8% at present) contracyclical. The impact on banks' incentives would be a disaster, especially in the present context where public authorities have already intervened a lot, in order to protect private institutions from closure. As we already pointed out, if governments want to smooth out economic fluctuations, they should use appropriate policy instruments such as fiscal and possibly monetary policy, and should not interfere with prudential regulation and supervision of financial intermediaries.*

This being said, it is important for prudential authorities to continue their efforts in trying to eliminate the possibilities of regulatory arbitrage that are offered by current regulatory arrangements. Similarly, rather than refusing the additional transparency provided by fair value accounting, regulators should develop new methods to "filter out" spurious components of market prices that do not reflect changes in the fundamental values of assets. This can only be done properly prudential authorities endeavour to clarify, and possibly express in quantitative terms, what are the exact objectives of prudential regulation and what are the appropriate benchmarks and measurement tools (asset valuation, provisioning, capital requirements,..) that must be chosen in order to implement these objectives.

9 *See Caruana (2004).*

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Valuation in insurance and financial crisis

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In the course of the recent financial crisis, the issue of asset valuation has regularly moved to center stage, due both to the sharp fluctuations observed in numerous assets, making economic measurement difficult, but also to the impact that fluctuations can have on the behaviour of economic agents that are required to submit annual financial statements –or even interim or quarterly ones. While this issue has not been seen as the cause of the latest crisis, it has nonetheless been considered as a potential source of its increasing magnitude, even though –at the time of this writing (early July)– we have not yet seen any massive sell-offs of major asset classes (equities or bonds, corporate issues in particular).

The question of asset and liability valuation is of particular concern for the insurance industry. Because of the specific characteristics of this industry, valuation poses specific problems which, far from being fully different compared to the other sectors –the banking industry in particular– in fact tend to be magnified. In fact, it is no accident that the only sector to be granted a transition regime in the application of new international accounting standards is the insurance industry, due to difficulties encountered by the International Accounting Standards Board (IASB) in finding a workable solution for the valuation of insurance liabilities. Similarly, it is no accident that the Internet meltdown was suddenly aggravated in 2002-2003 by the massive move on the part of insurance and reinsurance companies to liquidate their equity portfolios when, once a certain downward price threshold had been surpassed, they decided it was time to sell rather than face the consequences of further depreciation in equity prices on their balance sheets and their solvency margins. The memory of this last event, which without any warning whatsoever took on the proportions of a systemic risk for the global financial sector, recently came to mind when the fall in equity prices picked up speed globally in light of soaring oil prices and an uptick in inflation. Accordingly, the issue of insurance asset and liability valuation does not just pose a microeconomic problem in terms of assessing the financial strength of insurance and reinsurance companies. It also poses a macroeconomic problem in terms of financing the economy and ensuring financial stability.

In the rest of this article, we will examine the economic problems posed by the valuation of insurance and reinsurance assets and liabilities. Then, we will analyse the relevance of today's competing accounting standards, concluding that they offer a very imperfect resolution to the challenges of insurance valuation. Finally, we will analyse the consequences of these problems for financial stability –in terms of the solvency of companies, the financing of the economy, and the ability to absorb shocks to the system. We will conclude that they are significantly greater than is often imagined.

1| THE ECONOMIC PROBLEMS POSED BY VALUATION IN INSURANCE

Insurance poses very specific valuation challenges, on both the asset and liability sides of the balance sheet. These problems are related to the very nature of insurance liabilities. In fact, these liabilities are simultaneously partially virtual, long-tail, illiquid and sub-additive (which means that the value of a portfolio of insurance liabilities is less than the sum of its individual liabilities). This being so, they accumulate all of the valuation challenges that are found individually in other economic activities or transactions.

1|1 The virtual nature of most insurance and reinsurance liabilities

Insurance liabilities measure the value of the obligations that insurers and reinsurers have with respect to their insureds. Since insurance compensates for insured losses, the insurance obligation concerns the promise to indemnify the insured in the event that the risk against which the latter is insured comes to pass. As soon as a covered loss occurs, the insured has a claim on the insurer, obliging the latter to provide compensation under the terms and conditions of the contract. In this particular case, things are fairly straightforward: the value of the insurer's obligation is equal to the cost of indemnifying the loss under the terms of the contract. The real problem lies not in this point but in estimating the value of the insurer's obligations to policyholders who have not yet suffered an insured loss but who could do so during the period that separates them from the end of the policy. The question is all the more relevant considering that the insurer knows, from experience, that between now and the end of the contracts in force, a good number of its policyholders will have sustained an insured loss, such as an auto accident or a health-related mishap. How can the value of this obligation be measured? For one thing, it is purely virtual. And its value is nil because the insured cannot record a receivable from or a claim on the insurer on its balance sheet as the counterpart of the debt the insurer has with respect to the policyholder. Moreover, statistical laws tell us that when a policy reaches its term, the value of these obligations will not be nil, that certain risks will come to pass, and that we can –without waiting for the policies to expire– arrive at an estimated value of these obligations based on serious probability.

In general, insurance accounting considers that the value of the obligation is nil as long as the risk does not occur and therefore has not created any objective right to indemnification. This hypothesis has no significant implications for the valuation of the obligations of insurers and reinsurers, as long as the value of the liabilities arising from the occurrence of new insured losses is approximately equivalent to the value of the obligations discharged *via* the liquidation of the payout for past losses. This hypothesis surely becomes questionable in the case of a natural or technological catastrophe or an act of large-scale terrorism. This is why certain accounting standards continue to allow insurers and reinsurers to set aside so-called equalisation reserves, which are intended to cover events which have not yet occurred but which, if they were to occur, would probably be particularly costly.

Life insurance, when we focus on the savings aspect which represents more than 80% of the insurance turnover, poses a particular problem, since it creates entitlements that accumulate over the life of the contract, in the form of interest on the principal and a guarantee on the value of the capital that is accumulated, with the right to surrender the contract (or exit from the contract) as soon as it is initialised in the event of death. How can we measure the value of this obligation? For one thing, only interest (investment returns) already paid and the capital actually acquired generate an objective claim on the part of the insured beneficiary, which the latter can mobilise at will under the redemption or surrender option that most contracts of this type offer. In addition, if the policyholder does not exercise this right of redemption prior to the end of the contract –and it is rarely done– the interest that the insured will earn and the value of the capital he or she will accumulate under the contract can be estimated with a relative degree of precision using stochastic financial techniques, even though these benefits are only virtual at the time they are estimated. Under normal circumstances, the two valuations show little tendency to diverge. Conversely, in crisis situations –in particular financial crisis–

they have a tendency to diverge significantly, giving very different pictures of the financial position of life insurers, just when they most need to have a failsafe valuation. However, it should be stressed that this problem is not, strictly speaking, specific to insurance, and arises in other financial sectors as well, whenever it is necessary to estimate the value of assets like equities, whose future flows are virtual and uncertain.

1|2 The long-tail nature of insurance and reinsurance liabilities

Insurance and reinsurance liabilities typically have long-term horizons, much longer than bank liabilities. There are two specific reasons for this. For one thing, the viscosity of insurance liabilities is high: while demand deposits made with banks can be withdrawn immediately by clients with no penalty whatsoever, property-casualty insurance policies cannot be redeemed. In addition, they are renewed almost automatically by tacit agreement. Similarly, annuity payments cannot be advanced over time at the behest of the beneficiary; as for life insurance policies, they cannot be redeemed by insureds without being subject to contractual and tax penalties, within deadlines that can be measured in months rather than hours. Secondly, the liabilities of insurers are long-tail: the payment of annuities is spread over several decades. The duration of a life insurance policy is typically five to six years, including the redemption option (excluding the redemption option, the term is typically ten to fifteen years). Because claims settlement never comes just after a loss, even in the case of truly serious losses like the World Trade Center, for example, due to procedures of control and even recourse, which safeguard the interests of all stakeholders, in particular other policyholders, non-life insurance is structurally in a positive cash flow situation.

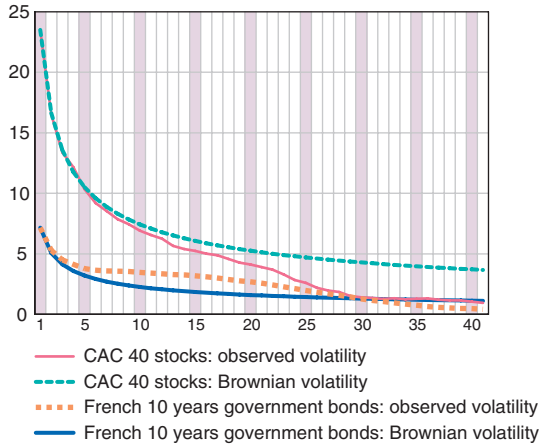
While the valuation of viscous liabilities is probably less uncertain than for other liabilities due to the lower or even nonexistent weight of redemption/surrender options (which constitute one of the most difficult elements to measure with certainty), the valuation of long-term liabilities and assets is much more difficult than that of short-term liabilities. First of all, it is more complex because it depends on a far greater number of parameters than the valuation of short-term liabilities. Secondly, it is more uncertain because it also depends on possible changes in trends and in behaviours that are cumulative and which can't be modelised as a simple random variable. This is true in particular with respect to the payout of annuities, pensions and long-term care, for which the horizon can be measured in decades, as opposed to health, auto, homeowners and natural catastrophes, for which the horizon is annual. But the main problem with long-term liabilities is related not to their valuation but rather to the valuation of the assets that are intended to match these long-term liabilities. Since the value of assets has a tendency to fluctuate over time, and given that both insurers and reinsurers are –because of the viscosity and duration of their liabilities– able to hang on to a portfolio of impaired assets as long as it has a reasonable chance of recovering its full value over a time frame that corresponds to their obligations, measuring the snapshot value of assets may not be the best way to evaluate the coverage that these assets offer for the liabilities. The question is all the more legitimate in that recent financial analysis has amply demonstrated, on the basis of available empirical data spanning a century, that both the historic value of assets and their market value are very bad "predictors" of their future value, particularly of their value when the time comes to cover the obligations they have to policyholders and pay the latter. In any case, in terms of actuarial expectation, holding on to a temporarily impaired portfolio of assets is a very profitable operation for insurers and reinsurers because it allows them to pocket the risk premium that is attributable to the short-term volatility of assets, without this volatility having an impact on their ability to satisfy their long-term commitments.

Admittedly, it can be claimed –and rightly so– that the future value of an asset is too uncertain to be used for the purpose of accounting or prudential valuation, and that the hypothesis of a future random and unforeseeable outcome only serves to integrate the conservatism that is the hallmark of both accounting and prudential standards. Conversely, while this is true when we look at values individually, it is less so when our level of analysis is portfolios of well-diversified assets. Financial econometrics has revealed significant regression to the mean behaviours for equities, and divergence with respect to the mean for bonds,

in the industrialised countries.[1] The chart below, which compares the effective volatility of the CAC 40 and government bonds since 1950 based on their holding horizon to the volatility that they would have if we assumed these assets had followed the random walk of a Brownian variable, clearly illustrates these behaviours. And naturally, these are fundamental for determining the structure of optimal asset portfolios intended to cover the obligations of insurance and reinsurance companies. The most recent generations of internal models increasingly integrate these divergence and convergence behaviour.[2] So long-tail insurance liabilities pose a very serious valuation problem for the assets that match these liabilities. This problem was ignored for too long, primarily for theoretical reasons: the dominant financial theory of the nineteen seventies and eighties considered that markets were totally efficient, that they incorporated all relevant information available at a given point in time, and that it was therefore impossible to find a better measurement of asset values than that provided by the markets. There were also practical reasons: even if not all assets followed a random walk, it was nonetheless difficult to arrive at a consensus over an acceptable alternative model. This is not true today thanks to recent developments in behavioural finance. The bubble that formed and then burst around Internet stocks put the subject back on center stage, since the most successful insurance and reinsurance companies in the aftermath were those that were not required by their supervisors –which were late adopters of the efficient markets theory– to unload their equity investments when prices troughed between 2002 and 2003.

