TABLE 2

After-Tax Return on Equity

	1993	1992	1991	1990	1989	1988	1987
Fannie Mae	25.3%	26.5%	27.7%	33.9%	30.7%	24.9%	25.1%
Freddie Mac	22.2%	21.2%	23.6%	20.4%	25.0%	27.6%	28.2%
Mortgage Originators	n.a.	n.a.	n.a.	n.a.	0.0%	0.7%	5.3%
Commercial Banks	15.7%[1]	13.0%	7.9%	7.8%	7.8%	13.3%	2.0%
S&P 500[2]	12.1%	10.7%	8.6%	12.0%	13.6%	14.8%	11.8%

Sources: Goodman and Passmore (1992), FDIC, *S&P Analysts' Handbook*, *Freddie Mac 1993 Annual Report*, *Fannie Mae 1992 Annual Report*, and *Fannie Mae Investor/Analyst Report* for the fourth quarter 1993.

[1] Through September 1993 (annualized)

[2] Pre-tax

the investment and brokerage industry, mortgage originators, and commercial banks—in which case Fannie Mae's and Freddie Mac's ROEs are evidence that they are earning positive economic profits—this again cannot be seen as absolutely conclusive.

A better approach would be to consider the relation between the market's value for Fannie Mae and Freddie Mac and their book values. This relation tells us about economic profits for the following reason: Consider a hypothetical company with $100 in capital at the start of the year and 100 shares of equity. Suppose this company will operate for 1 year and then be liquidated.[37] Suppose that the expected return on this hypothetical company is R_h and the expected return on the best alternative investment with similar risk is R_o. If one buys a share in this hypothetical company, then at the end of the year one has a claim on $\$(1+R_h)$. The present discounted value of this, accounting for risk, is

$$\frac{\$(1+R_h)}{1+R_o}$$

With an efficient stock market, this would also be the price at which a share of stock would trade today; that is, the market value of the equity would be

[37] This assumption is not critical for our conclusion. We make it only to keep this theoretical point as straightforward as possible.

$$\$100 \times \frac{1+R_h}{1+R_o} .$$

If this company is expected to earn positive economic profits, then $R_h > R_o$ and the market value will exceed the $100 of book value. If this company is expected to earn nonpositive economic profits, then $R_h < R_o$ and the market value will be less than the $100 of capital. In other words, a test of whether the firm earns positive economic profits is whether its market value exceeds the current value of its capital (equity). This test is usually formulated as the ratio of the market value of equity to the book value of equity: A ratio above one is evidence of positive economic profits, while a ratio of one or less is evidence of nonpositive economic profits.

For Fannie Mae the ratio of market value to book value was 2.54 in 1994, while this ratio was 2.63 for Freddie Mac.[38] In other words, these ratios suggest that Fannie Mae and Freddie Mac are making positive economic profits.

Although we believe this to be a good test in this context, we should point out that its validity depends inter alia on the book value of equity being an accurate measure of the true value of capital. The book value of equity is the book value of assets minus the book value of liabilities. A standard problem is that this difference may understate the true value of capital because the book value of assets can understate the true value of assets for two reasons:

(1) The book value is typically the historic value. If the assets have appreciated or there has been inflation, then the book value will understate the true value.

(2) There may be intangible assets (e.g., goodwill or brand equity) that are not measured by the accounting system.

In this context neither problem seems serious. Most of Fannie Mae's and Freddie Mac's assets are closely duration-matched, so swings in market interest rates do not significantly affect the market value of Fannie Mae and Freddie Mac. Moreover, current rates of inflation combined with these firms' current growth in assets make it difficult to believe that the ratios we found are due solely to the disparity between historic and current value.[39] As we have already noted, it seems unlikely that goodwill and brand equity are important intangible assets here.

Despite our confidence in these ratios, we consider one final piece of evidence. There is a method, known as Tobin's q, that uses a similar ratio, with a similar interpretation, but which is less

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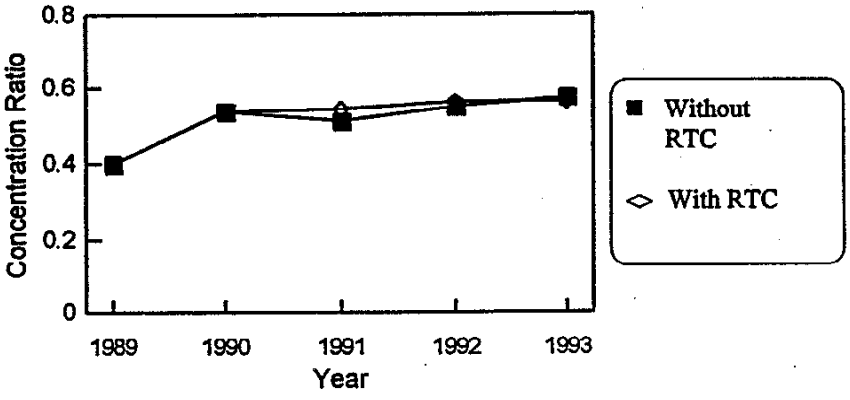
[38] Source: Value Line.

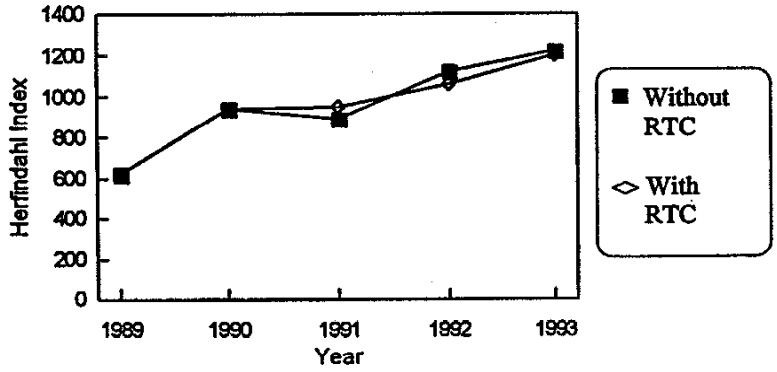
[39] Consider Freddie Mac. If we assume that (i) inflation has been 3% recently; (ii) all liabilities are current (a counterfactual assumption); (iii) no assets are marked to market (another counterfactual assumption); and (iv) Freddie Mac had a 41% growth in assets between 1992 and 1993 (source: *Freddie Mac 1993 Annual Report*), then *all* of Freddie Mac's remaining assets would have to be nearly 4 years old for mis-measurement of assets to account fully for Freddie's ratio of market value of equity to book value of equity. Four-year-old assets, however, are inconsistent with Freddie Mac's recent asset growth over the past 4 years.

