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**The GSE Implicit Subsidy and the Value
of Government Ambiguity**

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The GSE Implicit Subsidy and the Value of Government Ambiguity

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Abstract

The housing-related government-sponsored enterprises Fannie Mae and Freddie Mac (the “GSEs”) have an ambiguous relationship with the federal government. Most purchasers of the GSEs’ debt securities believe that this debt is implicitly backed by the U.S. government despite the lack of a legal basis for such a belief. In this paper, I estimate how much GSE shareholders gain from this ambiguous government relationship. I find that (1) the government’s ambiguous relationship with Fannie Mae and Freddie Mac imparts a substantial implicit subsidy to GSE shareholders, (2) the implicit government subsidy accounts for much of the GSEs’ market value, and (3) the GSEs would hold far fewer of their mortgage-backed securities in portfolio and their capital-to-asset ratios would be higher if they were purely private.

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Introduction and Summary

The housing-related government-sponsored enterprises Fannie Mae and Freddie Mac (the “GSEs”) have an ambiguous relationship with the federal government.³ Most purchasers of the GSEs’ debt securities believe that this debt is implicitly backed by the U.S. government despite the lack of a legal basis for such a belief and despite the fact that the prospectus for each GSE security clearly states that GSE debt is not backed by the government.

The markets’ impression that the government implicitly backs Fannie Mae and Freddie Mac is based on the GSEs’ history, on the size of their portfolios, on the fact that the government mandates housing goals for these firms, and on the many indicia of explicit government support. For example, the government provides the GSEs with a line of credit from the Department of the Treasury, fiscal agency services through the Federal Reserve, U.S. agency status for GSE securities, exemptions from securities registration requirements, exemptions from bank regulations on security holdings, and tax exemptions. The result is an ambiguous relationship between the GSEs and the federal government in which investors infer government support while government officials deny it.⁴

In this paper, I estimate how much GSE shareholders gain from this ambiguous government relationship. In particular, I use a standard discounted earnings model to estimate the proportion of Fannie Mae’s and Freddie Mac’s market value that can be

3. Reflecting their government sponsorship, Fannie Mae’s legal name is the “Federal National Mortgage Corporation” and Freddie Mac’s legal name is the “Federal Home Loan Mortgage Corporation.”

4. During his recent testimonies before Congress, Secretary of the Treasury John Snow explicitly denied there was any implicit government guarantee of the GSEs (September 10, 2003, and October 16, 2003). There have been a variety of legislative proposals to reform the GSEs, although they generally do not deal with the subsidy directly (see Nott and Jickling, 2003).

attributed to their GSE status. I refer to this estimated amount as their implicit government subsidy.^{5,6}

I draw three conclusions from my study:

- Fannie Mae's and Freddie Mac's ambiguous relationship to the government imparts an implicit subsidy to GSE shareholders and homeowners. In dollar terms, the gross value of this subsidy is estimated to be between \$122 billion and \$182 billion, of which the shareholders retain between \$53 billion and \$106 billion. Under my "middle-of-the-road" assumptions, GSE shareholders retain roughly 53 percent of the gains from their ambiguous government relationship or about \$79 billion.
- My calculation also suggests that roughly 44 percent to 89 percent of the GSEs' market value is due to their implicit government subsidy. Of course, if the GSEs' implicit subsidy is eliminated, their market value may not fall as much as suggested by these estimates because they would reorganize themselves. Indeed, without the "political risk" of changes in their GSE status, their price-to-earnings ratios might actually rise.
- If the GSEs were purely private, in the sense that their returns on equity and their returns on assets were similar to those of other large financial institutions, they would hold far fewer of their own mortgage-backed securities in portfolio and, as

5. The Congressional Budget Office calculated the GSE subsidy in a similar manner (CBO, 1996 and 2001a), although they calculated the net present value of the implicit subsidy embedded in recent debt issuance during a given year, not the value embedded in all debt outstanding. Some critics of their studies have argued that, since the GSEs do not receive a direct appropriation from the government, the term "subsidy" is inappropriate. I have tried to be more precise about the implicit nature of the GSE subsidy. Also note that both my technique and CBO's technique understate the value of the implicit subsidy to Fannie Mae and Freddie Mac because they ignore the reduced size of the GSEs that would result from removal of this ambiguous relationship. Without this relationship, the GSEs could no longer hold some assets profitably at market interest rates because the GSEs would need to hold more capital behind their assets in order to fund themselves at the same interest rates.

6. Applying standard equity valuation formulas to the GSEs is complicated by the fact that, historically, GSE earnings growth rates often exceed most reasonable estimates of the discount rate, suggesting that investors should plow all their earnings back into these firms. I, like many others, assume in my projections of GSE earnings that GSE growth eventually will be capped by the growth of the overall mortgage market.

a consequence, would be much smaller organizations. Their capital-to-asset ratios would be more than double their current capital-to-asset ratios.

My estimates span a wide range because the data that are currently available do not allow more precise estimates. However, while better data on mortgage rates and agency debt spreads would yield a more precise estimate of the GSEs' implicit subsidy, even on the basis of current data I conclude that the value of the federal government's ambiguous relationship to GSE shareholders is positive, very large, and does not seem to result in an increase in homeownership.⁷

A Discounted Earnings Model of GSEs' Implicit Subsidy

Fannie Mae and Freddie Mac are government-sponsored enterprises chartered by Congress and the GSE implicit subsidy is the “extra” cash flows that are derived from holding this charter relative to a purely private corporation. The discounted present value of the gross implicit subsidy to GSE shareholders (S_0) is :

$$S_0 = \sum_{t=1}^n \frac{(r_t^{private} - r_t^{GSE})D_t + f_t^{GSE} MBS_t + Ex}{\prod_{s=1}^t (1 + d_s^e)} \quad (1)$$

where r is the weighted-average yield (weighted across maturities) on debt (with a superscript for either private corporations or GSEs), d^e is the equity discount rate (using the Treasury yield curve and an estimate of the equity premium⁸), D is the outstanding GSE debt, f^{GSE} is the portion of the fee on mortgage-backed securities earned as a result of the special status of the GSEs, MBS is the stock of mortgage-backed securities, n is the

7. Fannie Mae and Freddie Mac have sponsored a number of studies criticizing the type of analysis undertaken by CBO and, by implication, the analysis undertaken here. In particular, see Gross (2003), Fannie Mae (2001), Pearce and Miller (2001), and Toevs (2001a).

8. My measure of the equity premium is constructed with equity analyst earnings forecasts, employing an approach similar to that used in Sharpe (2002).

investor's time horizon for discounting, and Ex is the value of tax exemptions and other explicit advantages.⁹

The GSEs may pass some of the subsidy on to homeowners in the form of lower mortgage rates. The present value of homeowner savings (H_0) from the GSEs' perspective is:

$$H_0 = \sum_{t=1}^n \frac{(m_t^{nongse} - m_t^{conform})M_t^{conform}}{\prod_{s=1}^t (1 + d_s^e)} \quad (2)$$

where m is the mortgage rate (with a superscript indicating the rate either on a conforming mortgage or on a similar mortgage in a comparable, but hypothetical, non-GSE world) and $M^{conform}$ is the stock of conventional, conforming mortgages purchased by the GSEs. (Conforming mortgages are mortgages that the GSEs are permitted to purchase under their charter.¹⁰)

The present value of the after-tax subsidy value of the GSE charter retained by the GSE shareholders is:

9. A different method of estimating the value of the GSE implicit subsidy is to value the implicit credit guarantee extended by the government using actuarial or option pricing methods. Gatti and Spahr (1997) take this approach when examining Freddie Mac and conclude that federal government still bears a nontrivial portion of Freddie Mac's risk. For a discussion of different methods of GSE subsidy estimation, see Feldman (1999) and Kane (1999).

