On Limiting the Retained Mortgage Portfolios of Fannie Mae and Freddie Mac

Dwight Jaffee
Haas School of Business
University of California, Berkeley
Berkeley CA, 94720-1900
Email: jaffee@haas.berkeley.edu

Version: June 30, 2005

Abstract

This paper evaluates a current policy proposal to limit the size of the retained mortgage portfolios held by Fannie Mae and Freddie Mac (hereafter F&F). The proposal is a response to the growing concerns that the interest rate risks contained in the F&F portfolios create a serious threat to the US financial system. The analysis begins with a review of data on how F&F operate and on the role they play within the US mortgage market. Special attention is paid to the manner in which the firms hedge their interest rate risk. Key questions regarding the policy proposal include (1) what fund sources will replace F&F as mortgage investors, how will the interest rate risk be covered after it is removed from the F&F portfolios, and (3) what is the likely impact of the change on US mortgage interest rates. The conclusion is to endorse legislation that will limit the F&F retained mortgage portfolios.

Key words:
Fannie Mae, Freddie Mac, retained mortgage portfolio, interest rate risk, mortgage market

On Limiting the Retained Mortgage Portfolios of Fannie Mae and Freddie Mac

1. Introduction

Fannie Mae and Freddie Mac (hereafter F&F) are government sponsored enterprises operating within the US mortgage market. F&F have two business lines, one to create and issue mortgage-backed securities (MBS) to capital market investors, the other to purchase and hold mortgages and MBS in their "retained mortgage" portfolios. It is increasingly recognized that the interest rate risk contained in the F&F retained mortgage portfolios represents a serious threat to the US financial system.[1] This paper evaluates the recent proposal to limit the size of the F&F retained mortgage portfolios, in order to control their interest rate risk.

In an earlier paper, Jaffee [2003], I concluded that F&F were holding large amounts of unhedged interest rate risk in their retained portfolios, and proposed that quantitative limits be imposed on the size of these portfolios. This conclusion has now been reinforced by the recent accounting scandals at the two firms, which provide further evidence that the firms are unable to control their interest rate risk. Even more recently, Fed Chairman Alan Greenspan, CBO Director Douglas Holtz-Eakin, and Treasury Secretary John Snow testified to Congress in favor of placing quantitative limits on the F&F retained mortgage portfolios (Greenspan [2005], Holtz-Eakin [2005], and Snow [2005]). Director Holtz-Eakin set the issue very clearly (Holtz-Eakin [2005], page 1):

[1] See White and Frame [2005] for a recent survey of a variety of policy issues involving Fannie Mae and Freddie Mac, as well as an extensive list of citations to the growing literature.

> "The large mortgage portfolios held by Fannie Mae and Freddie Mac are not necessary for the secondary mortgage market to operate efficiently; those enterprises' issuance of mortgage-backed securities (MBSs) can accomplish that outcome. In fact, their holdings in portfolios are the source of much of their risks and federal subsidies and most of their accounting difficulties. If the housing GSEs' investment portfolios were reduced through statute, regulation, or the adoption of investment portfolio fees, federal subsidies would lessen, with little change in benefits."

At the same hearings, Fannie Mae CEO Daniel Mudd and Freddie Mac CEO Richard Syron testified against such a proposal (Mudd [2005] and Syron [2005]). CEO Syron made his case equally directly (Syron [2005], p. 16):

> "Artificial caps would not reduce the risks associated with long-term prepayable fixed-rate mortgages. Instead, other institutions, primarily federally insured depositories, would assume the burden of managing the interest risk... In summary, the GSE portfolios serve important policy objectives and are integral to the overall efficiency and stability of the mortgage market. Our portfolio programs represent an important corollary to the securitization process - and therefore cannot be eliminated without the potential of significant harm to the system."

This paper provides a systematic evaluation of the effects of such a proposal to limit the size of the F&F retained mortgage portfolios. The agenda is as follows:

Section 2 begins by reviewing how F&F operate and their role within the US mortgage market. Special attention is paid to the manner in which the firms hedge their interest rate risk.

Section 3 analyzes how the mortgage market will respond if the size of the F&F retained mortgage portfolios is significantly limited. The analysis treats the proposal as a security for security exchange, whereby F&F redeem their debt (used to fund the retained portfolios) at the same time the retained portfolios are liquidated. Attention is also focused on how the F&F counterparties, used to hedge the interest rate risk, would transfer their hedging resources to new MBS holders.

Section 4 evaluates the likely impact of the proposed change on US mortgage interest rates. Given that the conditions of the Modigliani-Miller (M-M) invariance proposition are unlikely to be fully met, a change in mortgage rates is possible, but it is likely to be minimal, (less than 10 basis points).

Section 5 first considers alternative means to control the F&F interest rate risk, but in the end endorses limits on the F&F retained portfolios. This section also indicates which groups within the economy are the likely gainers and losers from the enactment of a quantitative limit on the F&F retained mortgage portfolios.

2. Fannie Mae, Freddie Mac, and the US Mortgage Market

Fannie Mae and Freddie Mac (F&F) represent, by a large margin, the two largest participants in the US mortgage market. They have an impact on every aspect of most mortgage transactions:

- Mortgage originators anticipate that they must satisfy the F&F "automated mortgage underwriting" criteria if they are to transact with F&F to securitize or sell their mortgages.
- F&F create approximately two-thirds of all residential mortgage backed securities (MBS).
- F&F hold about one-fifth of all US home mortgages or MBS in their retained portfolios.

We now consider more precisely how F&F operate.

2.1 The Business Lines of Fannie Mae and Freddie Mac

F&F operate two distinct business lines, *mortgage backed securitization* and *retained mortgage portfolios*. For the mortgage securitization line, F&F purchase and transform sets of whole mortgage loans into mortgage backed securities (MBS), which are then sold to investors (hereafter referred to as investor-held MBS). F&F guarantee these MBS against the risk of default, for which they obtain an annual guarantee fee. F&F retain no interest rate risk on the investor-held MBS, since all the cash flows from the securities are owned by the investors. In

contrast, for their retained mortgage portfolio business line, F&F directly purchase various mortgage-related securities, including, mainly, the repurchase of their own MBS.[2] The retained portfolios have both credit risk and interest rate risk, since F&F directly own the mortgage securities in these portfolios. Figure 1 shows that since 1990, the F&F retained mortgage portfolios business line has grown rapidly relative to the securitization line. For example, in 1990, the F&F retained portfolios equaled 23% of their net outstanding MBS, while by 2001 this ratio reached 80%.

