Risk and Trend Mapping - n°4

ANALYSIS OF SUBPRIME RMBS RATINGS IN THE USA

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Executive Summary

Financial markets experienced major upheavals in 2007. The impact of ill-managed distribution of mortgages in the USA, especially during the downturn in housing market that has started in the second half of 2005 and persisted throughout 2006, was spread by risk transmission mechanisms and finally erupted into a global liquidity crisis, commonly referred to as the "subprime" crisis. Securitisation was the main channel through which the problems of the US housing market rippled outward. This is because, at the same time, subprime loans were almost systematically refinanced through primary securitisation vehicles such as residential mortgage-backed securities (RMBS) and then through secondary vehicles such as collateralised debt obligations (CDOs).

Credit rating agencies (CRAs) became, for the most part, the focus of the discussions triggered by the subprime crisis, and questions were asked about their role in assessing the credit risk of securitisation vehicles. Specifically, issues were raised on the way that CRAs monitored credit risk in subprime RMBS and, more generally, on the whole process of rating structured finance products, such as potential conflicts of interest and the volatility of the ratings assigned to highly complex vehicles.

This report looks at CRAs' behaviour towards subprime RMBS over the first ten months of 2007. The analysis is essentially factual and yields the following observations:

- CRAs made a large number of rating downgrades to subprime RMBS, concerning EUR 73 billion worth of separate tranches. This is equivalent to some 9% of the total USD 820 billion outstanding in these instruments. Two-thirds of outstanding amounts initially categorised as "speculative" were downgraded, whereas the proportion of downgrades originally categorised as investment grade was around 5%;

- The downgrades were clustered on several key dates in July, August and October. Most of them coincided with significant changes in agencies' methodologies and large-scale reassessment of default risks on the underlying subprime loans. The bulk of the downgrades concerned recent tranches (2005 and 2006 vintages), which were issued at a time when pressures in the real estate market were already visible, especially in higher mortgage default rates;

- The extent of the rating changes was greater than in previous years: nearly half of them involved a transition to ratings in the speculative category. Moreover, ratings were highly unstable, insofar as a large number of tranches experienced successive downgrades during the review period.

The RMBS downgrades all occurred several months after market prices had started to decline in February 2007. However, the downtrend was sharply strengthened by the massive downgrades that began in summer. In particular, these coincided with a price decline of some 17% for the tranches at the upper end of the rating scale (AAA/Aaa) between July and October. A similar time lag was observed in the case of vehicles such as CDOs: most of the downgrades were made from October, whereas some market participants were already revealing heavy losses from June.

Introduction

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Securitisation was the main channel through which the problems of the US housing market rippled outward. Subprime loans had been transferred to financial markets on a vast scale through primary securitisation vehicles such as residential mortgage-backed securities (RMBS), secondary structured finance products such as collateralised debt obligations (CDO) and tertiary, leveraged finance systems known as structured investment vehicles (SIVs). As a result, the crisis spread far beyond the borders of the USA and affected not just the lenders that originated the subprime mortgages but many more market participants as well.

Credit rating agencies (CRAs) became, for the most part, the focus of the discussions triggered by the subprime crisis, and questions were asked about their role in assessing the credit risk of securitisation vehicles. Specifically, issues were raised on the way that CRAs monitored credit risk in subprime RMBS and, more generally, on the whole process of rating structured finance products, such as potential conflicts of interest and the volatility of the ratings assigned to highly complex vehicles[1]. The debate was further fuelled by the sudden, spectacular nature of rating actions, with numerous substantial downgrades since summer 2007, and by the delay between these actions and the first signs of trouble in the US housing market[2].

This report looks at CRAs' behaviour towards subprime RMBS over the first ten months of 2007. Part 1 contains a general review of rating actions; Part 2 provides a detailed analysis of the rating downgrade process, emphasising the fact that the downgrades were concentrated within a short space of time and were often significant; and Part 3 assesses the impact of CRAs' decisions on the market prices of RMBS tranches.

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[1] The AMF has communicated extensively on these issues, both in previous versions of this report and in connection with specific projects (e.g.: Aguesse, P. [2007]: "Is rating an efficient response to the challenges of the structures finance market? Rsik and Trend Mapping — n°2, March).
[2] Rating agencies have defended themselves against criticism of reacting belatedly. See, inter alia, the hearing of Standard & Poor's and Moody's before the US Senate Committee on Banking, Housing and Urban Affairs on 26 September 2007.

Analysis of underlying subprime loans

The US property market has expanded sharply over the past decade, fuelled by a sustained rise in both household borrowing and house prices in an economy flush with liquidity. Between 2000 and 2006, for example, outstanding mortgage loans jumped from USD 4.8 trillion to almost USD 9.8 trillion, a rise of around 13% per year (Chart 1). As part of this overall increase, the upsurge in low-quality, or "subprime" lending, was remarkable[3], with loans to subprime borrowers tripling over the period. At the end of 2006, subprime loans totalled USD 1.17 trillion and accounted for almost 12% of all mortgages.

Chart 1: US mortgage loans
(outstanding in USD billion)
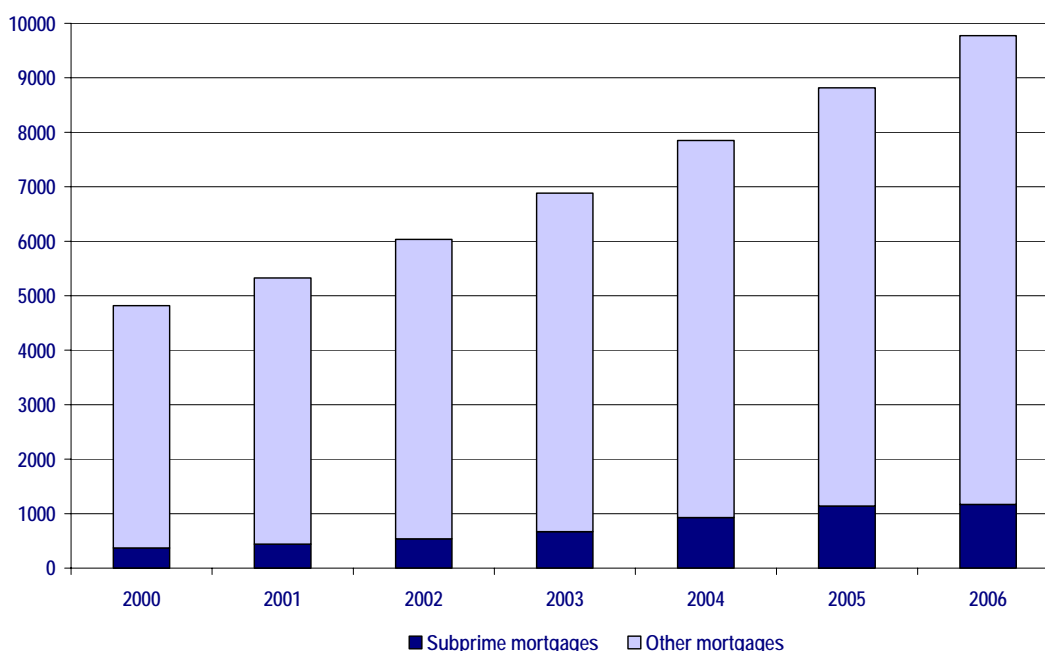
Source: LoanPerformance

Until recently, the rise of subprime lending was driven up by a number of factors. A vigorous property market and a spike in house prices led to a surge in demand for household credit, including from borrowers with weak credit histories. Between 2002 and 2005, lending to subprime borrowers was boosted by the sharp drop in delinquency rates for this segment and by the fast-paced development of a large secondary market for housing loans (Charts 2 and 3). The possibility of securitising new loans by issuing residential mortgage-

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[3] *There is no standard definition of "subprime" loans. A subprime loan is a mortgage granted to borrowers that pose a greater risk than do conventional borrowers, either because they have had problems managing their personal finances or because their repayment ability has been impaired by a series of adverse events. Several criteria can be used to classify a loan as subprime, including traditional debt-to-income or loan-to-value ratios. However, the most important factor appears to be the FICO score (developed by and named for Fair Isaac Corporation), which grades borrowers on a scale from 300 to 850 according to their credit history. Generally speaking, a loan is classified as subprime when borrowers are assigned a FICO score of less than 620. Another similar category consists of "Alt-A" loans, which are only slightly less risky than their subprime counterparts. These two types of loan are known as "non-conforming", in that they do not qualify for a guarantee from government agencies. This is also the case of "jumbo" loans, which exceed the loan limit set by these agencies (e.g., USD 417,000 for a single family loan).*

backed securities (RMBS) enabled loan originators to manage their credit risk more effectively and, if necessary, to offload the non-collection risks associated with poorer quality loans. The emergence of a large secondary market for mortgages also satisfied the growing number of investors looking to diversify their revenue streams and earn additional returns at a time when conventional debt instruments were offering very low yields[4]. In this expanding securitisation market, debt instruments backed by subprime loans played an increasingly important role. In 2006, for example, issues of subprime RMBS totalled USD 523 billion, accounting for 44% of all non-agency RMBS issues.