10. The GSEs also hold non-mortgage securities in portfolio and the issuers of these securities might also benefit from the GSE implicit subsidy. However, I do not account for this benefit here because Congress's intent was for the GSEs to benefit homeowners and not other types of borrowers. In addition, the GSEs' purchases of mortgages may or may not affect the rates on conforming mortgages that are not purchased by the GSEs. However, given the GSEs' cost advantages, the GSEs probably purchase almost all of the truly conforming mortgages. In general, a broader social welfare calculation would include these as well as many additional components, including the tax effects associated with households' lower mortgage payments, the possible taxpayer costs if a GSE defaulted, the GSEs' effects on mortgage market efficiency and innovation, and the possible employment changes due to capital reallocation toward the GSEs and away from other business investments. In this paper, I focus on the factors that directly affect GSE earnings.

$$Net\ Subsidy = (S_0 - H_0)(1 - \tau_{GSE}) \quad (3)$$

where τ is the average tax rate on GSE earnings.

In this paper, I simplify this calculation by assuming that GSEs influence mortgage rates in proportion to their yield advantage on debt. If this proportion is called ω , then:

$$m_t^{nongse} - m_t^{conform} = \omega(r_t^{private} - r_t^{gse}), \quad (4)$$

and I can rewrite equation 3 as:

$$Net\ Subsidy = (1 - \tau_{GSE}) \sum_{t=1}^n \frac{(r_t^{private} - r_t^{GSE})(1 - \omega\delta)D_t + f_t^{GSE} MBS_t + Ex}{\prod_{s=1}^t (1 + d_s^e)} \quad (5)$$

where δ is the ratio of all mortgages purchased by the GSEs divided by GSE debt outstanding. The parameter ω can be interpreted as the proportion of the funding advantage from the GSE implicit government guarantee that is passed through to mortgage rates. Equation 5 calculates the present value of GSE earnings due to the implicit subsidy; in an efficient market, this amount would be factored into the GSEs' stock prices.

In this paper, I simulate the value of the GSE subsidy using a wide range of parameter values. Unlike an approach that used average or the most recent values to estimate this subsidy, my approach accounts for the covariance among variables, the variability in possible paths for GSE debt and mortgage growth, and the mean-reverting evolution of interest rates and growth rates. For example, the GSE debt advantage is highly correlated with long-run Treasury rates. This advantage increases when rates are low, particularly during “flights to quality” by investors in the bond market. A static

analysis cannot capture this relationship. In addition, a dynamic analysis allows me to quantify the importance of imprecise measurements.

The Subsidy Value of GSE Debt and Its Effect on Mortgage Rates

Estimating the subsidy value of GSE debt and its effect on mortgage rates (the “ ω ” described above) is complicated. Here, I used the results from Passmore, Sherlund, and Burgess (2005), which I will refer to as PSB. They estimate the GSE advantage on long-term debt to be about 42 basis points, on average. To calculate this figure, their study compares yields on GSE debt to yields on AAA- and AA-rated financial corporate debt (of similar maturities), using several different groups as proxies for corporate debt. In addition, they estimate the short-term GSE debt advantage to be around 13 basis points, where the short-term advantage is computed as the difference between yields on GSE discount notes and repurchase agreements using GSE mortgage-backed securities as collateral. Then, taking a weighted average of the two figures results in their estimate of the GSE debt advantage of about 40 basis points.

A commonly asserted benefit of the GSEs is that they lower mortgage rates for homeowners. However, attempting to use government-sponsored enterprises to lower mortgage rates is indirect and, perhaps, less effective than a direct subsidy would be. As outlined above, the GSEs’ implicit subsidy mainly takes the form of lower funding costs. To pass these lower costs on to homeowners requires that GSE shareholders not capture this subsidy in the form of increased profits. Even if a mechanism exists that forces the GSEs to transmit this subsidy on to mortgage originators, these originators may also capture some or all of the subsidy and not pass it on to homeowners.

Using the Federal Housing Finance Board’s Mortgage Interest Rate Survey data from April 1997 to May 2003, PSB directly estimate the proportion of the subsidy transmitted by the GSEs to homeowners using a regression method that has some similarities to a method used in many other studies. This technique focuses on the differences in mortgage rates observed on mortgages that exceed the size limit imposed on GSE mortgage purchases (so-called jumbo mortgages) and mortgages below this size limit. These smaller mortgages are often referred to as conforming mortgages, even

though there are other restrictions on GSE purchases, and thus some of these mortgages cannot be purchased by the GSEs. The size limit on GSE purchases is called the conforming loan limit and is adjusted annually to reflect house price increases (but it is not adjusted downward when house prices decrease). In 2004, the conforming loan limit for most mortgages was \$333,700. The authors conclude that 16.4 percent of the GSE debt advantage is passed-through to homeowners via lower mortgage rates.

For my simulations, I use three pass-through scenarios based on PSB's work: the modal scenario, the larger pass-through scenario, and the smaller pass-through scenario. As shown in the top panel of exhibit 1, these scenarios each represent the median pass-through for a set of equally-likely ranges of estimated coefficients. For the smaller range of coefficient estimates, the median pass-through estimate is about 8 percent. For the larger range of coefficient estimates, the median pass-through rate is about 25 percent. Finally, for the modal range of coefficient estimates, the median is about 16 percent. As shown in the lower panel, the median mortgage rate reduction consistent with these scenarios implies that the activities of the GSEs seem to typically account for about 6.6 basis points of the difference between jumbo and conforming mortgage rates, with an estimated standard deviation of 3.2 basis points.

The Subsidy Value of Issuing MBS

When Fannie Mae and Freddie Mac issue mortgage-backed securities, they promise purchasers that payments will be made on these securities even if some of the underlying mortgages default. In return for providing this insurance against credit risk, Fannie Mae and Freddie Mac charge a guarantee fee. The average GSE guarantee fee is about 20 basis points. A substantial portion of this fee covers costs associated with processing MBS payments. Of the remainder, the credit loss portion of this fee is very small—perhaps only a few basis points—given the very low-risk nature of conforming mortgages.

To value the subsidy embedded in GSE MBS, one might compare the yields on purely private MBS to the yields on GSE MBS, if all other things were equal. But all other things are not equal because investors demand that purely private MBS have

significant credit enhancements, which are difficult to observe and value, while investors do not demand such enhancements from GSE MBS.¹¹ In addition, purely private MBS are usually originated and structured by commercial banks, which are subject to stricter capital requirements concerning mortgage-backed securities than are the GSEs and therefore might be securitizing because regulatory capital standards are too high.¹² Simulations of the value of the GSEs' advantage in mortgage securitization illustrate that it is very valuable (Passmore, Sparks and Ingpen, 2002), but estimating this value is even more difficult than estimating the GSE advantage when issuing debt.

Since I have little information about the cost of the credit enhancements that the GSEs' mortgage-backed securities would need if the GSEs were not government-sponsored, I make a conservative guess. Using Fannie Mae's 2002 financial data reported by line of business, it appears that income on its credit guarantee business, calculated as a share of the stock of outstanding MBS, was about 7.9 basis points.¹³ Fannie Mae's credit losses on mortgages were minimal—about 0.5 basis points.¹⁴ Thus, net income was about 7.4 basis points, with part of this income representing a return on GSE capital and the remainder being an implicit subsidy. Assuming a rate of return on equity ranging from 10 percent to 15 percent and a regulatory capital requirement of 45 basis points, the return to equity could range from 4.5 basis points to about 7 basis points.

11. CBO (1996, 2001a) attempted to compare purely private yields to GSE MBS yields and argued that the yield difference is around 30 basis points. However, CBO made this estimate based on limited data. Moreover, the logic of this technique is suspect because, unlike the savings on debt issuance, the yield difference between private and GSE MBS issuance is unrelated to GSE earnings. For example, if the GSEs did not lower mortgage rates at all, then the GSEs' 30 basis points of savings on MBS yields would exceed their total charge for guaranteeing MBS (about 20 basis points). As described in the text, one should examine the difference in credit insurance fees, not in security yields.