Observed and Brownian returns volatilities (short and long term)

(X-axis: time horizon, in years; Y-axis: annual volatility, in %)



1|3 The illiquid nature of most insurance and reinsurance liabilities

Strictly speaking, there is no real secondary market for insurance liabilities. Insurance contracts do not generally change hands after they are written. There are several reasons for this, which have to do both with the nature of insurance contracts and insurance regulation. The often long horizon of insurance obligations and their largely virtual nature make valuation difficult and uncertain, as we have already seen. Moreover, we need to consider the multi-dimensionality of insurance risks: financial risks most often can be collapsed into a single dimension (the interest rate risk, for example), even if this dimension may itself synthesise several dimensions upstream (a spread risk and an interest rate risk, for example). On the contrary, insurance risks always and immediately have several dimensions (in a policy as simple as auto insurance, coverage can be triggered by a multitude of different events), and their import is therefore more difficult to grasp analytically. In insurance, much more than in finance, it is difficult to have an *ex ante* vision of the outcome of contracts. This complexity makes insurance risks difficult for outside parties to manage. But, above all, it constitutes very fertile ground for the appearance of moral hazard issues, due to the strong degree of information asymmetry that it creates in favor of the underwriting insurer or reinsurer.

This situation, which is understandably not supportive of the emergence of a secondary market for insurance risks, has been aggravated further

1 *See Gollier (2008).*
2 *"Reinsurance and the Swiss solvency test", M. Dacorogna ed., SCOR Studies, 2008.*

still by regulation which, in every country, places strict limits on the conditions under which the ownership of insurance and reinsurance portfolios can be transferred, based on the principle that the underwriting insurer or reinsurer must maintain responsibility for it until all of the rights and duties it has created have been performed and have expired. This framework is motivated by the desire to protect the consumer against any deterioration in the security of his or her policy in the event of a transfer. Consequently, a portfolio of insurance contracts cannot be transferred to another licensed insurer until a long and cumbersome process has been completed and pending the prior approval of the relevant regulators. As a result, portfolio trades and transfers are exceptional, and mainly involve companies whose business license has been withdrawn by regulators, or those that have been taken over or aligned themselves with other companies to merge operations within a mutual framework. As such, they cannot in any way serve as a market benchmark for the valuation of insurance risks.

Things are different for insurance liabilities securitisation, which offers far more interesting prospects for establishing a market benchmark. In spite of its rapid growth in the course of the last ten years, the insurance securitisation market nonetheless remains small in both absolute and relative terms. At year-end 2007, it was valued at USD 38 billion, compared with USD 11.7 trillion for the asset-backed securities (ABSs) market. The depth and liquidity of the insurance securitisation market are not totally established at this time, especially since the term covers a set of very different products ranging from cat bonds, which cover insurance risks exclusively, to securitisation of embedded value, which covers risks that are essentially financial in nature, not to mention the securitisation of mortality, auto and other risks, which often seek to leverage regulatory trade-offs. A reflection of the limited depth and liquidity of this market, the rates that are established hardly resolve the uncertainties surrounding the valuation of insurance liabilities. Accordingly, cat bond rates fluctuate as broadly as or more so than reinsurance rates. So securitisation does not at this stage qualify as an incontestable market benchmark for insurance liabilities.

1|4 The sub-additive nature of insurance and reinsurance liabilities

At the foundation of insurance and reinsurance, we find the logic of diversification and pooling. This logic governs the constitution of good portfolios: insofar as possible, they must associate risks that are independent of one another –in the sense that the insured population has independent behaviours, that the risks covered are different, or that the geographic regions covered are distinct. The term pooling is often reserved for the underwriting of a single risk for a large number of insureds, whom we suppose are more or less independent of one another. Conversely, the term diversification is used for underwriting different risks in different countries. Market competition should push for the elimination of all of the diversifiable or poolable risk by insurers and reinsurers, such that insureds are left with only those risks that are not diversifiable. If the diversifiable risk is eliminated, then the corresponding risk premium should also be cancelled out, and the valuation of insurance and reinsurance liabilities should no longer cover anything but the actuarial expectation of the cost of the risk, plus the risk premium that corresponds to the non diversifiable risk, which is transferred to the insurer or the reinsurer. This being the case, the value of these liabilities as carried by insurers or reinsurers must be lower than the value of these same liabilities for insureds, with the gap between the two corresponding to the diversifiable risk premium. However, since markets are imperfect, the diversifiable risk is not totally eliminated by competition, and the value of one and the same insurance or reinsurance liability can change from one insurer or reinsurer to the next depending on the quality of its diversification and pooling.

But to successfully factor these benefits of diversification or of pooling into the valuation of insurance liabilities, the approach must be based not on individual contracts but rather on portfolios of contracts or on an entity-by-entity basis. It is only at this level that the effects of diversification and pooling are perceptible. However, by measuring the value of insurance liabilities at these aggregate levels,

we run the risk of over-estimating the decorrelation between insureds, between lines of business, and between geographic regions, particularly in extreme situations, which as a reminder generally are the result of a recorrelation of risks that are habitually decorrelated. This is one of the classic causes of the under-estimation of insurance and reinsurance liabilities. On the contrary, by failing to measure the value of insurance liabilities at a sufficiently aggregate level, we encourage insurers and reinsurers to make tradeoffs based on regulatory considerations, and transfer the risks they have written to other economic agents that are not or are less regulated, knowing that the market price of this risk transfer will mostly take into account the extent to which the portfolio is pooled and diversified, as estimated on the date of the transaction.[3] Some might consider that this situation would not necessarily be bad for the industry, since the market will have enabled the emergence of an objective value for the risk. Independently of the subjective perception of the entities involved, it would be possible to refer to it when assessing the values of the corresponding insurance liabilities. In fact, even if the insurance securitisation market were sufficiently deep and liquid, this would hardly be possible, since the effects of diversification are specific to each transferred portfolio and, as such, do not constitute a solid basis for measuring the value of the effects of diversification included in portfolios that have not been transferred.

2| THE LIMITED RELEVANCE OF EXISTING ACCOUNTING STANDARDS

As we have seen, it is not these problems taken individually but rather their concatenation that makes it hard to estimate the value of the liabilities and assets of insurance or reinsurance companies. In other words, no accounting solution to date has been able to offer a satisfactory solution to this problem set as a whole. All of the accounting standards contemplated up to now must be viewed as very imperfect with respect to this point, whether it is the historic cost standard, the fair value standard, or hybrid standards. In a universe that would correspond to static economic models, such as the Arrow-Debreu model, where institutions play no role, these differences and imperfections would be of no consequence since economic agents are presumed to be capable of understanding the economic reality that lies behind the accounting veil. More radically, in a universe where the Modigliani-Miller theorem applies, these differences disappear because the value of the firm must be the same regardless of how it is financed and the accounting standard it uses. Conversely, behavioural finance attaches a great deal of importance to these imperfections, to the biases that they introduce into the valuation process, and to the market inefficiencies they are capable of introducing. The aim of this section is not to present the various accounting standards, but rather to analyse the relevance of the solution these standards offer in light of the problems raised in the valuation of insurance assets and liabilities, as well as their impacts on the behaviour of economic agents.

2|1 The imperfection of historic cost accounting

Under historic cost accounting, which is still the method of choice for most local standards, assets and liabilities are measured at their entry cost or their amortised cost. It offers a great deal of stability for balance sheet carrying values, since these values only evolve on the basis of changes in the entitlements or claims of companies or clients. Insurers and reinsurers have mostly been fervent supporters of this method, which ensures a great deal of stability in their balance sheets and amortises economic and financial shocks (both upside and downside). As a result, this method is viewed as a source of conservatism: fluctuations in capital gains and losses neither inflate nor deflate the earnings or net assets of the company. Immunised against short-term fluctuations, the insurer or reinsurer can define a long-term strategy and stick to it for as long as its solvency is not affected. However, the historic cost standard does not in any way resolve any of the valuation problems we have identified:

• the effects of diversification and pooling between the contracts of a single portfolio and between the different portfolios of a single entity are not taken

3 *As a reminder, without the permission of the supervisory authorities, only the financial hedge can be transferred in insurance. The corresponding risks remain, conversely, on the balance sheet of the company that originally wrote them.*

into account, for reasons of conservatism that we find in all historical cost accounting in insurance;

• virtual liabilities are partially treated within the context of the equalisation reserve, which anticipates the cost of extreme events while leaving a great deal of latitude for determining the exact amount for individual companies;

• as for long-tail and illiquid liabilities or assets, they are measured on the basis of the price of the transaction that introduced these liabilities or these assets into the balance sheet; they therefore lose all relationship to the underlying economic and financial reality after the insurance contract is initialised.

The solution brought to these valuation problems by historic cost accounting can be summed up as not worrying about them and focusing instead on the accounting treatment of their consequences –*i.e.*, calculating the solvency of companies and measuring their ability to honor their commitments when the time comes to do so. In other words, the counterpart of this simplistic negation of valuation problems is a sophisticated analysis of solvency. As in the universe corresponding to the Arrow-Debreu model, insurers and reinsurers are presumed not to let themselves be taken in by the values written on the balance sheet, whose only function is to give stakeholders –most often assimilated to supervisors– a conservative assessment of the solvency of companies over a long-term perspective.

But the Arrow-Debreu model is purely static, whereas insurers and reinsurers operate in a dynamic world where a certain degree of accounting illusion prevails (as empirical observation confirms). The principal limitation of historic cost accounting is that it renders the balance sheet valuation insensitive to new signals given by the market price system. For insurers and reinsurers, this insensitivity affects the valuation of assets more than that of liabilities, which contains specific mechanisms intended to incorporate the most recent signals from the market, such as discounting annuities, correcting reserves for inflation, etc. For this reason, historic cost accounting introduces a strong incentive to sell assets that have undergone the most appreciation recently, generally when the cycle peaks.[4] This incentive is that much stronger since the assets in question show marked regression to the mean behaviour. The effects of this behaviour are naturally felt beyond insurance and reinsurance: it impacts the capital markets by improving their efficiency.

2|2 The imperfection of fair value accounting

Fair value accounting, which has recently been adopted in many countries, notably in Europe, for consolidated financial statement reporting, seeks to correct the insensitivity of historic cost accounting to new information from the market. In an ideal world, fair value is tantamount to market value, since it is the best available value when markets are functioning efficiently. The value of most of the assets of insurance and reinsurance companies is measured in this way. However, not every asset and liability has a market value that integrates, at all times, the most recent information made available by the market. This is true in particular of insurance liabilities, as we have seen. Hence the need to define an *ad hoc* fair value that is able, insofar as possible, to replicate what the market value of these liabilities would have been if they had been exchanged in an efficient market. After numerous discussions within the IASB, it seems that a consensus has been reached on measuring the value of these liabilities based on their current exit value, *i.e.*, the value they would have today if they were to be transferred to another insurer. This current exit value of insurance liabilities is comprised, according to the IASB, of three elements: the best estimate or actuarial expectation of the cost of the risks underwritten, plus a margin that the market requires to assume an uncertain debt (the risk margin), and another that the market requires to provide other services to insureds (the service margin). In other words, this is an appraised value.

Without discussing this accounting standard and the criticisms it has generated in great detail, notably those concerning the service margin,[5] it is necessary to stress that fair value, while it introduces market discipline, nonetheless only very imperfectly

4 *See Plantin, Sapra and Shin (2007).*
5 *See Duverne and Ledouit (2008).*

resolves the problems raised by the valuation of insurance liabilities and assets:

• the effects of diversification and pooling between contracts can be taken into account at the level of each homogenous portfolio of contracts, but not between the various portfolios of a single entity. The IASB is hostile to any measurement of liabilities that is dependent on the entity that manages them;

• virtual liabilities are largely excluded from the scope of the fair value accounting for the obligations of insurers and reinsurers, and wind up within the scope of the company's capital and net assets, which are intended to absorb shocks that are not easy to anticipate or that simply have not been;

• long-tail or illiquid liabilities, which are by nature difficult to match, are measured at their current exit value, whose forecasting dimension makes it necessary to take all new information into account;

• concerning the particular case of assets covering liabilities, Japan introduced assets of a fourth type –those held to cover insurance contract obligations and valued at their amortised cost, but the IASB has not, and the links between the valuation of insurance assets and insurance liabilities in IAS standards only transits *via* the discounting of liabilities using the risk-free rate.

