

How can we control the mortgage giants' interest rate risk?

Reining in Fannie Mae and Freddie Mac

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FANNIE MAE AND FREDDIE MAC (F&F) ARE government-sponsored enterprises that dominate the U.S. mortgage market. In a 2003 *Journal of Financial Services Research* article, I documented that the mortgage related securities directly held by F&F in their retained mortgage portfolios contain very large amounts of interest rate risk; at year-end 2005, the two firms' retained mortgage portfolios totaled \$1.4 trillion. I recommended expanding government regulation of F&F to control that risk.

Since that time, the need for action has been confirmed in two important ways. First, the recent accounting scandals at the two firms arose because the firms had not controlled their interest rate risk. Second, key government officials, including Alan Greenspan, Douglas Holtz-Eakin, and John Snow, have recognized that F&F interest rate risk creates significant systemic risks for the U.S. financial system, and they accordingly have called for regulatory actions.

This article compares and evaluates alternative policy proposals that could control the F&F interest rate risk. These proposals include:

- Limit the size of the F&F retained mortgage portfolios. (Specific proposals for this have already been brought before Congress.)
- Require complete hedging of all F&F interest rate risk, using matching callable bonds.

- Raise the F&F capital requirements, to reflect the actual level of F&F interest rate risk.
- Enhance the OFHEO stress test so it accurately measures the F&F interest rate risk.
- Introduce a user fee on F&F debt, giving the firms incentive to limit their interest rate risk.

If properly implemented, any one of these proposals could control the F&F interest rate risk. The alternatives differ, however, in their ease of implementation and in the side effects they have on F&F and the mortgage markets they serve. This comparison of the alternative policies focuses on those two factors.

FANNIE, FREDDIE, AND THE MORTGAGE MARKET

Fannie Mae and Freddie Mac dominate the U.S. mortgage market through two distinct business lines. First, the firms issue residential mortgage backed securities (MBS) in amounts that historically have exceeded half of all MBS issued in the United States. The MBS are sold to capital market investors, but F&F guarantee the timely payment of interest and principal on the securities. Second, F&F hold retained mortgage portfolios on their balance sheets, which have represented more than one-fifth of all outstanding U.S. mortgage securities. These portfolios are primarily funded by issuing F&F bonds, at interest yields only modestly above those of Treasury bonds (reflecting an implicit Treasury guarantee). For both business lines, F&F retain (through guarantee or ownership) all the risks of possible default by mortgage borrowers.

The two business lines differ significantly with regard to

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their interest rate risk. For the MBS line, all the interest rate risk rests with the final investors, not with F&F. For the retained portfolios, in contrast, F&F are the investors; thus the interest rate risk rests with the two firms, although they hedge a part of the risk by transferring it to other investors. In fact, if F&F were to hedge all the interest rate risk embedded in their retained portfolios, then the retained mortgage portfolios and the MBS business line would have the same impact on the U.S. mortgage market. In other words, a unique role for the F&F retained mortgage portfolios on the U.S. mortgage market may arise only to the extent that F&F do not hedge all their interest rate risk.

The retained portfolio business is substantially more profitable than the MBS line because of the unhedged interest rate risk embedded in the former. For the MBS line, F&F only earn an annual guarantee fee of about 20 basis points (0.20 percentage points) as compensation for bearing the credit risk; in 2003 (the last year for which financial statements are available for Fannie Mae), total MBS guarantee fee income for F&F was \$4.0 billion. For the retained portfolios, the firms earn the spread between the interest yield on the mortgage securities and the interest cost of funding the portfolios, less any hedging costs; for 2003, the net interest income earned was \$23.1 billion.

