

## Box 2

### US SUB-PRIME MORTGAGE SPILLOVER TO CREDIT RISK TRANSFER MARKETS

The share of adjustable rate mortgages (ARMs) in new mortgage credit extended in the US has risen significantly since 2002. Whereas at the end of 2002 the share of ARMs was about 20% in dollar volume terms and just over 10% by number of new mortgages granted, their respective shares peaked at around 50% and 35% in mid-2005, after which they declined somewhat (see Chart S7).<sup>1</sup> Of these mortgages, a substantial number were “sub-prime” – i.e. mortgages granted to individuals with poor credit histories.<sup>2</sup> This Box explains why delinquencies on these loans rose significantly after mid-2005, and shows how this ultimately led to spillovers into certain portions of the CRT markets in early 2007.

Delinquency rates on sub-prime mortgages increased markedly after mid-2005, especially on loans that were originated in 2005-2006, for four main reasons. First, sub-prime borrowers are typically not very creditworthy: they are often highly leveraged – usually with high debt-to-income ratios, while the mortgages extended to them typically have relatively large loan-to-value ratios – and frequently they have little in the way of assets to cover unexpected mortgage repayments. Second, sub-prime mortgages are short-reset loans, i.e. the interest rate initially charged to a sub-prime mortgage borrower is much lower than standard mortgage rates, but after a two to three year period, it is typically reset to a much higher rate. Because of this, although short-term market interest rates began to increase in the US from mid-2004 onwards, resets did not begin to translate into higher mortgage repayment burdens until sometime later. However, debt service burdens for loans eventually increased, and began resetting to higher rates from 2004 onwards. This led to financial distress for some of this group of borrowers.

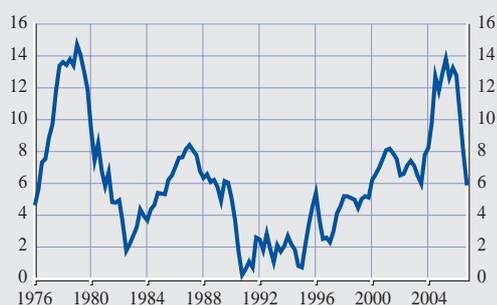
Third, in states that had previously seen high rates of house price inflation since the early 1990s, and consequently where housing had become less affordable, sub-prime borrowers had

<sup>1</sup> Source: US Mortgage Bankers Association.

<sup>2</sup> Sub-prime borrowers have often either missed payments on a debt or been late with payments. Lenders charge a higher interest rate to compensate for potential losses from customers who may run into trouble or default. Various estimates put the stock outstanding of sub-prime mortgages loans at 12-15% of total household mortgage credit in the US.

Chart B2.1 US house price inflation

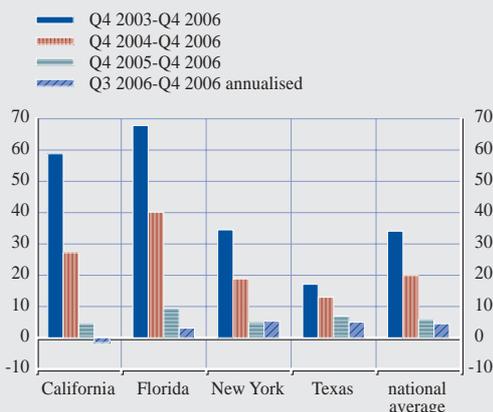
(% per annum)



Sources: Office of Federal Housing Enterprise Oversight (OFHEO) and ECB calculations.

Chart B2.2 House price inflation in selected states in the US

(% change)



Sources: OFHEO and ECB calculations.

counted on being able to refinance or repay mortgages early through home sales. For instance, according to one estimate, just under 50% of the outstanding amount of securitised sub-prime mortgages in 2006 was accounted for by just four states.<sup>3</sup> As the rate of US house price inflation began to decline after April 2005 (see Chart B2.1), it slowed substantially in these states (see Chart B2.2). As a result, there was a decline in the probability of sub-prime mortgages being refinanced or of being paid off early through home sales before being reset at a higher mortgage interest rate. As this possibility was pushed further into the future, sub-prime borrowers ended up incurring higher mortgage costs than they might have expected to bear at the time of taking out their mortgage. Slower house price inflation also limited the opportunities of borrowers wishing to withdraw equity – i.e. to pay down debt – through selling. This further reduced the ability of already delinquent borrowers to carry out a cash-out refinancing to remedy the delinquent status of their loans.