Chart 2: Subprime ARM* delinquency rates (%)
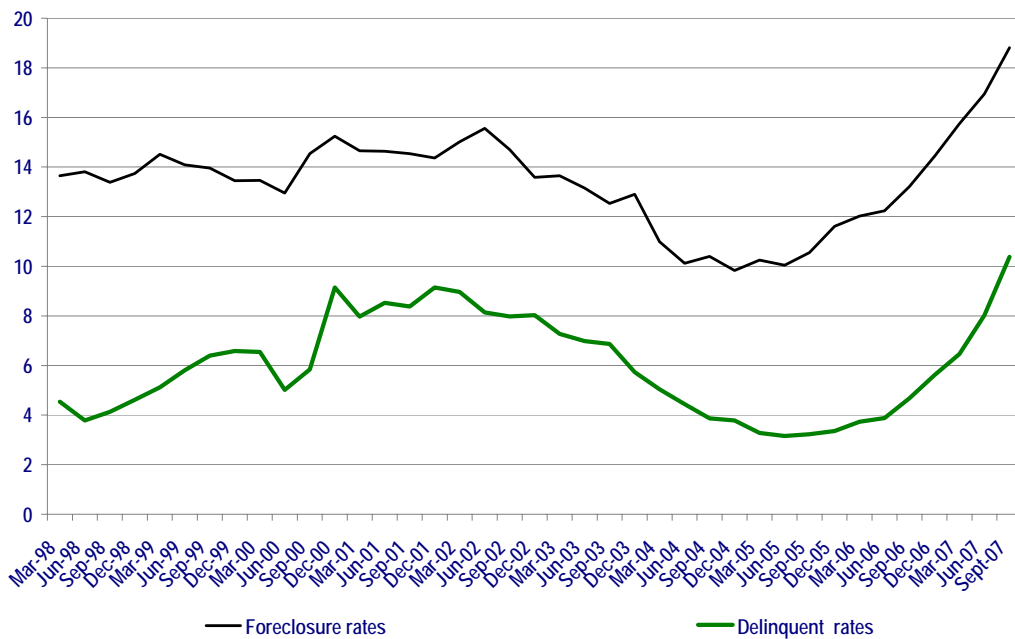
* Adjustable-rate mortgages (see below for description)
Source: Datastream

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[4] *The RMBS market is not new to the USA. Since 1970, a number of government-sponsored agencies (Fannie Mae, Freddie Mac, Ginnie Mae) have been purchasing prime mortgages from lenders and issuing mortgage-backed securities. "Agency MBS" represent the bulk of RMBS outstanding in the USA. Initially quite inflexible, RMBS changed radically in the more innovative financial climate of the 1990s, and began to attract a much broader spectrum of investors*

Chart 3: Non-agency RMBS issues in the USA
(in USD billion)

Legend: — Prime jumbo/Alt-A — Subprime/home equity — Other RMBS
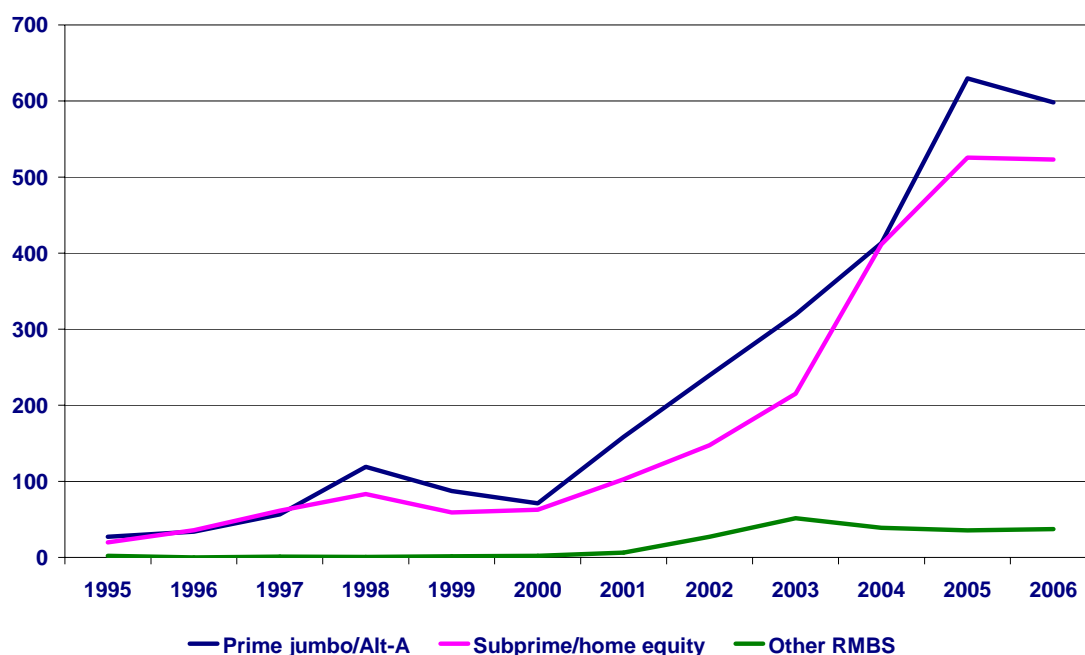
Source: Standard & Poor's[5]

A downturn in the property market from the middle of 2006, combined with a tightening of monetary policy stance since mid-2004, led to a slump in house prices, an increase in past-due payments and a rise in fore-closure rates on subprime loans. The large majority of subprime loans (around 80%) are typically granted at adjustable rates. These loans, known as adjustable-rate mortgages (ARM), are usually structured as "1/29" or "2/28" ARMs, which means that for an average 30-year term, borrowers generally pay a fixed, below-market rate in the first year or first two years (known as the initial rate discount or teaser rate), and a variable rate (usually 6-month LIBOR plus a margin) for the remaining term, i.e. 28 or 29 years. When these loans reset to a variable rate, borrowers face higher repayments, particularly at times when official interest rates are on the rise. The Federal Reserve's persistent rate hikes between mid-2004 and mid-2006 pushed the federal funds rate from 1% to 5.25%, squeezing borrowers when their mortgages reset and fuelling a dete-rioration in loan quality.

The growing number of households unable to meet their mortgage payments jeopardised the financial equi-librium of some lenders. A number of major subprime specialists collapsed, including New Century Financial Corporation in March 2007 and American Home Mortgage Investment Corporation in August 2007. The scale of the crisis prompted the House of Representatives to adopt a series of new measures in early Octo-ber 2007, aimed at helping those households worst affected by the crisis[6]. In December, the US government

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[5] *Standard and Poor's (2007) : Transition Study : U.S. RMBS Upgrades Are Down And Downgrades Are Up In 2006, 26 January.*
[6] *The Housing Tax Relief Bill introduced three measures to tackle the subprime crisis. These included partial or full tax relief on debt forgiven during mortgage foreclosure or renegotiations, which is expected to concern at least 2 million homeowners. The Congres-sional Budget Office (CBO) estimates that this measure will cost the government USD 1.4 billion over the next ten years. The Bill also extends the possibility for homeowners to deduct mortgage insurance from income for a further seven years, representing an estimated USD 600 million in foregone revenues over the next decade according to the CBO.*

announced an emergency action plan to assist indebted households on the verge of bankruptcy. The plan asked mortgage lenders to freeze interest rates for up to five years on certain loans granted between January 2005 and summer 2006. By keeping monthly repayments at the same level, borrowers would avoid a sudden, sharp increase in debt when their loans reset higher.

New RMBS issues have plummeted since the first shockwaves rippled across the subprime market. Standard & Poor's[7], for example, says it rated around USD 26 billion worth of issues in the third quarter of 2007, a drop of 64% compared with second-quarter 2007 and 73% with the same year-ago period. Securitisation transactions over full-year 2007 are therefore likely to be down significantly on previous years.

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[7] *"RMBS Trends: US Subprime Mortgage Paradigm Shifts As The Market Recalibrates Risk", Standard & Poor's, 10 December 2007.*

Credit rating agencies and the subprime RMBS market

➲ Overview

The three main credit rating agencies (CRAs) together took 9,496 rating actions[8] on US subprime RMBS tranches in the first ten months of 2007, compared with 836 in 2006 and 240 in 2005[9] (Table 1, see inset for a definition of the statistical sample used). The rating actions concerned 970 transactions, versus 184 in 2006 and 73 in 2005. Taken individually, the three CRAs changed the ratings or outlooks for between 382 and 697 transactions in 2007, representing between 2,020 and 3,667 actions on RMBS tranches. According to the agencies, between USD 33 billion and USD 74.9 billion in debt was affected by these rating actions[10].

Inset 1: Subprime RMBS sample used in this study

Defining a subprime RMBS sample poses several problems. First, as indicated above, there is no single accurate definition of a subprime loan, especially since the boundary between subprime and Alt-A or jumbo loans is sometimes blurred and porous. Second, it is important to be able to identify the subprime component of the RMBS pool, bearing in mind that many instruments are not composed exclusively of subprime loans. A threshold of exposure to subprime risk therefore needs to be defined for each portfolio, above which RMBS are classified as subprime.

These difficulties are reflected in the statistics published by the three CRAs reviewed here: Fitch, Standard & Poor's and Moody's. The RMBS samples used by each agency are not wholly consistent because of the different definitions applied. For example, the criteria used by each CRA in order to determine whether a loan should be classified as subprime, and in particular the critical FICO scores, are not identical.

To build a consistent sample for the three agencies, we applied the definitions given by the data provider Bloomberg. Subprime RMBS are thus defined as securities backed primarily (i.e., more than 50%) by high-risk loans falling into categories B or C in the mortgage rating scale applicable in the USA, otherwise known as "B/C mortgages". In contrast, "A mortgages" have a higher credit quality. Our sample therefore looks at all ratings of US "residential B/C MBS" tranches that were revised by the three major CRAs between 1 January 2005 and 30 October 2007.

The sample we have compiled appears satisfactory considering the statistics provided by the CRAs. For the period January-October 2007 for example, 80% of the tranches in the Bloomberg-derived sample can be found at least once in one of the three CRA samples. In contrast, when we compare the agencies' samples, the number of tranches common to all samples is much lower, even though RMBS tranches are almost always multi-rated. Obviously, multiple ratings do not imply that each CRA makes the same downgrades, which may explain why a tranche rated by all three CRAs, for example, may feature in the sample of only one or two of the agencies.