FIGURE 15
Four-Firm Concentration Ratios, Jumbo Market, 1989-1993



Source: The Mortgage Market Statistical Annual, 1994

FIGURE 16
Herfindahl Indices, Jumbo Market, 1989-1993



Source: The Mortgage Market Statistical Annual, 1994

susceptible to measurement problems.[40] Although constructing Tobin's q's for Fannie Mae and Freddie Mac is outside the scope of this report, we can use Goodman and Passmore's (1992) reported values: Fannie Mae had a Tobin's q of 1.6 in 1990 and a Tobin's q of 1.8 in 1989, while Freddie Mac's were 1.0 and 0.6 respectively. The Tobin's q's for Fannie Mae are strong evidence that Fannie Mae was earning positive economic profits. Freddie Mac's are more troubling, since they suggest no or negative economic profits. Goodman and Passmore attribute Freddie Mac's low q's to the temporary downward pressure that affected Freddie's stock in this period; that is, they argue that these low q's do not accurately reflect Freddie Mac's true profitability.

In summary, although no one piece of empirical evidence may be considered conclusive for our conjecture that Fannie Mae and Freddie Mac are tacitly colluding, the pieces of evidence (Goodman and Passmore's results, positive *accounting* profits, high ROEs relative to comparable firms, ratios of market value of equity to book value of equity in excess of one, and—for Fannie Mae only—Tobin's q's in excess of one) taken together support our conjecture. This, combined with the strong theoretical case for tacit collusion, makes us confident that Fannie Mae and Freddie Mac have been engaging in tacit collusion in the conforming market.

(4) The Jumbo Market

In 1993, 33 firms and the Resolution Trust Corporation (RTC) issued private-label MBSs. Most models of oligopoly behavior would argue that 33 or 34 firms should have serious difficulties in tacitly colluding; hence, a more competitive market should be expected.

These 33 or 34 firms hold different market shares. The Herfindahl index for 1993 is 1200.24 with RTC included and 1227.76 without RTC. To see the heterogeneity in market shares, compare these Herfindahl indices to the theoretical minimums (i.e., equal shares) for industries with this many competitors, 303.03 and 294.12, respectively. This heterogeneity is also reflected in the 57% four-firm concentration ratio for 1993. Although such heterogeneity can arguably lessen competition, it must be remembered that both Herfindahl indices are well below 1800, the level at which stringent antitrust scrutiny typically begins.

Both the four-firm concentration ratios and the Herfindahl indices have been growing over time (see Figures 15 and 16 respectively).[41] At face value this would suggest that the jumbo market has been becoming less competitive (or, alternatively, competitive pressures have been reduced). We caution, however, against this conclusion because the annual turnover rate among the largest firms has been rather great:

(1) Only two of the top four firms in 1989 were among the top four in 1993.

(2) In this 5-year period, four different firms have been the largest firm.

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[40] Tobin's q is the ratio of the market value of assets to their estimated replacement cost. See, e.g., Brealey and Myers (1988, p. 660) for further details.

[41] Source: *The Mortgage Market Statistical Annual for 1994*, Inside Mortgage Finance Publications, Inc. Washington: 1994.

(3) In this 5-year period, eight different firms have been in the top four.

These turnover statistics suggest an unsettled market in which firms are still competing for market share. This is not consistent with an industry engaged in stable tacit collusion. This conclusion is strengthened when one considers that there has recently been entry of large players (e.g., RTC, which entered at number one in 1991, and Countrywide/CWMBS, which entered at number five in 1993). It is difficult to sustain tacit collusion in the face of entry at this scale.

Commitment to the market seems weak for the private-label firms. First, one of the big competitors, RTC, must exit the industry by 1996.[42] Second, of the 35 firms in the industry in 1989, 20 (57%) were no longer in the industry in 1993.[43] The fact that a large competitor must exit hinders tacit collusion in two ways: One, the firm that must exit no longer cares much about *future* punishment and hence is more likely to undercut price; two, the surviving firms know that the exiting firm will not be around to punish them if they undercut, which may make them more likely to undercut price. Moreover, because firms exit so readily, firms are tempted to drive out weak firms rather than collude tacitly with them.[44] On the other hand, the fact that firms will so easily be driven to exit means that they will not compete as if their backs are to the wall. We conclude, therefore, that the evidence concerning exit points against tacit collusion, although this evidence may simultaneously suggest that the resulting price competition is less intense than it might otherwise be.

The output of these firms is homogenous. Were these firms tacitly colluding, this could facilitate tacit collusion. On the other hand, as noted above, product homogeneity will intensify price competition when firms are *not* tacitly colluding. If, as seems likely here, the private-label firms are not tacitly colluding, then the homogeneity of their product should lead to fairly intense price competition.

The capacity of firms in the jumbo market seems quite elastic. Fourteen percent of all MBSs issued by private labels in 1993 were issued by new entrants. Moreover, for the 21 of the 34 firms that operated in both 1992 and 1993, the median increase was 12.2%. As noted earlier, capacity has ambiguous effects for tacit collusion, but if there is competition, capacity makes it more intense.

Although we have no evidence (direct or indirect) on how demand for securities based on jumbo mortgages has fluctuated over time, we would be surprised if its fluctuations were not similar to those of the demand for securities based on conforming mortgages—given the significant substitutability of these assets. As we discussed for conforming mortgages, these fluctuations are not likely

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[42] The RTC's share of the market was 19.4% in 1991, 16.9% in 1992, and 1.2% in 1993. Source: Ibid.

[43] Source: Ibid. For this tally, we were using the names listed in ibid. To the extent firms have merely changed names (in a manner that is *not* obvious), then this 57% attrition rate would be overstated. We doubt that this, however, is significant. Moreover, clearly some of the companies, such Drexel Burnham Lambert, Smith Barney, and Glendale Federal have certainly exited.

[44] Muolo (1993) reports that some of the more established firms expected the newer and weaker firms to exit shortly. The more established firms would, therefore, have little incentive to attempt to collude tacitly with these firms.

to impede tacit collusion. On the other hand, the inhibiting effect of fluctuations on tacit collusion will be greater the more firms there are, so the inhibiting effect of demand fluctuations will be greater in the jumbo market than in the conforming market. Similarly, the supply fluctuations will be similar between the two markets. Again, the inhibiting effect of these supply fluctuations will be greater for the jumbo market than for the conforming market.

In summary, the large number of firms in the jumbo market is strong evidence against tacit collusion and for competition. This conclusion is further bolstered by the low Herfindahl index for this market, its lack of leaders (i.e., consistently dominant firms), fluctuations in market shares, and the high attrition rate among its firms, including large ones. Moreover, this competition could be quite intense: firms in this industry produce a homogeneous product and do not appear to be capacity constrained. We therefore feel confident in concluding that the jumbo market is better described by Bertrand competition (or similar models of intense competition, including perfect competition)[45] than by any other industrial organization model. In particular, we are confident that tacit collusion is *not* the correct model.

2.3. Entry

(1) The Basic Issues

As illustrated by our discussion in Section 2.2, most models in industrial organization predict that competition becomes more intense as the number of firms in the industry grows. Since the firms already in an industry (incumbent firms) wish to minimize the level of competition, their strategies will be governed in part by a desire to prevent or deter entry. How much their strategies are affected by the threat of entry depends on how serious the threat is. If, for example, the threat is remote, then their strategies will be affected little. If, however, the threat is serious, then we can expect considerable adjustments in their strategies. For instance, to deter entry, incumbent firms may seek to "lock up" buyers and suppliers through long-term contracts or engage in limit pricing (setting prices at levels that signal to potential entrants that entry would be unprofitable or that are sufficiently low to make entry unprofitable).[46]

For both the conforming and jumbo markets, we will consider the seriousness of the entry threat and the way in which this threat could be affecting the strategies of the incumbent firms.