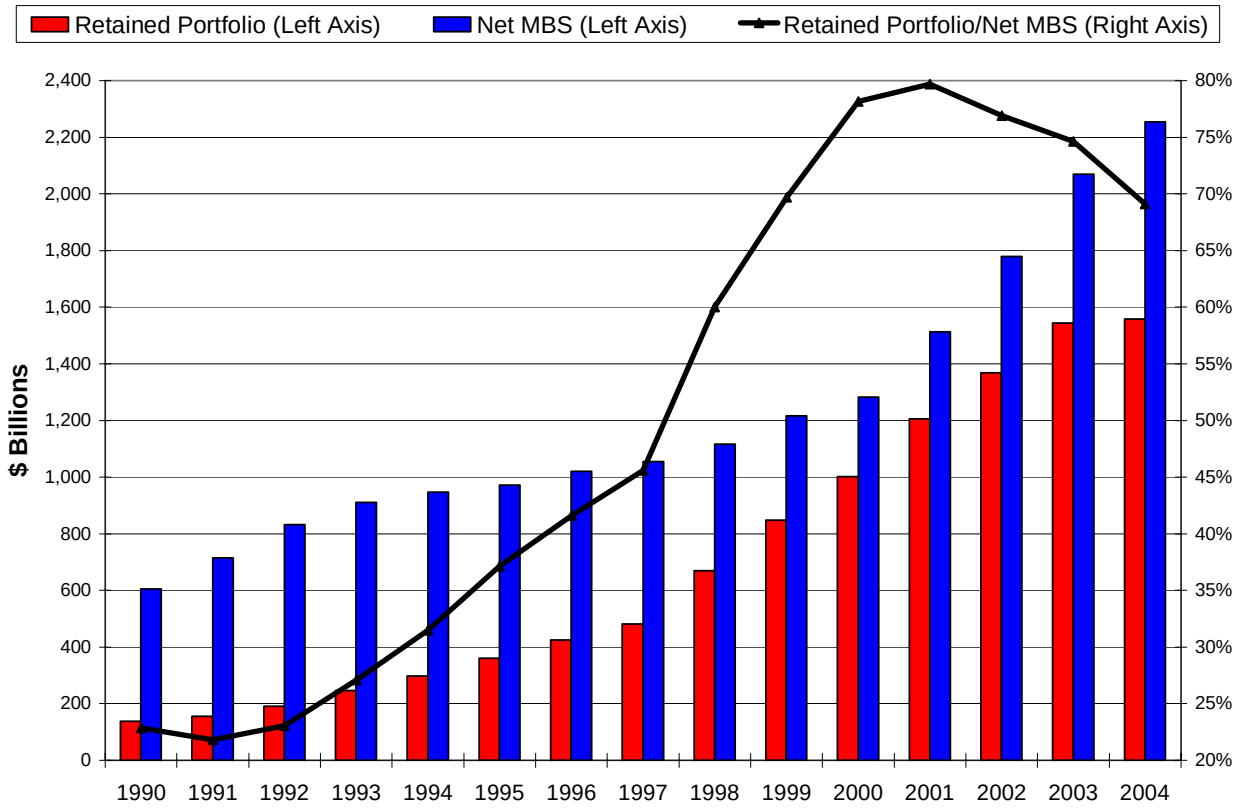

Figure 1. *Fannie Mae and Freddie Mac Retained Portfolios Relative to Their Investor-Held Mortgage-Backed Securities (MBS)* Outstanding. Since 1990, the retained mortgage portfolios of Fannie Mae and Freddie Mac have grown rapidly, reaching 80% of their net MBS outstanding in 2001. Source: OFHEO (2004).

[2] Additions to the F&F retained portfolios have often been as much as 50% of their newly issued MBS in recent years. By year-end 2003, F&F had retained over 38% of their total issued MBS, up from only 2% in 1990.

The profit potential for the two F&F business lines is substantially different. Revenue on the F&F investor-held MBS line derives primarily from the annual fee received for guaranteeing the timely payment of interest and principal. The average guarantee fee for the most recent year 2003 was just over 20 basis points (bp) for the two firms.[3] Revenue for the retained mortgage portfolios, in contrast, is based on the spread between the interest rate earned on the mortgage assets and the interest cost of the funding liabilities. For example, in 2003, the average spread was 172 bps for Fannie Mae and 186 bps for Freddie Mac[4]. The relatively large size of this rate spread arises from the low interest cost of F&F debt (due to the implicit Treasury guarantee) and the compensation for accepting the interest rate risk associated with the mortgage securities held in the portfolios.

Figure 2 compares the guarantee fee income F&F received on their investor-held MBS with the net interest income they earned on their retained mortgage portfolios. F&F's aggregate income is now dominated by the retained portfolio component. Furthermore, as documented in Jaffee [2003], the rate of return on equity (ROE) earned by the retained portfolio line substantially exceeds the ROE on the MBS securitization business line. It is thus not surprising that F&F have been significantly expanding their retained portfolios relative to their MBS business. The overall ROE earned by Fannie Mae and Freddie Mac far exceeds that of all other major US financial firms, representing the combined benefit of the implicit government guarantee on their agency debt and MBS issues and their relatively low capital requirements.

---

[3] All aggregate F&F data reported in this paper are from the Office of Federal Housing Enterprise Oversight, OFHEO (2004). These data include the restated values for Freddie Mac for the years since 2001, but comparable restated values are not yet available for Fannie Mae.

[4] These data are from Table 1 in the Fannie 2003 10K and Table 14 in the Freddie Mac 2003 annual report.

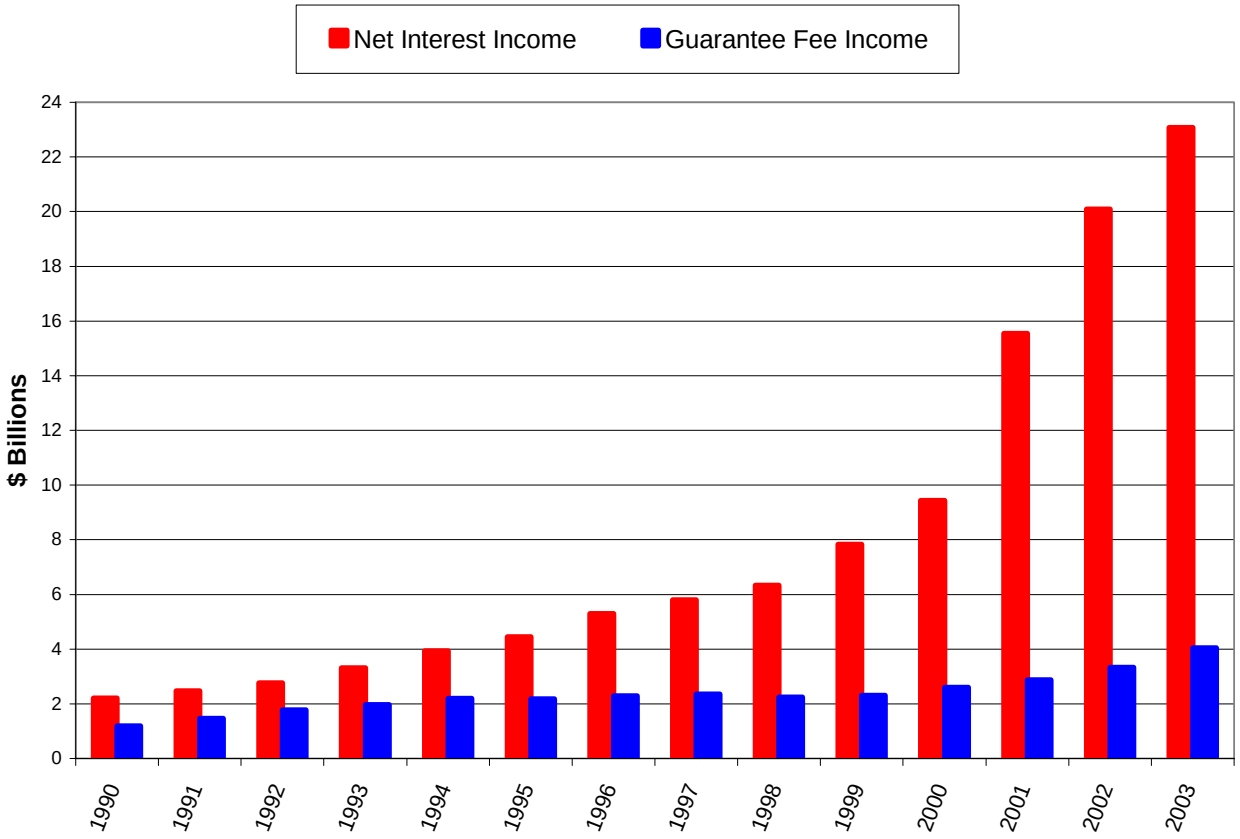

Figure 2. *Primary Sources of Fannie Mae and Freddie Mac Revenue*. Fannie Mae and Freddie Mac operate two primary business lines, Retained Mortgage Portfolios and Mortgage Backed Security (MBS) issues. The MBS business-line earns guarantee fees, which have grown slowly over time. The net interest received on the retained portfolios, in contrast, has expanded rapidly in line with the growing size of the portfolios. Source: OFHEO [2004].