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[8] "Rating actions" refer to changes in rating (category or notch), as well as changes in outlook.
[9] Due to the inherent structure of securitisation transactions, our analysis is often based on the number of tranches rather than on the amounts concerned, since low-rated tranches generally represent the smallest amounts of the transaction. A transaction corresponds to a securitised loan made up of several different tranches (see Annex III for an example).
[10] Between USD 42 billion and USD 81 billion based on the amounts at the date of issue (rather than the amounts outstanding at the time the action was taken).

Taking multiple ratings into account (i.e. when tranches are rated by several CRAs) and the fact that the rating assigned to a single tranche may have been adjusted several times during the period by one or more of the CRAs (see below), rating actions were taken on a total of 5,017 separate RMBS tranches in the first ten months of 2007, affecting around USD 93 billion in total outstanding debt at the end of October[11]. This last figure should be considered in relation to the amount outstanding in subprime RMBS. While rating actions concerned a modest 6.5% of subprime RMBS outstanding at end-September, the amount affected after the second wave of downgrades rises significantly to 11% by the end of October (see inset 2).

Table 1: Rating actions* on subprime RMBS

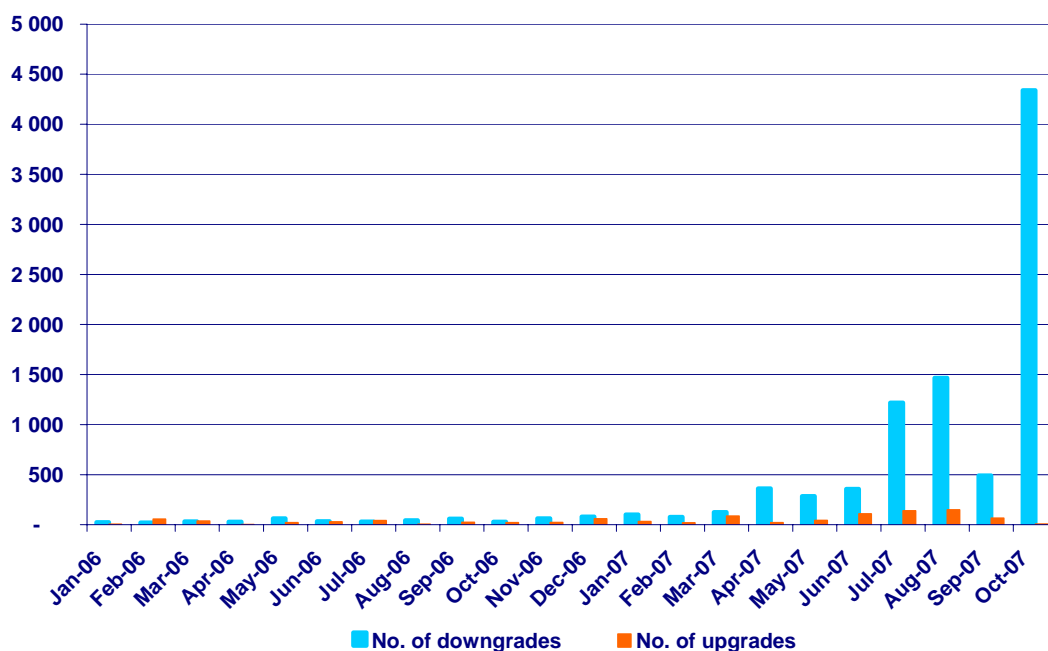| Year	Action	Fitch	Moody's	S&P	Total
2005		29	111	100	240
	Downgrades	23	64	15	102
	Upgrades	6	47	85	138
2006		178	482	176	836
	Downgrades	124	262	124	510
	Upgrades	54	220	52	326
2007 (Jan.-Oct.)		2,020	3,809	3,667	9,496
	Downgrades	1,851	3,401	3,570	8,822
	Rating	*1,464*	*2,493*	*2,885*	*6,842*
	Outlook	*387*	*908*	*685*	*1,980*
	Upgrades	169	408	97	674
	Rating	*92*	*304*	*36*	*432*
	Outlook	*77*	*104*	*61*	*242*

* Rating actions refer to upgrades and downgrades of credit ratings (category or notch) and changes in outlook
Sources: Bloomberg, AMF calculations

Since 2005, there have been far more downgrades than upgrades to subprime RMBS: taking all three CRAs together, there were 13 downgrades for 1 upgrade in the first ten months of 2007, compared to 0.75 downgrade for 1 upgrade in 2005 (Chart 4). Over the ten-month period to 31 October 2007, the agencies each downgraded between 357 and 680 transactions and between 1,850 and 3,570 tranches, affecting between USD 30 billion and USD 55 billion in outstanding debt. This was in marked contrast to previous years, with downgrades concerning between 124 and 262 tranches in 2006, and between 23 and 64 tranches in 2005. Adjusted for multiple ratings, downgrades in the first ten months of 2007 concerned USD 73 billion[12] worth of separate tranches (i.e., 4,616 tranches), representing around 9% of the estimated amount outstanding in subprime RMBS. Based on the samples defined by the CRAs, this percentage is slightly lower (7% for Fitch and 5.5% for Moody's). It should be noted that a small number of arrangers account for a significant proportion of the downgrades (see inset 3).

[11] *USD 115 billion based on the amounts at the date of issue.*
[12] *USD 84.3 billion based on amounts at the date of issue.*

Chart 4: Overview of downgrades/upgrades*

Bar chart showing monthly number of downgrades (light blue) and upgrades (orange) from Jan-06 to Oct-07. Y-axis ranges from 0 to 5,000. Values remain low through 2006 and early 2007, then downgrades rise sharply: approximately 400 in Apr-07, 300 in May-07, 400 in Jun-07, 1,250 in Jul-07, 1,500 in Aug-07, 500 in Sep-07, and about 4,350 in Oct-07.

■ No. of downgrades   ■ No. of upgrades

* Downgrades and upgrades include changes in credit rating (category or notch) as well as changes in outlook
Source: Bloomberg

Inset 2: Rating actions on subprime RMBS

The database used for our analysis provided no information about the amount outstanding in subprime RMBS. This makes it difficult to assess the extent of rating action taken as a proportion of the overall market.

One way to determine the extent of rating actions is to estimate the amount outstanding in subprime RMBS and compare it with the amount represented by the downgraded tranches. This can be done by identifying the percentage of subprime loans that are typically securitised. Available information* suggests that around 70% of subprime loans are repackaged in a securitisation transaction. Therefore, out of USD 1.17 trillion in outstanding subprime loans in 2006 (see above), some USD 820 billion will have been repackaged into RMBS. As a result, rating actions (downgrades and upgrades) taken in the period January-October 2007 on USD 93 billion of separate tranches can be said to have affected 11% of outstanding subprime RMBS. Downgrades alone (USD 73 billion worth of separate tranches) concerned 9% of outstanding subprime RMBS.

Another solution is to base the analysis directly on the statistical samples provided by the CRAs, which detail the rating actions taken during the review period, as well as the debt rated by the agencies based on its value at the date of issue**. In terms of downgrades:

- Fitch downgraded 7% of its rated debt. A more detailed analysis of the sample shows that downgrades concerned 64% of speculative-grade debt, versus only 6% of investment-grade debt.

- Moody's downgraded 5.5% of its rated debt, including 62% of debt initially rated in the speculative category and just below 5% of debt classified as investment grade.

* See for example: "Standard & Poor's Weighs In On The US Subprime Mortgage Market", RatingsDirect, Standard & Poor's, 5 April 2007.
** At this writing, these data was not available for Standard & Poor's.

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Inset 3: Concentration of arrangers on the subprime RMBS market

Industry concentration is one of the main features of the structured finance market and is also visible in the narrower context of massive downgrades of subprime RMBS. Ninety-three arrangers had set up the transactions that were affected by the 8,822 downgrades taken in the first ten months of 2007. However, the downgrades are clustered around the top five players, who accounted for nearly 37% of total downgrades and 41% of outstanding debt affected.
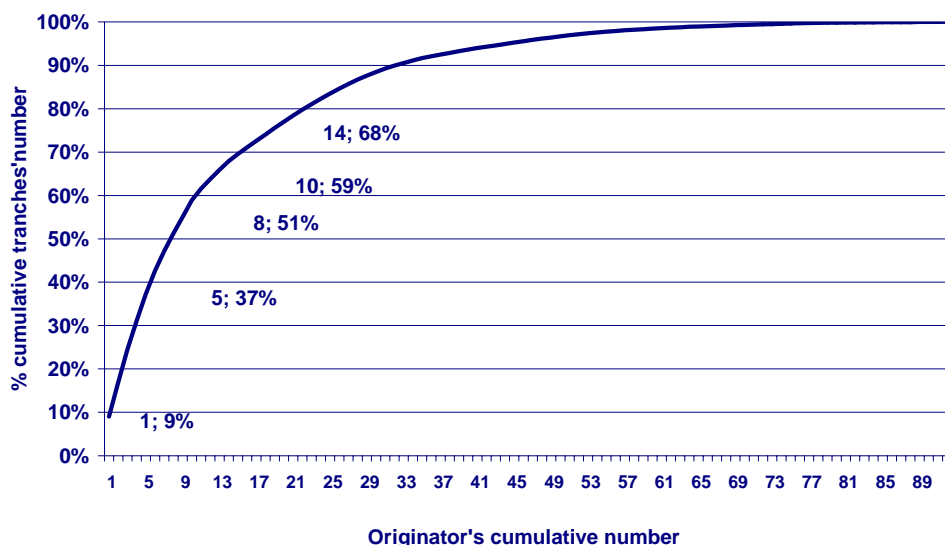
Sources: Bloomberg, AMF calculations

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The large number of downgrades appears to be largely a result of the lesser quality of loans granted in 2005-2006[13], which represented almost 75% of the downgrades reported up to October 2007 (Chart 5)[14]. The declining credit quality of the 2005-2006 subprime vintage suggests that while the amount of debt affected by subprime downgrades is still relatively low in relation to the size of the subprime RMBS market as a whole, it could rise steeply at the end of 2007 and particularly in 2008, since most of the loans granted in 2005-2006 are due to reset to adjustable rates in the first six months of that year (Chart 6)[15]. Without taking into account the impact of incentives planned by the Federal administration (see above), these resets could reach USD 890 billion in 2008, compared to some USD 750 billion in 2007.

