

The U.S. Mortgage Market, Fannie Mae, and Freddie Mac

An IMF Study

Fannie Mae and Freddie Mac, the U.S. government sponsored housing enterprises, have come under increasing scrutiny because of their rapid growth and the possible risks they pose to financial stability. Recent developments have highlighted the extremely large, highly leveraged, nature of these enterprises and the risks they are managing. The ability of homeowners to fix their mortgage rates while preserving prepayment rights has transferred complex and increasingly large risks to these enterprises and other investors.

While it is prudent for Fannie Mae and Freddie Mac to hedge their exposures, the very large size of their balance sheets implies that their hedging operations can accentuate sharp market moves. Although other countries also have seen booms in mortgage activity as a result of low long-term interest rates, the size of these two enterprises and the volume of mortgage prepayments and hedging are much larger than activities in other countries and thus raise particular financial stability concerns.

Fannie Mae and Freddie Mac were chartered as agencies by Congress to provide liquidity to the home mortgage market. They are owned by private shareholders and have no explicit government guarantee, but are believed by many market participants to enjoy an implicit one. This perception, which helps lower their borrowing costs, has been reinforced by a number of factors, including a line of credit from the U.S. Treasury; exemption of their debt from banks' large-exposure limits; exemption of their income from state and local taxes; exemption from SEC registration requirements; and, perhaps most important, the belief that they are "too big to fail." They have an AAA rating but the rating agencies have stated that, absent the implicit government guarantee, the rating would be AA instead.

The size of the U.S. mortgage and agency debt market has grown rapidly in recent years to surpass that of U.S. treasury securities (Figure 2.10). At the end of March 2003, securities directly issued by U.S. government-sponsored agencies (including, but not limited to, Fannie Mae and Freddie Mac) totaled \$2.4 trillion and mortgage-backed securities issued by the agencies totaled \$3.2 trillion.² The total of these two amounts was 161 percent of the size of outstanding U.S. treasury securities, compared with 73 percent as recently as 1996.

Fannie Mae and Freddie Mac manage large exposures to interest rate, prepayment, and credit risks. They provide credit guarantees for the mortgages they have securitized. In addition, they hold on their balance sheets nearly \$300 billion of home mortgages, plus an additional \$1.2 trillion of MBSs, compared with a total \$6.6 trillion of home mortgages outstanding in the United States. Some observers have warned of the systemic risks inherent in the agencies' large mortgage portfolios and their hedging operations, and have criticized the agencies for lack of transparency.

The Office of Federal Housing Enterprise Oversight (OFHEO), which supervises the two

agencies, oversees quarterly stress tests to ensure that they can withstand severe market conditions for interest rates and house prices. Based on these stress tests, OFHEO found that the capital of Fannie Mae and Freddie Mac has consistently exceeded the minimum required. However, regulators need to look closely at whether agencies' capital adequacy is sufficient, especially bearing in mind the questions about internal controls that have emerged in Freddie Mac. Their core capital-to-asset ratio at the end of 2002 was only 3.2 percent, and it is unclear whether they have taken sufficient account of the risk that the markets may not be deep enough to allow them to continuously hedge their growing portfolios in times of stress. More comprehensive stress tests and a greater safety margin for operational risks within the capital requirement are two possibilities that could be considered, which would increase the robustness of the agencies, allow them to take a longer-term investment horizon, and reduce the pressure on them to conduct precise, continuous hedging.

The expected volume of prepayments is strongly influenced by the level of interest rates, and this changes the duration of mortgages and MBSs. (When interest rates go down, borrowers can refinance at lower cost, but when rates go up they can continue paying at the originally fixed rates.) Dynamic hedging requires continuously adjusting the duration of agencies' liabilities to offset changes in the duration of mortgage-related assets. In August 2002, the duration gap between Fannie Mae's assets and liabilities widened to minus 14 months, as falling interest rates increased likely prepayment rates and thus shortened the expected duration of its mortgages. This gap prompted OFHEO to require an action plan to correct this imbalance and to monitor Fannie Mae's maintenance of its duration gap for the following six months before it declared itself satisfied in April 2003.

In January 2003, Freddie Mac announced it would restate its earnings and capital for prior years due to incorrect accounting for derivatives transactions, and in June 2003 three top executives left the firm over a corporate governance scandal. The firm's former auditor had mistakenly allowed various transactions to be used to smooth financial results and thus defer profits from marking to market hedges as required under the "fair value" accounting rules introduced in 2001. Its new auditor, appointed in 2002, insisted that the accounts be restated to remove this smoothing. Freddie Mac has stated that it expects retained net earnings at end-2002 to be increased by between \$1.5 billion and \$4.5 billion as a result of the restatement, and that future earnings would accordingly be lower than under the previous treatment. In addition, the new accounting practices will likely result in greater future variability of earnings.