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[45] In terms of *observable* effects, there are almost no differences between Bertrand competition and perfect competition. The differences between these two models mainly have to do with how strategic the competitors are assumed to be in theory. In Bertrand competition the competitors are (myopically) strategic, while in perfect competition the competitors are not strategic at all (they are price takers). Given how sophisticated the firms in the jumbo market are, we are hesitant to model them as non-strategic; hence, our emphasis on Bertrand competition.

[46] See Section 9.4 of Tirole (1988) for a textbook treatment of a standard limit-pricing model.

In assessing the seriousness of the entry threat, we need to consider "natural" barriers to entry as well as the strategic barriers that the incumbent firms may erect. In the context of conduits, natural barriers refer (possibly) to the following:

(1) Advantages granted certain conduits by law (e.g., exemptions from state and local taxation for Fannie Mae and Freddie Mac.)

(2) Legal prohibitions on entry (e.g., the prohibition against Fannie Mae and Freddie Mac securitizing jumbo mortgages).

(3) Advantages granted certain conduits by implicit financial guarantees (e.g., the implicit guarantee enjoyed by Fannie Mae and Freddie Mac because of their GSE status).

(4) High minimum efficient scales of production.

(5) Advantages resulting from experience (e.g., from learning by doing or built-up goodwill).

Point (1) and point (5), in part, refer to cost advantages that certain incumbent conduits might have. In particular, if their costs are lower at every level of output, then it is possible for them to price at a level at which they are profitable, but no entrant would be profitable. Indeed, the *possibility* that the incumbent conduits could set their prices to such levels might be sufficient to deter entry—at least if entry requires a sizable upfront unrecoverable investment.

Point (3) and point (5), in part, refer to the advantages of offering (or being perceived as offering) a superior product, that is, a product for which customers are willing to pay more. Since customers are willing to pay more, the incumbents can set their price such that the lower price that entrants would have to charge to take market share would be less than the entrants' costs.[47] Indeed, the *possibility* that the incumbent conduits could set their prices to such levels might be sufficient to deter entry—at least if entry requires a sizable upfront unrecoverable investment.

In discussing points (1), (3), and (5), we have noted that the *threat* of low prices by the incumbents could be sufficient to deter entry *if entry requires a sizable upfront unrecoverable investment.* That is, the issue here is whether "hit-and-run" entry is possible: Can potential entrants enter quickly enough to enjoy the incumbents' high prices, get out quickly enough to avoid the ensuing price response by the incumbents, and do all this without sinking significant capital?[48] If hit-and-run entry is possible, then the incumbents' threat to lower prices in response to entry loses its deterrent effect. To deter entry, the incumbents' *steady-state* prices will have to be low enough to deter entry. In other words, the threat of hit-and-run entry could result in considerable downward pressure on the incumbents' prices. We investigate the possibility of hit-and-run entry in greater detail below.

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[47] Formally, if the incumbents' product enjoys a price premium of P, then if the incumbents charge a price of p_I, the entrants would need to charge a price of $p_I - P$. If $p_I > AC > p_I - P$, where AC is average cost, then the incumbents are profitable at their price, but the entrants are unprofitable at their price.

[48] The theory of hit-and-run entry, also called the contestable-market hypothesis, is reviewed and critiqued in Gilbert (1989).

Point (4) refers to the idea that many production processes exhibit increasing returns to scale over some initial range of output (i.e., average costs are falling over some range as the firm expands from zero units). The point where average costs either level off or begin to rise is referred to as the minimum efficient scale (MES).[49] Since a firm is earning a profit only if its price exceeds its average cost, a firm may have to operate fairly close to its MES to be profitable. In many industries (e.g., automobiles), the MES is quite large (e.g., it equals a 10% share of the *total* U.S. automobile market).[50] If prices are fairly low, then entering at (or near) the MES could depress price so far as to make entry unprofitable. Even if a new entrant operating at the MES would not depress price that far, it may take an entrant a long time to reach the MES, particularly if there is learning by doing or customer goodwill towards the incumbents to overcome. While the entrant is growing toward the MES, it could be suffering losses. If near-term losses, appropriately discounted, outweigh long-term gains, appropriately discounted, then the entrant would choose not to enter. We investigate the issue of MES in greater detail below.

A sixth "quasi-barrier" is capital. We use the term quasi-barrier because capital is not a barrier to entry in classical economic terms: If positive economic profits (i.e., those that more than cover costs including the opportunity cost of capital) can be earned, then investors will wish to invest in an entrant. More recent game-theoretic work, however, has shown that if the information to the capital markets about the profitability of the market is less than perfect, then the incumbent firms can take strategic actions that raise doubts about profitability in the view of the capital markets, thereby raising the cost of capital to entrants past the point that entry is profitable.[51] For this reason it is perhaps worth considering the access of potential entrants to the capital markets.

(2) Evidence on Entry From the Jumbo Market

As we noted in Section 2.2.4 above, there has been entry into the jumbo market in the past 5 years. The jumbo market is, therefore, the natural place to go to examine the effectiveness of certain barriers in deterring entry. Admittedly, there is possibly some danger in generalizing our conclusions about the jumbo market to the conventional market as a whole, but we feel that many of the insights we gain here will carry over.

We observed above that turnover in the jumbo market has been quite high; that is, there has been considerable entry into this market. Figure 17 summarizes these rates of entry.[52] From Figure 17, although entrants tend to be smaller in terms of mortgages securitized, they are nevertheless a

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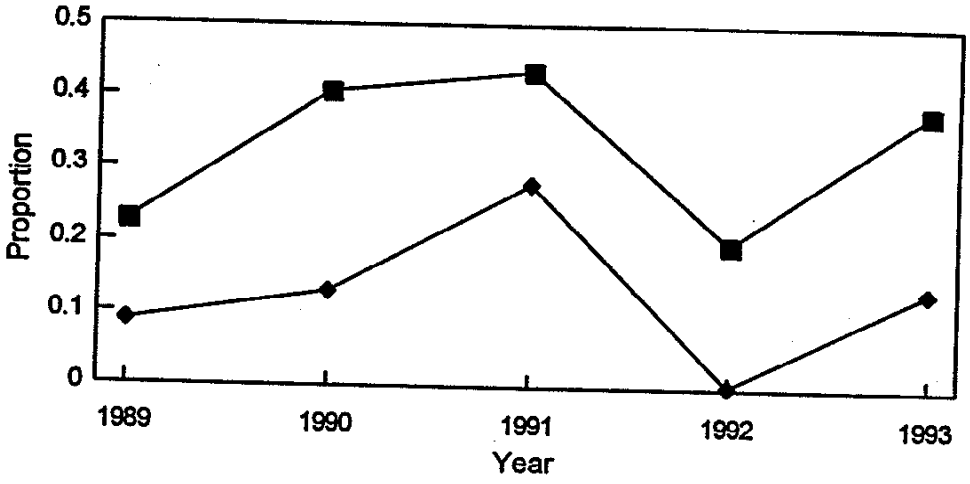
[49] For example, if x is output and the firm's cost function is $\$[x^2 + 1{,}000{,}000]$, where $1,000,000 is its annual fixed cost (e.g., the opportunity cost of its machinery), then its average cost is $\$[x + 1{,}000{,}000/x]$. Average cost is falling for $x < 1000$ units and rising for $x > 1000$ units. The MES is, therefore, 1000 units.