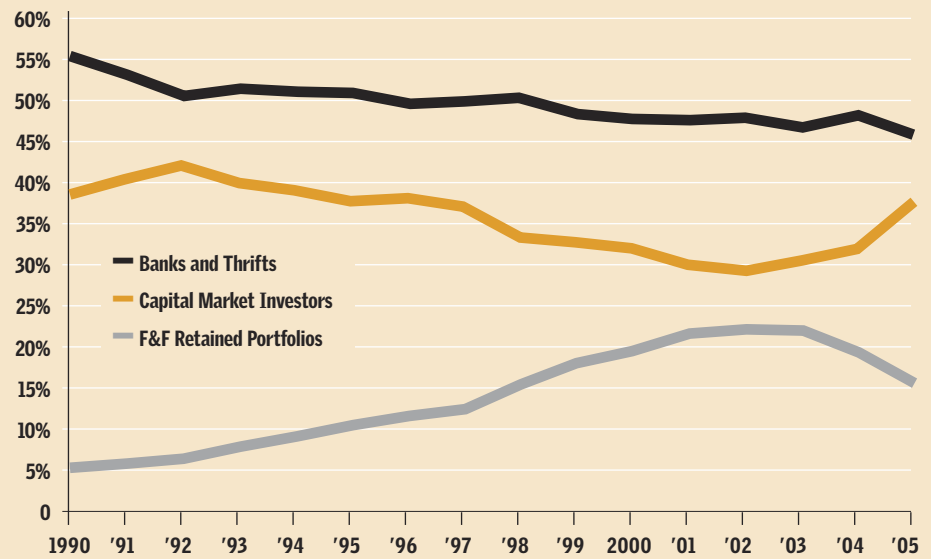
It is apparent that F&F's aggregate income is dominated by the retained portfolio component, because of both the large size of the retained portfolios and the large spread (in excess of 100 basis points) earned. This profit has provided F&F a strong incentive to expand their retained portfolios relative to their MBS issue business, at least until constrained by their recent accounting problems.

U.S. home mortgage related securities are ultimately held by one of three major investor classes: banks and thrifts, F&F retained portfolios, and all others (noted here as capital market investors). The three holder groups represent the three alternative channels through which capital market funds are allocated to holding the outstanding stock of home mortgages. Figure 1 shows that from 1990 to 2003, the F&F retained mortgage portfolio share rose from 5 percent to 22 percent, before declining to 16 percent in 2005 (as a result of their accounting crises). From 1990 to 2005, the bank and thrift share of total mortgage holdings fell steadily, with a cumulative decline of 10 percentage points (from 56 percent to 46 percent). From 1992 to 2002, the capital market investor share fell by 13 percentage points (from 42 percent to 29 percent), before recovering recently to 38 percent. Overall, the figure shows the rapid expansion of the F&F retained mortgage portfolios, limited only recently by the onset of their accounting crises.

FIGURE 1

Home Mortgage Securities

By Share of Major Holders, 1990-2005



INTEREST RATE RISK

The interest rate risk embedded in the F&F retained mortgage portfolios is the result of two special features of the standard U.S. long-term, fixed-rate, freely prepayable mortgage. First, in a rising interest rate environment, long-term, fixed-rate mortgages can lose substantial value. Second, in a falling interest rate environment, the mortgages may be prepaid by the borrowers, forcing F&F to replace the mortgages in a lower interest rate market. Together, these features mean that fixed-rate mortgage portfolios may lose significant value, whichever direction interest rates change. For example, if market interest rates were to change by two percentage points, the mortgage portfolio could lose more than 18 percent of its initial value if interest rates rise (and the firm is short-funded) and more than 25 percent of its value if interest rates fall (and the mortgage borrowers' prepayment option is not hedged).

To put those potential losses in context, the F&F retained portfolio capital requirement is only 2.5 percent, so capital would not provide significant protection if the firms were actually to suffer losses to the degree illustrated here. It should also be recognized that interest rate changes of 2 percentage points or more within a 12-month period have occurred during at least nine distinct episodes since 1953 for 10-year Treasury rates, and even more often for shorter-term Treasury securities.

To be sure, F&F hedge a part, and in some cases a significant part, of their interest rate risk. (I provide a detailed discussion of their hedging programs in my 2003 article.) The firms follow a dynamic hedging strategy in which they progressively adapt their hedged positions as interest rate levels change. This is a cost-effective technique, but it is necessarily imperfect and leaves the firms at risk to either rapid or sustained interest rate changes. In addition, the firms could deviate from the dynamic hedging strategy, for example, if they think interest rate



changes are particularly unlikely in one direction or another. Statistical results from the OFHEO-administered F&F stress tests indicate that the firms recently did make distinct bets on the expected direction of interest rates, just the opposite of a dynamic hedging approach. That is, at times the tests show that the firms performed much better when interest rates changed in one direction rather than in the other, a clear symptom of speculation in one direction.