2.2 The Role of Fannie Mae and Freddie Mac in the US Home Mortgage Market

We next consider how the F&F business lines fit into the structure of the US mortgage market. An overview is provided by considering who holds the outstanding stock of US home mortgages, which totaled $8.1 trillion at year-end 2004. Figure 3 shows the market shares for the three principal and identifiable classes of mortgage holders: depository institutions (commercial banks and thrifts), F&F retained portfolios, and all others referred to here as Capital Market/MBS. The three holder groups represent, in fact, the three alternative channels through

which capital market funds are allocated to holding the outstanding stock of home mortgages. Depository institutions represent the longest standing channel, in which the institutions both originate and hold the mortgages, based on bank deposits and other bank funds. The F&F retained portfolios are funded primarily by issuing agency debt, which provides an alternative link to the capital markets. Finally, the Capital Market/MBS channel covers all other holders, and primarily represents the channel through which MBS are held by such capital market entities as mutual funds and hedge funds.

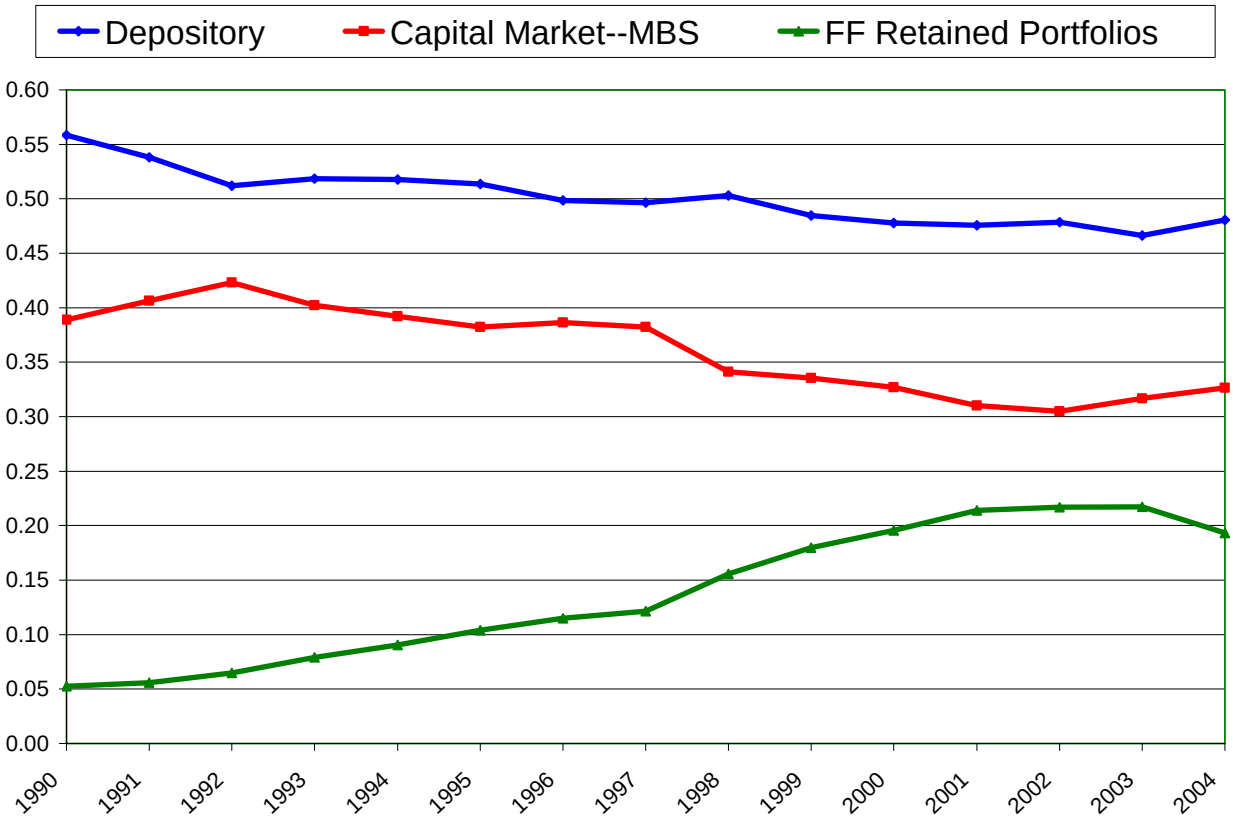

Figure 3. *Home Mortgages Outstanding, by Share of Major Holders*. US home mortgages outstanding are held by three major groups: depository institutions, the Fannie Mae and Freddie Mac retained mortgage portfolios, and capital market investors. The F&F share has risen substantially from 1990, while the depository and capital market investor shares have fallen. Source: Federal Reserve Flow of Funds data, and Fannie Mae and Freddie Mac Annual Reports.

Figure 3 shows that from 1990 to 2004. the depository institution share of total mortgage holdings fell by 8 percentage points to 48%, while the Capital Market/MBS share fell by 6 percentage points to 33% over the same period. In contrast, the F&F retained portfolio share rose by 14 percentage points over this period, reaching its high point in 2003 with a 22% market share. The rapid growth of the F&F retained portfolios is thus as evident from the market-wide perspective of Figure 3 as it was in the business-lines perspective of Figures 1 and 2.

2.3 The Interest Rate Risk Embedded in Mortgage Portfolios

We now consider the interest rate risk that is embedded in the F&F retained mortgage portfolios. The interest rate risk arises primarily from the long-term, fixed-rate, and freely prepayable, mortgage that is the mainstay of the US home mortgage market and, correspondingly, underlies the vast majority of the F&F portfolios.

Table 1 provides a useful quantitative gauge of the losses that may be created by a 30 year, fixed-rate, freely-prepayable, mortgage when interest rates change unexpectedly. We start with a hypothetical 6% market rate for the mortgage, and assume that the mortgage and its funding source both have coupons that put their initial market price at par (100). For Case 1, we now suppose that all market rates *rise* by 2 percentage points, and that the firm is funding its mortgage with short-term debt. As shown in Table 1, the mortgage value falls to 81.8, while the funding source value remains at 100 (because the short-term debt rollover always occurs at par). The upshot is a 18.2% loss, which illustrates the standard result for a “short-funded” portfolio in a rising interest rate environment.