The news of accounting and corporate governance problems at Freddie Mac unsettled the market. The biggest effect was on the equity price of Freddie Mac (in both January and June 2003) and to a lesser extent Fannie Mae (Figure 2.11). Interest rate spreads of agency over U.S. treasury debt widened. The market's initial reaction seemed to suggest more concern about the agencies' future profitability than about their creditworthiness.

Hedging in the Mortgage Market Can Amplify Interest Rate Movements

If U.S. bond yields rise further, one source of additional market volatility may be the dynamic hedging practices in the mortgage and MBS market, by both the agencies and

other investors (Box 2.1). The size of mortgage indebtedness and recent historically low interest rates greatly increased the volume of prepayments to be hedged in the last three

The hedging of mortgages and mortgage-backed securities (MBSs) is complicated by the need to predict, and constantly adjust to, the future tendency of borrowers to prepay their mortgages. A portfolio of fixed-rate pre-payable mortgages will, ex post, have an actual duration much shorter than the average contractual length of the mortgages because of prepayments. Prepayment rates will depend partly on future interest rates, as borrowers prepay when there are cost savings from refinancing, but will also depend on other factors, such as the frequency with which borrowers move house or the promptness with which they seize opportunities to refinance more cheaply. Past experience enables investors and analysts to estimate expected prepayment rates, depending on the interest rates and terms of the mortgages in the portfolio and the current level of interest rates.

The complicated nature of the prepayment risks means that the interest rate risk on mortgages or MBSs cannot be fully hedged away by other instruments, such as conventional bonds or derivatives. At any given instant, the exposure of an investment in MBSs to small interest rate changes can be hedged by a short position in conventional fixed-rate instruments, once the average duration of the MBSs has been estimated. But the hedge would need to be constantly adjusted, as the expected durations of the MBSs would change much more than the durations of the conventional instruments in response to interest rate changes. For instance, as interest rates rise, expected prepayment rates for MBSs fall, and their durations rise, leading hedgers to need to sell extra conventional instruments to remain fully hedged. The required hedging ratios would change over time even if interest rates remained the same, as the expected pre-payment rate would continue to evolve.

Several hedging strategies can be used by investors. One common one is to sell treasury securities. This provides a very liquid market for hedging, but its accuracy depends on a stable spread being maintained between treasuries and MBSs, which is not always the case.

The swap market similarly provides an avenue for hedging. Both types of hedge require continual readjusting of hedge positions. Because of a poor experience with government bond hedges in 1998–2000, including during the Long-Term Capital Management (LTCM) crisis, many participants turned to the swap market to hedge investment portfolios of MBSs and other securities. One visible consequence was the strong correlation of swap rates and swap spreads over U.S. treasury yields as U.S. mortgage rates fell in 2000–01. As rates fell, mortgage prepayment suddenly became more likely and hedged investors needed to receive fixed-rate interest payments in the swap market. This demand to receive fixed-rate payments was revealed by the decline in swap spreads at the same time as the overall level of rates fell. An approximate attempt to hedge against larger interest rate movements can be made by using option-related products such as buying swaptions (the option to enter into a swap at a certain fixed rate) or selling callable bonds (which give the issuer the right to pre-pay the bond). Both these instruments can allow investors to match some of the prepayment

features of MBSs, but will not exactly duplicate the likely behavior of the pool of mortgage borrowers. The growing size of the mortgage debt market appears to have encouraged the use of a wider range of hedges, such as these to absorb more easily the shifts in mortgage duration. While these sorts of hedges can be more exact than conventional bonds or swaps, they can be more expensive to implement and more illiquid.

A more fundamental way for mortgage lenders to reduce their hedging needs would be to price adjustable-rate mortgages more aggressively to limit the creation of new fixed-rate mortgages with prepayment rights, although persuading borrowers to accept adjustable-rate mortgages when fixed rates are still at historically low levels would undoubtedly be difficult.

Therefore the effect of these prepayments, and the consequent need for hedging transactions, has become a more important issue for financial stability. As dynamic hedgers see the expected duration of their assets increase when interest rates rise and the likelihood of prepayments falls, they will reduce duration elsewhere on their balance sheet by, for example, selling treasury securities, thus potentially accelerating the upward movement in yields in the overall market. As mortgage interest rates have risen from their historic lows in June, the volume of mortgage prepayments has already fallen rapidly.

Those borrowers with new mortgages or who have recently refinanced have locked in rates well below what are now current market levels. Meanwhile there are relatively few mortgages still outstanding that were taken out in the period before 2001 when rates were well above current rates and that have not already been refinanced.