Overall, the F&F interest rate hedging strategies represent a sophisticated use of interest rate derivatives, implemented to maximize shareholder value. The problem is not the firms' skill in carrying out the strategy, but that this strategy, when successfully implemented, transfers a significant component of the risk of unexpected and large future rate changes onto the U.S. Treasury based on its implicit guarantee of F&F debt. It is a fair to say that F&F rather fully protect their shareholders' equity against the small and foreseeable risks, while imposing on taxpayers the large and distant risks that would eventually require a bailout.

The firms are able to operate in this manner only because investors in F&F debt and MBS securities show little concern for the firms' riskiness, protected as they are by the implicit Treasury guarantee. Investors in private market firms, in contrast, would immediately require higher interest rates on a firm's debt, if the investor felt the firm was imperfectly hedging its interest rate risk. In brief, only F&F, based on their implicit government guarantee, can and do operate in this manner.

The likely costs of the interest rate risks embedded in the F&F retained mortgage portfolio are further magnified by two effects unique to F&F as government-sponsored enterprises:

- **Rising Funding Costs** F&F profits are particularly sensitive to changing interest rate levels because the firms

systematically issue close to half of their debt with an initial maturity of one year or less. At year-end 2003, for example, fully 46 percent of their debt had an initial maturity of less than one year, in a total amount of just under \$1 trillion. An unexpected increase in the F&F funding costs can then have severe effects on firm profits; for example, a 100 basis point jump in F&F debt rates in 2003 would have just about wiped out the combined profits of the two firms in that year. Furthermore, even if the initial rate rise is directed at just one of the firms, the ramifications in terms of rising debt costs would soon be felt by both firms.

- **Systemic Effects** Concerns for the ability of either Fannie Mae or Freddie Mac to fulfill its debt and MBS obligations are likely to have an impact on the entire U.S. finance system, owing to the immense amount of F&F debt and MBS outstanding. Table 1 shows that the outstanding F&F guaranteed securities (retained mortgage portfolio plus net MBS outstanding) at year-end 2005 totaled about \$4.0 trillion, an amount that exceeds the total debt outstanding in such other major fixed-income categories as all corporate bonds, all commercial loans, all consumer credit, and all municipal bonds. This is why Greenspan and Snow made public their desire for further regulation of F&F.

POLICY OPTIONS

Given the seriousness of this threat, policymakers are giving considerable attention to different methods of controlling Fannie and Freddie's interest rate risk. Among the policy responses:

- **LIMIT THE RETAINED PORTFOLIO SIZE** Since 2004, Congress has been considering proposals to limit the size of the F&F



retained mortgage portfolios. The proposals are to limit, but not to eliminate, the retained portfolios, as there may be benefits to allowing F&F to buy and sell mortgage related securities in special circumstances.

Assuming that F&F would continue to hedge their interest rate risk in the same manner as currently, any reduction in the retained portfolios would produce a proportionate reduction in their unhedged interest rate risk. Furthermore, a smooth and orderly transition to a new size limit can be ensured by allowing the existing retained portfolios to liquidate naturally — that is, the liquidation would be based on realized principal payments, not by required security sales — until the desired size is reached. As the portfolio size declines, F&F would accordingly reduce the amount of their debt outstanding, as well as the portfolio of interest rate derivatives they use to hedge the interest rate risk.

The portfolio limit proposals lead to several questions:

- Who would substitute for F&F as mortgage security holders?
- Is it actually beneficial to transfer interest rate risk away from F&F?
- What would be the ultimate impact on mortgage interest rates?

For the F&F substitute question, if we assume, as a working example, that F&F would continue to hold a 5 percent market share, then as one possibility, the mortgage market could return to the structure for holding mortgage related securities that existed in 1990. In that structure, F&F held a 5 percent market share, capital market

investors held 39 percent, and the depository institutions held 56 percent. Of course, this is just one possibility, and today capital market investors might take up a larger market share.

The second question concerns why it is preferable to transfer the risk from F&F to capital market and depository institution investors. The answer is based on three key factors:

- *Portfolio Diversification* Lack of diversification is a key drawback to the F&F retained mortgage portfolios because they are invested essentially 100 percent in homogenous mortgage securities. Capital market and depository institution investors, in contrast, typically hold highly diversified portfolios in which mortgage securities are just one component.
- *Firm Concentration and Capital Resources* The F&F retained mortgage portfolios have the disadvantage that they are concentrated in just two firms. Capital market investors, in contrast, number in the millions. Even depository institutions number about 10,000 firms. Furthermore, both of these groups hold significantly more capital than do F&F.