By choosing market value for the principal assets of insurers and reinsurers, fair value introduces significant volatility into their valuation, without including the equivalent at the level of liabilities, the valuation of which is –by design rather than by nature– less volatile, since it is based on an appraised financial value that is by definition much more stable than market values. In addition, to the extent that the liabilities of insurers and reinsurers are long, the reference to fair value and market value for the valuation of assets introduces artificial volatility into the prices of the value of the net assets. This is particularly true during periods of crisis, when asset prices no longer reflect future profits although liquidity constraints may affect the economy and the company in the short run.[6] This artificial volatility is aggravated by the fact that fair value offers a strong incentive to sell those assets that have depreciated the most recently, in general when the cycle troughs.[7] The effects of this distortion can well spread beyond insurance and reinsurance and into the capital markets, where they reduce efficiency.

2|3 The imperfection of hybrid standards

In practice, accounting systems are not as pure as we have imagined them to be above. They incorporate a healthy dose of pragmatism, the purpose of which is to allow them to adapt to reality. Accordingly, historic cost accounting integrates an impairment mechanism that is used to improve the measurement of long-term assets by allowing the depreciation of those assets whose value slips below the entry value on the balance sheet for a period that exceeds the definition of temporary. However, if guaranteeing that impairments are sufficiently objective requires assessing the other than temporary nature of the depreciation using criteria that reproduce the workings of the market, then we find ourselves once again in a situation where the accounting method is that of historic cost accounting whenever assets appreciate, and in a fair value situation whenever the value of assets is impaired on an other than temporary basis. In fact, far from having reduced the inefficiencies of historic cost accounting, this way of calculating impairments leads to an accumulation of the inefficiencies of fair value accounting, which encourages insurers and reinsurers to sell assets whose price has fallen, independently of their prospects for recovery, with those of historic cost accounting, which encourages them to sell those assets whose price has risen independently.[7] To avoid this, it would be necessary to calculate impairments on the basis of a discount rate for future cash flows that is specific to each insurer or reinsurer, at a price that is nonetheless more subjective in terms of assessing the other than temporary nature of the depreciation.[7]

Similarly, fair value accounting has developed, as a transition measure, a hybrid standard known as International Financial Reporting Standards 4 Phase I (IFRS 4 Phase I) for insurance and reinsurance while awaiting the definition of a permanent standard that is more appropriate

6 *See Allen and Carletti (2006).*
7 *See Plantin, Sapra and Shin (2007).*

(known as IFRS 4 Phase II). This standard, which is inspired by the US GAAP solution, in practice blends the existing IAS and IFRS standards and local standards. Schematically speaking, assets are measured at their fair value, while liabilities are valued at their historic cost. It is immediately clear that this transition standard poses a major problem in that it applies two different accounting philosophies to assets and liabilities, with the risk of generating, at the level of net assets for insurance and reinsurance companies, substantial artificial volatility that is the pure product of a hybrid accounting convention and, as such, is unrelated to any underlying economic and financial reality whatsoever. In an attempt to reduce this risk, the IASB added a specific mechanism inspired directly by US GAAP, the notion of "shadow accounting", which allows to us take into account the fact that changes in net assets may be passed on to policyholders *via* profit-sharing mechanisms, for example, and to thereby link liabilities to assets when this is necessary. But given the difficulty of defining this link precisely, the IASB opted to remain relatively general in its wording on shadow accounting, leaving the door wide open to a high degree of heterogeneity at the level of market practice, even if domestic auditors and accounting standard boards have imposed a minimum of standardisation. Above all, since shadow accounting deals with only one aspect of insurance and reinsurance asset/liability matching, the hybrid standard of Phase I still contains a serious risk of artificial volatility in the net assets of companies.

Overall, and in light of the specific valuation issues that insurance and reinsurance companies face, the hybrid standards are hardly more effective than the pure standards, despite their stated aim of better taking the industry's concerns into account.

3| FINANCIAL STABILITY AND INSURANCE VALUATION

Often neglected, issues related to insurance valuation nonetheless are located at the heart of many problems of financial stability. Admittedly, insurance and reinsurance companies have virtually never solicited public finances or monetary policy in crisis situations. The case of Japan is emblematic in this respect: while the difficulties encountered by the banks in the 1990's mobilised both monetary policy and public finances, insurers have experienced numerous bankruptcies without benefiting from any public support whatsoever, even though the responsibility for many of these failures can be attributed to competition from a postal company that is supported by public finances. The stakes in terms of financial stability are not limited to the solvency of insurance and reinsurance companies, and also touch the financing of the economy and the ability of the latter to absorb significant financial shocks.

3|1 Supervising insurance and reinsurance company solvency

In insurance and reinsurance, as in banking, the supervision of solvency is based on compliance with certain defined capital ratios, with capital understood in the large sense –liabilities that can withstand stresses, shocks and unforeseen losses. The measurement of solvency naturally depends on the valuation of insurance assets and liabilities, to the extent that the net worth of the company constitutes the principal constitutive element of solvency. With respect to the issue of solvency supervision, current exit value probably constitutes one of the most interesting innovations in the area of fair value accounting. Indeed, current exit value corresponds pretty well to the economic measurement of the obligations of insurers and reinsurers, which is what supervisors need to be paying attention to. The Solvency II reform, which is currently under discussion at the European level, has integrated current exit value into its standards for the valuation of insurance and reinsurance obligations.

The stability of value measurements made using the historic cost method, or the amortised cost method, has barely any economic significance for solvency. It requires integrating an additional prudential margin into the solvency margin calculation and, to support this aim, setting the margin at a comfortable enough level to absorb not only a new stress but also the earlier adverse deviation in the underlying values. In fact, when company financial statements are presented using the historic cost accounting method, it is generally the case that the financial

position of the companies whose license has been withdrawn by regulators must be drastically revised downward without being able to attribute the earlier over-estimation of its position to fraud.

In the same manner, fluctuations in market value are not particularly relevant to the supervision of insurance and reinsurance company solvency, insofar as they do not correspond to an irreversible impairment in an underlying trend in the valuation of this or that balance sheet line item. The relatively long timeframe of insurance and reinsurance, as well as the viscosity of insurance and reinsurance company balance sheets, still allows for the contemplation of a later correction for these fluctuations as long as the company is solvent *hic et nunc*. It is important to understand the argument: by anticipating a correction of this kind, we are not being imprudent; we are doing no more than engaging in asset/liability management designed to optimise the social gains and economic well-being. Hence, we authorise inter-temporal pooling, which is one of the fundamental aspects of pooling itself.

Supervisors should therefore be wary of both historic values and market values, and should refer insofar as possible to other valuations and other hypotheses. Above all, the combination of assets at market value and liabilities at current exit value carries the risk of an artificial volatility in net worth compared with the real financial wealth of the enterprise. To attenuate the adverse consequences of this artificial volatility, the solvency margin should be able to function as a shock absorber under these circumstances –naturally, under the supervision of the relevant authorities. This is how prudential standards can play an important corrective role with respect to the imperfections of accounting. In fact, it is neither desirable nor possible to obtain accounting standards that suit the specificities of insurance and reinsurance while also ensuring the comparability of their earnings with those of other economic sectors. Conversely, it is part of the exclusive mission of prudential regulation and supervision to stick close to the reality of the industry. We can see the beginnings of a distribution of roles, with accounting standards more specifically in charge of comparability and prudential standards in charge of dealing with the specific features of insurance and reinsurance.

In this vein, the effects of risk pooling and diversification should be taken into account by the prudential standards, much like Solvency II reform does, insofar as they cannot be by the accounting standards. If this limitation of accounting standards were not corrected for by the prudential standards, companies would be encouraged not to conserve risks in their balance sheet and would instead seek to transfer them insofar as possible to other, non-regulated agents. The market values of risks that would result would be for this reason partially inefficient and would not send out the right messages to insurers and their clients. They would lead to the selection of a sub-optimal level of protection in the economy. It should be noted that, in order for these transfers to be mutually profitable, it would not be necessary for the agents involved to be capable of managing these risks. It would suffice that the cost of their relative incompetence versus insurers and reinsurers not be higher than the gain that is to be had in terms of the valuation of the effects of diversification and pooling thanks to risk transfer and securitisation.

3|2 Financing domestic economies

Via the premiums that they invest, insurance and reinsurance companies play a fundamental role in financing domestic economies. They finance a large portion of public debt and investment in corporate debt and equity instruments. In a country like France, households make 40% of their direct and indirect investments in equities *via* insurance and reinsurance.[8] Similarly, households make 77% of their direct and indirect investments in corporate bonds *via* insurance and reinsurance. Overall, French households make 60% of their investments in businesses *via* their insurance contracts, compared with only 25% *via* their mutual fund investments and 15% directly. These figures attest to the importance of insurance for household investment in the productive economy.

It is clear that, if insurers had to reduce their investments in equities, this would not be offset by a rise in other components, which include direct investment (21% of all household investments in equities) and investments in mutual funds (38%

8 *Estimate based on looking through mutual funds, at their original investments.*

of all household investments in equities). Neither the government nor businesses could hope to replace insurers. It would be necessary to increase the role of pension funds or foreign investors. In countries like France, where pension funds are quasi-inexistent, the first alternative is not available. As for the second alternative, that of increasing the role of foreign investors, it is not indefinitely extensible. Indeed, foreign investment already accounts for nearly half of all share ownership in France's, an important psychological threshold for both citizens and foreign investors alike. The consequences for the European economy, which has a substantial need for equity capital, would be disastrous.

In fact, the market value valuation of equities runs the risk of dissuading insurers and reinsurers from investing sufficiently in equities. As we have seen, fluctuations in market value should encourage insurers and reinsurers to unload their equity holdings when the capital markets are down. This is most unfortunate –particularly since, as we have seen, equities exhibit regression to the mean behaviour that should logically make them an attractive ownership option when the markets are bearish (unlike bonds, which exhibit a divergence from the mean). Since equity market depreciation is in general synchronised with situations of financial stress for companies, the latter should also be encouraged by fair value measurement considerations to under-weight equities in their own portfolios compared with what optimal asset/liability management would suggest.

This is why it will be important that the prudential standards correct, insofar as possible, this effect of fair value accounting on the ownership of equities by insurers and reinsurers. From this perspective, the capital requirements on equities proposed today under Solvency II would only aggravate the situation, because they are excessive with respect to the capacity of insurers and reinsurers to hold these securities over periods sufficiently long to hope to reap the beneficial effects of their regression to the mean. The European Commission has proposed that the default stress level be determined for the equity risk on the basis of the volatility of equities over a one year horizon. Calculated on this basis, it would be 32% for listed equities and 45% for private equity. This level is problematic, not only because it would be very dissuasive with respect to equity ownership, but also because the reference to annual volatility is incorrect given the multi-year timeframe of the insurance liabilities that equities cover. The Solvency II draft runs the risk of reinforcing the distortions introduced by the notion of fair value on equity ownership by insurers and reinsurers. It should be noted that, curiously, prudential standards have historically given preference to the hypothesis of a regression to the mean for bonds alone, even though empirical work highlights the opposite, *i.e.*, divergent behaviour with respect to regression to the mean for bonds and regression to the mean behaviour for equities.