12. There is a long literature on capital arbitrage as a motivation for securitization; see Ambrose, LaCour-Little, and Sanders (2004), DeMarzo (2004), or Passmore (1994).

13. Note that this calculation does not control for the possibility that Fannie Mae management might inflate their operating expenses.

14. Fannie Mae's losses have been in this range for several years despite weak economic conditions and, according to their 2003 Annual Report, they do not anticipate a significant increase in these losses.

This range represents the fees that would be earned by a firm issuing purely private MBS. Lacking better information, I will assume in the simulations below that the subsidy-related component of the guarantee fee ranges from zero to six basis points, with an average of three basis points across all of the simulations.

Starting Values and Growth Assumptions for Simulating the GSE Subsidy

I am now in a position to simulate the present discounted value of the implicit GSE subsidy. The preceding sections described the techniques used to estimate the parameters of the subsidy model (equation 5). As described earlier, my estimates of $(r^{private} - r^{GSE})$ are based on the debt spreads provided in PSB, my estimate of ω is equal to β_1 in the regression analysis provided in PSB, and my estimates of f^{GSE} are based on Fannie Mae's income statement.

My simulation treats Fannie Mae and Freddie Mac as one entity. For initial values of the size of this entity, I average the combined values of their portfolios from 2001:Q2 to 2003:Q3. The two-year average smooths out any recent, temporary fluctuations in these values. As outlined in the top left panel of exhibit 2, this combined entity has \$1.4 trillion of debt, has issued \$1.6 trillion of mortgage-backed securities that are not held in its own portfolio, holds \$1.3 trillion of mortgages and mortgage-backed securities in its portfolio, and has a market value of \$119 billion.

As described in the upper right panel, I also assume that the starting level of mortgage debt is \$5.3 trillion (the average over the past two years), which implies that the GSEs' initial market share is 54 percent. Projecting the growth of GSE mortgage-related assets is difficult because historically the GSEs almost always grow faster than the mortgage market (as shown in the middle panel). Such growth cannot continue over a long horizon, however, without the GSEs absorbing the whole market. Therefore, I assume that there exists a limit to the GSE share of the conventional, conforming mortgage market.

I pick a maximum market share and assume that in simulations where the GSE growth rate exceeds the market's growth rate, the GSEs grow faster than the market until they hit their maximum market share, at which time the GSEs' growth rate gradually

declines to the market growth rate (thus they exceed the “maximum share” for most or all of the projection).¹⁵ I conservatively choose, in turn, 55 percent, 60 percent, and 65 percent as the maximum market share in the simulations.

The median growth paths for each market share assumption are shown in the lower left panel. In these growth paths, the GSEs’ growth rate starts higher than the market growth rate and then declines slowly to the market growth rate. However, in the simulations, there are some growth paths that start below the market growth rate and then rise, and some that have a “hump shape” where the GSE growth rate increases initially and then declines to the long-run market growth rate of about 8-1/2 percent (the average growth rate of the mortgage market over the past ten years).

Finally, to discount the cash flows generated by the GSEs, I assume that equity investors compare the return from investing in the GSEs to the return from investing in the overall market. I discount the cash flows using the Treasury yield curve plus an equity premium (for example, for the cash flow five years out, I discount using the five-year Treasury rate, and for the cash flow ten years out, I discount using the ten-year Treasury rate). The lower right panel shows the time-varying estimate of the equity premium (the estimation technique for the equity premium is similar to that described in Sharpe, 2002).

The GSE Subsidy Calculations

Perhaps the easiest way to illustrate my simulation technique is to focus on the calculation of the subsidy embedded in GSE debt. As outlined at the top of exhibit 3, I start with the two-year average of GSE debt outstanding and then pick a historical combination of debt growth, the spread between the yield on GSE debt and the yield on

15. In the simulations, the growth rate is applied to the total of GSE mortgage obligations (both those held in portfolios and those off-balance sheet.) The total is then split into on- and off-balance-sheet obligations based on the two-year average ratio prior to the initial period (roughly 56 percent of the GSE mortgage obligations are on-balance-sheet—both whole mortgages and MBS—and the rest are securities traded publicly). The GSEs, however, might be likely to hold an increasing portion of their securities on their balance sheets as their growth rates decline in an effort to boost profits. Thus, holding this split constant may understate the subsidy.

the debt issued by AAA or AA financial corporations—the GSE debt advantage—as well as the associated Treasury yield curve and equity premium (which are added together to create the discount rates). The GSE debt advantage is multiplied by the size of their combined portfolios to generate the initial cash flow associated with the GSE subsidy at a given time. Over the projection horizon (25 years), the spread moves to its long-run historical average, with the movement based on a simple ARIMA model. Generally, this average is reached fairly quickly (in less than five years).

The GSE portfolio growth rate, as discussed earlier, often exceeds the growth rate of the mortgage market. Once the maximum market share is reached, however, the GSE growth rate gradually falls towards the market growth rate, eventually reaching the market growth rate. In turn, the growth rate of GSE debt also moves to the mortgage market's long-run growth rate. My measure of the GSE debt subsidy for this simulation is the sum of these annual discounted cash flows over the 25 year period. I follow a similar nonparametric process to calculate the value of the mortgage savings of households. To generate the cash flows, I multiply the estimated pass-through proportion (ω) by the GSE debt advantage that prevailed at a given time, and then multiply this spread by the mortgages purchased and held or securitized by the GSEs.

I use 74 monthly observations (from April 1997 to May 2003) of the equity premium, the Treasury yield curve, the GSEs' debt advantage, the growth rates of the GSEs' mortgage and debt portfolios, and the estimated mortgage savings to homeowners observed during a given month. To eliminate outliers, I smooth the data using 12-month moving averages. For each simulation, I choose the values for these variables that were observed in a given month so that the historical joint relationships between the variables are maintained. With 74 historical observations over time and 3 different estimates of the mortgage savings for each month, this nonparametric process generates 222 simulations of the cash flow attributable to the GSE subsidy. In addition, I make reasonable assumptions about the range of the MBS subsidy and the maximum GSE market share and assume that values within this range are equally likely, letting the former vary from 0 to 6 basis points (in increments of 3) and the latter have a value of either 55 percent, 60 percent, or 65 percent. All told, I run 1,998 simulations. The result of my simulations

should not be interpreted as a current estimate of the subsidy value (that is, based only on current spreads, etc.), but instead as an estimate that averages over expected future market conditions based on recent historical experience.

As shown in the lower left panel, I estimate the median gross subsidy to Fannie Mae and Freddie Mac to be \$149 billion, with 80 percent of the estimates falling between \$122 billion and \$182 billion. Similarly, as shown to the right, most estimates of the after-tax net subsidy lie between \$53 billion and \$106 billion, with a median estimate of \$79 billion. The wide range of estimates emphasizes the data limitations and fluctuations of key variables over the sample. Nonetheless, the estimates suggest that the GSE subsidy is positive and large.

The Robustness of GSE Subsidy Estimates and the Need for Better Data

As described in the first line of the top panel of exhibit 4, my median estimate of the present value of the GSE spread advantage on debt is \$131 billion (line 1, column 2). Adding in the value of the MBS subsidy and the GSE exemptions (tax exemptions, registration exemptions and others¹⁶) increases the gross subsidy to \$149 billion (line 4). Homeowners saved \$33 billion on their mortgage payments (line 5), while taxpayers recaptured part of this implicit subsidy (line 6), in part because of federal taxation of GSE income (line 6a) and in part because homeowners took fewer mortgage interest rate deductions against their individual taxes (line 6b). Accounting for homeowners' savings and taxpayer recapture, I calculate a median net GSE subsidy of \$79 billion after tax (line 7). I estimate that 66 percent of the GSEs' market value is attributable to the subsidy.

