

# 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.

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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

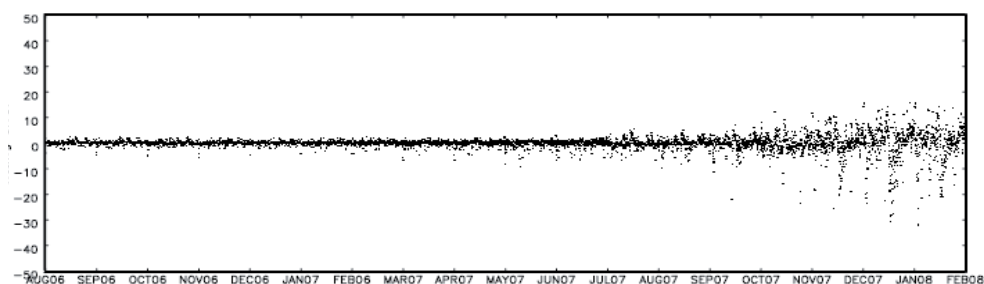
assets. The direct consequence of this uncertainty regarding asset valuation has been a general distrust between counterparties. This distrust has already resulted in: a breakdown in the most liquid markets, such as commercial paper markets since August 2007; a durable impairment in the functioning of 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

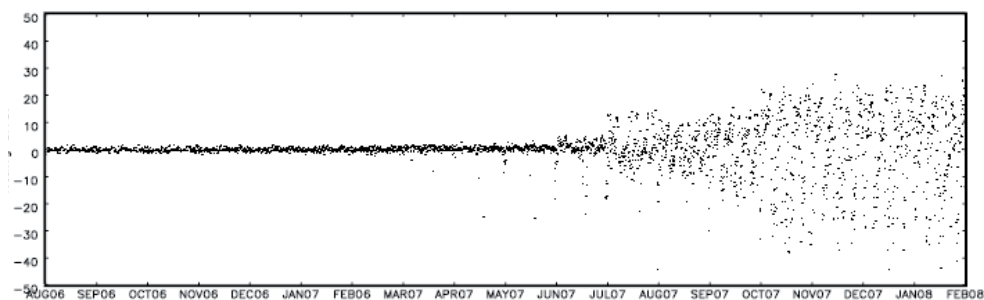
**Chart 1**  
**Rated home equity loan ABS tranches**

(Y-axis: fitting error)

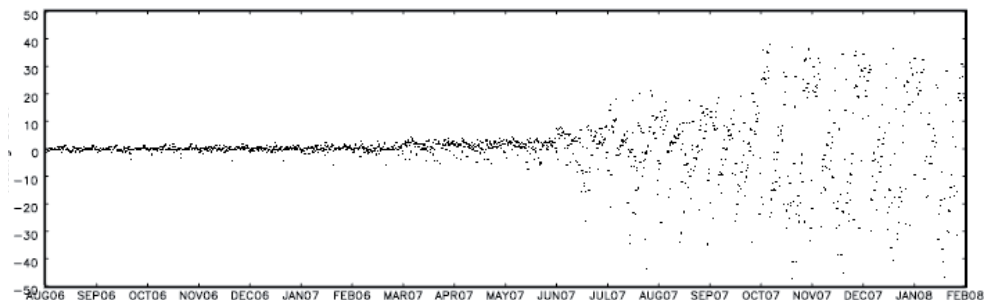
AAA—



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.<sup>1</sup> 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.<sup>2</sup> 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.<sup>3</sup> At some point however, the tendency to underestimate the probability of a collapse in real estate prices is exacerbated.

<sup>1</sup> See Caballero (2006).

<sup>2</sup> See Fisher (1933); Bernanke et al. (1999).

<sup>3</sup> 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,<sup>1</sup> 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.

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).

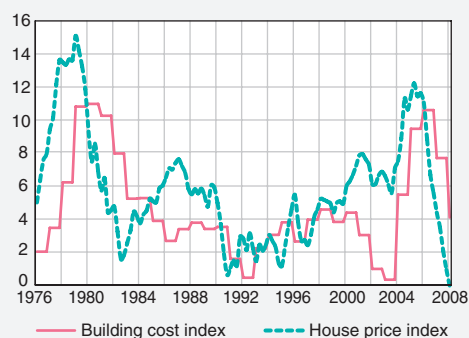
<sup>1</sup> The most commonly-used affordability index is published by the National Association of Realtors. It is defined as:

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

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

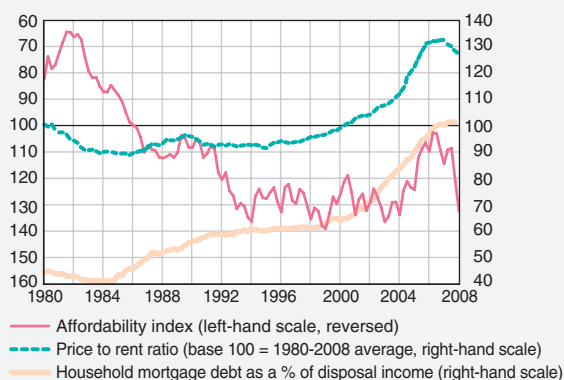
## House prices and building cost index

(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.