- *Government Guarantees* A key concern created by the F&F retained mortgage portfolios is that the U.S. Treasury might have to pay for their portfolio losses. Private capital market investors, of course, receive no government guarantees, and the deposit insurance provided by banks and thrifts is actually funded by the industry, with no link to the Treasury.

The third question concerns the impact on U.S. mortgage interest rates. If only private market entities were involved, then standard finance principles would indicate no expected material effect on mortgage interest rates. This assumes that bank and capital market investors readily replace F&F as mortgage holders, and that the interest rate derivatives currently used to hedge the F&F portfolios would be equally available to the new bank and capital market investors.

F&F, however, may represent a special case because of the subsidies they receive from the implicit government guarantees. Limiting the size of the F&F portfolios would reduce the subsidies, and thus might be expected to raise mortgage rates. But F&F are also unique in that the subsidies are provided to just two firms, raising the possibility that the subsidies might just raise F&F profits instead of lowering mortgage rates. For this reason, limiting the F&F portfolios is unlikely to have a material impact on U.S. mortgage interest rates; existing quantitative estimates are ambiguous. In addition, F&F would likely respond to portfolio limits by expanding their MBS issue line, which would also offset any tendency for mortgage rates to rise.

TABLE 1

Major Components of U.S. Debt Markets

Year-end 2005, in trillions of dollars

All Treasury debt	4.7
Total F&F guarantees	4.0
All corporate bonds	3.0
All commercial loans	2.4
All consumer credit	2.2
All municipal bonds	2.2

NOTE: F&F guarantees = retained portfolios + net MBS
SOURCE: Federal Reserve Flow of Funds L.2, monthly reports for Fannie Mae and Freddie Mac.

Finally, from year-end 2001 to year-end 2005, the F&F market share declined by about one third (from 22 percent to 16 percent) without any apparent negative impact on U.S. mortgage markets:

- U.S. residential mortgages outstanding grew by over 50 percent.
- The 30-year, conforming mortgage rate fell from 7.07 percent to 6.27 percent.
- The jumbo conforming mortgage rate spread fell from 37 basis points to 21 basis points.
- The mortgage/10-year Treasury rate spread fell from 198 basis points to 180 basis points.

By all four measures, conditions in the U.S. mortgage market improved at the same time that the F&F market share fell significantly

Our overall conclusion is that an orderly reduction in the size of the retained mortgage portfolios is unlikely to raise U.S. mortgage interest rates by any material amount. Taking into account that the proposal may avoid a major disruption of the

risk. Callable debt is also easy for the regulator to verify, and has the further benefit for the firms that the accounting rules are straightforward, eliminating all the complexity created by the rules for derivative hedging.

From 2001 to 2005, Freddie Mac's callable debt outstanding as a share of fixed-rate assets has more than doubled, from under 30 percent in 2001 to over 60 percent in 2005. This suggests that Freddie Mac is already recognizing the benefits of callable debt as an interest rate risk hedging device. Of course, there is a cost: The interest rates on 10-year callable bonds for Freddie Mac are about 100 basis points above the cost of comparable non-callable bonds. The reduction in F&F profits, however, would be less than the reduction created by an explicit portfolio size limit.

RAISE CAPITAL REQUIREMENTS Raising the capital requirements imposed on F&F is an alternative solution. The current "minimum" capital requirements — 2.5 percent of assets plus 0.45 percent of adjusted off-balance-sheet obligations — were instituted, however, only to provide protection against credit risk. Capital requirements against interest rate risk are exceedingly difficult to calibrate, because they require precise quantitative measures of the amount of the rate risk in a portfolio and the amount

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U.S. financial system, expected future mortgage rates may well be lower as a result of implementing the proposal.

This analysis also has the implication that a reduction in the size of the retained mortgage portfolio would significantly reduce F&F profits. Our earlier discussion indicated that, in 2003, F&F net interest income from the retained portfolios was \$23 billion, while guarantee fees on MBS issues were only \$4 billion. Thus, a significant reduction in the size of the retained mortgage portfolio could well reduce F&F profits by more than half, even if the direct effect is offset by increased MBS guarantee fees and wider spreads on any allowed portfolio amounts.