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[13] See for example: Standard & Poor's (2007): "A comparison of 2000 and 2006 RMBS subprime vintages sheds light on expected performance". RatingsDirect, 22 March.

[14] In a publication dated 26 October 2007 ("Update on 2005 and 2006 vintage US subprime RMBS rating actions", Special Report), Moody's indicates that it had downgraded 52% of its subprime RMBS tranches issued in 2006.

[15] See Crédit Suisse's study dated 12 March 2007 ("Mortgage Liquidity du Jour": Underestimated No More", Equity Research). An OECD report (A. Blundell-Wignall: Structured Products: Implications for Financial markets, OECD, 2007) also mentions a steep hike in resets for subprime loans over the short term.

Chart 5: Number of tranches downgraded in January-October 2007 – by vintage*
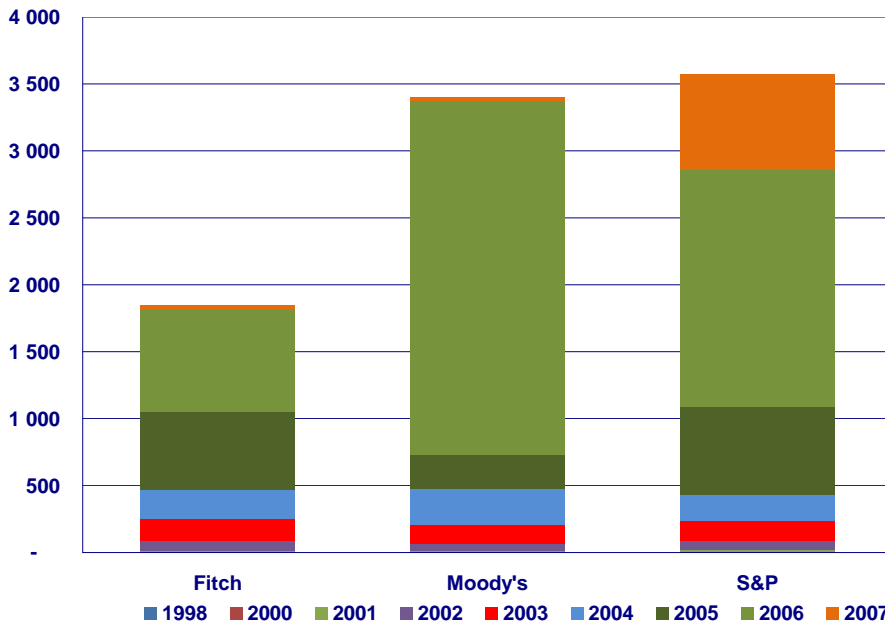
* Downgrades cover downward adjustments to ratings (category or notch) and negative outlooks
Source: Bloomberg

Chart 6: Expected monthly mortgage resets

Monthly ARM Reset Schedule by Sector (Securitized + Non-Securitized)
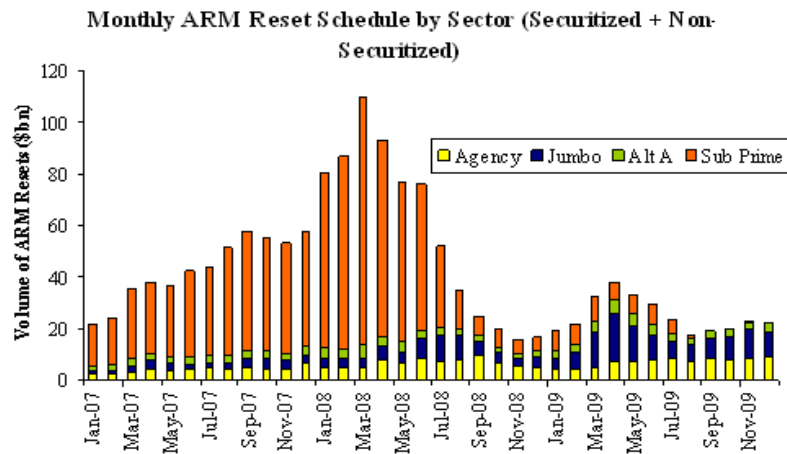
Source:

Credit Suisse

The downgrade process is slightly less intense if rating actions are decomposed into negative outlooks and rating adjustments. In fact, negative outlooks accounted for between 20% and one-third of CRA actions in 2007. Rating outlooks, which indicate the likely direction of a rating over the medium-term, accounted for the bulk of rating actions up to June, when they still represented 40% of all downgrades (Chart 7). Overall, 6,842 rating changes (category or notch) affected 3,995 separate RMBS tranches and approximately USD 60.4 billion in outstanding debt[16]. Individually, the agencies each downgraded between 1,464 and 2,885 separate RMBS tranches, with an estimated worth of between USD 23.4 billion and USD 40.6 billion.

Chart 7: Breakdown of downgrades into negative outlooks and rating adjustments
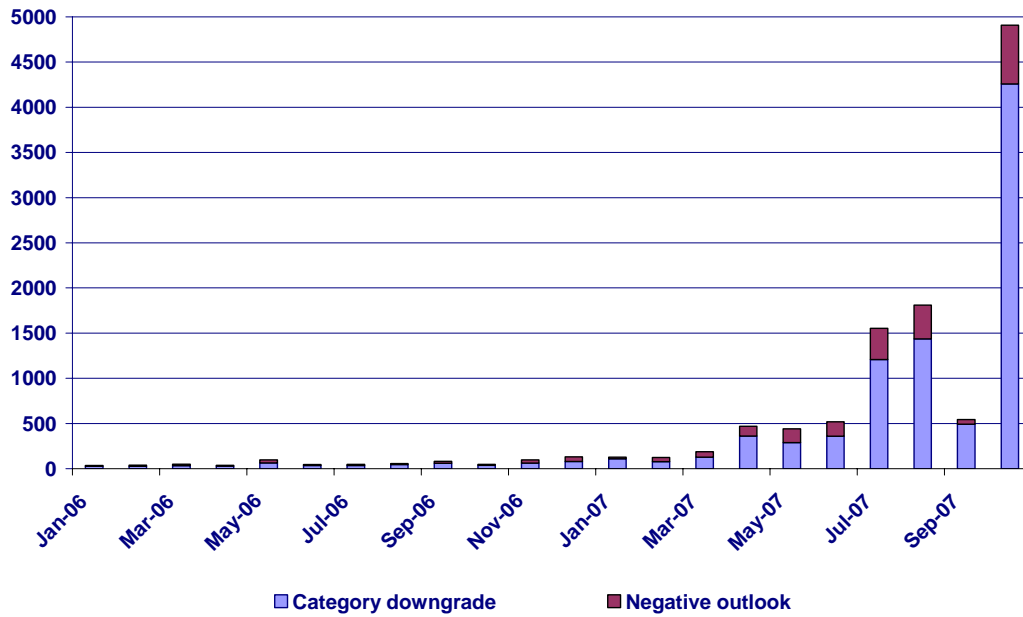
Source: Bloomberg

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[16] *USD 69 billion based on the amount at the date of issue.*

➲ Downgrade process

Based on our analysis of the downgrade process up to October 2007, we noted that:

- the bulk of the downgrades were made within a short space of time;

- the downgrades were severe given the extent of the adjustments;

- the ratings were extremely volatile, with a single tranche experiencing successive rating actions.

1. Timeframe for downgrades

We observed that the CRAs acted in a similar fashion, with numerous RMBS tranches downgraded from July onward, although Fitch had already downgraded 182 subprime RMBS tranches in April. Eighty percent of rating changes observed over the first ten months of 2007 occurred within a short space of time: July and August for the first wave of downgrades and October for the second (Chart 8). The massive downgrades made in the summer coincided with announcements of changes to the methodology for assessing default risks on subprime RMBS tranches. The CRAs made similar changes to their approach, including stricter documentation requirements for underlying mortgages, a reassessment of foreclosure probability on "2/28" mortgage loans, and closer consideration of the performance of underlying loans at the start of their life (see Annex I). However, taken individually, a number of differences can be observed in the actual timing of subprime downgrades. Two CRAs, Moody's and Standard & Poor's, made one-third of their downgrades in the summer months and more than 60% over several days in October. In contrast, downgrades by Fitch occurred on a more regular basis as from the start of the summer.