Table 1: Losses That May Result for a	
30-Year, 6% Fixed Rate, Prepayable Mortgage	
Initially, mortgage rate = 6%	
Mortgage Value	100.0
Funding Value	100.0
Case 1: Market Rates Rise by	
2 percentage points (mortgage rate = 8%);	
Firm is short-funded.	
Mortgage Value	81.8
Funding Value	100.0
Net value change	-18.20%
Case 2: Market Rates Fall by	
2 percentage points (mortgage rate = 4%);	
Firm is maturity matched, but mortgage prepays.	
Mortgage Value	100.0
Funding Value	125.6
Net value change	-25.6%

For Case 2, we alternatively assume that all market rates ***fall*** by 2 percentage points, while the firm is maturity matched in its funding, but has not hedged the mortgage prepayment option. As shown in Table 1, the mortgage value remains at 100, since this is the amount paid by the borrower upon prepayment. The firm, however, is still responsible for the funding source, whose market value is now 125.6. The upshot is a 25.6% loss, which illustrates the loss potential for a maturity-matched firm that fails to hedge the prepayment option on its mortgage assets.

Thus, whichever way market rates change, a mortgage portfolio may suffer major losses. To put these potential losses in context, the F&F retained portfolio capital requirement of 2.5% would provide no significant protection if the firms were actually to suffer losses to the degree illustrated here. It is also noteworthy, as shown in Figure 4, that changes of 2 percentage points or more within a 12-month period rate have occurred during at least 9 distinct episodes since 1953 for 10-year US Treasury rates, and even more often for shorter-term Treasury securities.

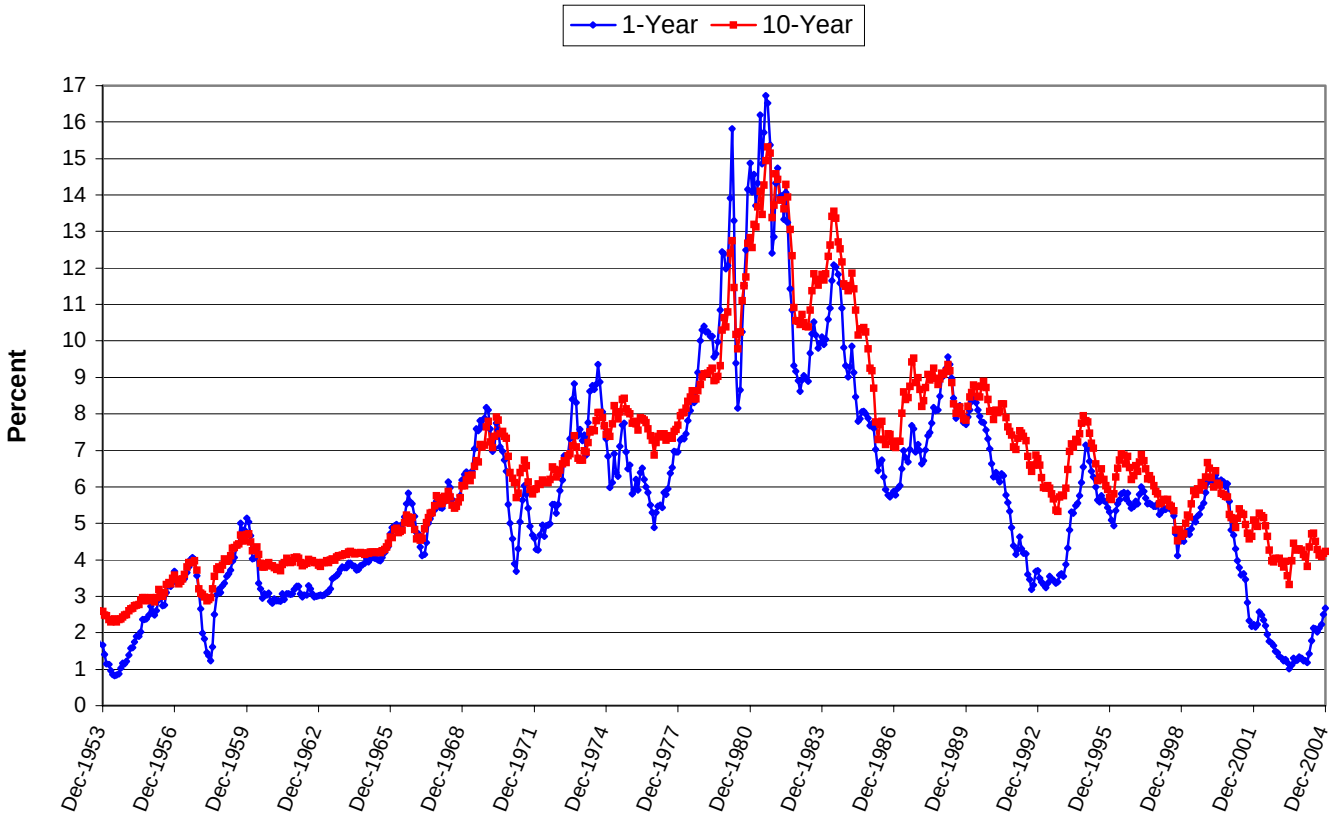

Figure 4. *US Treasury Constant Maturity Interest Rates Since 1953*. US Treasury 10-year interest rates have changed by more than 2 percentage point within a 12 month period during 9 distinct episodes since 1953 (covering the years from 1980 to 1986 and 1994 to 1995). The one-year Treasury rate, of course, has been even more volatile. Source: US Treasury [2005].

To be sure, Fannie Mae and Freddie Mae hedge a part, and in some cases a significant part, of their interest rate risk. Table 1 illustrates only worst case scenarios in the sense that, given the direction of the change in interest rates for each case, we have assumed precisely the worst possibility for how the firms control their interest rate risk. This is appropriate for illustrating the toxic potential that necessarily exists in any portfolio investing primarily in fixed-rate, long-term, freely-prepayable mortgages. We now consider how F&F actually do hedge their interest rate risk.

2.4 Interest Rate Risk Hedging by Fannie Mae and Freddie Mac

F&F use interest rate derivatives to avoid the outcomes illustrated in Table 1.The firms use interest rate swaps to adjust the portfolio duration (to avoid the Case 1 outcome), and they use option-based derivatives (in particular, swaptions) to hedge the mortgage prepayment risk (to avoid the Case 2 outcome). A detailed discussion of their hedging programs is provided in Jaffee [2003]. The following is a summary of the F&F hedging programs:

1) The firms use a quite *complete short-run hedging* strategy to protect their capital against losses from small or moderate, near-term, interest rate changes. This is sensible because, otherwise, the firms would just have to replace any lost capital to continue to meet their capital requirements.; furthermore, by hedging, the firms maintain a more stable pattern of earnings.

2) The firms carry out relatively *little long-run or catastrophic hedging* against the risks of potentially very large interest rate changes, especially those that might occur in the more distant future. The firms find it is too expensive to hedge these risks, which in any case are likely to create losses well beyond the level of each firm's capital. The risk is thus borne primarily by the US Treasury as the result of its implicit guarantee of the F&F liabilities.