[50] Source: Oster (1994, p. 61).

[51] See, e.g., Bolton and Scharfstein (1990).

[52] We define a firm as entrant in a given year if it securitized no mortgages in the previous year. Source: *The Mortgage Market Statistical Annual for 1994*, Inside Mortgage Finance Publications, Inc. Washington: 1994.

FIGURE 17
Entry in the Jumbo Market, 1989-1993



Source: The Mortgage Market Statistical Annual, 1994

significant source of securitization: In 3 of the 5 years, they accounted for more than 10% of the jumbo mortgages securitized.

The significant entry that the jumbo market has experienced in the past 5 years suggests that neither strategic nor natural barriers to entry are particularly effective. Given our conclusions from Section 2.2.4 about competitiveness in the jumbo market, the lack of effective strategic barriers comes as no surprise (indeed, it further supports our earlier conclusions): Strategic barriers from an oligopoly require (i) a motive for erecting barriers (e.g., protecting tacit collusive pricing); and (ii) an ability to collude tacitly on erecting these barriers. As we concluded previously, neither requirement is likely to be met in the jumbo market.

We next consider the effectiveness (or lack thereof) of natural barriers. We know of no legal or implicit advantages that have been granted private-label firms (i.e., barriers (1) and (3), above). The no-jumbo-mortgages restriction on Fannie Mae and Freddie Mac is effective in keeping them out (i.e., barrier (2) from above), but will have no impact on other potential entrants (except, possibly, to encourage their entry). This leaves as possible natural barriers high MES and advantages from experience.

From Figure 17 entrants operate at a smaller scale, on average, than do incumbent conduits. Combine this with the fact that price should be close to the MES in a competitive market, and we can conclude that either the MES must be fairly low or rapid growth is possible. The reasoning behind this conclusion is that if the MES were high, then these entrants would not find entry profitable, at least not immediately. Therefore, either the MES is low, so entry is profitable immediately, or the entrants believe they can grow quickly enough to reach a scale at which they will be profitable.

To distinguish between these two explanations, we consider the growth rate of entrants. In the 5-year period 1989–93, there were 56 entrants.[53] Of these, 26 (46%) did no securitization in the year following their entry; that is, their entry appears to be hit and run (an additional five only lasted 2 years). For the 30 firms for which we can calculate growth rates, their median growth rate from their first year to their second year was 79.8%.[54] This is impressive, although it must be recognized that average annual growth rate for the jumbo market as a whole was 66.2% (85.0% if 1993 is not included). These findings are, unfortunately, not entirely conclusive with respect to choosing between the two explanations. On the one hand, if the 46% of firms that were in the market for just 1 year were hit-and-run entrants, then this would argue for a low MES. Unfortunately, the data available to us do not allow us to distinguish hit-and-run entrants from hit-and-run-over entrants (i.e., entrants who left because they were losing money). Given the great sophistication of many of these entrants, such as investment firms and large mortgage originators, we doubt that the infant mortality rate would be as high as 46%; yet at the same time, we are aware that the infant mortality rate for many new ventures is typically fairly great and a rate of 46% is not unreasonable in comparison.[55] The rapid growth rates of the longer term entrants means that a strategy of suffering short-run losses while building toward the MES cannot be dismissed as an explanation. One problem, however, with this explanation is that it could merely be picking up the growth in the market itself. A second problem is the number of entrants that came in with a large market share (e.g., RTC, which entered in 1991 with 19.4% of the total market, and Countrywide/CWMBS, which entered in 1993 with 6.3% of the total market);[56] that is, because there seems to be an option of large-scale entry, it is unclear why conduits would pursue the small-scale-entry-and-grow strategy.

Even without distinguishing between the two explanations, it is clear that MES is not much of a barrier: Either it is low or conduits can grow sufficiently quickly to reach the MES.

We turn now to advantages from experience (barrier (5)). We have argued previously that consumer goodwill and brand loyalty are unlikely to be important considerations in this market: The buyers are sophisticated, the products are exceedingly homogenous, and the rating agencies eliminate

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[53] Source: Ibid.

[54] Source: Ibid.

[55] Professors Glenn Carroll and John Freeman (private communications), experts on organizational ecology, inform us that a rate of 46% is not unreasonable and is comparable to the infant mortality rate for newspapers, breweries, and, for the early 20th century, automobiles.

[56] Source: *The Mortgage Market Statistical Annual for 1994*, Inside Mortgage Finance Publications, Inc. Washington: 1994.

the need to establish consumer goodwill. Consequently, we doubt that experience vis-à-vis consumers could be an important entry barrier in the conduit market. With respect to learning by doing and other production-related experience barriers, we face essentially the same issues that we faced when we considered MES: Either these barriers are not important, making hit-and-run entry feasible, or they are moderately important, but firms learn quickly enough that they do not serve to bar entry. Given the relative sophistication of the entrants—in particular the experience of many offering other securities—we wonder if little weight should be put on production-related experience barriers. On the other hand, Muolo (1993) reports that managers of some established conduits in the jumbo market felt that the inexperience of new entrants in 1992 would cause them to suffer losses. We lack the data necessary to verify their prediction, but we feel that some weight should be given to the opinions of industry insiders.

Again, as with the MES question, no matter how we view production-related experience barriers, they clearly are not much of a deterrent in this industry.

To summarize:

(1) Strategic and natural entry barriers are weak in the jumbo market.

(2) There are reasons to believe that the MES is relatively low in this industry, although the available evidence is inconclusive and can be interpreted in a way that does not support low MES.

(3) There are strong reasons to believe that customer-related experience barriers are not present in this industry.

(4) There are reasons to believe that production-related experience barriers are low in this industry, although the available evidence is inconclusive and can be interpreted in a way that does not support low production-related barriers.

(3) Do the Lessons From Entry in the Jumbo Market Extend to the Conventional Market?

With respect to those natural barriers that are common to the conventional market as a whole, the obvious question is whether they would be equally weak in this broader market, particularly after privatization. We suspect that the answer is yes. Yet it must be remembered that Fannie Mae and Freddie Mac both have more experience than the private-label conduits and also operate at a scale that is an order of magnitude greater than the private-label conduits.