Chart 8: Cumulative downgrades by agency (excluding changes in outlook)
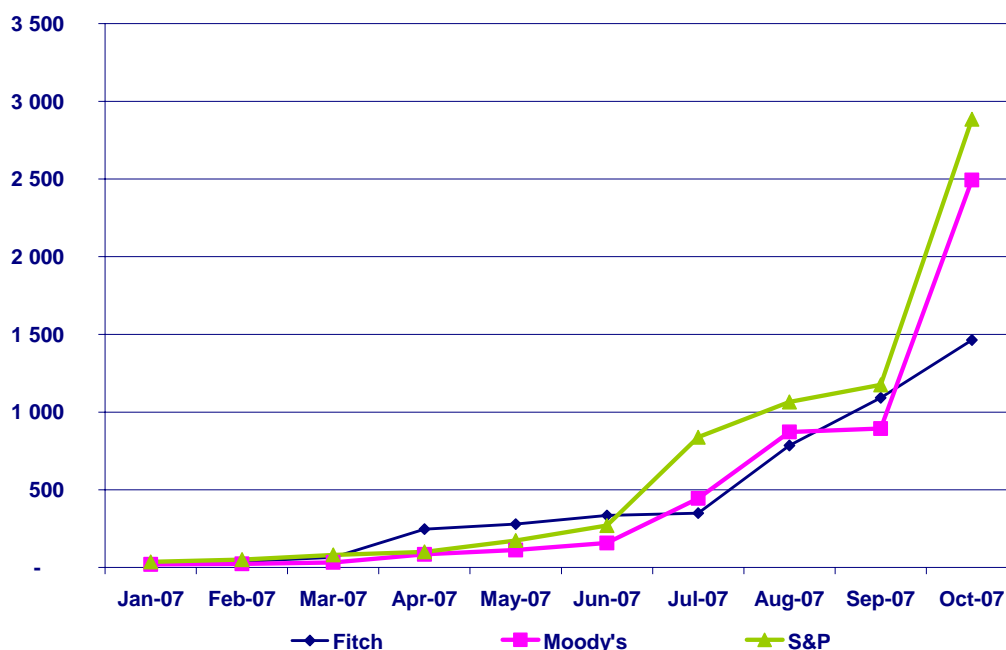
Sources: Bloomberg, AMF

The large majority of the downgrades were made on three days in July (July 10, 12 and 19), one day in August (August 16), and several days in October (October 11, 15, 17 and 19). More than 60% of negative rating actions (including negative outlooks) in the first ten months of 2007 were taken on these eight days alone, affecting between USD 8.5 billion and USD 42 billion for each agency. On 10 July, Moody's downgraded 258 tranches (Table 2). Of the 276 tranches moved to negative outlook by Standard & Poor's the same day, 238 (86%) were subsequently downgraded on 12 July. Downgrades by Fitch were made on a steady basis throughout August, and mainly consisted of negative outlooks. Two-thirds of the 2,685 negative rating actions published by the CRAs between July and August were again downgraded in October, when more than 4,339 negative rating actions were taken by at least one agency (including 658 negative outlooks). Sixty percent of the 725 tranches which had been given a negative outlook in the summer were downgraded at least once in October.

Table 2: Rating action on the eight key days of 2007

|		10 July 2007	12 July 2007	19 July 2007	16 Aug. 2007	11 Oct. 2007	15 Oct. 2007	17 Oct. 2007	19 Oct. 2007
Fitch	Negative outlooks	-	7	-	209	-	1	-	2
	Rating changes	**4**	**2**	**-**	**5**	**124**	**11**	**-**	**74**
Moody's	Negative outlooks	30	-	-	5	314	7	11	38
	Rating changes	**258**	**12**	**-**	**285**	**1,325**	**10**	**7**	**126**
Standard &	Negative outlooks	276	8	-		1	3	129	16
	Rating changes	**73**	**311**	**169**		**37**	**178**	**602**	**697**

Sources: Bloomberg, AMF calculations

Inset 4: Downgrades of structured finance products (CDOs)

RMBS were not the only instruments to be affected by the wave of downgrades. Structured finance products such as CDOs, some of which contained RMBS tranches, were also downgraded. On aggregate, the three main CRAs made 11,892 downgrades to tranches of structured products over the first 11 months of 2007, mainly in October and November. While the large majority of downgrades consisted of negative outlook adjustments in October, more than three-quarters of November's downgrades concerned rating changes. Fifteen percent of debt downgraded had received a negative outlook in the previous month. Lastly, 45% of rating changes affected the highest rated tranches (AAA/Aaa and AA/Aa categories).

Over the period January-November 2007, the downgrades concerned 1,251 transactions and 6,137 separate tranches. Taken individually, the three agencies each revised between 3,492 and 4,457 ratings.

**Number of tranches of structured products (CDOs) downgraded by CRAs**
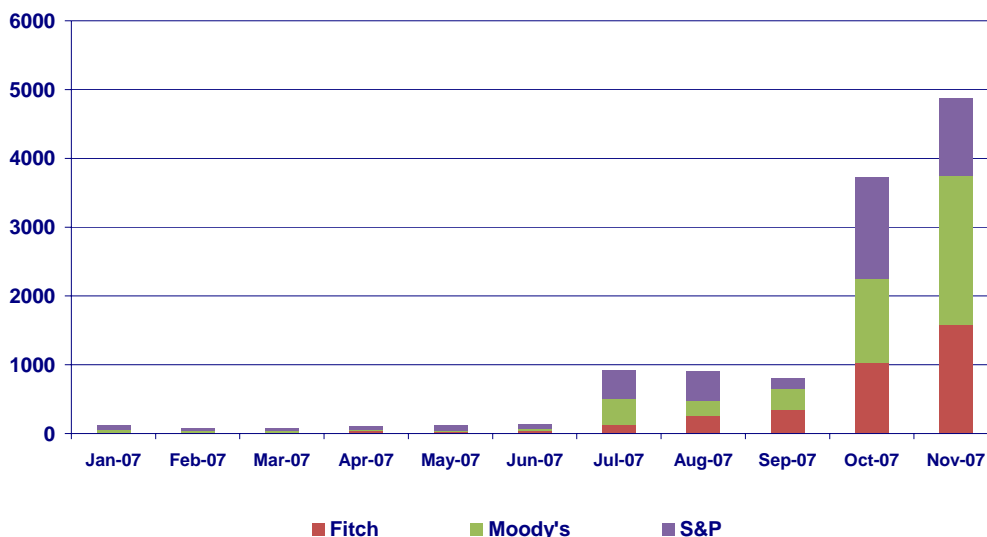
Source: Bloomberg

2. Extent of the downgrades

Examining all the downgrades (including outlook downgrades) made during the first ten months of 2007, we see that all levels of rating without exception were affected. Downgrades of investment-grade[17] tranches account for 74% of the total, compared with 26% for tranches in the speculative category (categories above 6[18], Chart 9). Unsurprisingly, the worst-affected investment grade tranches are those toward the lower end of the rating scale (categories 3 to 5[19]). Nevertheless, 12% of the downgrades are to tranches that in theory are the least risky, rated AAA (Aaa) or AA (Aa) by Standard & Poor's and Fitch or Moody's, respectively. Most of the latter downgrades occurred on two days: 16 August and 11 October 2007.

Chart 9: Pre-downgrade tranche ratings, January-October 2007 *
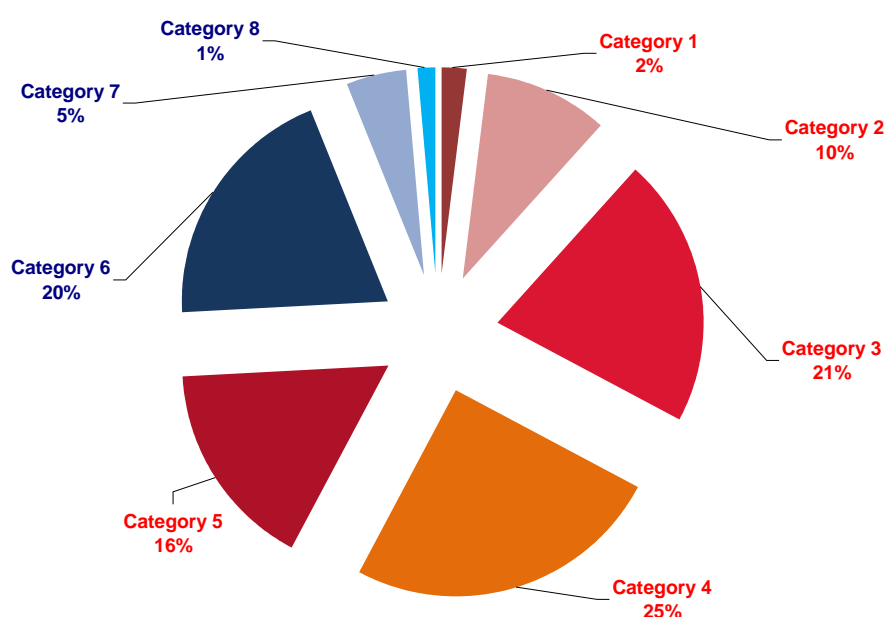
* Downgrades include downward rating adjustments (category or notch) and negative outlooks
Source: AMF

In contrast to previous years, moreover, many of the downgrades made during the first ten months of 2007 were significant. More than two-thirds of all rating actions involved a downgrade of at least one category[20] (Chart 10), compared with less than one-half in the period 2005-2006. The majority (60%) of these rating changes consisted of a downgrade of at least two categories (compared with 34% and 36% in 2005 and 2006), and in more than 26% of cases, the announcement involved a reduction of more than three levels (compared with less than 5% in the two previous years). In sum, nearly half the downgrades (not including negative outlooks) resulted in a transition to a speculative-grade category. This observation applies to all three of the CRAs under review.