As the volume of actual and prospective prepayments has fallen, durations of MBSs, which had declined dramatically, have increased rapidly again. In May during the peak of the refinancing boom, for example, the pace of refinancing was such that the average expected duration of MBSs fell to 0.5 years, compared to over four years in early 2000, and it has widened again to over three years in early August (Figure 2.13).

The speed and magnitude of this change in duration has generated the need for large amounts of extra hedging. The exact proportion of MBSs whose hedges are adjusted on a continuous basis is not known, but around 40 percent of MBSs are held by the agencies, which have a policy of hedging. If we assume that around half the total outstanding are held in continuously hedged portfolios, the rise in duration since the low point in May has already created the need for hedgers to sell the equivalent of \$500 billion of 10-year conventional securities, which is more than double the amount of total U.S. government debt issuance with maturity two years and over in the year ending June 30, 2003.

The strains of accommodating this hedging activity have been clearly evident and were illustrated dramatically in the swap market at the end of July. After swap spreads had remained stable during the first phase of interest rate rises from mid-June to late July,

the five-year spread between the swap rate and treasury yield rose from 41 basis points on July 25 to a peak of 66 basis points on August 1 before falling back again below 40 basis points on August 7 (Figure 2.11). Swaption volatility also jumped sharply. Many analysts attributed these developments to the strong demand from investors to pay fixed rates under swaps to hedge their increased fixed-rate asset exposure.

The likely continuous hedging needs from the mortgage market remain very high. One market analyst has estimated that, if long-term interest rates were to rise by a further 50 basis points, the expected duration of the MBS market would increase by almost one year, leading to additional hedging sales equivalent to around \$200 billion of 10-year securities, while a 50 basis point fall would create the need to reduce short positions by a similar amount (Modukuri, 2003). Given the amounts involved, a sudden rise or fall in interest rates could be further amplified by this hedging, particularly at longer maturities, as hedgers sell into markets where prices are already falling, or buy into rising markets. Institutions affected by these hedging needs include the agencies, banks and other investors in mortgage-related instruments, and counterparties that have taken on some of the positions hedged by these investors.

The agencies have the largest and most concentrated positions, and so the impact on them is perhaps the most important for financial stability. The close regulatory and public attention to Fannie Mae and Freddie Mac may have caused them to hedge more exactly on a continuous basis, presumably amplifying the effect of interest rate moves still further. This hedging also has likely costs for the agencies arising from the bid-offer spread of transactions.

For every \$100 billion of MBSs dynamically hedged on a continuous basis, the total hedging cost of adjusting to an additional one-year change in average duration would be \$10 million per basis point of bid-offer spread paid. The speed of market movements and illiquidity during periods of rapid rate movements, illustrated by discontinuities (so-called “gapping”) in prices, also mean that the agencies face increased interest rate exposure during these market moves. Meanwhile, the funding costs have gone up for the agencies as spreads have widened further.

Continued stories of accounting uncertainties and investigations appear to have led to sales of agency debt by some investors. Foreign central banks, for instance, which increased holdings of agency securities rapidly in the early part of the year as part of the search for yield, appear to now be making net sales, despite their continued buildup of dollar reserves. Ten-year agency spreads against U.S. treasury bonds have widened to over 50 basis points from 37 basis points at the end of May, for instance. Spreads are currently highly volatile, but if this increased funding cost is sustained, it will reduce the agencies’ profitability, although it should be noted that they reported comfortable net interest margins of over 100 basis points at the end of 2002.

It may be that other investors—such as banks, securities firms, or hedge funds—have sustained considerable losses during the recent market turbulence, especially if they have been attempting to benefit from the interest rate carry that can be earned on MBSs

or longer-term instruments or otherwise felt less need than the agencies to hedge their full interest rate risk. However, no specific information of such losses has emerged, nor any additional market disruption that would arise from feared failures of significant counterparties.

It is also possible that some of these institutions will have moved recently to hedge their positions more closely as volatility increased, adding further to the sales into a falling market.

In summary, the more volatile market environment for the agencies, potential difficulties for the market in absorbing their hedging needs, and possible lower profit margins all argue for regulators to examine closely whether the agencies' capital base is large enough to absorb the risks on their growing balance sheet. The narrowness of the safety margin provided by their capital has increased the need for them to maintain precise hedges on a continuous basis. The continuous, nondiscretionary hedging by the agencies and others in the mortgage market could amplify the size of any future increase in interest rates and add to market volatility. The amplifying effects of dynamic hedging are similar to those seen during some previous well-known spikes in market volatility, which are described in the case studies in Chapter III. But how powerful the amplification might be will depend on the speed and size of any interest rate rise and the not yet fully tested ability of the rest of the market to absorb the increasingly large duration needs of the hedgers.