As shown in columns 3 and 4 of the table, my estimates vary widely, mainly reflecting the uncertainty regarding the size and the variation over time in my estimates of the GSE debt spread advantage, my estimates of the difference between jumbo and conforming mortgage rates, and my estimates of the proportion of the jumbo-conforming spread difference that can be attributed to the GSEs. These spreads are often very small and thus difficult to estimate precisely with available data. The variation in estimates

16. I use CBO's valuation of these exemptions (CBO, 2001a).

suggests that the net subsidy to the GSEs could be as little as 44 percent and as much as 89 percent of their market value.¹⁷

The imprecision in my implicit subsidy estimates reflects the fact that small differences in the estimated mortgage savings and the GSE debt advantage make a big difference in the subsidy estimate. As shown in the lower left panel, a 3 basis point increase in the estimated GSE effect on the median jumbo-conforming mortgage spread drops the average net subsidy estimate \$10 billion, or 15 percent (line 1). A 6 basis point increase in the estimated GSE debt spread advantage raises the net subsidy estimate by \$9 billion or 11 percent (line 2). Both of these changes are within my bounds of error, illustrating that making precise implicit subsidy estimates is difficult. Regardless, the GSEs' implicit subsidy appears to be substantial. Other changes shown in the table, such as in the maximum market share assumption, have a smaller impact.

The diagonal, dashed line in the lower right panel further illustrates the importance of the estimated mortgage rate savings passthrough to homeowners in determining the size of the subsidy estimate. Small changes in this parameter can substantially change the size of the estimated subsidy. My simulations suggest that the GSEs retain a substantial portion of the subsidy—\$79 billion given my median estimated spread of 6.6 basis points (shown by the intersection of the dashed and dotted lines on the chart). However, they would retain much less—\$60 billion—if rates were lowered 10.6 basis points (the median reduction in the larger mortgage rate reduction scenario) and much more—\$94 billion—if rates were lowered only 3.3 basis points (the median in the smaller mortgage rate reduction scenario). (Note that these values are shown on the chart by the intersections of the diagonal dashed line with the vertical dashed lines labeled “3.3 bp Estimate” and “10.6 bp Estimate,” respectively.)

Looking at this calculation from the perspective of the average homeowner, the annual mortgage payment saving (after accounting for the mortgage interest deduction) for a homeowner with a typical conforming mortgage in 2002 (the solid line) was \$63 per

17. Theoretically, the subsidy can exceed the market value if part of the subsidy is absorbed by higher-than-usual costs such as management salaries and benefits.

year if GSE activity lowered their mortgage rate 6.6 basis points (the intersection of the solid and the vertical, dotted lines on the chart), \$101 if the mortgage rate were lowered 10.6 basis points (the intersection with the right-dashed line), and only \$32 (the intersection with the left-dashed line) if the rate were lowered only 3.3 basis points. It is very hard to estimate such small quantities with precision using the data currently available. But given the large number of mortgages purchased by the GSEs, such estimates are important when judging the size of the GSE subsidy.

A Comparison to CBO's Technique

On multiple occasions, Congress has requested that the Congressional Budget Office estimate the value of the implicit subsidy to housing-related GSEs (CBO 1996, 2001a, 2003, 2004). During the period 1998 and 2002, CBO's valuations of the annual implicit GSE subsidy have ranged from \$14 billion to \$22 billion. As described in CBO (2004), these numbers are smaller than my subsidy estimates for two reasons. First, I calculate the present value of the subsidy from the stock of debt issued by Fannie Mae and Freddie Mac, whereas CBO calculates the present value of the implicit subsidy derived from the debt *issued* in a given year. In other words, CBO's technique is analogous to valuing the GSE subsidy as if it were an annual appropriation by Congress. My approach is to estimate the value of the implicit subsidy to GSE shareholders.

Second, PSB's estimate of the effect of GSEs on mortgage rates is smaller than CBO's estimate (CBO, 2001b). CBO uses a traditional technique to estimate this effect that does not attempt to take into account other factors that may influence the jumbo-conforming spread (see PSB for further details). Despite these differences in estimation techniques, the conclusions of our approaches are similar. As described in CBO (2004), "In sum, both CBO and Passmore conclude that the housing GSEs receive large subsidies and that only a portion of those subsidies reach borrowers in the conforming market."

Fannie Mae has commissioned and published several studies critiquing CBO's study or my study (Fannie Mae 2001, Fannie Mae 2004, Gross 2003, Toevs 2001a, and Toevs 2001b). Most of these comments focus on the estimation of the GSE's debt advantages or on their impact on mortgage rates, which we discuss in PSB. One

comment, however, relates directly to this valuation of the subsidy—that the mortgage rate reductions created by the GSE should be applied to all conforming mortgages (and maybe jumbo mortgages as well) rather than to only mortgages purchased by the GSEs. I have not incorporated this suggestion. The GSEs affect mortgage rates by purchasing conforming mortgages from banks and other mortgage originators. To the extent they offer a higher price for a mortgage, the originator has the opportunity to offer the mortgage borrower a mortgage with a lower mortgage rate. The various critiques listed above do not spell out why an originator would take the higher price for mortgages purchased by the GSEs and transfer some of these profits to other mortgages. In a competitive environment, the originator would be forced to lower the mortgage rate only for the mortgages sold to the GSEs and would put itself at a competitive disadvantage if it “cross-subsidized” other mortgages. In other words, the jumbo and the conforming mortgage markets are very competitive, and supply of mortgages in both the conforming and jumbo markets are essentially perfectly elastic. Thus, a shift of mortgage borrowers from one market to the other does not necessarily influence either rate.¹⁸

GSEs, Leverage, and the Implicit Government Subsidy

As pointed out in Greenspan (2004) and illustrated in exhibit 5, the implicit government subsidy has allowed Fannie Mae and Freddie Mac to operate with a higher return on equity, a lower return on assets, and a lower capital-to-asset ratio than other large financial institutions.¹⁹ If the implicit subsidy could be removed and if the GSEs

18. Indeed, measuring the difference between jumbo and conforming rates using rates for loans near the conforming loan limit might be the worst possible measure. With little or no cost to moving below the conforming loan limit, any borrower will do so even if the gain is minimal. Those who borrow an amount slightly above the conforming loan limit may have characteristics (which are difficult to observe) that prevent them from moving below the conforming loan limit.

19. I compare Fannie Mae and Freddie Mac to banks holding greater than \$50 billion in assets who belong to bank holding companies (BHCs) with risk characteristics similar to those of Fannie Mae and Freddie Mac. (There are 11 such companies.) To compare risk characteristics, I use Bloomberg’s calculation of “beta.” Beta is a measure of non-diversifiable risk to equity investors. Fannie Mae and Freddie Mac have a beta of around 0.8. In my comparison group, all of the BHCs have betas between 0.6 and 1.0. I use the commercial banks’ return on equity and
(continued...)

operated under the same conditions as other financial institutions, how would the GSEs change?

Without the implicit subsidy, the GSEs would likely hold fewer of their own securities directly and, instead, would allow a greater volume of their securities (as well as securities originated by others) to trade in public markets among purely private investors.²⁰ Note that such a decision has little effect on GSE mortgage purchases and thus little effect on mortgage rates and homeownership. Mortgages would still be purchased, but they would be securitized and distributed to the public, rather than securitized and held in GSE portfolios (and thus funded with implicitly-subsidized GSE debt). A rough estimate of how much capital the GSEs would need to raise and how much of their securities they would need to distribute to the public if the implicit subsidy was eliminated can be obtained by calculating the fraction of GSE income generated by the subsidy and then assuming that more typical financial ratios would result from their complete privatization.

The GSEs' income can be written as:

$$I_{GSE} = sI_{GSE} + (1 - s)I_{GSE} \quad (6)$$

where s is the share of income resulting from the implicit subsidy.