3) The firms use a *dynamic hedging strategy* in which they progressively adapt their hedged positions as interest rate levels change. This provides a partial offset to the risks in (2), but it is necessarily incomplete since the cost of hedging itself rises as the initially unlikely possibilities become more likely. In addition, there is no mechanism through which the firms can credibly commit to follow a dynamic hedging strategy. Indeed, recent results for the two firms suggest they have taken distinct bets on the expected direction of interest rates, just the opposite of a dynamic hedging approach.[5]

[5] The evidence is provided by the OFHEO stress test results for those quarters in which the losses the firms suffer are asymmetric between the rate increase and rate decrease shocks. This suggests the firms had more fully hedged against rate changes in one direction than the other. This is equivalent to betting that interest rates will move in the unhedged direction. Moreover, it appears from this same evidence there have been periods in which Freddie Mac was betting that rates would fall (which they did), while Fannie Mae was betting that rates would rise. This is a key reason that Freddie Mac's restatement raised its reported profits, while Fannie Mae's restatement is likely to lower its reported profits.

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 the risk of unexpected, large, and future rate changes onto the US Treasury based on the implicit guarantee. Indeed, it is a fair to say that F&F rather fully protect their shareholders equity against the small and foreseeable risks, while imposing on US taxpayers the large and distant risks that would eventually require a US Treasury bailout.

The firms are able to operate in this manner only because the purchasers of their agency debt and their MBS show little concern for the firms' riskiness, protected as they are by the implicit Treasury guarantee. Thus, the investors have no incentive to provide oversight regarding the inherent riskiness of the F&F portfolios. Private market firms, in contrast, would receive unmistakable market signals, in the form of rising funding costs, whenever investors perceived that their positions were at risk due to imperfect hedging by the issuing firm. In brief, only F&F, based on their implicit government guarantees, can and do operate in this manner.

2.5 Contagion In Risks Between Fannie Mae and Freddie Mac

The discussion has so far focused on the interest rate risks of the firms individually, without considering possible feedback links between the firms and between the firms and the overall capital markets. The feedback links arise because a firm's profitability will fall whenever the interest rates on its agency debt rise (relative to the rates on other securities). Then, as the firm's profitability falls, the agency debt rates will rise further, creating a vicious circle.

The initial source of the agency rate rise could reflect market concern that one or the other of the firms has suffered significant losses. Or, it could as well reflect an event initially unrelated to F&F, but in which "a flight to the safety of Treasuries" raises the spread between agencies and

Treasuries. Whatever the underlying cause, rising agency rates reduce the firms' profitability, leading to a contagion between the firms and between the firms and the capital markets.

The possible contagion through the agency debt market is made even worse by the systematic strategy of the firms to issue a substantial amount of their debt with an initial maturity of 1 year or less. At year-end 2003, for example, fully 46% of their debt had an initial maturity of less than one-year, and this does not include that part of their initially long-term debt scheduled to mature in the following year. The firms have adopted this short-funding strategy because the short-term rates in the agency debt market are especially low.[6] The result is that the two firms must, in effect, go to the agency debt markets each year to refinance what is approximately one-half of their total outstanding debt, an amount equal to just under $1 trillion at year-end 2003.

The effect on firm profitability can be very large. Any event that would cause a jump of 10 basis points in their agency debt costs will lead to additional interest costs of just under $1 billion; a jump of 100 basis points would have just about wiped out the combined profits of the two firms in 2003. The practical significance of this effect is illustrated in Figure 5, which shows the spread between Agency rates and Treasury rates at the one-year maturity since 1996. Although the average spread is about 15 basis points, the spread has varied from about zero to almost 60 basis points.[7]

---

[6] In particular, the agency debt yield curve is typically more steeply sloped than the libor-based swap yield curve. The firms then use the libor-based swap market to transform their short-term agency debt into synthetic long-term debt. Jaffee [2003] shows that this saves the firms about 23 basis points a year in funding costs relative to issuing long-term agency debt directly. But the firms are at major risk if agency interest rates rise unexpectedly relative to Libor rates.

[7] Mark Flannery, in discussing an earlier draft of this paper, pointed out an apparent conflict between treating the agency debt of F&F as if it has an implicit Treasury guarantee at the same time that we note the large swings in the spreads between agency and Treasury interest rates. Indeed, it would seem the trust of investors in the implicit guarantee is time varying, conditioned by the firms' status at each moment. Nevertheless, most of the time ,the firms can borrow at vary small spreads over Treasuries, suggesting that investors normally ignore the possibility that the firms' strategy might have an adverse impact on their returns.

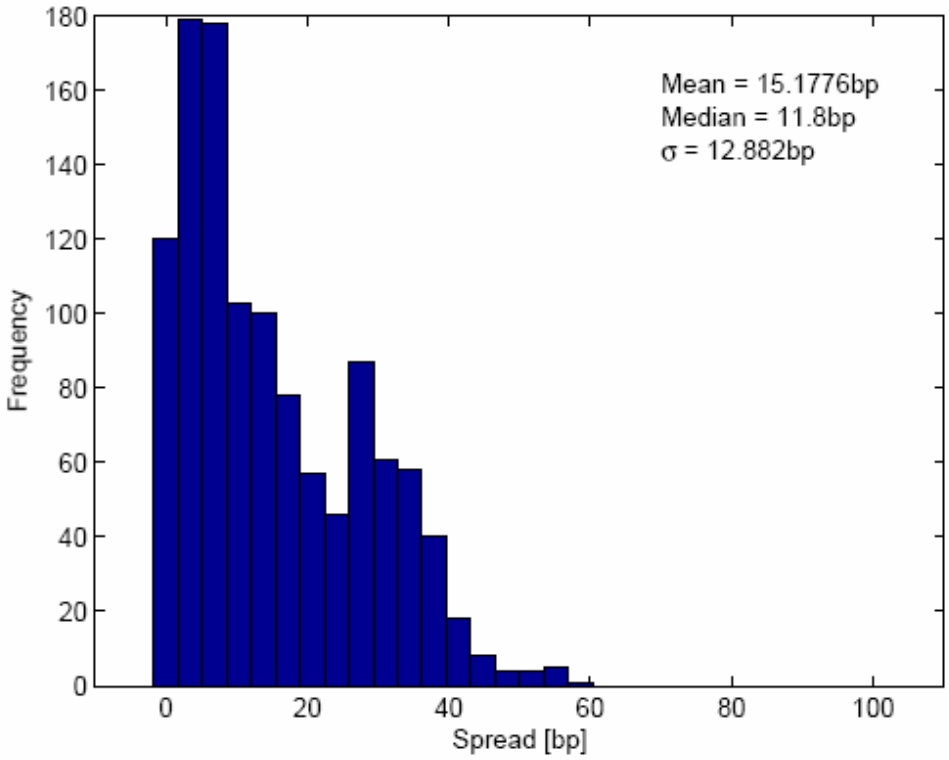

Figure 5. *Fannie Mae Agency -US Treasury Rate Spread, 1-Year Maturity*. Agency spreads against US Treasury rates have been volatile, from 0 to 60 basis points at the 1-year maturity. Source: Fannie Mae [2005] and US Treasury [2005].

To be sure, F&F both actively use derivatives to hedge the interest rate risk created by this short-funding strategy, and in this way they are protected against the normal pattern of interest rate changes. But, as St. Louis Fed President William Poole [2004] has pointed out, the derivatives F&F use are based mainly on Libor interest rates, not agency rates. Thus, the derivatives would provide no relief against an unexpected rise in agency interest rates relative to Libor. This outcome would, in fact, be quite likely if the agency rates rise due to concerns for the credit worthiness of F&F; indeed, Libor rates might actually fall in such circumstances, if there were a flight to quality.