3|3 The financial stability of economies

Insurance and reinsurance do not stop at just helping to finance the economy. They also play the role of shock absorption. By definition, they absorb the real shocks that they insure or reinsure, and some of these shocks may have a macroeconomic dimension –such as major storms or cyclones, earthquakes, terrorist attacks and so on. The bulk of the shock inflicted by the attack on the World Trade Center was absorbed by insurance and reinsurance, and it was the European companies that absorbed half of that shock, thereby helping to spread its impact globally. However, companies are also increasingly encouraged to transfer their risks to other actors, less well qualified than they are to manage and absorb them. This is due not only to the inefficient combination of existing accounting and prudential standards, but also to the emergence of a deeper and more liquid securitisation market, which offers an increasingly competitive alternative to the insurance and reinsurance companies.

But, as we have seen, the longer term horizon of insurance and reinsurance companies compared with other financial services players such as banks, enables them to maintain depreciated/impaired assets in their portfolio that other investors might have a tendency to unload but that these companies will keep in their balance sheet whenever there is a potential for rebound, which is in particular the case for diversified equity portfolios which exhibit regression to the mean behaviour. Unfortunately, we have also seen that the accounting standards in force throughout the world encourage short-term arbitrage

on the part of insurers and reinsurers in financial boom situations as far as historic cost accounting is concerned, and in financial depression situations as far as fair value accounting is concerned, which prevents companies from fully playing their role of long-term investor role and shock absorber in the latter hypothesis.

In the interest of greater financial stability, it is important that the shock absorption potential of insurance and reinsurance not be overlooked, and that the accounting and prudential standards be designed and articulated coherently, so that this potential can be realised. The stakes are high, because they concern the ability of the market to absorb shocks by itself, with minimum intervention on the part of public policymakers. Otherwise, fiscal and monetary policy will be solicited, at a much higher cost for taxpayers because these interventions are also a source of moral hazard in the economy. The importance lies less where this issue is taken into account –at the level of accounting or solvency– and more with the fact that it be correctly valued in one of these two standards. Above all, it is vital that the two standards avoid aggregating the obstacles. As we have seen, it is likely that prudential standards have a particularly significant role to play in this area.

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Bringing transparency to financial reporting: towards an improved accounting framework in the aftermath of the credit crisis

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The credit crisis, amongst other things, is a crisis of confidence. What was once considered a problem limited to losses on US subprime mortgages has now spread throughout the global financial landscape. A lack of understanding of where these losses have landed has resulted in a significant downturn in financial and economic activity.

Confidence will only return once investors are satisfied that the true extent and location of these losses has been fully disclosed. For this to be achieved –despite siren calls the contrary– the financial system requires greater, not reduced levels of transparency and disclosure. The International Accounting Standards Board (IASB) is mindful of its responsibilities, and its work in conjunction with the Financial Stability Forum (FSF) is aimed at improving financial reporting in a number of key areas.

Today, the world's financial markets are facing what could rightly be called a crisis, and the implications are far-reaching. Lending from financial institutions has dried up as they seek to recapitalise. Investors and managers are still seeking to assess their losses resulting originally from the US subprime lending. As a result of this unprecedented situation, economies throughout the world are slowing. Unemployment is rising in many countries. This is all occurring at a time when the spectre of inflation has returned.

It is therefore understandable that policymakers have made developing an appropriate response to the credit crisis a priority. Because of the global dimensions of the current crisis, the response must be an international one as well, requiring coordinated efforts amongst regulatory authorities.

While this paper does not provide a thorough analysis of causes of the current credit crisis, it is evident that at the heart of the crisis were bad lending practices. Bad lending was then compounded by the absence of prices in the secondary markets for some structured credit products and uncertainty about the location and size of potential losses. This in turn led to funding difficulties caused by the reluctance to extend credit to a number of financial institutions thought to hold low-quality liquid assets. Financial reporting enters the scene by way of its requirements to value these assets and to alert the markets to risks associated with their existence.

My personal view is that showing the changes in values of these securities, even if imperfect, provides much needed transparency and enables markets to adjust in a necessary, even if painful manner. I am not alone in this assessment. The Chartered Financial Analyst (CFA) Institute, representing financial analysts throughout the world, asked its members whether fair value requirements for financial institutions improve transparency and contribute to investor understanding of the risk profiles of these institutions. 79 percent said yes. While a slight majority believed that fair value had a role in prolonging the credit crisis, 74 percent surveyed believed that fair value accounting improved market integrity.[1]

None of this is to say that International Financial Reporting Standards (IFRS) are perfect, and IASB is now considering improvement to its standards in the light of developments. The IASB is conscious that improving existing accounting practices has proved valuable in addressing crises in the past, as was seen with the Asian financial crisis (in part, a catalyst for international accounting standards and the formation of the IASB) and the failure of Japanese banks and the US Savings and Loan crisis in the 1990s (which prompted new accounting standards for derivatives and other financial instruments). These are valuable lessons and their remedies should not be discarded lightly.

While the current crisis plays out, it is important that all those who have a stake in the efficient functioning of capital markets consider what improvements can be made, and the IASB is no exception. However, it is equally important that any response should be measured and appropriate.

1| RESPONDING TO THE CRISIS AT HAND

In the area of financial reporting, the credit crisis raises questions both regarding the appropriate immediate response by the IASB and the longer-term issues about the accounting of financial instruments. The IASB is responding to both questions.

The IASB continues to work closely with the FSF, which has been designated by public authorities to manage the regulatory response to the crisis. The Financial Stability Forum report, adopted by the Group of Seven (G7) Finance Ministers and Central Bank Governors made recommendations for enhancing the resilience of markets and financial institutions.[2] The report was the result of collaboration by the main international bodies and national authorities in key financial centres. It set out 67 recommendations, which were endorsed by the G7 on 11 April.

1 *See* http://www.cfainstitute.org/memresources/monthlyquestion/2008/march.html.
2 *See Report of the Financial Stability Forum on "Enhancing market and institutional resilience", April 2008, available from* www.fsforum.org.

Of these recommendations, three relate to enhancements to financial reporting and form the core of the IASB's response to the credit crisis. They relate to three topics: fair value measurement and its disclosure, consolidation, and derecognition. The IASB had a role in developing those recommendations and strongly supports the approach outlined. The recommendations were as follows:

1|1 The IASB should improve the accounting and disclosure standards for off balance sheet vehicles on an accelerated basis and work with other standard-setters towards international convergence.

IASB response: the IASB already had two projects under way directly related to off balance sheet vehicles. The consolidation project identifies when an entity should be brought on to another entity's balance sheet, whilst the derecognition project examines when assets or liabilities can be removed from a balance sheet. Both of these projects are described by the Memorandum of Understanding which sets out a roadmap for convergence between IFRSs and US General Accepted Accountings Principles (GAAP). The inclusion of both these projects in the convergence programme with the Financial Accounting Standards Board (FASB) should ensure consistency of accounting in these areas in the world's major markets.

The IASB has prioritised both projects in order to accelerate their completion. Public discussions about the proposed new consolidation standard are about to begin with an exposure draft of the consolidation standard expected to be published during the second half of 2008. IASB staff have also been developing proposals to improve derecognition requirements, which they expect to present an update to the IASB during the IASB's meeting in October.

1|2 Fair value in illiquid markets: the IASB should enhance its guidance on valuing financial instruments when markets are no longer active. To this end, it will set up an expert advisory panel in 2008.

IASB response: it is undoubtedly difficult to value complex, illiquid, structured credit securities. However, it is important to understand the current requirements in IFRSs (and US GAAP). Many of the loans that triggered the crisis were in fact shown at amortised cost in the books of financial institutions. When recoverability of a loan is doubtful the loan has to be marked down, even under historic cost accounting, to the present value of the cash flows expected from the loan –that value would be similar in many ways to fair value. No entity is ever allowed to disclose assets valued at more than their recoverable amount in its financial statements.

That being said, the IASB is committed to determining whether additional guidance is needed to address the question of fair value measurement of financial instruments when markets are no longer active. During its meeting in May 2008, as part of its fair value measurement project, the IASB announced the creation of an expert advisory panel to identify valuation and disclosure issues encountered in practice in the current market environment. The panel met for the first time on 13 June and will meet as a whole or as a subgroup several times throughout July and August of this year. The discussions of the panel members over the coming weeks will give the Board insight into the type and extent of additional guidance that might be necessary in this area and the form of any such guidance. We have ensured that the panel is made up of experts from over twenty organisations such as the Basel Committee on Banking Supervision, the Financial Stability Forum, central banks, financial institutions, and accounting firms. Our aim was to select participants based on their practical experience with

the valuation of financial instruments in the current market environment.

The panel started its work by creating a description of practical issues experienced with the valuation and disclosure of financial instruments in the current market environment. The insights from this and their experiences will go towards the creation of additional guidance.

This is an important initiative. The principles-based approach to IFRSs has been widely supported; however, the application of broad principles also requires good judgement based on practical experience and sound training. The panel will seek to identify the practical challenges of consistent application of fair value when markets become inactive and will help the IASB and the FSF to decide how best to get any guidance into the marketplace as quickly as possible.

1|3 Disclosure: the IASB will strengthen its standards to achieve better disclosures about valuations, methodologies and the uncertainty associated with valuations.

IASB response: in 2007, new disclosure rules related to financial instruments and associated risks came into place. These new disclosure rules, partly developed with the assistance of bank supervisors and the private sector, enhanced the quality of disclosures significantly. Indeed, it is interesting to note that the short-term funding risks associated with Northern Rock bank in the United Kingdom were set out in their annual accounts after they adopted IFRS 7 *Financial instruments: disclosures*.

We can always improve and learn from experience. The IASB has now begun reviewing IFRS 7, to assess its effectiveness in ensuring that entities disclose information that reflects their exposure to risk and any potential losses arising from financial instruments with the off-balance sheet entities with which they are involved. IFRS 7 also includes disclosure requirements in relation to fair value measurement and these requirements are included in the review.

The steps taken to date include consultations with preparers, auditors, users and regulators of IFRS compliant financial statements, an analysis of good disclosure practice observed in financial reports and a review of good practice suggestions made by regulatory bodies. The staff expects to be able to present proposals to the IASB in September.

The IASB is also working expeditiously on its general proposals on fair value measurement. That project is aimed at providing consistent guidance on the measurement of fair value and related disclosures, when IFRSs already require the use of fair value. As noted previously, we have established an advisory group of experts to assist in that project and believe that its conclusions will provide greater clarity to users of financial statements and others in the application of fair value by an entity. We will also draw upon the experience of the US GAAP from FAS 157 *Fair value measurement*.

2| ADDRESSING THE QUESTION OF FAIR VALUE IN THE LONG-TERM

The question of the appropriateness and extent of fair value accounting, particularly for financial institutions, will not go away when the credit crisis subsides. We know that even when the IASB has addressed the three areas above, many will still argue that the IASB must deal with more fundamental issues of fair value accounting. Indeed, a number of commentators have argued that, apart from the three areas above, the use of fair value accounting was at the heart of the current crisis, or at the very least exacerbated the crisis.

To some extent, the broader questions of fair value accounting, inevitably raised in regard to the current crisis, address issues that are fundamental to the future of accounting. How much transparency is a good thing? We at the IASB start from the premises that financial reporting that is derived from our standards is targeted primarily at investors and providers of capital. Our conceptual framework enshrines that principle. Investors generally argue that it is the job of financial reports to reflect the economic situation of an entity at a particular time. Others argue that

this introduces unnecessary volatility into financial reports that leads to suboptimal decision-making.

It is in the area of financial instruments, embodied by IAS 39 *Financial instruments: recognition and measurement*, that the use of fair value is most germane to the current crisis and has come under the most scrutiny. IAS 39 existed before the IASB was constituted, but the IASB has reaffirmed that there appears to be no alternative to fair value accounting for derivatives and similar financial instruments. For example, two parties may enter into an agreement based on exchange rate movements between two currencies. There is no cost price for this type of derivative (outside minor transactional costs). However, shifts between the two currencies could trigger significant gains or losses –which are real. Traditional cost accounting is meaningless in this situation. On the other hand, fair value accounting gives a better description of the financial position.