To calculate s , I use the same approach as used earlier to calculate the present values of the subsidy cash flows. In this case, however, I calculate the subsidy for a given year, rather than over a 25-year period. The result is divided by the actual income of the GSEs.²¹ As shown in the middle right panel of exhibit 5, this share ranges between

19. (...continued)
return on assets rather than the BHCs' returns to control for the possibility that large commercial banks are indirectly subsidized through the safety net or deposit insurance (the so-called "dueling subsidies" argument). For a description of this argument, see Van Order (2000a, 2000b).

20. Most of the GSEs' mortgage-related assets in portfolio are mortgage-backed securities.

21. The actual income for Freddie Mac in 2001, 2002, and 2003, however, is uncertain until their restatements are completed. I use the most recent values available as of November 2003.

20 percent and 40 percent and mainly reflects my calculation of the GSE debt advantage for a given year.

As described above, if the implicit subsidy were zero, the GSEs would need to adjust their balance sheets so that their returns were more in line with the typical returns generated by large financial institutions. In particular, returns on assets would have to rise and returns on equity would have to fall until the risk-adjusted returns on assets and equity are equal to those for institutions with similar risk characteristics. One manifestation of the implicit subsidy is that investors view GSE assets as generally safer than most other financial assets, but GSE returns on equity are higher—contrary to the common view that financial markets generally reward taking increased risk with higher financial returns. To make my calculation, I conservatively assume that, absent the implicit subsidy, GSE returns would fall in line with the returns generated by large commercial banks whose parent companies are similar to the GSEs, even though the low risk of GSE assets might suggest they should fall even lower.²² In other words,

$$roe_{bank} = \frac{(1-s)I_{GSE}}{K^*} \quad ; \quad roa_{bank} = \frac{(1-s)I_{GSE}}{A^*} \quad (7)$$

where K^* and A^* would represent the capital and asset holdings of the GSEs without the implicit subsidy. Since

$$roe_{GSE} = \frac{I_{GSE}}{K_{GSE}} \quad ; \quad roa_{GSE} = \frac{I_{GSE}}{A_{GSE}}, \quad (8)$$

I can rewrite these equations as:

$$\frac{K^*}{K_{GSE}} = \frac{(1-s)roe_{GSE}}{roe_{bank}} \quad ; \quad \frac{A^*}{A_{GSE}} = \frac{(1-s)roa_{GSE}}{roa_{bank}} \quad (9)$$

22. As discussed earlier, it is difficult to find purely private financial institutions that are comparable to GSEs. No large financial institutions specialize in holding conforming mortgages.

In the lower left panel of exhibit 5, I calculate the capital-to-asset ratio of this hypothetical no-implicit-subsidy GSE (K^*/A^*) and the size of its on-balance sheet assets relative to the current GSE size (A^*/A). Given the rough nature of these calculations, they can only be taken as suggestive. However, it appears that the GSEs would need to raise their capital-to-asset ratio substantially—to between 8 percent and 10 percent—and sell many of the mortgage-backed securities they currently hold in portfolio to the public, so that their mortgage-asset portfolio would be roughly thirty to sixty percent of its current size (although, recall, the dollar amount of mortgages purchased by the GSEs would not necessarily change because the mortgages would be purchased, securitized, and distributed to the public rather than purchased, securitized, and held in the GSEs' portfolios).²³

While such actions would clearly lower GSE profitability, they might raise the GSEs' price-to-earnings ratios. As shown in the lower right panel, the price-to-earnings ratios of these large commercial banks have recently exceeded that of the GSEs, suggesting that investors value more highly a dollar of earnings produced by banks than a dollar of earnings produced by GSEs. One possible explanation for this different valuation is investors' realization that the political dependency of the GSEs makes their future earnings more uncertain and thus more difficult to value.

Concluding Thoughts

As pointed out by Feldman (1996), there are two major implications of using GSEs to deliver subsidies to homeowners. First, the size of the implicit subsidy is only weakly controlled by policymakers because the GSEs control their own debt issuance and hence the size of the implicit subsidy. Second, the shareholders of Fannie and Freddie

23. If the GSEs only securitized mortgages, the percent of capital needed would be substantially less because of the low credit risk associated with conforming mortgages. It is the mortgage portfolio, with its interest rate and prepayment risks, that requires much higher levels of capitalization.

have incentives to maximize the value of their stock, which may impede the efficient delivery of GSE benefits to homeowners.

To this list, one might add two more considerations. First, the implicit subsidy ultimately depends on purchasers of GSE debt and their view of the GSEs' relationship to the federal government. As noted by Poole (2003), this ambiguous relationship means that the subsidy might end abruptly should investors come to substantially doubt that the GSEs are government-backed. Second, as discussed earlier, the implicit subsidy has to pass through many channels before reaching home purchasers.

These four concerns suggest that more research is needed about the relative efficiency of different institutions for delivery of subsidies to homeowners. In particular, the success of the GSEs in meeting public policy goals should be examined more closely and measured more formally, given the large implicit subsidy that is captured by GSE shareholders.