Fannie Mae's and Freddie Mac's greater experience means that they are further along any learning curve. If there are increasing returns to experience, then this additional experience could be significant.[57] In other words, while entrants might be able to catch up (or not stay too far behind) to "new" incumbents relatively quickly, the gap they must make up to catch "old" incumbents could be

[57] For instance, suppose that marginal cost as a function of time, $c(t)$, was given by the function $c(t) = \sin(t\pi/10) + 7 - .35t$. It is readily shown that reduction in cost due to greater experience is rather small when t is small (i.e., for a newer industry), but much greater for larger t (i.e., an established industry).

sufficiently great as to deter entry. We, however, see little reason to believe this. Given the nature of mortgage securitization, we expect that whatever learning takes place is more valuable early on rather than later. After all, this is not an industry with production trade secrets. Consequently, we do not expect that the GSEs' greater experience gives them a substantial cost advantage.

If Fannie Mae and Freddie Mac employ the same production technology as the private-label conduits, then MES will not be a significant entry barrier as shown above. If, however, they employ a different technology, one with a far greater MES, then MES could be a significant entry barrier in a broader market.[58] Since Fannie Mae and Freddie Mac are operating at a much greater scale than the private labels, this possibility cannot be completely ruled out. Indeed, some of the natural barriers that we discuss below in Section 3.3.5 can be seen as indicating a far greater MES for the GSEs. Moreover, the importance of Fannie Mae and Freddie Mac in the conforming market allows them to discipline poorly performing mortgage servicers in a way that the private labels cannot, which could lead to lower costs for Fannie Mae and Freddie Mac. On the other hand, many of the private labels are vertically integrated into mortgage servicing, so the ultimate importance of this advantage could be small. Unfortunately, there is no way for us to resolve these issues conclusively with the data that are available to us.

In summary, our analysis of entry into the jumbo market suggests that there are no significant natural entry barriers. With the possible exception of MES, we feel that this conclusion can be extended to the broader conventional market. We cannot, however, be sure that MES would not be an important barrier in the conventional market because the scale of operation of Fannie Mae and Freddie Mac raises the possibility that they are employing a different technology, one with a much higher and more significant MES.

(4) Strategic Barriers in the Conforming Market

Whereas it seems theoretically implausible that the private-label incumbents would erect strategic barriers to entry, the same cannot be said of Fannie Mae and Freddie Mac. The natural barriers to entry into the conforming market are, however, sufficient to allow Fannie Mae and Freddie Mac not to incur the costs of erecting these strategic barriers. Moreover, their current practices reveal no evidence that they have erected strategic barriers. Should the natural barriers be eroded or eliminated, then Fannie Mae and Freddie Mac may attempt to erect strategic barriers.

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[58] To see this suppose, for example, the two technologies were such that the average cost under the first technology was a constant, but that the average cost under the second technology was U-shaped. Suppose, too, that the leftmost edge of the U was greater than the constant average cost under the first technology, but the bottom of the U was less than the constant average cost under the first technology. As long as firms produced little, they would use the first technology, but they would switch to the second technology once they were beyond a certain level. If that switching point is greater than the level of output of the private labels, but less than the output of Fannie Mae and Freddie Mac, then the private labels would be using a different technology than Fannie Mae and Freddie Mac. Moreover, if the bottom of the U is significantly less than the constant average cost under the first technology, then Fannie Mae and Freddie Mac could deter entry and possibly drive out the private labels if there were open competition in the conventional market.

Whether they will and, if so, what kind of barriers they will erect is a topic we take up in Section 5.1 below.

(5) Natural Barriers in the Conforming Market

Fannie Mae and Freddie Mac enjoy a number of natural barriers:

(1) Implicit federal guarantee against default.

(2) Exemption from state and local taxation.

(3) Exemption from Securities and Exchange Commission filing requirements.

(4) No need to purchase pool insurance.[59]

(5) No need to have securities rated.[60]

(6) Liquidity premium (network externality) from their large size.

(7) Exemption for institutional investors from concentration rules on the percentage of Fannie Mae and Freddie Mac securities in their portfolios. Moreover, for regulated financial institutions, a lower capital requirement is assigned to the GSEs' passthroughs than is assigned to private-label passthroughs.[61]

Items (1), (6), and (7) can be seen as making securities of Fannie Mae and Freddie Mac more desirable to buyers (or, in the case of (7), large classes of buyers). Items (2)–(5) can be seen as lowering the GSEs' costs.

Since entry is effectively barred in the conforming market, these seven barriers must, as a whole, be effective. It is difficult, however, to assess how important these barriers are *individually*. We do our best below.

Item (1) is undoubtedly important. Goodman and Passmore (1992) report that private-label securities are trading at yields 45 to 60 basis points above Fannie Mae's and Freddie Mac's securities. This difference must be due, in large part, to the market's treatment of the GSEs' securities as if they were rated better than AAA (AAA+), whereas many private-label securities are rated below AAA.[62] Although this difference could, in part, result if the market thought Fannie Mae and Freddie Mac were less likely to default than the private labels, this cannot explain a AAA+ rating. Such a rating can only arise if Fannie Mae and Freddie Mac are seen as being fully backed by the federal government.

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[59] See Seiders (1984).

[60] Ibid.

[61] Private communication from Bill Shear. Also see Goodman and Passmore (1992).

[62] Source: Ibid.

There is no way for us to estimate the importance of items (2)–(5) directly. Item (4) is critical, however: The presumably prohibitive cost of acquiring sufficient credit enhancements must, in part, explain why the private labels do not attempt to compete with Fannie Mae and Freddie Mac in the offering of "super" high-grade securities. At some level the other three are likely minor: Many industries support firms that face different taxation and different securities regulations (due to different countries of origin). On the other hand, if the market is sufficiently competitive, then even small advantages could be enough to deter entry.

Item (6), the liquidity premium, represents the idea that because the market for the GSEs' MBSs is so large, it will be more liquid than the market for private-label MBSs. Greater liquidity means that it is easier to sell securities, both because their greater availability means that more market players have evaluated the securities, and because any given trade is a smaller proportion of the entire market and hence will have a smaller impact on the price (i.e., the discounting necessary to move a large block of securities is reduced or eliminated, the more liquid the securities). Presumably, investors are willing to pay a premium for this greater liquidity. In fact, Fannie Mae promotes itself as providing liquidity.[63] We doubt, however, that this premium is particularly significant, especially given the greatly increased volume of private-label securities and the homogeneous nature of these securities across conduits.

Item (7) appears important in competition for selling or swapping securities with depository institutions. Goodman and Passmore (1992) estimate that a consequence of risk-based capital requirements is that the funding cost of GSE securities is 36 basis points less than the funding cost of private-label securities. Item (7) is an amplification of item (1): Presumably, regulators would not effectively impose this 36-point difference if Fannie Mae and Freddie Mac did not enjoy the implicit federal guarantees.