It is true that elements of the standard are complex, some needlessly so in my mind to accommodate exceptions to principles. IAS 39 employs a multitude of different measurement methods depending on the stated intention of the holder or issuer of the instrument. Therefore, the IASB believes that even though IAS 39 brings about significant discipline and transparency, IAS 39 is not a long-term solution for accounting for financial instruments. The IASB has recently published a discussion paper[3] setting out the challenges and considering potential solutions. The fundamental question being asked is how far should we go towards improving and simplifying the reporting of financial instruments? For example, should we go as far as applying a single measurement method for all types of financial instruments (with appropriate presentation and disclosures)? If so, the only measurement method that seems appropriate for all types of financial instruments seems to be fair value (or some similar current value measurement method).

As with many areas of valuation and measurement, there are difficult questions to consider with no simple answers. It is therefore important that all those who have an interest in the reporting of financial instruments use this as an opportunity to express their views on this important issue.

3| Drawing on the lessons of the current crisis (and others)

Obviously our review of IAS 39 and accounting for financial instruments should take into account any lessons learned from this current crisis. A key question that many banking supervisors and financial institutions will demand that the IASB addresses is whether accounting standards should take questions of financial stability and the potential pro-cyclicality into account.

This issue goes to the heart of the IASB's mission and the purpose of financial statements in the view of the IASB and our *Framework*. IFRSs are designed to provide an economic assessment of an entity at a particular date –to record the value of an entity today, not what it was worth yesterday or to predict the value of it tomorrow. It is for others to use information provided by financial statements as a basis to make assessments of an entity's future performance based on reliable, comparable information provided by IFRSs.

The debate surrounding the use and appropriateness of fair value for financial instruments is often portrayed as a technical accounting matter, but it is both broader and of relevance to more than just accountants. The fundamental question is should an accurate assessment of an entity's economic position at the balance sheet date be reported, or should a degree of opaqueness be introduced into financial reporting?

We often hear that our approach encourages volatility in financial statements. Volatility is not invented and when companies report volatility that volatility is real. The change in the value of assets and liabilities is an economic event and all businesses are exposed to economic volatility. It results when changing events occur in the economic environment in which an entity operates. And all the accounting does is to attempt to describe the situation as best as it can be measured.

Another argument often used against fair value is that its application has caused a downward spiral

3 *Reducing complexity in reporting financial instruments, available from* www.iasb.org.

in prices –so-called pro-cyclicality– that artificially depresses market values and ultimately forces these institutions to seek additional funding in order to meet their regulatory capital requirements. Some have argued that during times of extreme stress in the markets a form of circuit breaker in the financial statements is required to prevent such a downward spiral occurring.

While accounting standards *may* result in some element of pro-cyclicality, we remain cautious of any attempt to address this issue through the standard-setting process. Financial statements contain information that should enhance transparency for investors and hence improve the ability and willingness of an investor to take an investment decision. Attempts to suppress such information will simply erode market confidence with investors applying a healthy risk premium or seeking investment opportunities elsewhere.

It is for this reason that I believe any attempts to place so-called circuit breakers into the system should be applied to prudential regulation requirements rather than in the published financial information –a view which I believe is gaining increased traction. We recognise that supervisory authorities have the ability to adjust numbers and capital requirements if appropriate, and, of course, continue to work with supervisors to reach a consensus on the accounting requirements, but our different perspectives and objectives often lead to slightly different approaches.

The crisis in credit markets, amongst other things, is a crisis of confidence. Confidence that counterparties will be unable to honour transactions has already claimed one large US financial institution with a history dating back over 80 years and frozen interbank lending across the world. It is only when confidence begins to return that credit markets will return to some sense of normality.

It is for this reason that transparency and disclosure must be enhanced, not reduced. Where there is doubt and uncertainty, there will remain a dearth of confidence. Markets and sophisticated investors will not be fooled by simply withholding information vital to making appropriate investment decisions. I believe that the broader debate regarding transparency and disclosure has already been decided by the markets. Investors continue to punish companies who are believed to be failing to disclose their true economic position and reward those are believed to have all of the bad news out on the table.

The IASB is an active participant of the FSF and will continue to respond expeditiously to issues raised by the credit crisis. There is much for all to do, and I am encouraged to see international organisations and central banks working in unison under the auspices of the FSF. Whilst this is not a crisis caused by accounting, the IASB is mindful of its role in identifying solutions to the unprecedented challenges being experienced by markets.

The theme of this report is valuation and its publication is timely. Coupled with planned enhancements to disclosures and guidance, transparency offered by improved accounting guidance is part of the cure, not the disease.

Improving fair value accounting

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The turmoil on international financial markets is proving complex to a degree that few could have anticipated when it initially emerged in the summer of 2007. There is still much uncertainty over the duration and potential impact of this turmoil on the real economy.

This episode has revealed a series of flaws in various areas of the international financial system. One issue on which regulators, supervisors and other interested parties are focusing is the application of fair value. In many cases discussions turn on quantitative and qualitative matters geared to improving valuation methods and their implementation, especially when applied to complex financial instruments. There is also in-depth reflection about what information institutions should provide investors regarding the application of fair value, so that investors may take well-grounded decisions.

Another area of the debate on fair value considers to what extent its application affects management and investment decisions, and particularly how it may exacerbate procyclical behaviour by financial markets.

To examine the relationship between valuation and procyclicality and to identify some solutions to the perverse interaction of the two, the article discusses the advantages of fair value and its limitations, stressing in particular some of the most relevant ones which have emerged during the current financial turmoil. In addition, it puts forward some ideas that might contribute to improving fair value: the use of reserve valuations and of dynamic provisions. It is argued that they can not only improve fair value accounting but also lessen financial procyclicality.

The turmoil on international financial markets is proving complex to a degree that few could have anticipated when it initially emerged in the summer of 2007. There is still much uncertainty over the duration and potential impact of this turmoil on the real economy.

This episode has revealed a series of flaws in various areas of the international financial system. One topic on which regulators, supervisors and other interested parties are focusing is the application of fair value. In many cases discussions turn on quantitative and qualitative (governance) matters geared to improving valuation methods and their implementation, especially when applied to complex financial instruments. There is also in-depth reflection about what information institutions should provide investors regarding the application of fair value, so that investors may take well-grounded decisions.

Another area of the debate on fair value considers to what extent its application affects management and investment decisions, and particularly how it may exacerbate procyclical behaviour by financial markets. The procyclical behaviour of financial agents means that in good times they tend to increase their risk-taking, and financial vulnerabilities thus build up. These vulnerabilities become manifest when the economic cycle turns adverse, prompting changes in market participants' strategies and amplifying the cycle.

Procyclicality is certainly an intrinsic characteristic of financial markets. But beyond a certain point it arguably generates highly adverse effects on long-term growth prospects ("excessive procyclicality"). This is the case especially when it leads to or exacerbates myopic behaviour and excessive short-termist behaviour on the part of financial institutions. The adverse consequences of procyclicality tend to be more intense at times, as at present, when the interplay between asset valuation and leverage has become more important. If valuation methods tend to introduce incentives to increase leverage and mispricing risks, the adjustment process when economic conditions change will be more pronounced, amplifying its adverse impact on the economy. As it is known, leverage and mismatches tend to grow slowly, but downward adjustments occur rapidly.

It would therefore be desirable to introduce incentives to mitigate this procyclical behaviour, and in any event to avoid regulations that might encourage it. Indeed, during the conception of Basel II, procyclicality was a controversial and widely debated topic, and the Basel Committee itself included various mitigating mechanisms in the Accord. On the contrary, and surprisingly, there has been very little debate until recently concerning the new accounting rules financial institutions have to apply.

The use of fair value to approximate the value of financial instruments is nothing new. Its use has gradually increased over time and has gained in significance as specific products, such as derivatives, have become widespread. For these and other financial instruments, valuation at cost has been inadequate in providing a true and fair view of companies. Historical cost is less informative from a time perspective, and is also insensitive to the signals market prices emit, which hampers agents' decision-making and market discipline.

These limitations of cost-based accounting support the use of fair value as the valuation method on which accounting rules should be based. Fair value offers evident advantages in that it provides for a better approximation to the economic reality prevailing at each point in time.

That said, and as will be argued in this article, fair value would need to be perfected in several areas. In particular, it should allow a better evaluation of risks and profits over the business cycle and it should be compatible with promoting financial stability. The current financial turmoil dating back to the summer of 2007 exemplifies the problems of the present conception of fair value, especially when there are no deep and liquid markets (or these are disappearing), and the products being valued are complex.

When markets disappear, and it is no longer possible to use a market price to value financial instruments, it becomes necessary to resort to internal valuation models based on inputs not directly observable in the market and which, in turn, are subject to high procyclicality. In this way, a negative dynamic arises and intensifies the problems as a result of the reaction of investors and bank managers, who act to limit losses.

To examine the relationship between valuation and procyclicality and to identify some solutions to the perverse interaction of the two, the rest of this article is structured as follows. The first section discusses the advantages of fair value and its limitations, stressing in particular some of the most relevant ones which have emerged during the current financial turmoil. The second section analyses factors that might contribute to improving fair value since, as already mentioned, a return to historical cost seems neither viable, possible nor desirable. The final section draws the main conclusions and policy implications.

1| ADVANTAGES AND LIMITATIONS OF FAIR VALUE WHAT HAS THE FINANCIAL TURMOIL TAUGHT US?

Like any other valuation method, fair value cannot be considered to be a perfect description of reality. Accordingly, to assess whether fair value is appropriate, there are two pertinent questions. First, does it offer suitable (reliable, comparable and relevant) information enabling economic agents to take well-grounded investment decisions? And second, what weaknesses does it entail?

1|1 The advantages of fair value

Starting with the advantages, it should be noted that financial innovation in recent decades has developed a series of products for which valuation at cost has no use. A clear example of this are financial derivatives, where fair value has proven to be the only method capable of offering a transparent, relevant and reliable valuation. However, the growing complexity of some of these products, and certain limitations in valuation models, have proven problematic recently. I shall return to this point later.

More broadly, fair value provides additional advantages in that it offers a closer view of the actual situation of financial markets. In other words, and unlike cost-based methods, it enables the information contained in market prices at each point in time to be included, which is useful for those who have to commit funds, or have funds committed, to a financial institution. Likewise, this information is closer to that which institutions themselves use for management purposes, which contributes to introducing appropriate incentives between managers and investors.

Consequently, fair value is associated with greater market discipline, since the action of market players will have a more direct bearing on institutions' decisions. What is more, insofar as investors consider the information in financial statements to be useful and relevant, confidence will be reinforced. Both these matters, greater market discipline and strengthened confidence, entail improvements in terms of efficiency.

Fair value, as indicated, is a market estimation of financial instruments, which is what enables it to include ahead of time all the information available at a given moment. It will thus contribute to detecting potential solvency problems that may be liable to affect institutions, as it will rapidly reflect any deterioration in the quality of their balance sheets.

In sum, the advantages of fair value, and moving beyond the presence of a series of increasingly relevant financial instruments for which valuation at cost is not viable, have to do with improvements in the allocation of resources that internalise the information present in financial markets.

1|2 The disadvantages of fair value

Nonetheless, and as stated, no valuation method is free from limitations, as methods are no more than conventions on how to measure value.

The traditionally disputed limitations of fair value can be grouped around three ideas: the subjectivity of valuation methods; the greater volatility induced; and, in connection with the latter, the excessive emphasis on the short term.

When financial markets are active, the prices traded on them conceivably reflect consensus between buyers and sellers about the future cash flows of financial instruments, and on the degree of uncertainty

surrounding them. Under these circumstances, fair value coincides with market price.

However, there are not always active markets, and prices are therefore not always available for use in applying fair value. In these circumstances, estimating fair value involves the use of valuation methods that allow estimation of what the market price of the financial instrument would be. Irrespective of the model or technique used to develop valuation models, there is some subjectivity in their design. Expressed otherwise, valuation will be affected by the judgement of those who have to develop a model, since they have to take decisions on the theoretical grounds they apply and on the assumptions and simplifications they consider necessary.