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[17] *The Investment-grade category corresponds to ratings from AAA (resp. Aaa) to BBB- (resp. Baa3) from Standard & Poor's and Fitch (resp. Moody's). See Annex II.*
[18] *A preliminary analysis is needed before agency ratings can be compared directly with each other. This results in a cross-reference table that assigns a category ranging from 1 to 8 to each rating (see Annex II).*
[19] *Categories 3 and 4 consist of issuers that may exhibit a default risk in certain economic conditions.*
[20] *Of the remainder, 76% correspond to negative outlooks and 24% to notch changes within the same category.*

Chart 10: Size of downgrades for the period January-October 2007*
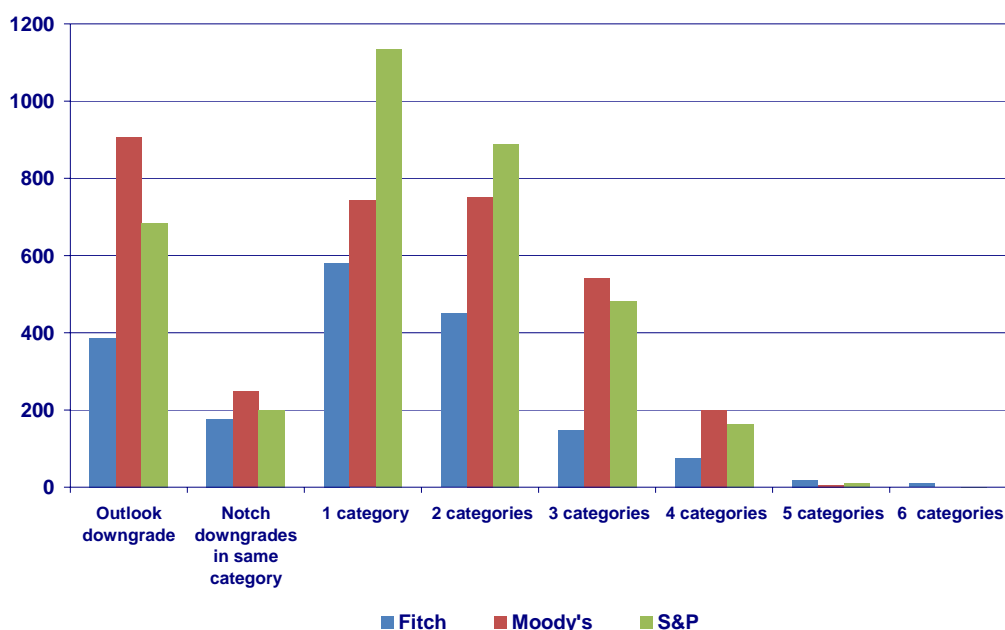
* *Downgrades include downward rating adjustments (category or notch) and negative outlooks*
Sources: Bloomberg, AMF calculations

The above comments can be expanded upon by building a transition matrix, which highlights the patterns followed by the ratings of different tranches (Table 3). In particular, the matrix points up the origins of the tranches downgraded to speculative. Of the 3,238 tranches moved to the speculative category, 79% were originally rated in categories 4 and 5, compared with 20% in categories 1 to 3. Furthermore, some of the downgrades were severe. For example, the ratings of 67 tranches were moved from category 2 (AA) to category 5 or higher (BBB- to C).

Table 3: Transition matrix
(based on downgrades between January and October 2007)

		Last rating							
		1 AAA	2 AA	3 A	4 BBB	5 BBB-(BA3)	6 BB	7 B	8 CCC to D	Total
Second-to-last rating	1	75	67	16	10	7		1		176
	2		477	229	75	13	33	11	10	848
	3			500	544	212	386	209	26	1,877
	4				543	182	771	519	192	2,207
	5					354	449	385	246	1,434
	6						484	616	632	1,732
	7							57	373	430
	8								118	118
	Total	75	544	745	1,172	768	2,123	1,798	1,597	8,822

Note: The data on the diagonal concern negative outlooks with no category change and, to a lesser extent, changes of notch within the same category. The other data (excluding the diagonal) concern category changes.
Sources: Bloomberg, AMF calculations

3. Rating volatility

CRAs frequently undertook a series of rating actions on the same tranche during the first ten months of 2007. This resulted in a highly level of volatility:

- 42% of tranches experienced more than one action (mostly downgrades), of which 12% were moved more than four times;

- 1,266 tranches had their ratings changed (upwards or downwards) by the same agency more than once (Table 4). In 31% of these cases, the same agency made three changes or more. Specifically, the figure is 39% for Standard & Poor's, 24% for Moody's and 11% for Fitch.

Table 4: Tranches experiencing successive rating actions

No. tranches re-rated by the same agency	More than once	At least three times
2005	25	5
2006	190	19
2007 (Jan-Oct)	1266	396

Sources: Bloomberg, AMF calculations

The instability of these ratings can be illustrated by the re-rating of one RMBS tranche. The FHLT 2006-B SLM7 tranche (worth USD 4.4 million), part of the FHLT 2006-B transaction arranged by Fremont Home Loan Trust, was downgraded some ten times by all three CRAs from March 2007 onward (Chart 11)[21]. Standard & Poor's lowered its rating five times, Moody's four times and Fitch twice. By end-September the tranche, initially rated as investment grade *(*Ba1), had slipped to the speculative category (D).

Chart 11: Rating history for the FHLT 2006-B SLM7 tranche of the FHLT 2006-B RMBS transaction

Code couleur : Moody's; Fitch, S&P
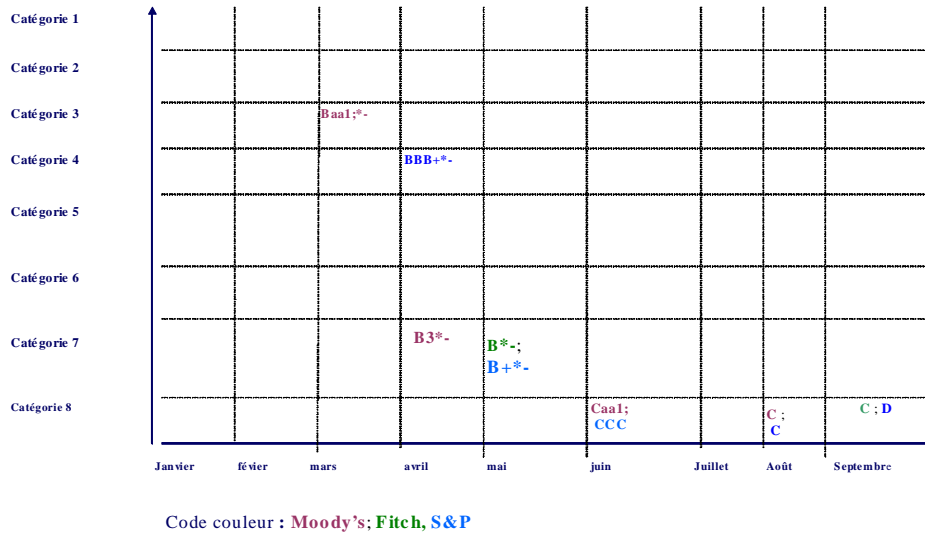
NB: An asterisk separates the current rating from the outlook (e.g. B+- indicates a negative outlook)*
Source: AMF

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[21] *The rating changes for all the tranches in this transaction are given in Annex III.*

4. Consistency

Ultimately, looking at the ratings assigned to downgraded tranches at end-October 2007, there are justifiable concerns about the consistency of the evaluations issued by the three CRAs. Of the tranches downgraded in 2007, 58% were rated by a single agency and 35% by at least two, of which one-quarter by all three (i.e. 114 transactions and 490 tranches, Table 5). Before the downgrade, 22% of these 490 tranches (worth a combined USD 5.3 billion) were in the speculative category. After the last downgrade, nearly 30% of them had been moved to that category.

Table 5: Downgrades and multiple rating*

	Tranches down-graded at least once	Tranches down-graded by a single agency	Tranches downgraded by more than one agency	o/w down-graded by two agen-cies	o/w down-graded by three agen-cies
2005	50	34	16	11	5
2006	263	184	79	54	25
2007(to end-October)	4616	3010	1606	1116	490

* Multiple rating: a tranche that has been downgraded or moved to negative outlook by at least two CRAs
Sources: Bloomberg, AMF calculations

Regarding the 490 separate tranches with three ratings, splits were observed in many cases. For our purposes, a rating split means that the ratings assigned to a multi-rated tranche are different. The difference is defined with reference to the above rating categories. In more than 80% of cases, at the end of the review period, downgraded tranches were not placed in the same category by at least two CRAs, of which 30% were classified in a different category by all three agencies. A difference of one level only can be observed in just one-third of cases (Chart 12). The difference rises to two levels in 33% of cases and to three levels in more than 18% of cases.

Apparently, these differences can be explained partly by a dissimilarity in the methodological approaches used to capture loss distribution for the tranches. For example, Standard & Poor's and Fitch calculate the probability that a tranche will be affected, whereas Moody's considers the expected losses on the tranche. Aside from these differences of methodology, each agency uses its own data and statistical representations, such as the correlation of default probabilities, which are key parameters for assessing credit risk on different tranches.