2.6 Systematic Risks Created by Fannie Mae and Freddie Mac

Table 2: Major Components of US Debt Markets, Year End 2004, $ Trillions	
All Treasury debt	4.4
FF Guarantees	**3.7**
All corporate bonds	2.9
All commerical loans	2.2
All consumer credit	2.1
All municipal bonds	2.0
Source: Federal Reserve, Flow of Funds.	

The issues of interest rate risk and contagion discussed above would affect F&F directly, and the US Treasury indirectly based on its implicit guarantee. We now consider the possibility that the F&F interest rate risk could disrupt the entire US financial system. This concern reflects a primary reason that Federal Reserve Governors and Bank Presidents have been so outspoken about the danger created by the F&F retained portfolios.

The source of this threat is the immense size of F&F debt and MBS outstanding in comparison with other components of the US debt markets. Table 2 shows that the F&F guaranteed securities outstanding (retained mortgage portfolio plus net MBS outstanding) at year-end 2004 totaled about $3.7 trillion. The remarkable point in the table is that this amount exceeds the total amount of debt outstanding in such other major fixed-income categories as all corporate bonds, all commercial loans, all consumer credit, and all municipal bonds. These categories, of course, represent the debt issued by thousands of firms and municipalities and millions of consumer, yet the F&F obligations far exceed their amounts. And the contagion discussion of the previous section suggests that whatever the initial source of an event—just one of the firms, or an event unrelated to either firms--the ramifications in terms of rising agency debt costs would soon be felt by both firms.

A key implication of the immense size of F&F is that it makes more understandable why investors in F&F debt and MBS are so confident that the implicit guarantee will be honored; the firms are truly too big to be allowed to fail. It is with the recognition of this serious threat that we now turn to a solution, namely a proposal to limit the size of the retained mortgage portfolios.

3. A Proposal to Limit the Size of the F&F Retained Mortgage Portfolios

The proposal considered here is limit significantly the size of the retained mortgage portfolios held by Fannie Mae and Freddie Mac. It is not recommended to eliminate completely the retained portfolios, since it may be beneficial for F&F to retain certain mortgages that cannot be readily securitized, and there may be cyclical and liquidity benefits to allow F&F some potential to buy and sell mortgage related securities in special circumstances. The determination of the specific size limit is left for a more detailed and future study, perhaps to be carried out by the F&F regulator (existing or newly appointed as the case might be).

A smooth and orderly transition to the 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 mortgage sales—until the desired size is reached. As the portfolio size declines, F&F would accordingly reduce the amount of their agency debt outstanding, as well as the portfolio of interest rate derivatives they use to hedge the interest rate risk. Since the pattern of liquidation would be predictable, the investors and counterparties involved with all aspects of the retained portfolios and MBS new issues could anticipate the changing structure and make the necessary adjustments.

3.1 Mortgage Market Structure with Limited F&F Retained Portfolios

An immediate question concerns which investors will pick up the market share to be liquidated by F&F. At year-end 2004, the F&F retained mortgage portfolios represented 19% of all outstanding mortgages and MBS. If, for a numerical example, we assume that F&F continue to hold a 3% market share, then new investors must be found for the liquidated 16 percent share. As one possibility, the mortgage market could just return to the structure for holding mortgages and MBS that existed in 1990, as illustrated earlier in Figure 3. This means that the 16 percent market share liquidated by F&F would be transferred to the depository institutions and the capital market/MBS investors in approximately equal shares.

It is also noteworthy that in recent years, the F&F market share declined significantly without any apparent negative impact on the US mortgage market. Specifically, from December 2002 through December 2004, the F&F market share fell by over 10 percent (from 22 to 19 percentage points), while US residential mortgages outstanding grew by 28%, the conforming mortgage rate fell from 6.05% to 5.75%, and the spread between jumbo and conforming mortgages fell from 37 basis points to 19 basis points.[8] Thus, by all three measures, conditions in the US mortgage market were improving at the same time that the F&F share of the market was falling.

A further question concerns where the depository institutions or capital market investors will obtain the funds to make these additional investments. To answer this, it is important to recognize that F&F are only intermediaries: they issue agency debt on one hand, and use these funds to purchase mortgage securities on the other. Under the proposal, F&F will be liquidating mortgages and redeeming agency debt in equal amounts. So investors holding agency debt in the current regime become immediate candidates to replace F&F as holders of mortgage securities.

[8] The growth in mortgages outstanding is from the Federal Reserve's Flow of Funds data, the mortgage rate is the Freddie Mac Primary Mortgage Market Survey, and the jumbo-conforming spread is from Inside Mortgage Finance.

3.1.1 Issues for Capital Market Investors

The owners of the previously outstanding agency debt, of course, may not wish to hold the mortgage securities that would otherwise have been in the F&F portfolios. The most important concern for capital market investors is that the mortgage securities will be subject to interest rate risk, the same risk facing the F&F portfolios in the first place. The original agency debt holders might, instead, prefer to invest in safer securities such as Treasury bonds. Then the question is whether the displaced Treasury bond investors will hold the mortgage securities. There could, in fact, be a chain of such displacements. In the end, however, it is a matter of market equilibrium that some investors must and will step to the plate and hold the mortgage securities.

Wall Street firms will expedite the transition to this equilibrium by creating structures which facilitate the holding of mortgages by capital market investors. The most obvious solution is to place the mortgage securities into portfolios that allow the interest rate risk to be hedged with the same derivatives used by F&F. These portfolios, which could be marketed as mutual funds or hedge funds, would thus basically replicate the original agency debt in terms of its risk attributes.[9]

Multiclass MBS, sometimes referred to as Remics or Collateralized Mortgage Obligations (CMOs) represent still another possible solution. Multiclass MBS are created by carving single-class MBS into two primary classes. The senior classes, which may represent a major part of the principal value, can be structured so that the holders face little or no interest rate risk. These classes would be sold to investors with little tolerance for interest rate risk. The junior classes, in contrast, would contain highly concentrated amounts of interest rate risk, and would be sold to

[9] The hedging cost should approximately equal the cost faced by F&F, since the same counterparties would presumably be prepared to sell the same hedges to the newly created funds. It is quite possible, however, that the capital market investors may desire more hedging than that used by F&F. The additional hedging provides a distinct public benefit since it would reduce or eliminate the likelihood of a market collapse and/or Treasury bailout due to losses from interest rate risks.

investors, such as hedge funds, that were prepared to take on these risks or hedge them directly, in order to earn the higher returns they would be expected to provide.

One final issue arises from the fact that a significant share of the F&F agency debt is now sold to Asian investors. The question will thus arise concerning the alternative securities to which these investors will transfer their holdings. Presumably, their primary reason for investing in agency debt is to invest in safe dollar denominated debt, and they would continue to do so. Once they are invested in dollar denominated debt, however, they are really no different than any other group of US capital market investors who were initially holding agency debt. Thus, the discussion of this section should apply to them as well.

3.1.2 Issues for Depository Institutions

Depository institutions represent the second class of investors who will have to expand their holdings of mortgage related securities as a substitute for the F&F retained portfolios. At year-end 2004, the depository institutions maintained a 48% market share for mortgage securities. The banks should have little problem either accepting or hedging the interest rate risk on additional mortgage securities, given that they are already holding the most concentrated market share. It is also noteworthy that as recently as 1990, the banks were maintaining a 56% market share.