(6) Summary on Entry

Strategic barriers do not currently appear to play a role in either conduit market. There are no effective natural barriers in the jumbo market. Moreover, this conclusion likely carries over to the broader conventional market. The one caveat is that we cannot be sure that Fannie Mae and Freddie Mac do not enjoy an advantage due to a high MES. The natural barriers in the conforming market that arise from Fannie Mae's and Freddie Mac's agency status are effective in deterring entry. That is, we believe that entry would be likely (although not certain) into the conforming market if Fannie Mae and Freddie Mac lost their agency status and were left to play on a level field with the private-label conduits.

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[63] Source: Bill Shear (private communication).

2.4. Suppliers[64]

(1) The Basic Issues

The term "suppliers" refers to those firms that supply the inputs for securitization. Suppliers, therefore, include mortgage originators, mortgage servicers, and providers of credit enhancement. These firms operate in distinct, but related, submarkets.

Given a market structure (i.e., ignoring possible changes to the structure such as vertical integration),[65] our main interest in suppliers has to do with their market power vis-à-vis the conduits. Market power translates into extracting more of the gains from trade (i.e., the surplus). Understanding market power is thus critical for identifying the winners and losers. Moreover, because surplus extraction can lead to inefficient allocations of resources, understanding market power is also critical for determining what welfare losses are being suffered. Specifically, we need to understand the distribution of market power between conduits and suppliers to answer questions such as the following:

(1) To what extent, if any, do the profits of the conduits stem from their market power vis-à-vis the suppliers?

(2) Would increased competition within the conduit market (e.g., as might follow the privatization of Fannie Mae and Freddie Mac) increase the market power of suppliers?

(3) What trends, if any, in a supplier market might affect the relative market power of the two sides?

What is the distribution of market power between suppliers and conduits? How, if at all, has this distribution been changing over time? There are two possible sources of potential market power for suppliers: (i) the industry structure and degree of competition within the supply market; and (ii) the industry structure and degree of competition among the conduits.

(2) The Supply of Mortgages

The most important suppliers to the conduits are the mortgage originators. Judging by four-firm concentration ratios and Herfindahl indices, the supply market is a fairly competitive industry:[66,67]

- The four-firm concentration ratio for conforming mortgages in 1993 was 9.7%.

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[64] See Weicher (1994) for further discussion of how the supply markets operate now and how they may operate in the future.

[65] We consider vertical integration below in Part 4.

[66] Source: *The Mortgage Market Statistical Annual for 1994*, Inside Mortgage Finance Publications, Inc. Washington: 1994.

[67] One might argue that, because much of mortgage lending is local, looking at national statistics is not the correct way of analyzing competitiveness. It must be remembered, however, that our interest is in originators as sellers of mortgages, not as lenders. Local market power could be important for lending, but, because it is a national market for the sale of mortgages, local market power is irrelevant to our analysis; that is, we really do want to consider national statistics.

- The four-firm concentration ratio for jumbo mortgages in 1993 was 24.4%.
- The four-firm concentration ratio for conventional mortgages in 1993 was 11.5%.
- The four-firm concentration ratio for all mortgages in 1993 was 14.2%.
- The 25-firm concentration ratio for all mortgages in 1993 was 35.5%.
- For conforming mortgages in 1993, the Herfindahl index is approximately 113.2.[68]
- For jumbo mortgages in 1993, the Herfindahl index is approximately 277.7.
- For the entire mortgage market, the Herfindahl index is approximately 122.2.[69]

By the standards of the industrial organization literature, these measures indicate a very competitive supply market, regardless of the conduits' market structure. *In a competitive market, there is no markup over marginal cost.* We would therefore expect originators to sell their mortgages at a price equal to the expected value of the mortgages (risk-adjusted) were they to remain in the originators' portfolios (or to be sold in the nonconduit secondary market).

In this light answering the three questions we posed above is straightforward:

(1) The conduits are gaining as much profit as possible in their dealings with the originators given their own market conditions.[70]

(2) Because the supply of mortgages is so competitive, small changes in the competitiveness of the conduit markets would have little impact on the profits or market power of the originators.

(3) The supply of mortgages would have to become much less competitive for market power to tip toward the originators.

One question that remains is whether the supply of mortgages is becoming or will become less competitive in the future. The 25-firm concentration ratio for all mortgage originations has been increasing over the past 5 years (from 26.1% in 1989 to 35.5% in 1993). This increase has been fairly steady, although the concentration ratio did drop in 1991 (falling from 28.4% in 1990 to 26.8% in 1991). This would suggest that the market has been getting less competitive. Given, however,

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[68] *The Mortgage Market Statistical Annual for 1994* (Inside Mortgage Finance Publications, Inc. Washington: 1994) gives market share for only the largest 10 firms in the conforming and jumbo markets, whereas a true Herfindahl index requires the market shares of all the firms. To get around this, we have approximated the Herfindahl indices for these markets by assuming that the remaining mortgages are supplied by firms with the same market share as the 10th largest firm in the market. The bias in this procedure could go in either direction. We do not, however, expect it to be large.

[69] Ibid. gives market share for only the largest 25 firms in the overall mortgage market, whereas a true Herfindahl index requires the market shares of all the firms. To get around this, we have approximated the Herfindahl indices for this market by assuming that the remaining mortgages are supplied by firms with the same market share as the 25th largest firm in the market.

[70] The apparent fact that conforming mortgage rates are 20 to 50 basis points below jumbo rates does *not* contradict this conclusion: There are reasons to believe that the equilibrium output in the conforming conduit market exceeds the competitive equilibrium level—see Section 5.2.4—which would push down mortgage rates in the conforming market.

where it is today, this trend would have to continue for quite some time before our conclusions would need to be changed. To know whether this is a long-term trend would require a careful analysis of the origination market—something that is beyond the scope of this report. We can, however, look at the works of others to gain some knowledge concerning this issue.

Toevs and Zizka (1994) and Weicher (1994) argue that among the trends in mortgage banking are (i) greater concentration and (ii) declining profitability due to entry. Their first trend suggests that concentration ratios should continue to rise, which would lessen competition. On the other hand, if there is entry, this will fuel competition. We see few serious barriers to entry into mortgage origination.[71] Moreover, the findings of Berger and Hannan (1994) suggest that there may be a limit to how concentrated mortgage lending can become: They find that there is a reduction in cost efficiency in concentrated financial markets, which could invite entry, thereby limiting how concentrated the origination market can become locally. Because the origination market is necessarily more concentrated locally than nationally, this therefore suggests that the national origination market (i.e., the market for mortgage sellers) cannot become too concentrated either.

Finally, it should be noted that we could treat mortgage originators as "competitors" to Fannie Mae and Freddie Mac, since many mortgage originators hold mortgages in portfolio and issue "debt" (e.g., demand deposits and certificates of deposit) against them. We have chosen, however, to account for this competition differently: We build it into the supply curve of mortgages from originators (recall we expect originators to sell their mortgages at a price equal to the expected value of the mortgages were they to remain in the originators' portfolios).

In summary, the supply of mortgages appears to be highly competitive. Although current trends seem to point toward greater concentration, the market is so competitive now that it should remain competitive for a long time. Moreover, there are reasons to believe that the trend toward greater concentration cannot continue indefinitely, which may mean that the supply of mortgages will remain permanently competitive.