Associated with this subjectivity is so-called model risk, *i.e.* the probability that errors will be made in the valuation of a specific instrument owing to the use of inappropriate techniques or to having made assumptions that prove unsatisfactory.

Furthermore, the use of valuation models may give rise to new information asymmetries, creating moral hazard problems. When there are incentives to manipulate the information reported to the markets, the use of valuation models opens up the possibility –which is more evident than when using historical cost– of institutions cherry-picking specific parameters or assumptions, thereby accentuating information asymmetry problems.

Secondly, it has been argued that fair value increases volatility on bank balance sheets, on profit and loss accounts, and consequently on the levels of regulatory capital that banks must hold. As described below, this would intensify the procyclicality of financial markets.

Insofar as fair value takes into consideration market conditions at a specific time, the profit and loss account would be excessively influenced by these potentially very temporary market conditions. This argument would be weightier if the volatility observed on markets were not in response to fundamentals but to spurious reasons. What is more, this volatility might be exacerbated by investors' decisions if they were to act from a short-term perspective motivated by the changes in accounting value reflected in financial information.

The greater sensitivity of fair value to financial market circumstances may affect the behaviour of bank managers, encouraging undesirable behaviour in terms of appropriate risk management. Thus, for example, if a revaluation of assets was reflected in the institution's profits, that might lead to an increase in the dividend pay-out to shareholders, restricting institutions' capacity to soften intertemporal shocks.

If results were affected by greater volatility, this would be transmitted to regulatory capital, contributing to procyclical behaviour by bank managers. The contractionary phase of the cycle may thus be accompanied by an across-the-board fall in valuations, which would feed through to results and to institutions' capacity to generate reserves. This effect would compound the greater requirements attributable to credit risk that are typical in these contractionary phases, insofar as defaults are negatively correlated to GDP. And this at a time in the cycle when institutions would face greater difficulties increasing their own funds through fresh capital. Accordingly, with a view to meeting minimum regulatory capital requirements, bank managers might react by reducing the credit they grant to the real economy, which would entail a highly adverse impact.

Thirdly, and as a result of the greater volatility induced in banks' profits and loss accounts, the use of fair value might create perverse incentives in banks' management decisions, placing excessive emphasis on the short term. These perverse incentives may be specifically perceived in investment decisions, *e.g.* avoiding those sectors in which the volatility of credit ratings is greater, but they will also affect managers when their compensation is linked to accounting results. Managers might therefore benefit by setting greater store by those decisions that result in profits in the short term, without taking sufficiently into account other long-term strategic questions, including those relating to risks taken. Further, in the case of relatively illiquid instruments, managers' short-termist decisions might ultimately affect (or alter) the prices which fair value is actually intended to approximate.

1|3 The limitations exposed by the financial turmoil

The current turmoil in the international financial system has highlighted some of these limitations of fair value.[1] In fact, this is the first time that many of the products developed recently, in particular the most complex ones, have been tested. This is the case, too, for the models which, under the fair value approach, have been used to value such products. It is therefore worth analysing in some detail the implications that may derive from these circumstances.

Since last summer, liquidity on many markets has dried up considerably. Entities that valued specific products using pre-turmoil market prices have been obliged to resort more to mark-to-model valuations, largely based on inputs not directly observable in the markets (default probabilities, correlations between the defaults of a portfolio, etc.). In this transition process, certain fair value implementation weaknesses have come to light.

For one thing, adaptation difficulties have proven more acute for those institutions which, prior to the emergence of the turmoil, resorted to a limited number of information sources in their valuation process to determine the prices at which to value financial instruments, and in particular the most sophisticated and complex instruments. For example, some entities drew excessively on primary market prices as an approximation to the fair value of the products to be valued. Hence, when these markets virtually disappear for specific business segments, valuation problems emerge with greater intensity.

Moreover, difficulties have been greater for those entities which, before the turmoil, had not developed appropriate contingency plans or which had in fact earmarked insufficient resources to the development of fully fledged valuation models (model development, stress testing, laying of contingency plans, etc.).

The lack of liquidity, along with greater valuation problems, became manifest for a set of complex products that were rapidly developed in recent years under the originate-to-distribute banking model. In particular, these products combine and repackage, *via* asset securitisation, new financial instruments that are re-sold to investors. The successive combinations of securitisation tranches substantially alter the distribution of losses on these products, so that the level of risk, which increases with each successive securitisation, is much more difficult to calculate. Beyond the complexities inherent in the valuation of this type of highly sophisticated product, the turmoil has highlighted certain shortcomings which should be taken into consideration.

These models were designed under benign economic conditions, and without due consideration being given to how they would operate if conditions turned adverse. In this respect, the valuation models used have not included all the relevant risk factors and, in particular, they have suffered from the absence of three of these risks: model risk, liquidity risk and counterparty risk. For example, many models have not taken sufficiently into account that the underlyings of a lot of these complex products were US subprime mortgage loans, which were therefore sensitive to changes in interest rates, to house prices and to borrowers' incentives. The correlations between defaults in the subprime loan portfolio behind asset-backed bonds were considerably underestimated.

Ultimately, one element that has characterised the current turmoil, in particular at its onset, has been the lack of investor confidence. It was not clear, first, who was bearing the risks nominally considered to have been transferred, and second, what exposures were actually committed. This lack of transparency has also been evident in relation to the information provided to markets about the models applied to estimate the fair value of the different products.

In order to properly understand financial information, investors need to be able to judge how financial instruments have been valued. For this purpose, they need to know, first, the committed exposures, and second, how they are being valued: which techniques are applied, which inputs are used, what assumptions have been made and what is the degree of sensitivity of the valuation to the emergence of different scenarios.

1 *See, for example, CEBS (June 2008), FSF (April 2008), BCBS (June 2008) and the Banco de España FSR (04/2008).*

In sum, the financial turmoil has highlighted significant weaknesses regarding the implementation of fair value in at least three areas. First, from a quantitative standpoint, it has exposed shortcomings in the design of valuation models, which have not properly captured the characteristics of the most complex products. Second, from a more qualitative perspective, it has highlighted governance problems, in that systems have not been appropriately designed to verify and test the valuations made. And third, the information reported to the market does not appear to have been sufficient to allow users of such information to understand it.

These implementation-related limitations of fair value have affected agents' behaviour, offering arguments in favour of the general limitations indicated earlier. In particular, fair value has been seen to induce greater procyclicality in certain circumstances.

Indeed, investors in the most senior securitisation tranches were not prepared to manage much higher levels of risk than those initially considered. These types of instruments, generally included in the trading portfolio, rapidly began to lose value, meaning that many investors took the decision to sell once the value fell below specific thresholds in the fair value of the instrument. This process exerted downward pressure on valuations, feeding back into further declines. The final effect has been a very significant impact on the profit and loss accounts of numerous institutions, many of which have had to shore up their capital position under difficult market conditions.

2| Is it possible to improve fair value?

As argued so far, a return to valuation at cost appears to be neither feasible nor desirable. Yet the application of fair value under very adverse financial market conditions has highlighted significant limitations which bear negatively on financial stability. Improving its functioning would appear to be necessary.

This section is intended to offer some thoughts that may contribute to the debate on how to design an accounting framework capable of combining two requirements of great importance for the financial system: to offer relevant, reliable and comparable information so that investors may make their investment decisions appropriately; and, at the same time, to contribute to financial stability, or at least to limit the incentives which, from the regulatory angle, may contribute to impairing stability.

In other words, improving fair value will involve seeking valuation mechanisms that give a truer and fairer view of the risks and profits institutions take during the cycle. There are two potentially useful approaches here.

2|1 Valuation reserves

Firstly, institutions could set aside valuation reserves for those more complex structured products that are mark-to-model. These reserves would entail the recognition, in accounting terms, of the uncertainty associated with the calculation of fair value under specific circumstances.

As earlier stated, many of the problems of applying fair value concern the very complexity of the products to be valued, and the speed with which market conditions may deteriorate at a given moment. Consequently, it can be extremely difficult to make estimates of certain inputs that are necessary in the valuation models, and which moreover are not (or may cease to be) observable in the markets.

Faced with these difficulties, it is worth performing different stress tests envisaging different possible scenarios. That provides a measure of the degree of uncertainty surrounding the valuation of a specific instrument at a given time. Ideally, institutions should therefore reflect these measurements of uncertainty in their financial statements: objective and transparent valuation reserves might play a useful role. For example, among other inputs valuation models require estimates of probabilities and of loss given defaults. Estimating these is, especially for the more sophisticated products, complex and may be subject to a high degree of uncertainty. Accordingly, banks should have different estimates of the fair value of the instrument depending on the distinct values these inputs may take given different assumptions and scenarios. Institutions

should reflect in their accounts the estimation of the fair value of the instrument, along with a valuation reserve that reflects the uncertainties surrounding this estimation.

As earlier stated, the valuation reserves should be objective and transparent. And two further qualifying conditions should be added here. First, they should be symmetrical. That is to say, these reserves have to function both in the good times of the cycle and when economic conditions turn adverse. In other words, it is not a question of generating buffers to face difficulties, but of improving the valuation of complex financial instruments by explicitly and transparently incorporating the uncertainty that surrounds the valuation.

Secondly, and running counter to a view widely held at present, fair value implementation problems do not emerge *ex novo* when economic and financial conditions turn adverse; they already exist in good times. It is precisely in these periods when agents act with excessive optimism, valuing risks inappropriately. Can it be disputed at present that the losses being posted do not stem from the excesses committed in the prior years of strong economic growth? This is why the valuation reserves should act at all times so as to offer a more appropriate valuation of the instruments for which valuation models are needed.

All in all, the inclusion of valuation reserves gives a truer measurement of the value of the instrument than that which would be obtained from a direct application of a point estimate of its fair value, since it reflects explicitly in the financial statements a measurement of the degree of uncertainty that institutions manage when they are valuing instruments. Accordingly, investors may take their decisions on a firmer basis.

2|2 Dynamic provisions

The second mechanism that might help improve fair value is dynamic provisions. These are, in fact, a good measurement of the fair value of a loan portfolio.

Conceptually, provisions should be understood as adjustments to the book value of the loans on deposit institutions' balance sheets. These adjustments take into consideration the impact that the credit risk borne by the institutions entails for these loans.

Debate turns on whether this correction in value should envisage exclusively the specific losses that may be identified for specific loans as of the date of the financial statements, or whether consideration should also be given to the losses that the institution, aware that it has incurred them, cannot specifically identify at the level of each individual loan.

In other words, is it reasonable that investors should be surprised in the future by what is already known is going to happen, or is it better that they should have this information when they are about to take their decisions? What better contributes to the true and fair view of banks reporting financial information?

In the field of credit risk, saying that "it is known what is going to happen" is no more than verifying a fact highlighted both by the supervisory experience and by the economic literature. Drawing on supervisory experience, several episodes of financial instability have shown that, following periods of strong credit expansion, the risks that have built up materialise in the form of defaults. It seems difficult to counter the argument that the losses affecting a good number of international banks today respond to the excesses committed by their managers during the long expansionary phase preceding the financial turmoil.

The economic literature, from an empirical viewpoint, has also found firm evidence of a positive relationship between processes of rapid credit growth and losses attributable to credit risk,[2] which emerge with a certain lag. Theoretically, various arguments have been used relating to information asymmetry and to problems of incentives, which justify this relationship between credit growth and default.[3] In other words, at good times in the business cycle risks tend to be underestimated, and build up in bank balance sheets.