**Chart 12: Split ratings at end-October 2007
on the sample of tranches downgraded and rated by the three CRAs**
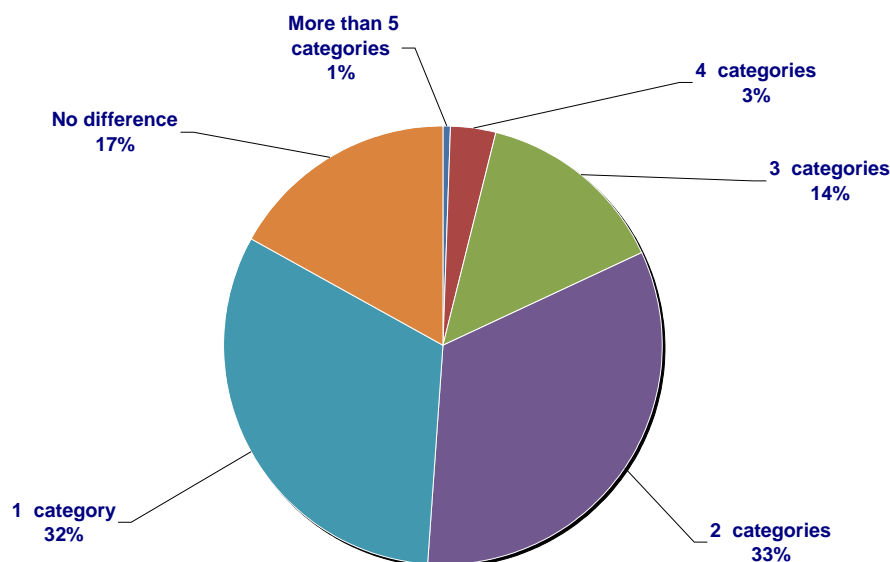
Sources: Bloomberg, AMF calculations

Whereas tranches in categories 1 and 2 rarely exhibit rating splits, the number and distribution of differences between agencies' ratings begin to increase and widen as from category 3[22], chiefly for tranches in categories 4 and 5[23], which are close to speculative. To be specific, nearly one-quarter of downgraded tranches are currently categorised as both investment grade and speculative grade.

➲ Impact of ratings on financial markets

The link between CRAs' behaviour and the market's assessment of subprime RMBS tranches can be gauged from the ABX Home Equity Index[24], a new synthetic index of subprime RMBS created in early 2006. Like the CDX and iTraxx indices for credit derivatives on US and European corporate bonds, the ABX.HE comprises five sub-indices, each covering a given rating (AAA, AA, A, BBB and BBB) and compiled by combining equivalently rated tranches of 20 preselected RMBS deals[25]. Investors can hedge their positions or take synthetic exposures to trends in these markets. The ABX.HE is both a tool for valuing subprime RMBS tranches and an indicator of the cost of protection on this asset class[26].

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[22] *One-quarter of the tranches in category 3 exhibit differences of more than three levels.*
[23] *20% of the disparities between CRAs concern categories 4 and 5, with differences of more than three notches in 60% of cases.*
[24] *The index is constructed by CDS IndexCo LLC (a consortium of 16 banks) and Markit (a data vendor specialised in credit securitisation).*
[25] *Every 6 months, a panel of 15 investment banks selects 20 of the largest 25 subprime RMBS securitisation deals originated in the previous six months. Each series has its own identity and is named after the half-year in which it was launched. For example, ABX HE 06-01 for the index launched in January 2006.*
[26] *An arbitrage relation links the price of a CDS of a class of subprime RMBS directly to the price of the class.*

Since early 2007, confidence in the quality of structured mortgage products has declined in several stages, reflecting growing uncertainty about the assessment and extent of the underlying risks. At the beginning of the year, the ABX.HE indices exhibited no sharp movements, merely the beginnings of a downtrend in the lesser-rated BB- and BB tranches (Chart 13). The trend accelerated strongly in February as bad news from the US housing market began to emerge, but CRAs did not revise their ratings. In February, the prices of the lowest rated RMBS tranches plummeted as investors became alarmed about the quality of the underlying loans. On 27 February, the price of BB-rated tranches dropped more than 35%. After levelling off for a time, the correction accelerated under the combined impact of fresh tensions in the subprime market and the first announcements from Moody's[27] of massive downgrades of numerous RMBS tranches from June onwards. By end-June, the lowest-rated tranches were trading at 56% of their beginning-of-year value. At this stage, the downtrend had not affected the highest rated classes: AAA and AA.

Starting in mid-July, massive downgrades by all CRAs caused another sudden, steep fall in the market. The prices of AAA and AA-rated tranches, which had not been affected by the February 2007 price movements, fell for the first time. On 10 July, the ABX.HE AAA sub-index began to decline, even though the wave of rating downgrades and negative outlooks announced that day did not concern deals rated AAA or even AA. The large number of downgrade announcements would seem to have triggered strong risk aversion, resulting in an across-the-board price decline for all RMBS tranches, downgraded or not.

Chart 13: ABX.HE- 07-1 index price by rating level*
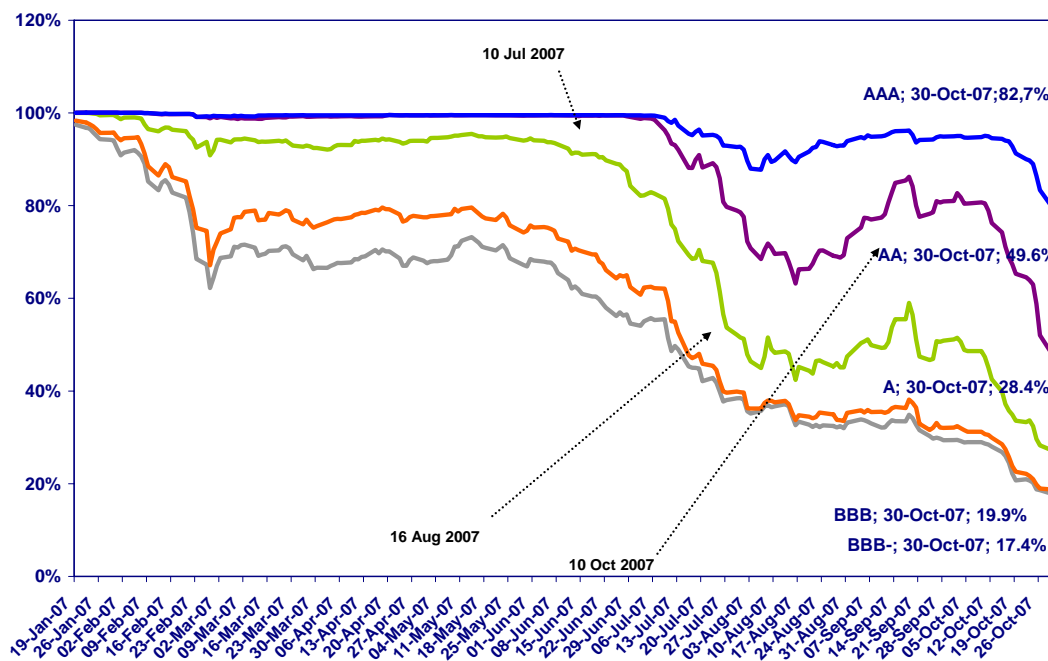
* See Annexe IV for index changes per vintage.
Sources: Markit, AMF

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[27] *Most of the downgrades made on 15 June involved RMBS tranches backed by subprime second-lien mortgages, which have fewer guarantees than first-lien mortgages. The worst affected tranches are those rated close to the limit of investment grade, although a few AAA and AA tranches have already been hit.*

Calm returned to the markets in the second half of August. The prices for the lowest rated tranches remained severely depressed, while those for the highest rated tranches (AAA and AA) rallied sharply. This situation lasted until 10 October, when further massive downgrades of RMBS tranches and more complex structured financing products such as CDOs triggered a severe correction. Highly rated tranches were the worst affected. At end-October, AAA-rated tranches were trading at 82% of their beginning-of-year value and AA tranches at 49%.

Conclusion

Subprime mortgages, and hence the securitisation vehicles backed by them (i.e. subprime RMBS), have developed strongly in recent years, despite a decline in credit quality in the second half of 2005, as well as a rise in default rates and a slump in housing prices from 2006 onwards. An analysis of the way CRAs dealt with subprime RMBS in the period January-October 2007, which was marked by a sharp downturn in the market and a large-scale reassessment of risk, yields the following observations:

- CRAs made a large number of rating downgrades to subprime RMBS, concerning EUR 73 billion worth of separate tranches. This is equivalent to some 9% of the total USD 820 billion outstanding in these instruments.

- A closer analysis of the downgrades suggests that nearly two-thirds of outstanding amounts initially categorised as "speculative" have been marked down, compared with 5% of those initially categorised as investment grade.

- The downgrades were clustered on several key dates in July, August and October. Most of them coincided with significant changes in agencies' methodologies and large-scale repricing of default risk on the underlying subprime loans.

- The bulk of the downgrades concerned recently issued tranches. Specifically, most of the rating actions were taken in respect of securitisation vehicles issued in 2006.

- The extent of the rating changes was greater than in previous years: nearly half of them involved a transition to ratings in the speculative category.

- Ratings were highly unstable, insofar as a large number of tranches experienced successive downgrades over a period of time.

- The downward price adjustment in the subprime RMBS market started in February, i.e. before CRAs began their downgrades. However, the decline was sharply strengthened by the massive downgrades that started in summer. In particular, these resulted in a price decline of some 17% for the tranches at the upper end of the rating scale (AAA/Aaa). A similar time lag was observed in the case of vehicles such as CDOs: most of the downgrades were made from October onwards, whereas some market participants were already reporting heavy losses in June.

Annex 1

Methodological changes

CRAs altered their methods of monitoring and rating subprime RMBS transactions in 2007. These methodologies differ from one agency to another but nevertheless conform to a common overall format.

Main rating criteria and processes

Stage 1: Calculate default probability from individual loan characteristics

- FICO score (credit score developed by Fair Isaac Corp.)
- Credit sector (Prime, Alt-A, Subprime)
- Property type (single-family, building, etc.)
- Product type (fixed rate, 2/28, interest-only, etc.)
- Combined loan-to-value*
- Documentation
- Occupancy type (owner-occupier, investor)
- Loan amount
- Loan purpose: purchase, refinance
- Loan seasoning (age of loan when included in RMBS pool)
- Loan terms
- Prepay penalty
- Interest-to-income ratio

* Combined loan-to-value = Ratio (total loan amount / property value) when a second-lien mortgage is taken out in addition to a first-lien mortgage

Stage 2: Adjust the default probability of individual loans according to local economic conditions (state of residence, local unemployment rate, etc.)