(3) The Supply of Mortgage Servicing

The supply of mortgage servicing seems very competitive:[72]

- The four-firm concentration ratio in 1993 was 9.5%.
- The 25-firm concentration ratio in 1993 was 31%.
- The approximate Herfindahl index in 1993 was 80.2.

By the standards of the industrial organization literature, these measures indicate a very competitive market. We would, therefore, expect that servicing is being sold to the conduits at or near the servicers' marginal cost. Consequently, any surplus is captured by the conduits.

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[71] However, increased automation may raise the MES for origination, which could ultimately limit entry.

[72] Source: Ibid.

With regard to the questions asked in Section 2.4.1, the answers are identical to those reached for the supply of mortgages.

One question that remains is whether the supply of servicing is becoming or will become less competitive in the future. The 25-firm concentration ratio for servicing has been increasing over the past 11 years (from approximately 11% in 1989 to 31% in 1993).[73] This increase has been steady. This would suggest that the market has been getting less competitive. Given, however, where it is today, this trend would have to continue for quite some time before our conclusions would need to be changed. To know whether this is a long-term trend would require a careful analysis of the servicing market—something that is beyond the scope of this report.

In summary, the supply of servicing appears to be highly competitive. Although current trends seem to point toward greater concentration, the market is so competitive now that it should remain competitive for a long time.

(4) The Supply of Credit Enhancements

Outside providers of credit enhancement (i.e., insurers of mortgage pools) are suppliers to some private-label conduits. There are 10 firms in this industry.[74] We could obtain no information on their activities by individual firm. As a whole they enhanced only 11% of all private-label securities (on a dollar basis) in 1993.[75]

Given that there are 10 firms and they account for only 11% of the enhancements, we could reasonably doubt that they exercise much market power. This view is strengthened if we consider the alternatives to outside enhancement:

(1) Corporate guarantees.

(2) Senior/subordinated interests.

This suggests that the market power of outside providers of credit enhancement is limited.

In terms of the time trend, the senior/subordinated structure has been growing in popularity since 1988.[76] Moreover, the larger private labels, which are accounting for a larger share of the jumbo market (firms such as Citicorp, Residential Funding Corporation (a subsidiary of General Motors), and GE Capital Mortgage Services), have the ability to rely on corporate guarantees if need

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[73] Sources: Ibid. and Fabozzi and Modigliani (1992).

[74] Source: The Mortgage Market Statistical Annual for 1994, Inside Mortgage Finance Publications, Inc. Washington: 1994.

[75] Source: Ibid.

[76] Source: Ibid.

be.[77] In light of this, we do not feel that the outside providers of credit enhancement are likely to gain significant market power in the future.

(5) Conclusions

We find no evidence that suppliers exercise significant market power vis-à-vis the conduits. For the two supply markets for which we have data, mortgages and servicing, the evidence suggests that these markets are very competitive. We feel confident, therefore, in concluding that the conduits capture all the surplus in their relation with their suppliers.

2.5. Substitutes and the Demand for Mortgage-Backed Securities

(1) The Theoretical Arguments for a Flat Demand Curve

The greater the number and availability of close substitutes to the competitors' product, the flatter will be the demand curve faced by the competitors. Although the slope of the demand curve does not determine the nature of the strategic interaction among competitors,[78] the slope of the demand curve has an impact on the welfare consequences of these strategic interactions.

As we have noted earlier, estimating demand curves for the conduit markets would be difficult even were the necessary data available. Given that the necessary data are not available, it is impossible to estimate these demand curves. However, by examining possible substitutes, we can make theoretical predictions about their likely shapes.

Substitutes for securities backed by conventional mortgages include (in order of closeness):

- Securities *previously* issued by the conduits.[79]
- Ginnie Mae securities backed by FHA/VA mortgages.
- High-grade bonds, including Treasury bonds.
- Other securities.

These substitutes are numerous and widely available. Moreover, for each submarket (i.e., conforming and jumbo), the products of the other submarket are close substitutes. In particular, the abundance of securities backed by conforming mortgages means the demand curve for securities backed by jumbo mortgages should be exceedingly flat. Finally, finance theory predicts that we should expect fairly flat demand curves for financial securities such as these.

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[77] See Chapter 8 of Fabozzi and Modigliani (1992) for a discussion of this issue.

[78] For example, many textbook introductions to Bertrand competition and tacit collusion assume a flat demand curve.

[79] This is known as the *durable-goods problem*: The existence of a resale market creates close substitutes for new products, thereby putting downward pressure on the price of the new products. See Chapter 1 of Tirole (1988) for a more detailed discussion.

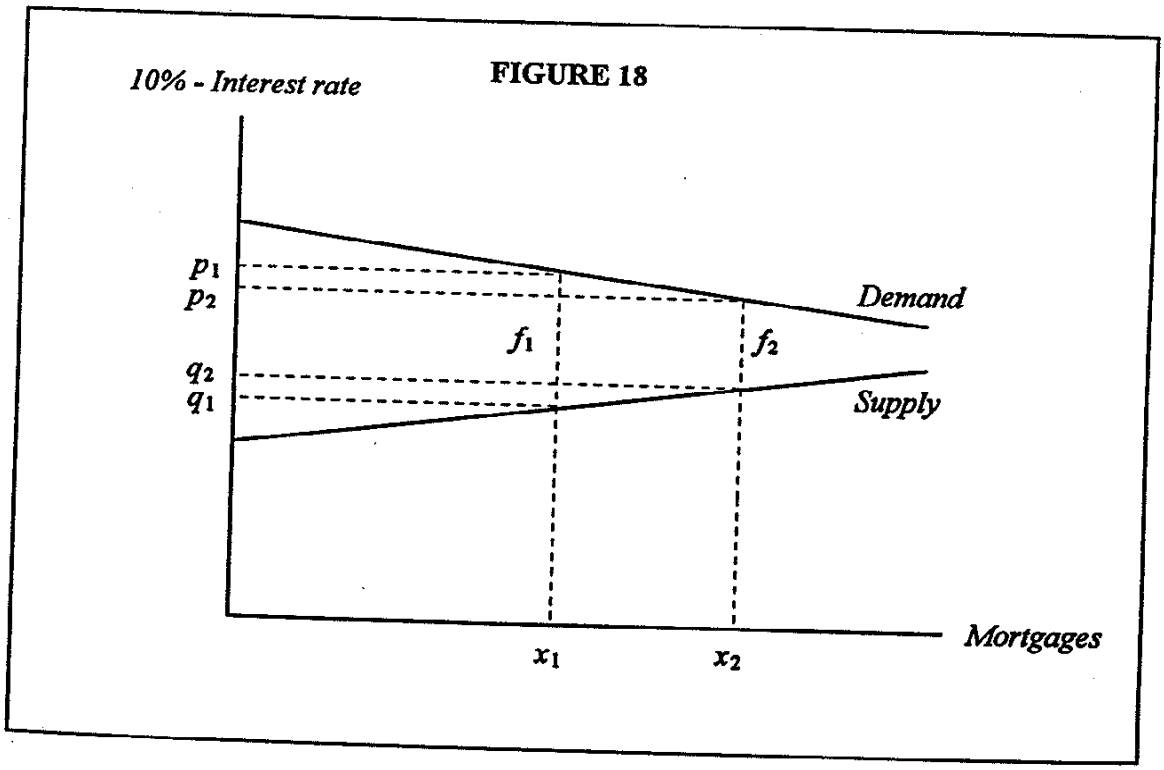
(2) The Empirical Evidence for Flat Demand Curves

Although the theoretical case for relatively flat demand curves seems strong, what about the empirical evidence? As we have repeatedly noted, it is not possible to estimate the demand curves directly with the data available to us. We can, however, look at an indirect measure to gain some sense of the long-run demand curves.