Therefore, there are objective, well-founded reasons both in the supervisory experience and in

2 *See Jiménez and Saurina (2006).*
3 *During economic booms bank managers tend to underweight the possibility of bad borrowers being financed (the opposite happens during recessions). The literature offers several explanations to rationalise fluctuations in credit policies, such as herd behaviour (See Rajan, 1994), agency problems (See Williamson, 1963) and the so-called institutional memory hypothesis (See Berger and Udell, 2004). Borio (2007) summarises the main factors that explain why during good times it is possible to observe an overextension in risk-taking.*

economic theory to justify the fact that a correct valuation of loans in the credit portfolio should also include the factors of risk which, though they have not been specified at the level of individual loans, can in fact be quantified through statistical procedures. The absence of value corrections for these reasons distorts the true and fair view that financial information should provide, hampering decision-making by investors. Dynamic provisions, as an approximation to the fair value of banks' loan portfolios, mitigate the fact that, at favourable times in the cycle, risks are assumed and build up but are only disclosed with a delay in financial institutions' profit and loss accounts.

With regard to improving fair value through the two methods proposed (valuation reserves and dynamic provisions), it should be borne in mind that two instruments are involved that would be totally objective and transparent for investors, so that the latter may have the fullest information possible.

There are two further arguments in favour of valuation reserves and of dynamic provisions. The first takes into account the fact that the information reported in the financial statements should ideally converge with that which institutions use for management decision-making. Conceivably, managers will have to consider what uncertainty surrounds their valuations for the different financial instruments; it may likewise be assumed that when they analyse the credit quality of their balance sheet, they will bear in mind the best estimate available of credit risk losses. If these two assumptions are correct, improving fair value in this direction will contribute to bringing the information analysed by managers and investors into line. Should managers fail to take into account risks and profits over the cycle in their decision-making, the introduction of the proposed changes to fair value will help them do so. And that is good for risk management while, at the same time, investors are offered better information.

The second of these arguments in favour of valuation reserves and of dynamic provisions is that mechanisms are involved that not only offer a truer and fairer view of the bank, but which also contribute to mitigating the current procyclicality of accounting rules, and in general the procyclical behaviour proper to financial market participants. That is to say, both measures favour a longer-term view, and in particular one "through the cycle", both for managers and for those who need to evaluate the risk profile of banks.

2|3 General principles for the review of fair value

Beyond the specific instruments that may be considered, the significance of which has been outlined, there is a series of general guiding principles that are relevant when reviewing fair value. These are listed below.

Search for better valuations

This principle should be binding both in the more quantitative aspects referring to valuation models (consideration of all the necessary factors of risk; use of tried and tested methodologies, etc.) and as regards providing a more realistic view of the risks and profits associated with business activity throughout the cycle (*e.g.* through dynamic provisions and valuation reserves).

Minimise the procyclical impact induced by fair value

It should be acknowledged that, during the favourable phases in the cycle, financial market participants display a natural behaviour that leads them to build up a series of risks which, when the situation turns adverse, tend to materialise. Accounting rules should not encourage this type of behaviour. From the standpoint of the application of fair value, the use of dynamic provisions and of valuation reserves may contribute to mitigating such risks.

Governance

Both quantitative and qualitative aspects are relevant in the implementation of valuation models. Sufficient resources should be set aside, and models should be revised and tested by independent units and subjected to different stress tests, among other considerations.

TRANSPARENCY

So that investors may take well-founded investment decisions, they need to be able to receive the necessary information. It will not only be important to know the volume of exposures valued by means of fair value, but also matters relating to the valuation method and inputs used, to the assumptions made and to those aspects that may contribute to users' better understanding of the financial information.

This article proposes a debate on the suitability of fair value as a valuation method, in the light of the dysfunctions that the current financial turmoil has highlighted.

The main argument holds that accounting rules relating to asset valuation involve the application of fair value as the best standard for providing final users of financial statements with relevant, reliable and comparable information. However, it is proposed that fair value needs to be improved in order to strengthen the relevance, reliability and comparability of information. This can be done through two specific mechanisms (dynamic provisions and valuation reserves) within the framework of some more general guiding principles for this review process.

Regarding the two specific mechanisms discussed, both share important characteristics that are relevant in terms of their effectiveness and usefulness for market participants: objectiveness, transparency and symmetry throughout the business cycle. As to the general principles, these are: the search for better valuations; minimising the procyclical impact induced by fair value; strengthening governance; and promoting transparency.

Importantly, at the level of financial institutions, the proposed change in fair value should enable the quality of the information understood in the aforementioned terms to be compatible with the application of best practices in risk management, in order to restrict the generation of inappropriate incentives that may impair the stability of the financial system. While fair value is a step forward when compared, for instance, with cost valuation, the current turmoil very clearly shows that it is by no means the end of the road. Let us continue along it.

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Résumés

La valorisation aux prix de marché convient-elle aux institutions financières ?

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Les mérites de la comptabilisation en valeur de marché pour les institutions financières font depuis un certain temps l'objet d'un débat animé. Beaucoup estiment que les prix de marché constituent la meilleure estimation de la valeur, et qu'il convient de les utiliser systématiquement. Cependant, d'autres suggèrent qu'en période de crise, les prix de marché ne reflètent pas bien la valeur réelle et que leur utilisation peut entraîner de graves distorsions. Cet article décrit les circonstances dans lesquelles les prix de marché mesurent correctement le rendement futur et celles dans lesquelles ce n'est pas le cas en raison des imperfections du marché. À notre avis, dans des situations de crise financière caractérisées par une rareté de la liquidité et la faiblesse des prix qui s'ensuit, il convient de compléter la valorisation aux prix de marché à la fois par des valorisations à partir d'un modèle et par des valorisations fondées aux coûts historiques. Le reste du temps, et en particulier lorsque les prix d'actifs sont faibles parce que les anticipations de flux de revenus futurs ont diminué, il convient en revanche de valoriser les actifs à leur valeur de marché.

Définir un cadre adapté au fonctionnement de marchés de capitaux modernes – Les leçons de la crise récente

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La crise financière actuelle marque un tournant qui nécessitera une action globale de la part du secteur financier afin de rétablir la confiance vis-à-vis des établissements financiers en général et du marché des produits de crédit structurés en particulier. Le modèle *originate-and-distribute* (octroi puis cession de crédits) subsistera mais il fera l'objet de modifications et obligera les banques à améliorer leurs modes de gestion. Les infrastructures des marchés de produits dérivés, les processus de gestion des risques et la gestion de la liquidité constituent les principaux axes d'amélioration. S'agissant des aspects liés à la valorisation, les tentatives de réforme devront tenir compte du fait qu'il ne s'agit pas seulement d'un problème de comptabilisation. Les modifications mises en œuvre devront préserver les avantages de la comptabilisation en juste valeur mais, dans le même temps, résoudre les problèmes d'illiquidité des marchés, de procyclicité et de cohérence entre les normes comptables.

Révision des pratiques de valorisation sur l'ensemble du cycle économique : davantage de symétrie est nécessaire

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La crise actuelle a mis en évidence les faiblesses de l'application des normes comptables et les écarts résultant de la valorisation des produits financiers. Pendant la période d'expansion, la réévaluation des actifs, l'accumulation de créances hors bilan et la comptabilisation de gains latents ont brouillé l'exposition des établissements financiers au risque. Mais, nous le savons aujourd'hui, lorsque les cycles se retournent, les tendances baissières et les incertitudes planant sur la valeur des actifs peuvent engendrer une dynamique négative qui risque d'exagérer le creux du cycle. Ce fait est généralement admis, mais nous devons faire preuve de davantage de symétrie dans notre approche : lorsque les valorisations progressent en phase d'expansion, il est également plus tentant, grâce à l'augmentation des bénéfices, des rémunérations et des dividendes, d'acheter davantage de ces actifs qui s'apprécient, ce qui exacerbe le pic. D'où des questions légitimes concernant le rôle des systèmes de gestion du risque, des normes comptables et de la réglementation dans la création des incitations adéquates et dans la communication des informations sur le profil de risque des entités financières tout au long du cycle économique. Plus fondamentalement, on se demande si la valorisation à la valeur du marché procure la représentation objective nécessaire ou peut au contraire contribuer à

fausser le prix du risque pendant les périodes d'expansion en gonflant artificiellement le risque pendant les phases de repli, ce qui altère la valeur informative des prix.

Changer de normes comptables au plus fort de la crise risquerait de porter atteinte à la confiance des investisseurs et il convient donc de s'en garder. De plus, il faut tendre vers la comptabilisation à la juste valeur, mais en réexaminant les conséquences des normes comptables sur les comportements et les incitations, surtout en période d'expansion, afin de pouvoir amender les pratiques actuelles. Les incohérences entre les règles comptables, les meilleures pratiques de gestion du risque et les normes prudentielles peuvent coûter très cher en termes de stabilité financière. Il convient d'améliorer la gouvernance et la gestion du risque au sein des établissements financiers, et les autorités de contrôle doivent examiner plus attentivement les contrôles et les processus internes, ainsi que les méthodes de valorisation et de simulation de crise.

Valorisation et fondamentaux

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Cet article n'a pas pour objet de fournir une description exhaustive de la crise financière qui a commencé il y a un an. Cela a déjà été effectué de façon très complète et convaincante, notamment par Borio (2008), Brunnermeier (2008), Crouhy *et al.* (2008) et Calomiris (2008), qui décrivent et analysent les nombreux éléments déclencheurs et les mécanismes par lesquels la crise est apparue et s'est propagée sur les principales places financières. Nous souhaitons en revanche nous consacrer à ce que nous considérons comme l'une des questions fondamentales de cette crise, qui n'a pas encore été traitée : il s'agit de la valorisation.

La valorisation se trouve à la confluence de la dynamique de marché, du comportement économique, des normes comptables et des règles prudentielles. Les interactions multiples, et mêmes systémiques (en ce qui concerne l'épisode actuel), entre ces différents éléments, associées à l'incapacité des intervenants de marché de valoriser des instruments financiers complexes au sein de marchés illiquides/tendus, ont entraîné un effondrement financier qui est déjà considéré par de nombreux observateurs comme la pire crise financière depuis la Grande crise des années trente.

La prise en compte des événements extrêmes pour la valorisation d'options européennes

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Selon les modèles traditionnels de valorisation d'options (Black et Scholes, 1973), les marchés financiers sous-évalueraient l'influence des risques extrêmes.

Dans cet article, nous proposons un modèle d'évaluation d'options européennes fondé sur des hypothèses garantissant entre autres une meilleure prise en compte des événements extrêmes.

À partir de simulations, nous comparons les prix d'options obtenus à partir du modèle classique de Black et Scholes, à ceux résultant de notre modèle. Nous montrons que le modèle traditionnel conduit à une surévaluation des options « à la monnaie » qui sont les plus échangées sur le marché. Les options « dans la monnaie » et « hors la monnaie », les moins liquides, sont en revanche sous-évaluées.

Juste valeur et stabilité financière : enjeux de marché et dynamiques stratégiques

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La juste valeur a joué un rôle particulier dans la crise actuelle, et son application soulève un certain nombre d'interrogations. Si les instances de normalisation comptables s'attellent à certains aspects, d'autres revêtent une dimension plus macroéconomique.

En ce qui concerne les inconvénients immédiats de l'approche en juste valeur, tant les instances de normalisation que les superviseurs bancaires travaillent à l'élaboration de recommandations sur les modalités de valorisation des instruments financiers en période de crise et sur les procédures internes que les établissements financiers doivent mettre en place.

Cependant, cette crise a également mis en lumière des aspects plus macroéconomiques, liés à l'application généralisée de la juste valeur. À cet égard, les banques centrales, de par la vision globale qu'elles ont du système financier et leur rôle crucial sur les marchés financiers, semblent bien placées pour jouer le rôle de gardien de la stabilité financière. Afin qu'elles puissent remplir cette fonction de façon optimale, un renforcement de la coopération entre banques centrales, instances de normalisation comptables et superviseurs est souhaitable.

Comment réagir face aux bulles des prix d'actifs ?

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Cette étude tente de déterminer comment la politique économique doit réagir face à d'éventuelles bulles des prix d'actifs. Elle cherche à répondre à trois questions.