FULL HEDGING WITH CALLABLE DEBT An alternative strategy is to require that F&F hedge all the interest rate risk embedded in their retained mortgage portfolios (in which case the firms would be free to set any size for the portfolios). A potential problem with this approach, illustrated by the accounting crises at the two firms, is the difficulty of monitoring the amount of hedging when the firms apply complex, dynamic strategies based on interest rate derivatives.

There is a simple and transparent solution: Require F&F to hedge 100 percent of the prepayable mortgages in their retained mortgage portfolio with callable debt of an equivalent duration. This requirement directly eliminates all the F&F interest rate

of the risk that has been successfully hedged. Indeed, neither the Basel I bank capital requirements nor the soon-to-be-announced Basel II requirements apply to interest rate risk. Thus, while from a longer-run perspective, capital requirements are likely to be a practical tool for controlling the interest rate risk of financial institutions, they are not yet a feasible tool. In this regard, it is worth noting Andrew Davidson's intriguing proposal to achieve the benefits of F&F portfolio size limits through the capital requirements by setting higher levels for the capital requirements, the larger the size of the retained mortgage portfolios.

EXPAND THE STRESS TEST The OFHEO stress test is currently implemented to verify that F&F maintain sufficient capital resources to withstand unexpected and extreme movements in interest rates. F&F have passed this test at every quarterly test date since it was instituted.

There are, however, three fundamental issues that bring to question whether those successes are real:

- The stress test accepts as given the financial data provided by each firm as of each test date, including the full portfolio of derivative instruments (swaps and swaptions) used to hedge the interest rate risk. Given the accounting errors and misrepresentations revealed

for both firms, the accuracy of those and future test results is open to question.

■ A key aspect of the stress test software is the equations that characterize mortgage market behavior, such as the speed of borrower prepayment. Borrower behavior has been changing rapidly, but it is unlikely the stress test software has been sufficiently updated to cover the changes. The result is an understatement of the losses that F&F would likely suffer.

■ As currently administered, the OFHEO stress test is easily “gamed” by F&F because the precise interest path and the test date are known well in advance. The solution is to administer tests at surprise dates with unexpected interest rate stress paths, but OFHEO has so far been unwilling or unable to carry out and release the results of such tests.

As with the capital requirements discussed above, in the long run the OFHEO stress test methodology could become an efficient tool for judging capital resources relative to interest rate risk. But it does not yet offer a sufficient level of assurance.

USER FEES, LEADING TO FULL PRIVATIZATION Congress successfully applied a user fee (of 35 basis points annually) to all debt issued by a former government-sponsored enterprise, Sallie Mae. It is well worth considering this policy as a tool to control the interest rate risk of F&F. Soon after the imposition of the user fee, Sallie Mae became a proponent of its own privatization. Since its privatization, Sallie Mae has been extremely successful, and it now dominates the market for student loans. A key element in the success of Sallie Mae has been its new ability, as a private firm, to originate student loans.

It is certainly possible, and perhaps even likely, that the imposition of user fees on F&F debt issues would also cause the firms to become active proponents of their own privatization. As indicated earlier, a significant share of their current profits arises from the no-cost, implicit Treasury guarantee on their debt. If they had to pay a market price for this guarantee, their profits would shrink substantially. Furthermore, under their GSE charters, F&F are currently prohibited from originating mortgages. It is likely the firms could profit significantly from participating in mortgage originations, which their privatization would allow, following the same path to success as Sallie Mae.

Privatization of F&F is a compelling and complete solution for controlling their interest rate risk. It was given serious consideration in an earlier multi-agency task force that reported to Congress in 1996. The conclusion at the time was that the legal and administrative impediments of privatization were too difficult, as long as F&F did not desire the change. The subsequent and successful privatization of Sallie Mae, however, has provided a roadmap to how such a privatization can be accomplished.

CONCLUSION

This discussion leads to the conclusion that retained portfolio size limitations, full hedging with callable debt, and user fees can all be readily implemented and would control the interest

rate risk of Fannie Mae and Freddie Mac. Each policy also has its unique appeal:

- Portfolio size limits create a mortgage market structure previously used (about 1990).
- Full hedging with callable bonds allows F&F to retain their current operating structure.
- User fees provide incentives that may well lead to full privatization.

Given the serious risks posed by F&F, policymakers would do well to adopt one of these proposals. R

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