Another possible issue is whether the depository institutions have incentive to purchase additional mortgage securities. One positive factor is that the forthcoming changes in bank capital requirements, generally described as Basel II, are likely to provide depository institutions with significantly expanded incentives to hold mortgage securities (see Calem and Follain [2005]). Another positive factor is that banks have the option to issue subordinated debt as an alternative source to additional deposits. In fact, Ely [2004] has recently proposed a special

structure within bank holding companies that would allow banks to create special debt issues that would be collateralized by the mortgage assets.

Overall, it would appear that depository institutions are likely to be willing and able investors to replace the F&F retained portfolios.

3.1.3 Where Does the Interest Risk Go?

The inherent interest rate risk in mortgage securities does not disappear, even if a smooth transition is made from the F&F retained mortgage portfolios to capital market and depository institution holders. This raises the question, therefore, why is it 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, since they are invested essentially 100 percent in homogenous mortgage securities. The portfolios thus realize no diversification benefit against shocks such as highly volatile interest rates. Capital market and depository institution investors, in contrast, typically hold the mortgage securities within portfolios that contain a wide range of different assets, thus providing the key advantage of diversification.
- Firm Concentration. The F&F retained mortgage portfolios have the disadvantage that they are concentrated in just two firms. Capital market instruments, in contrast, are spread across potentially millions of investors and even depository institution holdings are spread across thousands of banking firms. To be sure, the portfolios of the largest banks are of a magnitude comparable to the F&F retained portfolios, but there is the key difference that these portfolios are widely diversified across different loan classes. The banks also hold substantially more overall capital, all of which is available for mortgage losses.

- Government Guarantees and Market Discipline. Agency debt issued by F&F is unique in that investors believe the US Treasury will bail them out if the issuing firms face serious financial distress. The result is that these investor provide no market oversight and F&F face no market discipline in their investment strategies. Capital market entities, in contrast, have no government guarantees and thus directly face market oversight. Depository institutions fall between these extremes, but rest much closer to the capital market case. Most importantly, deposit insurance today operates as an industry-wide reinsurance plan, without any claims, implicit or explicit, on the US Treasury Specifically, deposit insurance is funded by the participating institutions using a system based on experience rating, Among its many advantages, this system provides individual institutions with a strong incentive to monitor and if necessary control their brethren, since they will pay the cost of failed institutions.

4. The F&F Retained Mortgage Portfolios and US Mortgage Rates

The likely impact of the proposal on US mortgage interest rates is an important question and one difficult to answer with precision. From a conceptual perspective, the proposal amounts to a security for security exchange, with mortgage securities and hedging instructions replacing agency debt in investor portfolios. If this were an entirely private market transaction, the prima facie case, based on standard finance concepts, would be no interest rate effect at all.[10]

For the F&F retained mortgage portfolios, however, the role of government subsidies and guarantees must be considered. Indeed, if the government subsidies are successful in reducing mortgage rates, then it could be expected that removing the subsidies would necessarily raise the

[10] Roll [2003], in contrast, argues that agency debt and mortgages differ significantly in their risk characteristics, and thus cannot be perfect substitutes. Therefore, he concludes that reducing the retained portfolio will necessarily raise mortgage interest rates. This argument ignores, however, that the hedging instruments currently used by F&F will be equally available to whichever investor group ends up holding the mortgages released from the F&F portfolio. The right question is the degree of substitution between agency debt on one side and mortgages *plus* the hedging instruments on the other. This is an empirical question, and the evidence presented in the text below suggests they are very close substitutes.

interest rates. This conclusion is quite valid when subsidies are provided to an industry of competitive firms, so that the consumers of the good in question benefit from lower prices; if the subsidies are then removed, higher prices for the good in question would be expected.

F&F, however, represent a unique case in which significant subsidies are provided to just two firms within an industry. There is, furthermore, significant evidence that the firms use their market power to maximize profits; see Hermalin and Jaffee [1996] for a general discussion of the issue. In particular, it is hard to imagine that F&F could continue to earn returns on equity well in excess of 30% for a decade or more if other firms could enter their markets and compete. In the present context, this issue takes the specific form of how much of the subsidies are passed through to mortgage borrowers and how much is retained as profits for F&F. This issue has become highly contentious: studies at the Federal Reserve (Passmore [2005] and Passmore, Sherlund and Burgess [2005]) estimate that only a small amount of the subsidy is passed through to mortgage borrowers, less than 10 basis points; while a study sponsored and published by Fannie Mae (Blinder, Flannery, and Kamihachi [2004]), estimates the impact of F&F on the conforming mortgage rate to be as high as 30 basis points.

It is important to recognize, however, that these studies are basically addressing the question of what might happen to mortgage interest rates if F&F ceased to exist altogether. The question at hand, in contrast, concerns the effect on mortgage interest rates if the F&F portfolios are highly limited, while the firms' MBS creation business continues and perhaps even expands. Fortunately, two recent studies have directly addressed this question. The recent paper by Lehnert, Passmore, and Sherlund [2005], at the Federal Reserve, finds that both portfolio purchases and MBS issues are equally effective in reducing the spread (although neither as a very large absolute impact). The implication is that any tendency for mortgage rates to rise due

to smaller retained portfolios can be eliminated by increasing F&F MBS issues. A similar conclusion is implicit in the results of an earlier paper by Naranjo and Toevs [2002], originally sponsored and published by Fannie Mae.[11]

Overall, the conclusion is that an orderly and steady reduction in the size of the retained mortgage portfolios is unlikely to raise US mortgage interest rates by even 10 basis points, everything else being the same. Taking into account that the proposal may avoid a major disruption of the US financial system, future mortgage rates may well be ***lower*** as a result of implementing the proposal. Moreover, even if there where a small initial increase in mortgage rates, this could be readily eliminated by increased volumes of MBS issues. Since F&F will have every incentive to expand their MBS issues under the proposal, I conclude that rising mortgage rates are not a relevant concern for the proposal.

The potential to substitute additional MBS issues for retained portfolio purchases also answers another possible concern, namely that absent the retained portfolios, F&F will be unable to stabilize mortgage markets. This concern vanishes once it is recognized that MBS issues tightly link the mortgage market with the overall capital markets. Thus, idiosyncratic shocks to the mortgage market are readily offset by the large flows of funds available from capital market investors through expanded MBS issues.[12]

[11] To be precise, Naranjo and Toevs find that conforming mortgage rate spreads fall by 10.5 basis points per $ 1 billion increase in F&F mortgage purchases, while the spreads fall by 8.0 basis points per $1 billion increase in F&F MBS issues. Thus, a sufficiently large volume of MBS issues can offset the effect of any decline in the size of the F&F mortgage purchases.

[12] Of course, the mortgage market will still have to adapt to whatever fundamental interest rate trends develop in the capital markets. Not even F&F can offset such basic trends, nor would this be desirable even if it were feasible.

5. Conclusions

In concluding, we review several alternative solutions to limit F&F interest rate risk.

5.1 Redesign the Fixed-Rate, Freely Prepayable, Mortgage Instrument

The freely-prepayable aspect of the fixed-rate mortgage instrument is the fundamental source of the interest risk problem. Without the free prepayment option, the interest rate risk of mortgages becomes substantially easier to hedge and portfolio managers can be more readily monitored to confirm they are carrying out the stated hedging policy. Redesigning the mortgage contract thus has the potential to be a first-best solution. It is also of note in this context that the predominance of freely prepayable mortgages in the US appears to be the result of the F&F requirement that only such mortgages can be securitized in their primary MBS products.