Fourth, the availability of sub-prime mortgages was amplified by investor demand for higher yielding assets. This boosted demand for residential mortgage-backed securities (RMBS) and Collateralised Debt Obligations (CDOs) containing mortgage-backed securities (MBS), which offered higher returns compared to those available from corporate or sovereign credit. The supply of sub-prime assets responded, aided by the application of excessively loose credit standards by mortgage originators – including those originated by mortgage brokers, whose share in total originations in this market has increased dramatically in recent years. As most of these loans originated by brokers were subsequently securitised, it appears that the originating brokers now have less incentive to monitor borrowers' creditworthiness.<sup>4</sup> The combined result of financially stretched borrowers, higher interest rate resets, and reduced abilities to avoid resets or to carry out a cash-out refinancing for delinquent loans because of declining house price inflation, was increased delinquency rates on securitised sub-prime mortgage loans. The most recent vintages of sub-prime mortgages originated in 2005 and 2006 saw delinquency

<sup>3</sup> Source: JP Morgan Chase & Co.

<sup>4</sup> To some extent this should have been mitigated by brokers having to repurchase delinquent loans from the underlying asset pool. However, as some of the brokers were experiencing financial difficulties and even in some cases filed for bankruptcy, this did not occur, leading to even greater losses on the underlying asset pools.

**Chart B2.3 Delinquency rates on securitised sub-prime adjustable rate mortgage loans by vintage year in the US**

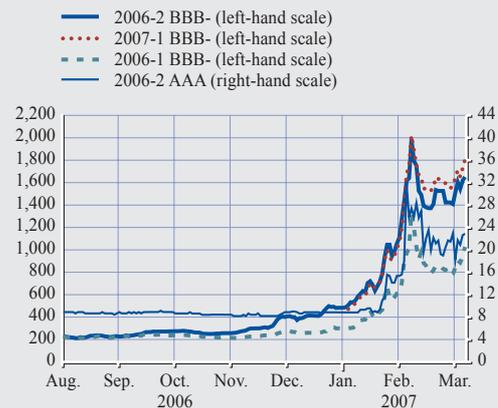
(basis points spread)



Source: Fitch Ratings.  
Note: Includes RMBS transactions rated by Fitch Ratings.

**Chart B2.4 ABX-HE-BBB- and AAA-rated spreads over the risk-free rate in the US**

(basis points spread)



Source: JP Morgan Chase & Co.

rates on securitised mortgage pools climb much faster than on older vintages (see Chart B2.3).

As the frequency of sub-prime mortgage delinquencies rose, the impact on the lower quality end of the CRT market was substantial, and market participants' concerns over deteriorating sub-prime credit quality led to a significant increase in the cost of credit protection associated with sub-prime non-agency RMBS. For instance, the spreads on an index comprised of lower quality tranches of securities ultimately backed by sub-prime loans – originated during 2006 – rose from around 200 basis points in August 2006 to over 1,000 basis points by the end of March 2007 (see Chart B2.4).<sup>5</sup> This indicated that market participants had rapidly reappraised the risks associated with these securities and demanded much higher premiums for credit protection compared to either risk-free rates or to premiums paid on higher-rated (AAA) tranches for the same vintage. Moreover, the impact on spreads for different vintages varied among the lower-rated tranches, probably reflecting expectations that lower house price inflation in the second half of 2006 would affect the underlying assets, as the loans in the underlying RMBS pools of the later reference series (i.e. 2006-2 and 2007-1) have yet to reset, indicating more delinquencies are probable during the second half of 2007.

The extent to which this deteriorating performance of sub-prime RMBS could affect broader structured credit markets depends on the concentration of these assets as collateral for CDOs and how developments in the ratings of these sub-prime assets feed through to CDO tranche ratings. In 2006, according to Moodys, the average share of sub-prime assets in CDOs asset pools was about 45%; just over 22% of this was rated Baa or lower. Depending on the type of CDO there was a great deal of variability around this average figure, no sub-prime collateral

<sup>5</sup> This ABX.HE index is the most relevant index covering US sub-prime non-agency RMBS. The index allows market participants to buy or sell credit protection on the index depending on the level of risk they wish to hedge or assume. The index is composed of series ranging from AAA-rated to BBB-. Each series is comprised of a basket of 20 CDS referencing sub-prime non-agency MBS. Every six months a new series is created referencing 20 new RMBS. The underlying mortgage assets in the RMBS were originated during the first and second halves of 2006, and the first half of 2007.

for ‘high-grade’ CDOs, i.e., containing only prime residential mortgage backed (RMBs), and as much as 88% of the pool for so-called ‘mezzanine’ CDOs.<sup>6</sup> A substantial amount of this sub-prime CDO collateral is currently poised for rating downgrade review and some of it had already downgraded between Q4 2006 and Q1 2007. It cannot be ruled out that further poor performance of collateral and subsequent downgrading could trigger downgrades of CDO’s tranches themselves and lead to a reassessment of risk in structured credit markets.

<sup>6</sup> See Moody’s (2007), “The impact of sub-prime residential mortgage-backed securities on Moody’s-rated structured finance CDOs: a preliminary review” Special Comment, March, and Moody’s (2007), “US sub-prime mortgage market update: April 2007”, Special Report, April.