This can lead to "disaster myopia",<sup>4</sup> 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.<sup>5</sup>

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<sup>6</sup> and thus may not accurately take into account "fat tail risk".<sup>7</sup> It is also sensitive to market condition, and in particular low volatilities.<sup>5</sup> 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.<sup>8</sup>

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.<sup>9</sup> The collateral's cash flows are allocated

<sup>4</sup> See Guttentag and Herring (1984).

<sup>5</sup> International Monetary Fund (2007).

<sup>6</sup> 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). Danielsson reports that under normal distribution, such an event happens with probability  $10^{-40}$  years (to be compared to the estimated age of the universe  $10^{10}$  years).

<sup>7</sup> See Landau (2008).

<sup>8</sup> See Ashcraft and Schuermann (2007).

<sup>9</sup> 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.<sup>10</sup> 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:<sup>11</sup> 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.<sup>12</sup> 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.<sup>13</sup> 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

<sup>10</sup> See Crouhy *et al.*, 2008.

<sup>11</sup> 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.

<sup>12</sup> See Matherat in this issue of the Financial Stability Review.

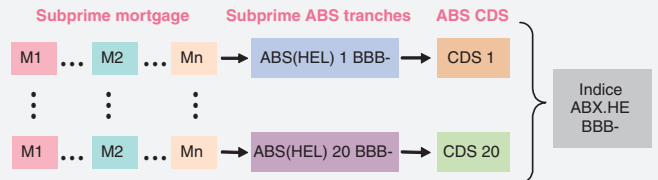
<sup>13</sup> See Box 3.

**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-)**

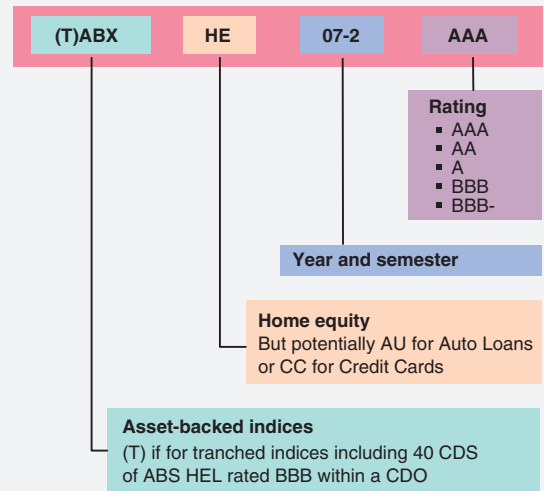


**How does it work?**

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 to par gives the value of underlying bonds compared to their initial notional value.

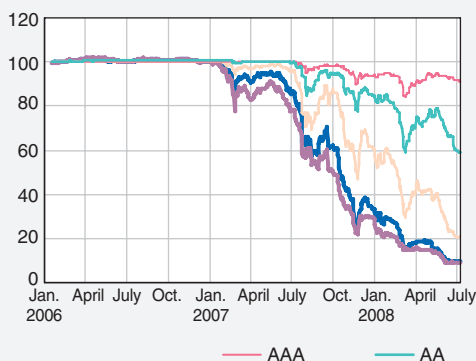
**ABX home equity indices at par**



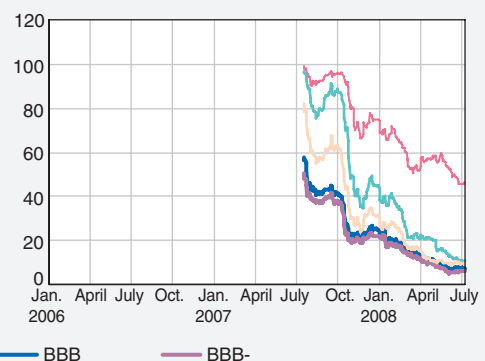
**ABX home equity indices quote/par**

(as a %)

**ABX.HE 06-1**



**ABX.HE 07-2**



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<sup>14</sup> 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.<sup>15</sup>

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

<sup>14</sup> See, for instance, Fender and Kiff (2004).

<sup>15</sup> 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.

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<sup>1</sup> 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.

<sup>1</sup> 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).

	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.)

from forced transactions, involuntary liquidations or distressed sales. Until now the international auditing profession<sup>16</sup> 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.<sup>17</sup> 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

<sup>16</sup> 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.

<sup>17</sup> 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.<sup>18</sup> 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.<sup>19</sup> 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).<sup>20</sup>

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.<sup>21</sup> 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<sup>1</sup>), 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.*

.../...

<sup>1</sup> 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").

<sup>18</sup> See International Monetary Fund (2008).

<sup>19</sup> See Financial Stability Forum (2008).

<sup>20</sup> Auditing Accounting Estimates, including fair value accounting estimates, and related disclosures.

<sup>21</sup> 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 disclose 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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