It is feasible to construct mortgage contracts without free prepayment options. In particular, essentially all commercial mortgages use “yield maintenance”. This means that if a commercial mortgage borrower wishes to redeem the mortgage, the lender has to be compensated for the difference between the market value of the mortgage and the remaining principal value. This difference will be positive when market interest rates have fallen since the mortgage was issued. Yield maintenance and similar tools can provide a flexible mechanism through which borrowers can prepay mortgages, but without imposing a financial cost on the lender.

5.2 Raise the F&F Capital Requirements

Raising the capital requirements imposed on F&F is an alternative possibility. One immediate issue is that the current requirements are legislatively mandated, and thus could not be changed just by action of the regulator. A more fundamental issue is that capital ratios provide serious protection only if the firm does not respond by carrying out still more risky investment strategies. It seems fair to say that OFHEO, the current F&F regulator, has not created an

impressive record in this regard. For example, as discussed at length in Jaffee [2003], the OFHEO stress test continues to be administered in a way that it can be easily "gamed" by F&F.

5.3 Full Privatization

The most complete solution is to privatize F&F. This had been given serious consideration earlier by a multi-agency task force; see Hermalin and Jaffee [1996]. The conclusion at that time was that the legal and administrative impediments were too difficult, as long as F&F did not desire the change. In effect, the implicit guarantee could not be withdrawn as long as the GSE status remained, and the GSE status could not be withdrawn as long as the implicit guarantee remained. The result was a standoff, with no action possible. On the other hand, another GSE, Sallie Mae, was readily privatized once the firm became a proponent of the change (Lea [2005]). The lesson here is that privatization can be a feasible policy only if conditions exist such that F&F also prefer privatization.

5.4 Final Comments

The paper has argued the following key points in favor of the proposal to limit the retained mortgage portfolios of F&F:

1) The F&F retained mortgage portfolios are increasingly creating unacceptable risks for the US Treasury, US taxpayers, and the US financial system.
2) The retained portfolios, and thereby the risks they create, are readily eliminated through an orderly liquidation of the portfolios based on normal mortgage payments and repayments.
3) The US taxpayers and the US financial system as a whole are major beneficiaries of the proposal. US mortgage borrowers stay about even; mortgage rates may rise a small amount in the short run, but the much larger cost of a major disruption to the mortgage market is thereby avoided. F&F shareholders, however, are likely to be worse off.

References

Blinder Alan, Mark Flannery, and James Kamihachi [2004], "The Value of Housing-Related Government Sponsored Enterprises: A Review of a Preliminary Draft Paper by Wayne Passmore, Fannie Mae Papers, Volume III, Issue 2, May 2004.

Calem, Paul and James Follain [2005], "The Potential Competitive Impacts of Basel II in the U.S. Market for Residential Mortgages," Statement before the U.S. House of Representatives Subcommittees on Financial Institutions and Consumer Credit and on Domestic and International Monetary Policy, May 2005.

Congressional Budget Office (2004), "Updated Estimates of the Subsidies to the Housing GSEs," an attachment sent to the Senate Committee on Banking, Housing, and Urban Affairs, April 8, 2004; available at http://www.cbo.gov/showdoc.cfm?index=5368&sequence=0

Ely, Bert [2004], "A Fully Privatized Mortgage-Financing Plan," paper presented at Privatizing Fannie Mae, Freddie Mac, and the Federal Home Loan Banks, a conference at the American Enterprise Institute, October 2004.

Fannie Mae [2005], Constant maturity agency debt interest rates, available at: http://www.fanniemae.com/markets/debt/Cmi/constant_maturity.jhtml?p=Debt+Securities&s=Benchmark+Securities&t=Constant+Maturity+Debt+Index+ .

Frame, W. Scott and Larry D. Wall, (2002a), "Finance Housing through Government-Sponsored Enterprises," Federal Reserve Bank of Atlanta Economic Review, First quarter.

Frame, W. Scott and Larry D. Wall, (2002b), "Fannie Mae's and Freddie Mac's Voluntary Initiatives: Lessons from Banking," Federal Reserve Bank of Atlanta Economic Review, First quarter.

Hermalin, Benjamin and Dwight Jaffee (1996), "The Privatization of Fannie Mae and Freddie Mac: Implications for Mortgage Industry Structure,", in Studies on Privatizing Fannie Mae and Freddie Mac, US Department of Housing and Urban Development, May 1996.

Greenspan, Alan [2005], Testimony of Chairman Alan Greenspan, Hearing on *Regulatory reform of the government-sponsored enterprises*, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, April 6, 2005.

Holtz-Eakin, Douglas [2005], Testimony before the Senate Committee on Banking, Housing, and Urban Affairs, April 21, 2005.

Jaffee, Dwight [2003], "The Interest Rate Risk of Fannie Mae and Freddie Mac, ," Journal of Financial Services Research, 24:1 5-29.

Lea, Michael [2005], "Privatizing a Government Sponsored Enterprise: Lessons from the Sallie Mae Experience," paper presented at Fixing the Housing Finance System, a conference at the Wharton School, April 2005.

Lehnert, Andreas, S. Wayne Passmore, and Shane Sherlund, [2005], "GSEs, Mortgage Rates, and Secondary Market Activities," Federal Reserve Board, Finance and Economics Discussion Series Working Paper No. 2005-07.

Mudd, Daniel [2005], Testimony before the Senate Committee on Banking, Housing, and Urban Affairs, April 20, 2005.

Naranjo, Andy, and Alden Toevs [2002], "The Effects of Purchases of Mortgages and Securitization by Government Sponsored Enterprises on Mortgage Yield Spreads and Volatility," Journal of Real Estate Finance and Economics, 25:2/3 pp 173-195.

OFHEO [2004], Mortgage Markets and the Enterprises in 2003," issued October 2004 and available at: http://www.ofheo.gov/media/pdf/MME2003.pdf

Passmore, Wayne [2005], "The GSE Implicit Subsidy and the Value of Government Ambiguity," Federal Reserve Board, Finance and Economics Discussion Series 2005-05 (forthcoming in Real Estate Economics).

Passmore, Wayne, Shane Sherlund and Gillian Burgess [2005], "The Effect of Housing Government-Sponsored Enterprises on Mortgage Rates," Federal Reserve Board, Finance and Economics Discussion Series 2005-06 (forthcoming in Real Estate Economics).

Poole, William, [2004], "Panel on Government Sponsored Enterprise," speech to Annual Conference on Bank Structure & Competition, Federal Reserve Bank of Chicago, May 6, 2004.

Roll, Richard, [2003], "Benefits to Homeowners from Mortgage Portfolios Retained by Fannie Mae and Freddie Mac, " Journal of Financial Services Research, 25:1 pp 29-42.

Scholes, Myron S. (2000), "Crisis and Risk Management," American Economic Review, Vol 90, No. 2, pp. 17-21.

Snow, John [2005], Testimony of Secretary John W. Snow before the U.S. House Financial Services Committee, Proposal for Housing GSE Reform, April 13, 2005.

Syron, Richard [2005], Testimony before the Senate Committee on Banking, Housing, and Urban Affairs, April 20, 2005.

US Treasury [2005], Constant maturity interest rates, available at: http://www.treas.gov/offices/domestic-finance/debt-management/interest-rate/

White, Lawrence J. [2005] "Fussing and Fuming over Fannie and Freddie: How Much Smoke, How Much Fire?", Journal of Economic Perspectives, forthcoming.