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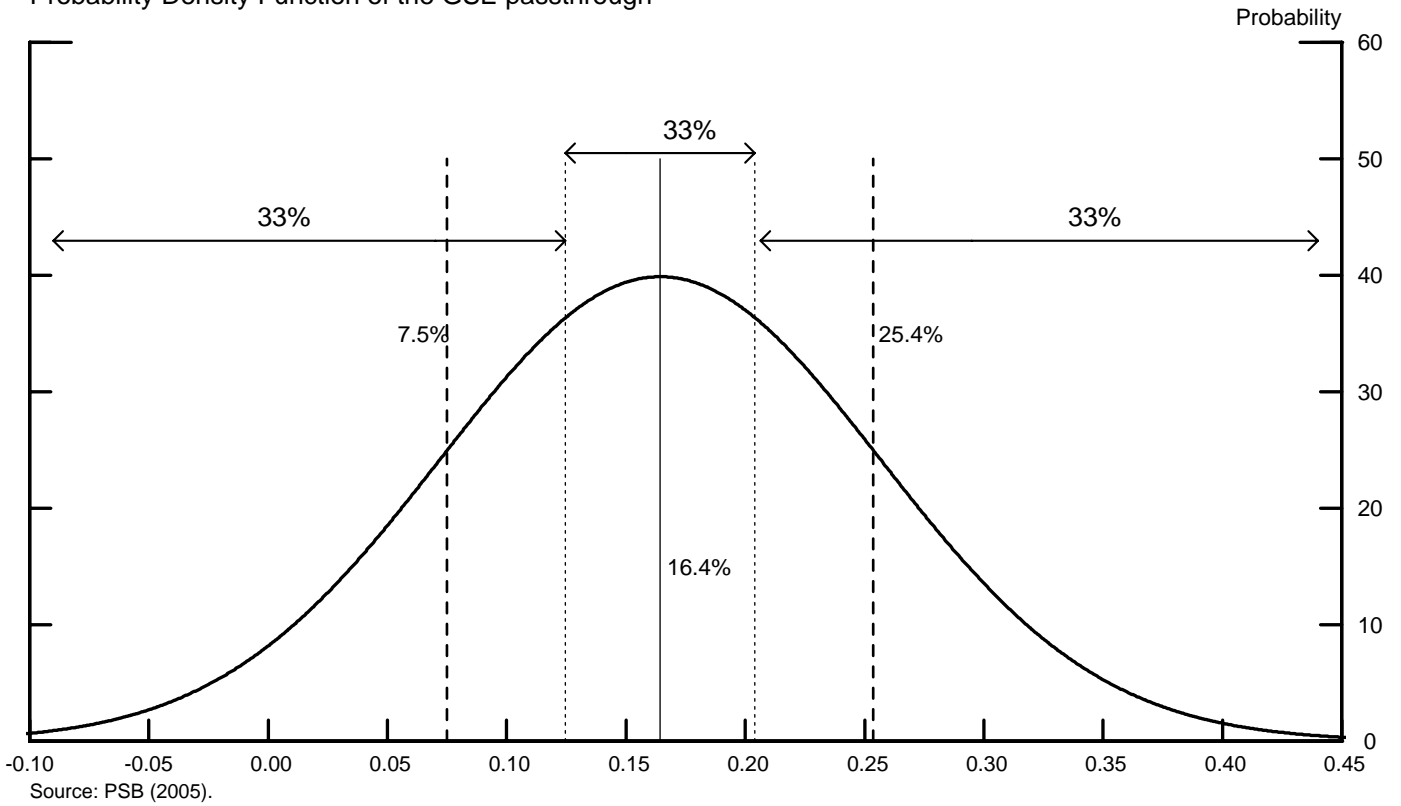
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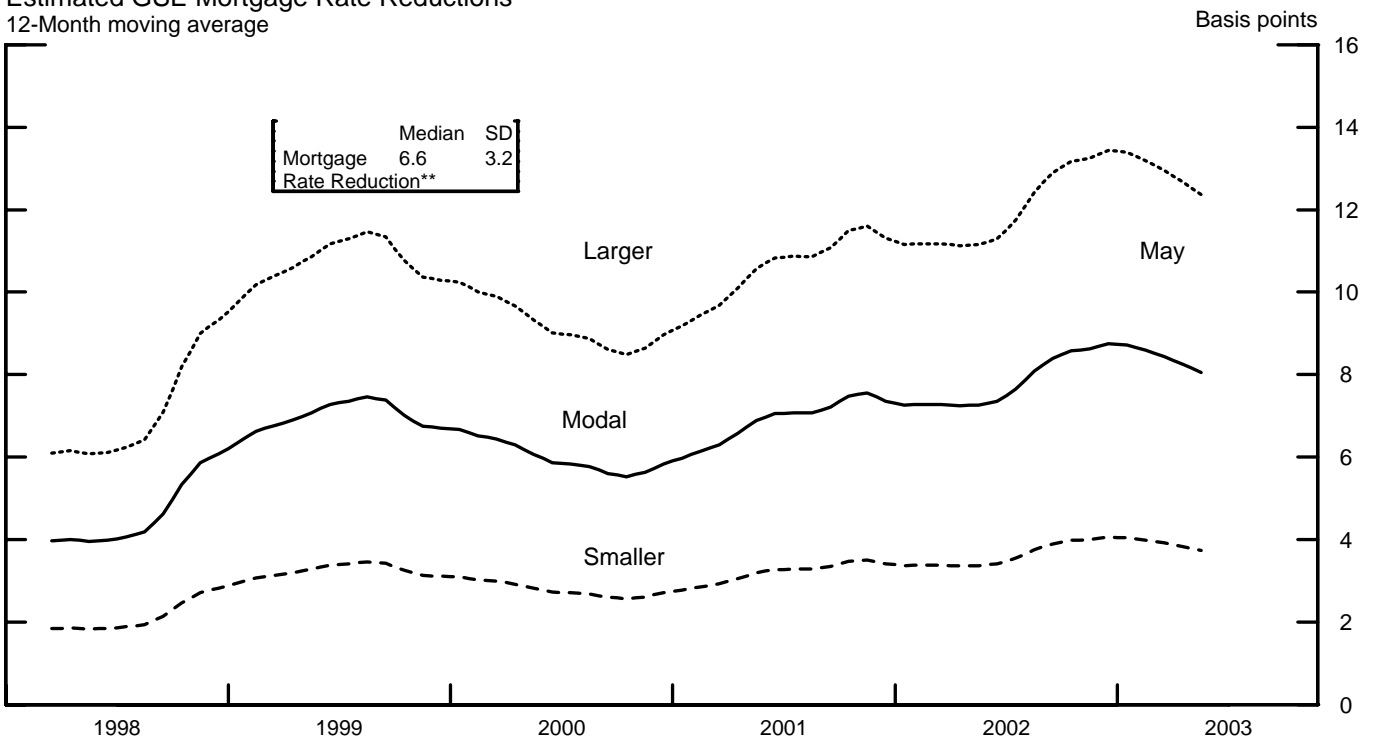
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Exhibit 1
Homeowners' Mortgage Savings

Probability Density Function of the GSE passthrough



Estimated GSE Mortgage Rate Reductions*
 12-Month moving average



* The GSE liquidity effect is assumed to be passed through in part to the homeowners. In the larger pass-through scenario, the GSE passes through 25.4% of debt savings; in the modal pass-through scenario, 16.4%; and in the smaller pass-through scenario, 7.5%.
 ** Median and Standard Deviation calculated from data prior to twelve-month averaging.

Exhibit 2 Historical Values

Starting Values for GSEs' Combined Portfolios*

- Eight-quarter average
- Agency debt is \$ 1.4 trillion.
 - GSE MBS is \$ 1.6 trillion.
 - GSE retained portfolio is \$ 1.3 trillion.
 - GSE market value is \$ 119 billion.

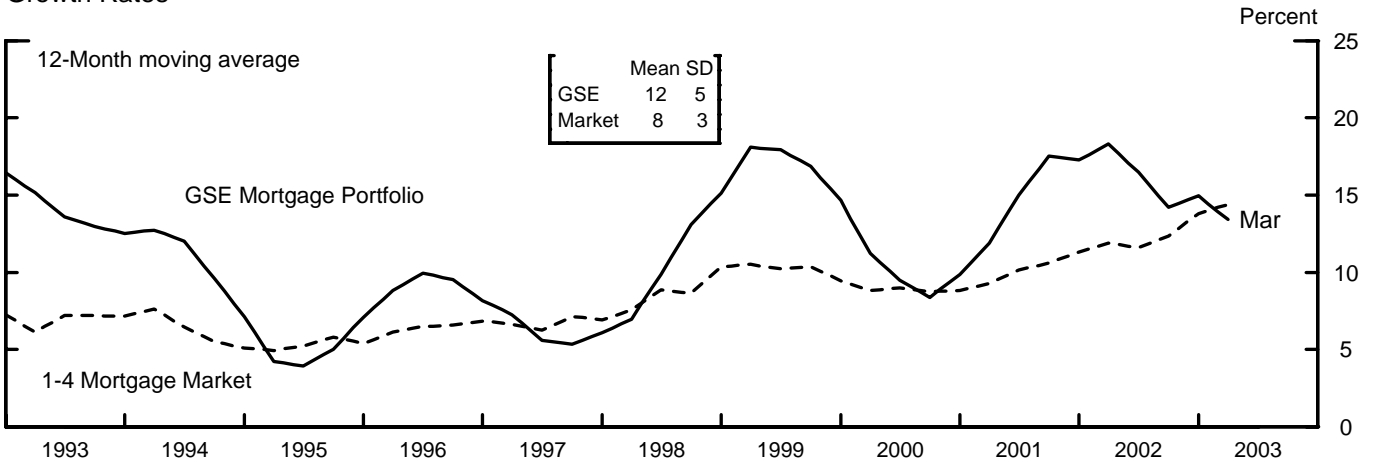
* Average over 8 quarters, 2001:Q2 to 2003:Q1

Market Growth Assumptions

- Total 1-4 mortgage debt is \$ 5.3 trillion. *
- GSE starting market share is 54 percent. *
- GSE growth rate exceeds market growth rate until it reaches the maximum market share, after which GSE growth rate declines to the market growth rate.
- GSE maximum market share is either 55, 60, or 65 percent.

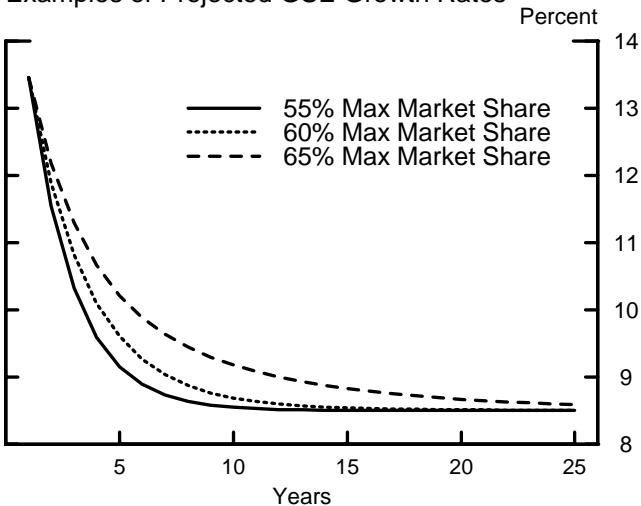
* Average over same 8 quarters.