- Certaines bulles sont-elles plus problématiques que d'autres ?
- Quelle doit être la réaction de la politique monétaire ?
- Quelles sont les autres solutions appropriées ?

Ma conclusion est que les bulles des prix d'actifs qui sont associées à des périodes d'expansion du crédit sont particulièrement préoccupantes, car leur éclatement peut engendrer des épisodes d'instabilité financière, avec des effets délétères sur l'économie. Ce n'est pas aux bulles elles-mêmes que la politique monétaire doit réagir, mais plutôt à l'évolution des perspectives d'inflation et de la demande globale qui résultent des mouvements des prix d'actifs. Néanmoins, le cadre réglementaire et les pratiques de supervision doivent permettre d'agir sur ces bulles tout en empêchant l'interaction entre celles-ci et l'offre de crédit, afin de limiter les conséquences dommageables pour l'économie.

Réglementation, valorisation et liquidité systémique

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Il est largement admis que les normes comptables internationales (IFRS), adoptées par l'Union européenne en 2005 ainsi que par d'autres juridictions, ont aggravé la récente crise financière. L'application de la norme IAS 39, qui régit les modalités de mise en oeuvre des provisions et élargit le champ d'application de la valorisation à la juste valeur, a eu pour effet, lorsque les prix des actifs de crédit ont sensiblement diminué en 2007 entraînant ainsi des dépréciations massives, d'obliger les établissements à se procurer du *cash* en vendant des actifs, ce qui a alimenté un cercle vicieux de nouvelles dépréciations et de nouvelles ventes. La volatilité liée à la valorisation au prix du marché a renforcé l'instabilité de cette dynamique en dissuadant les nouveaux acheteurs d'entrer sur le marché. Les règles comptables de juste valeur sont donc procycliques et peuvent contribuer à la disparition systémique de la liquidité. Le prix des actifs qui devaient être vendus immédiatement est tombé à un niveau largement inférieur au prix théorique de ces mêmes actifs si on les avait conservés jusqu'à l'échéance ou sur une certaine durée au-delà de la crise. Cette prime de liquidité ne représentait plus une fraction de point de pourcentage, mais des dizaines de points de pourcentage. Un certain nombre d'observateurs en ont conclu que la valorisation au prix du marché devrait être suspendue en période de crise. Je pense que cette initiative, par elle-même, affaiblirait encore les incitations à prêter de façon responsable lors des périodes favorables, sans pour

autant résoudre le problème en période défavorable. L'utilisation procyclique des prix de marché n'est pas l'apanage des normes comptables : elle se trouve également au cœur de la réglementation financière moderne.

Les effondrements financiers ne se produisent pas par hasard. Ils suivent toujours des périodes de fortes hausses des prix des actifs. L'exemption de la valorisation au prix du marché ou d'autres règles lors d'une crise, puis l'utilisation de ces règles à d'autres moments, comme lors de l'expansion précédente, favoriseraient un comportement laxiste d'octroi de prêts et un endettement excessif lors des périodes favorables. Cette asymétrie contribuerait à provoquer des crises plus fréquentes et plus fortes. Par ailleurs, les crises sont des périodes au cours desquelles une rumeur devient une prophétie auto-réalisatrice, à mesure que la panique et la peur se répandent. Ce n'est certainement pas le moment d'accroître l'incertitude en modifiant les normes comptables. Il est certes nécessaire de réviser l'application des règles de valorisation au prix du marché, mais il ne s'agit pas d'accorder une confiance aveugle au « messager » lors des périodes favorables et de l'éliminer en période de crise.

Toutefois, les mécanismes qui conduisent les intervenants de marché à accueillir les baisses de prix par des ordres de vente ne sont pas exclusivement liés à la comptabilisation en juste valeur. Les prix courants, y compris les prix au comptant et à terme, jouent un rôle important dans les systèmes de gestion du risque de marché et du risque de crédit approuvés par les régulateurs du système financier. Les limites de risque et les ordres de vente sont déclenchés par une hausse de la volatilité des prix et/ou par une baisse des cours. La philosophie même de la réglementation bancaire actuelle (la sensibilité au risque) consiste à intégrer les prix du marché dans l'évaluation du risque et la réponse qui lui est apportée. Si les prix (au comptant et à terme) sont procycliques, le fait de leur accorder davantage d'importance dans la gestion et la réglementation du risque nous entraînera, sans grande surprise, dans une spirale d'effondrement systémique. Cet article examine le rôle de la valorisation et la liquidité systémique et démontre que si notre utilisation de la valorisation au prix du marché et des prix du marché ou du risque était davantage inspirée par une vision économique, une telle approche pourrait améliorer la résilience systémique du système financier.

Comptabilisation en juste valeur et stabilité financière

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Les prix de marché donnent des signaux appropriés susceptibles d'aider la prise de décision des investisseurs. Toutefois, en présence d'incitations faussées et de marchés illiquides, d'autres effets moins favorables introduisent une volatilité artificielle qui perturbe les décisions réelles. Dans un contexte de valorisation en valeur de marché, les variations des prix des actifs apparaissent immédiatement dans les bilans des intermédiaires financiers et provoquent des réactions de leur part. Les banques et les intermédiaires financiers ont toujours réagi aux évolutions de l'environnement économique, mais la valorisation en valeur de marché amplifie et développe de leur part des réactions synchrones, aggravant ainsi les répercussions sur les marchés de capitaux.

Pour les actifs s'échangeant sur les marchés liquides (comme les actions cotées), la comptabilisation en valeur de marché est préférable à la comptabilisation au coût historique en termes d'arbitrages économiques. Mais pour les actifs et les engagements, à long terme et illiquides (comme les prêts bancaires et les engagements des sociétés d'assurance), cette dernière est préférable. Nous passons en revue les effets et les avantages respectifs de ces deux modes de comptabilisation.

La procyclicité des systèmes financiers : faut-il modifier les règles comptables actuelles ?

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Les systèmes financiers ont intrinsèquement tendance à accentuer les fluctuations du cycle d'activité plutôt qu'à les éliminer et la crise actuelle en est la parfaite illustration. Selon certains experts, les réformes récentes de la réglementation bancaire internationale (Bâle II) et des règles comptables (IAS 39) pourraient, désormais, accentuer cette procyclicité intrinsèque. Le présent article analyse le bien-fondé de cette accusation et étudie les mesures qui pourraient être envisagées afin d'atténuer cette caractéristique indésirable des systèmes financiers.

Valorisation dans l'assurance et crise financière

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Au cours de la récente crise financière, la question de la valorisation des actifs est revenue assez systématiquement sur le devant de la scène, en raison à la fois des fortes fluctuations enregistrées par de nombreux actifs qui en rendent difficile la mesure économique, mais aussi en raison des conséquences que ces fluctuations peuvent avoir sur le comportement des agents qui ont à présenter des comptes annuels, voire semestriels ou trimestriels. Si cette question a moins été vue comme la cause de la crise, elle a néanmoins été considérée comme une source potentielle d'amplification de celle-ci, bien que l'on n'ait pas encore observé, à la date où cet article est rédigé (début juillet), de comportements de vente massive de grandes classes d'actifs (actions ou obligations d'entreprise notamment).

La question de la valorisation des actifs et des passifs se pose tout spécialement pour le secteur de l'assurance. Ce secteur, en raison de ses spécificités, pose en effet des problèmes tout particuliers, qui loin d'être moins aigus que dans les autres secteurs, notamment dans la banque, ont tendance à les amplifier. Ce n'est d'ailleurs pas par hasard si le seul secteur à avoir bénéficié d'un régime transitoire dans l'application des nouvelles normes comptables internationales est l'assurance, ceci en raison de la difficulté rencontrée par l'International Accounting Standards Board (IASB) à trouver une solution pertinente pour la valorisation des passifs d'assurance. De même, ce n'est pas un hasard si la crise des valeurs internet a été brutalement aggravée en 2002-2003 par la liquidation massive de leur portefeuille d'actions par les compagnies d'assurance et de réassurance qui, passé un certain seuil, ont craint les conséquences dommageables d'une poursuite de la baisse des actions sur leur bilan et leur solvabilité. Le souvenir de ce dernier évènement, qui a pris, brutalement et de façon totalement imprévue, la tournure d'un risque systémique pour le secteur financier international, est récemment revenu à l'esprit lorsque la chute des actions s'est accélérée dans le monde suite à l'envolée des prix du pétrole et de l'inflation. La question de la valorisation des passifs et des actifs d'assurance ne pose donc pas seulement un problème microéconomique pour l'appréciation de la solidité financière des compagnies d'assurance et de réassurance. Il pose aussi un problème macroéconomique pour le financement de l'économie et la stabilité financière.

Dans la suite de l'article, on se propose d'examiner, dans une première partie, les problèmes économiques posés par la valorisation des actifs et des passifs en assurance et en réassurance. Dans une seconde partie, on analyse la pertinence des standards comptables aujourd'hui en compétition, pour conclure que ceux-ci ne résolvent que très imparfaitement les problèmes posés par la valorisation en assurance. Dans une troisième partie, on analyse les conséquences de ces problèmes pour la stabilité financière, en termes de solvabilité des compagnies, de financement de l'économie et de capacité d'absorption des chocs, pour conclure qu'ils sont significativement plus importants qu'on ne le suppose souvent.

Instiller de la transparence dans l'information financière : vers l'amélioration du cadre comptable après la crise du crédit

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President, **International Accounting Standards Board**

La crise du crédit est, entre autres, une crise de confiance. Ce qui hier était considéré comme un problème limité à des pertes sur les prêts hypothécaires *subprime* américains s'étend aujourd'hui à toute la sphère financière mondiale. On ne sait pas avec précision où ces pertes sont localisées à présent, ce qui entraîne un recul notable de l'activité financière et économique.

La confiance ne reviendra que lorsque les investisseurs seront certains que toute la lumière a été faite sur l'ampleur et la localisation réelles de ces pertes. Pour cela, et contrairement aux chants de certaines sirènes, le système financier a besoin de davantage de transparence et de communication, et non de moins. L'International Accounting Standards Board (IASB) est conscient de ses responsabilités et cherche, avec le Forum de Stabilité Financière (FSF), à améliorer l'information financière dans un certain nombre de domaines clés.

Améliorer la comptabilisation en juste valeur

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Les turbulences sur les marchés de capitaux internationaux se révèlent beaucoup plus complexes qu'on aurait pu le prévoir lorsqu'elles ont débuté durant l'été 2007. Une grande incertitude persiste quant à la durée et à l'incidence potentielle de ces perturbations sur l'économie réelle.

Cet épisode a mis en évidence une série d'imperfections sur différents compartiments du système financier international. L'application de la juste valeur est l'une des questions sur lesquelles se penchent les autorités de régulation et de surveillance ainsi que les autres parties prenantes. Dans de nombreux cas, les débats portent sur des questions quantitatives et qualitatives axées sur l'amélioration des méthodes de valorisation et leur mise en œuvre, notamment lorsqu'elles s'appliquent à des instruments financiers complexes. Une réflexion approfondie est également menée s'agissant des informations que les établissements doivent fournir aux investisseurs en ce qui concerne l'application de la juste valeur, afin que ces derniers puissent prendre des décisions mûrement réfléchies.

Les débats relatifs à la juste valeur examinent également dans quelle mesure son application exerce une incidence sur les décisions en matière de gestion et d'investissement et notamment sur la façon dont elle peut accentuer le comportement procyclique des marchés financiers.

Pour étudier la relation entre la valorisation et la procyclicité et trouver des solutions à l'interaction perverse entre les deux, le présent article analyse les avantages de la juste valeur et ses limites, en mettant l'accent sur les plus importantes, qui sont apparues au cours des récentes turbulences financières. Cet article présente en outre quelques idées susceptibles de contribuer à l'amélioration de la juste valeur, comme l'utilisation de réserves de réévaluation et du provisionnement dynamique, qui pourraient, selon certains, non seulement améliorer la comptabilisation en juste valeur mais également diminuer la procyclicité financière.

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