Stage 3: Calculate loss severity as a percentage of the loan amount in the event of default

- Loan amount
- Combined loan-to-value
- Loan coupon (interest rate)
- Property type (single-family, building, etc.)
- Loan purpose: purchase, refinance
- Credit sector (Prime, Alt-A, Subprime)
- Product type (fixed rate, adjustable rate, 2/28 5/25 etc)
- Loan seasoning
- FICO score (credit score developed by Fair Isaac Corp.)
- Loan term
- Servicer rating

Stage 4: Calculate expected loss for each loan (default probability * loss severity)

Stage 5: Aggregate loans in RMBS portfolio and calculate expected loss on the portfolio

Main changes and / or announcements in 2007 concerning securitisation methodology for US subprime RMBS

Agency model:
Fitch Ratings: ResiLogic
Moody's: Moody's Mortgage Metrics for Subprime
Standard & Poor's: LEVELS 6.0

Timeline	
Fitch **18 January 2007**[28]	Report summarising the main criteria for the ResiLogic model (published in October 2006)
Standard & Poor's **1 March 2007**	Model upgraded from version 5.7 to 6.0. Standard & Poor's rates the probability of default on individual loans on a scale of RG1 to RG10 (RiskGrade, with RG10 representing the highest probability), plus a penalty factor ranging from 0.6 to 4.5 in version 5.7. Aside from the probability of foreclosure, LEVELS 6.0 also calculates loss severity on the basis of the market value of the property, market trends and price histories. The model then calculates the expected loss of each loan and aggregates the loans in the RMBS portfolio. Version 6.0 includes new assumptions: more importance is given to additional second-lien loans, since the most significant variable for calculating default probability is no longer the loan-to-value* ratio of the first-lien mortgage. The combined loan-to-value (CLTV) ratio is used when the borrower has a second-lien loan with a simultaneous first lien. Thus the two main variables for calculating default probability are the FICO score and CLTV. ** Loan-to-value = Loan amount / Property value*
Moody's **April 2007**	In April 2007, the ratings for securitisations backed by second-lien mortgages were revised, resulting in an average 25% increase in expected losses. The ratings for originators were adjusted for like-for-like loans. Moody's gives two examples of the impact of a change in rating methodology: the expected loss rises from 5% to 5.7% on the first transaction and from 6.65% to 13% on the second. The change in expected loss depends more heavily on some criteria than on others:

	Transaction 1	Transaction 2
Projected losses before new methodology	5%	6.65%
Projected losses after new methodology	5.70%	13%
Loan characteristics		
Average loan-to-value	80%	85%
Average combined loan-to-value	81%	91%
% first-lien-loans	99.70%	92%
% first-lien loans with simultaneous second lien	3%	30%
Full documentation loans	66%	35%
% interest-only loans	11%	13%
% investment properties	7%	7%
% 2-4 family properties	7%	10%

With an interest-only mortgage, the borrower makes payments of interest only instead of principal and interest for a specified period of time.

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[28] *Fitch Ratings "ResiLogic: U.S. Residential Mortgage Loss Model Technical Document" 18 January 2007.*

Fitch June 2007	Fitch Ratings extended its SmartView monitoring system to subprime RMBS trans-actions. SmartView is used for monthly surveillance of transactions, with the loan being put Under Analysis where necessary. This is different to Credit Watch. Deals that are Under Analysis are posted on the Fitch Ratings website, meaning that Fitch will be issuing a rating action within 30 days.
Moody's: **July 2007**	Moody's made several changes to its methodology for rating subprime RMBS classes: • stronger default assumptions for first-lien mortgages where the borrower has piggybacked a second-lien mortgage • stronger default assumptions for loans with little documentation. • higher risk factor for recently granted loans (the default risk declines with the length of time during which the borrower has kept up regular payments)
Standard & Poor's **10 July**	Expected losses on 2/28 ARM loans is increased by some 21%.
Fitch **6 and 14 August 2007**[29]	6 August 2007: Fitch announces changes to some of the underlying criteria of the ResiLogic methodology, which calculates expected losses for individual RMBS deals, and publishes a report on the subject. The main changes are: • Higher default probability for ARMs after the rate reset (i.e. transition from fixed rate to variable rate). For 2/28 ARMs, the default expectation is multi-plied by 1.2 if the loan is not associated with a second-lien loan and by 1.5 if it is. • Change in the multipliers for the probability of foreclosure due to local eco-nomic conditions (e.g. the multiplier for California is further increased). • Greater differentiation in the levels of mortgage documentation. Effective August 2007, the number of categories increases from 3 (Full, Reduced, None) to 4 (Full, Reduced, Low, None). Fitch Ratings gives an example of the impact of the changes to its methodology and assumptions: expected losses for the ABX HE 07-01 rise from 5.65% to 8.23%.

[29] *Fitch Ratings "US RMBS: criteria update to ResiLogic Model" (14 August 2007).*

Annex 2

Rating classes

		Fitch	Moody's	Standard & Poor's
Investment	**category 1**	**AAA**	**Aaa**	**AAA**
Investment	**category 2**	**AA+**	**Aa1**	**AA+**
		AA	**Aa2**	**AA**
		AA-	**Aa3**	**AA-**
Investment	**category 3**	**A+**	**A1**	**A+**
		A	**A2**	**A**
		A-	**A3**	**A-**
Investment	**category 4**	**BBB+**	**Baa1**	**BBB+**
		BBB	**Baa2**	**BBB**
Investment	**category 5**	**BBB-**	**Baa3**	**BBB-**
Speculative	**category 6**	**BB+**	**Ba1**	**BB+**
		BB	**Ba2**	**BB**
		BB-	**Ba3**	**BB-**
Speculative	**category 7**	**B+**	**B1**	**B+**
		B	**B2**	**B**
		B-	**B3**	**B-**
Speculative	**category 8**	**CCC+**	**Caa1**	**CCC+**
		CCC	**Caa2**	**CCC**
		CCC-	**Caa3**	**CCC-**
		CC	**Ca**	**CC**
		C D	**C**	**C D**

Annex 3

Ratings for the FHLT 2006-B transaction from January to October 2007

Tranches	Amounts at the date of issue	(coupon)	March	April	May	June	July	August	September	November (composite rating)
1-A	168,810,000	1 Month LIBOR + .15bps								AAA
2-A-1	216,724,000	1 Month LIBOR + .4bps								AAA
2-A-2	149,095,000	1 Month LIBOR + .1bps								AAA
2-A-3	184,275,000	1 Month LIBOR + .16bps								AAA
2-A-4	67,939,000	1 Month LIBOR + .24bps								AAA
M-1	45,163,000	1 Month LIBOR + .28bps				A1*-				AA+
M-2	31,614,000	1 Month LIBOR + .3bps				AA*-; A2*-				AA
M-3	18,567,000	1 Month LIBOR + .32bps							A+	A+
M-4	17,061,000	1 Month LIBOR + .36bps							A	A-
M-5	16,058,000	1 Month LIBOR + .39bps							A-	BBB
SL-A	189,504,000	1 Month LIBOR + .2bps				Aa2*-	A-*; BBB-		A;B	BB
M-6	15,054,000	1 Month LIBOR + .45bps					Baa3; BBB+*; BB		BBB	BB+
M-7	14,552,000	1 Month LIBOR + .9bps					Ba2; BBB*; B		BBB-	BB-
M-8	12,544,000	1 Month LIBOR + 1.07bps			BBB*-; Baa3*-		B2; BBB*; B		BB+	B-
M-9	9,534,000	1 Month LIBOR + 1.9bps			BBB-*-; Ba1		Caa1 ; BBB-*-; CCC		BB-	CCC+
M-10	6,523,000	1 Month LIBOR + 2.5bps			Ba2*-; BB+*-	BB+*-	Caa2 ; CCC		B+	CCC
M-11	10,043,000	1 Month LIBOR + 2.5bps		Aa1*-		A1*-		AAA*; Baa2	B	CCC-
SL-M1	13,606,000	1 Month LIBOR + .42bps		Aa2*-		AA*; A2*-		AA+*; Ba1	BB+; C	CCC+
SL-M2	12,189,000	1 Month LIBOR + .47bps		Aa3*-	AA*-	AA-*; Baa2*-		AA+*; B1	B;C	CC+
SL-M3	8,362,000	1 Month LIBOR + .52bps		A1*-	AA-*-	BB*; Baa3*-		Ca	C; CCC	C+
SL-M4	7,370,000	1 Month LIBOR + .62bps		A2*-	BBB-*-	B*; Ba1*-	B	C	C; CCC	C+
SL-M5	7,653,000	1 Month LIBOR + .72bps		A3*-	BBB-*-; BB-*-	B-*; B3*-	CCC	C	C	C+
SL-M6	7,086,000	1 Month LIBOR + .8bps		BBB+*-; B3	B*-; B+-	CCC; Caa1*-	CCC	C	C	DDD
SL-M7	6,945,000	1 Month LIBOR + 1.5bps	Baa1-		BBB*-; Baa3*-				C ;D	DDD
SL-M8	6,519,000	1 Month LIBOR + 1.7bps								DDD
SL-M9	5,811,000	1 Month LIBOR + 2.5bps			BBB*-; Baa3*-					DDD
SL-B1	6,236,000	6.5%								DDD

Agencies: MOODYS   STANDARD and POOR'S   FITCH   Bloomberg

Annexe 4

ABX-HE by rating level and vintage
(source: Markit)

Indice des classes de RMBS "subprime" AAA

Indice des classes de RMBS "subprime" AA

Indice des classes de RMBS "subprime" A

Indice des classes de RMBS "subprime" BBB

Indice des classes de RMBS "subprime" BBB-