Growth Rates



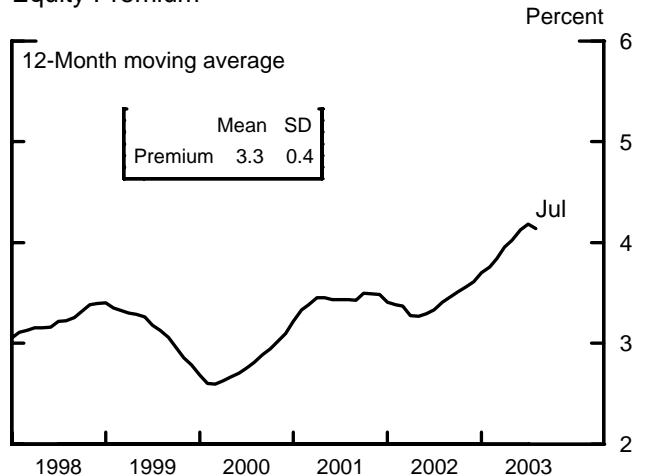
Source: Federal Reserve and GSE Quarterly Financial Statements.

Examples of Projected GSE Growth Rates



Long-run market growth rate is 8.5 %.

Equity Premium



Note: The long-run expected return on the S&P 500 less the 10-year Treasury bond yield.

Exhibit 3
Subsidy Calculations

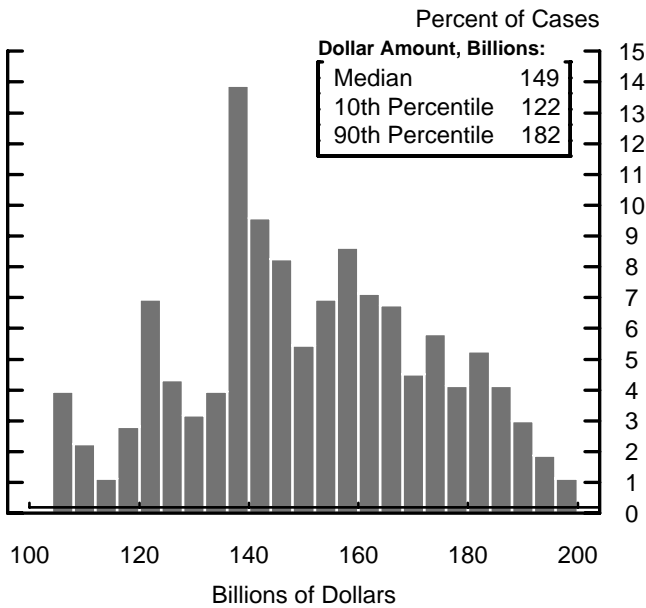
GSE Debt Subsidy Calculation

- | | |
|--|--|
| 1) Two-year average of GSE debt outstanding. | 4) Debt advantage and debt growth move toward long-run average over projection period. |
| 2) Pick historical combinations of debt growth rate, GSE debt advantage, Treasury yield curve, and equity premium (at 12-month moving averages). | 5) Cash flows discounted and summed to estimate subsidy value. |
| 3) GSE debt advantage multiplied by debt outstanding to yield cash flow at given time. | 6) Similar technique is used for homeowners' mortgage savings. |

Number of Simulations

- 74 historical observations (April 1997 to May 2003, monthly)
- 3 estimates of mortgage rate savings (High, average and low)
- 3 Maximum market shares (55, 60, 65 percent)
- 3 MBS subsidies (0 - 6 basis points, by 3)
- **1,998 simulations.**

Fannie & Freddie Gross Subsidy, Level



Fannie & Freddie After-tax Net Subsidy, Level

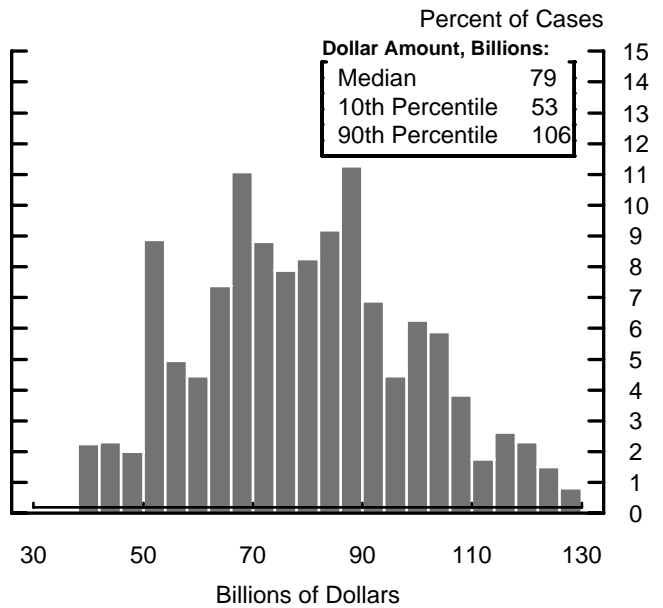


Exhibit 4
Robustness

Estimates of Present Value of GSE Subsidy

Billions				
Elements of Subsidy	Mean	Median	10th Percentile	90th Percentile
	(1)	(2)	(3)	(4)
1. GSE Debt Subsidy	126	131	103	141
2. GSE MBS Subsidy	19	19	0	40
3. GSE Exemptions	6	6	5	7
<hr/>				
4. GSE Gross Subsidy	151	149	122	182
5. Homeowner Savings	32	33	14	53
6. Taxpayer Recapture	39	39	23	56
6a. From GSEs	28	28	19	37
6b. From homeowners	11	12	5	19
<hr/>				
7. GSE Net Subsidy*	80	79	53	106
Memo:				
8. Percent Retained **	53	53	37	65
9. Net Subsidy as Percent of Market Value	67	66	44	89

* Line 8 is line 4 less lines 5 and 6. Values in columns 2, 3, and 4 do not necessarily sum because they reflect individual variable distributions.

** Median and percentiles calculated for all 1998 simulations (not line 6 divided by line 4).

Robustness Test

	Increase in Factor (bps)	GSE Net Subsidy*	
		Change (\$B)	Change (%)
(1) Mortgage Savings	3	-10	-15
(2) Weighted Debt Spread	6	9	11
(3) Equity Premium	66	-6	-7
(4) MBS Subsidy	3	12	16
(5) Max Market Share	500	2	2

* Compares the median over all simulations to the median of simulations where the given factor incremented by the given amount. For the MBS subsidy the base case is a subset of all simulations where the MBS subsidy equals 3 basis points and for the maximum market share the base case is a subset of all simulations where the maximum market share equals 60 percent.

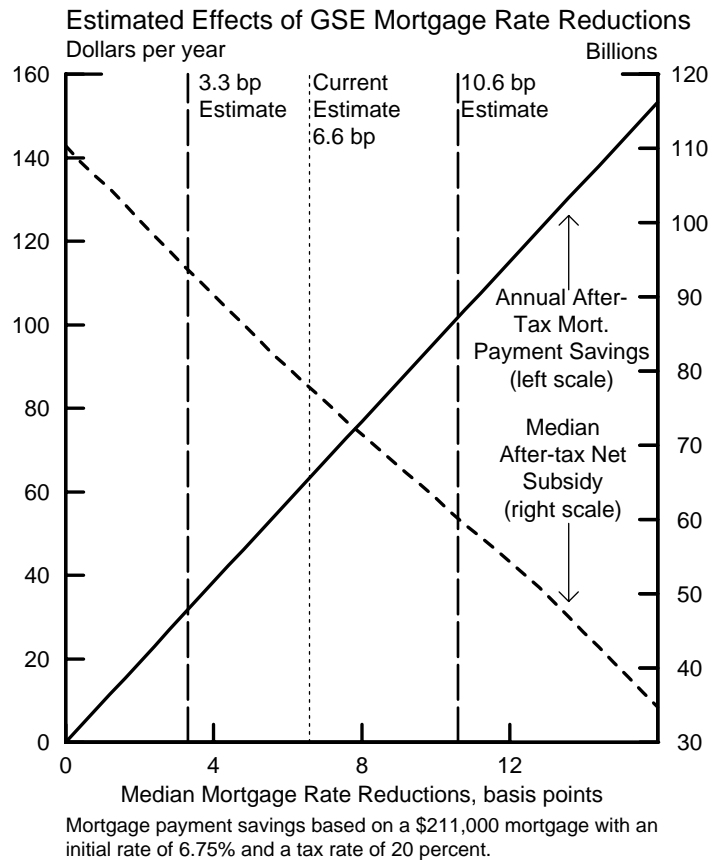
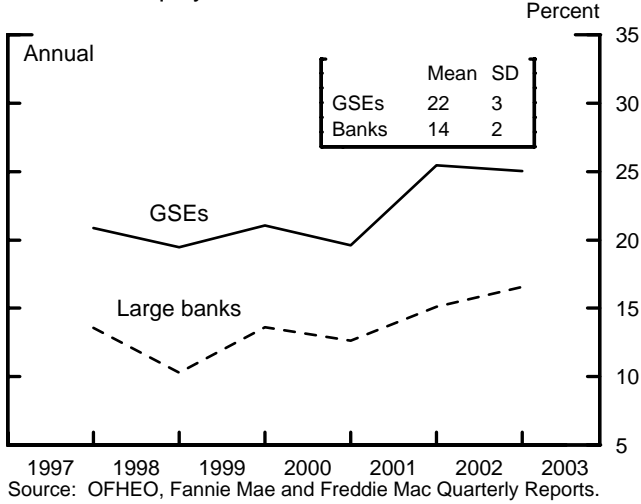
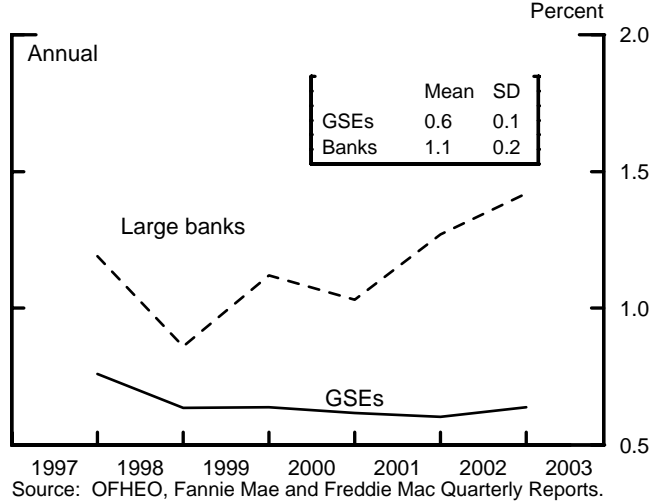


Exhibit 5
Comparing GSEs to Large Banks¹

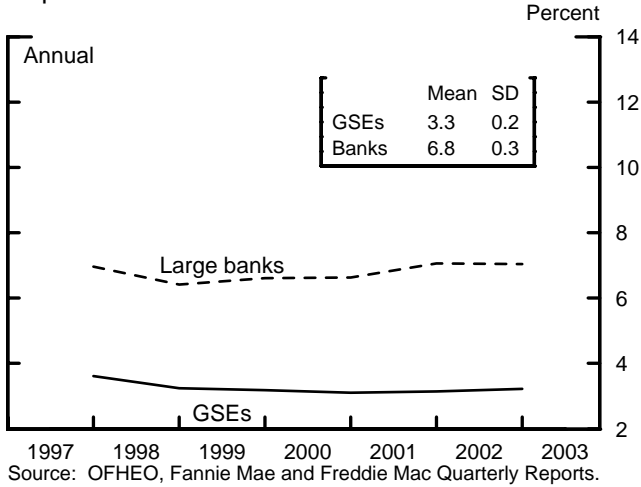
Return on Equity



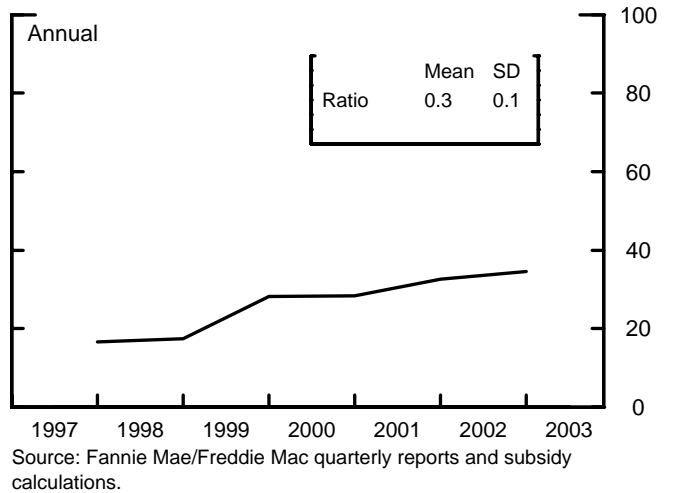
Return on Assets



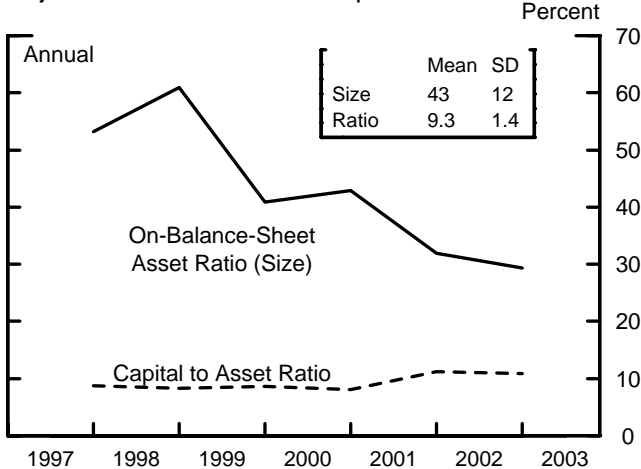
Capital to Assets



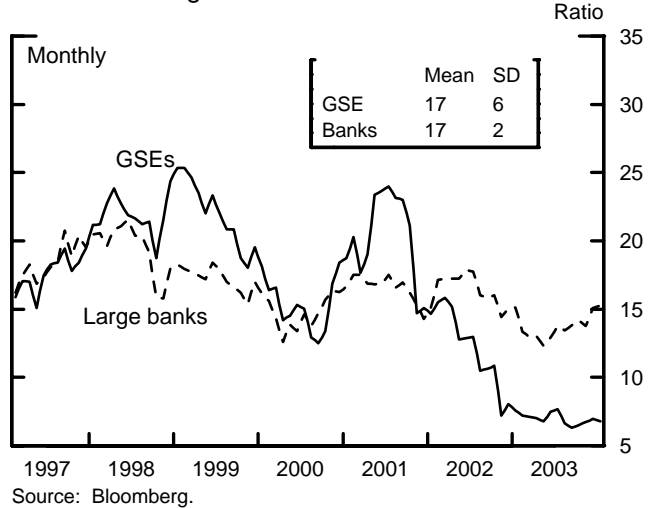
Estimated Net Subsidy to Net Income Ratio, GSEs



Adjusted GSE Assets and Capital



Price to Earnings Ratios



1. Large banks are all banks over \$50 billion with beta values within 0.2 of the GSEs.