Goodman and Passmore note that Fannie Mae's and Freddie Mac's guarantee fees can be used as a crude measure of price. To see why, consider Figure 18. To make the figure correspond to our usual notions of demand and supply, the price axis (vertical axis) is the negative of interest plus a constant (e.g., 10%). Demand is investors' demand for MBSs. Supply is that component of mortgages offered for securitization that depends on the price offered by Fannie Mae and Freddie Mac (supply is also affected by the economy-wide interest rate, demand for housing, and other such factors outside this figure). The points x_1 and x_2 denote two amounts of mortgages securitized at different points in time. The difference between demand and supply at x_t is, roughly, the guarantee fee, f_t. Let p_t denote the price paid by investors for x_t and let q_t denote the price paid to suppliers for x_t. The elasticity of demand, ε_D, is given by

$$\varepsilon_D = \frac{p_1}{x_1} \times \frac{x_2 - x_1}{p_1 - p_2} > \frac{f_1}{x_1} \times \frac{x_2 - x_1}{(p_1 - p_2) + (q_2 - q_1)} = \frac{f_1}{x_1} \times \frac{x_2 - x_1}{f_1 - f_2} \equiv \varepsilon_f .$$

FIGURE 18



Consequently, the elasticity calculated with respect to the guarantee fee is a lower bound for the true elasticity of demand.

From 1983 to 1990, Fannie Mae's average guarantee fee fell 13.0%,[80] while the value of MBSs issued increased 59.7%.[81] Dividing the latter by the former, we get a "demand elasticity" of at least 4.57, which is exceedingly elastic; that is, consistent with a relatively flat demand curve. Repeating the exercise for Freddie Mac yields a "demand elasticity" of at least 17.9, which is even more elastic.[82] We have put "demand elasticity" in quotes to reflect that these are crude measures (for a variety of reasons— including omitted factors that may have shifted the demand curve over time), which are meant more to be suggestive than definitive. Nevertheless they are consistent with theoretical arguments given above.

In passing, we note that the same trick can be used to approximate the lower bound of the elasticity of supply, ε_S:

$$\varepsilon_S = \frac{q_1}{x_1} \times \frac{x_2 - x_1}{q_2 - q_1} > \frac{f_1}{x_1} \times \frac{x_2 - x_1}{(q_2 - q_1) + (p_1 - p_2)} = \varepsilon_f .$$

From our calculations above, we can reasonable conclude that supply is highly elastic; that is, the supply curve is relatively flat.

2.6. Buyers and the Demand for Mortgage-Backed Securities

The last set of market participants to consider are the buyers. In particular, the question is whether they possess market power. If they do, then this could affect the analysis and conclusions we have reached so far.

There are many classes of investors in mortgage-based securities. We find no evidence that there is much concentration within any class. Consider just the largest class, commercial banks:[83]

- Commercial banks hold just 25.4% of all MBSs.
- The four-firm concentration ratio for commercial banks (measured against all MBSs held by commercial banks) is 14.7%.
- The *hundred*-firm concentration ratio for commercial banks (measured against all MBSs held by commercial banks) is 58.9%.

We feel quite confident in concluding that there is no buyer-power in the MBS market.

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[80] Calculated from figures given in Goodman and Passmore (1992).

[81] Calculated from figures given in *Fannie Mae 1990 Annual Report.*

[82] Calculated from figures given in Goodman and Passmore (1992) and *Freddie Mac 1993 Annual Report.*

[83] Source: *The Mortgage Market Statistical Annual for 1994*, Inside Mortgage Finance Publications, Inc. Washington: 1994.

We should note that there are certain classes of investors for whom Fannie Mae's and Freddie Mac's mortgage-based securities are particularly attractive. These are investors who, for legal or other regulatory reasons, are required to hold only government securities or high-grade securities. Although a possible implication of such investors would be to make Fannie Mae's and Freddie Mac's demand curve slope down, our previous analysis (see Section 2.5) suggests that their demand curves are relatively flat. We feel, therefore, that the existence of such investors is not important to our analyses of these markets (although they have some importance in our welfare analysis below).

2.7. The Government

Government statutes are very important in the mortgage industry as a whole. One must distinguish, however, between those that affect the *structure* of the industry and those that affect the *performance* of the industry. Our analysis is concerned primarily with the *structure*. Our discussion above, particularly Section 2.3.5, covers what we see as the statutes that are important to the structure of the industry, particularly the conduit markets. After reviewing many of the relevant statutes, including recent regulations such as the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA), the Real Estate Settlement Procedures Act (RESPA), the Community Bank Development Act, the Bank Enterprise Act, and the Riegle-Neal Interstate Banking and Efficiency Act, we feel that these regulations are unlikely to affect the structure of the industry, although they will certainly have important effects on its performance. A more important statute is the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (FHEFSSA) (Public Law 102–550, Title XIII). We discuss its impact below in Section 3.3.

2.8. Conclusions

Our analysis suggests that in analyzing the conventional market today, the market should be split into two: the conforming market and the jumbo market.

Effective natural barriers to entry stemming from their GSE status effectively limit the conforming market to just Fannie Mae and Freddie Mac. An analysis of this submarket from both a theoretical and empirical perspective led us to conclude that Fannie Mae and Freddie Mac were exploiting their protected duopoly position by engaging in tacit collusion. Moreover, there was no obvious dispersion of the surplus they were capturing to either the suppliers or the buyers. The only limit to Fannie Mae's and Freddie Mac's market power came from competition from close substitutes (e.g., Ginnie Mae and securities backed by jumbo mortgages) and from competition from mortgage originators who could otherwise hold mortgages in their portfolios. The relative flatness of their demand curve means that the surplus they captured was limited to the difference between the price and their costs (i.e., their marginal revenue schedule effectively coincides with their demand curve so they are not earning additional profits by restricting output to a level below the competitive level).

Many firms, a lack of effective natural barriers, and an inability to erect strategic barriers to entry have doomed the jumbo market to intense competition. Consequently, there would be little

surplus to disperse among suppliers and buyers even if the suppliers and buyers had market power, which we concluded they did not. As with the conforming market, the demand curve in this market is relatively flat.

We can synthesize this analysis with a simple formal model of the conventional market as it currently exists: Assume flat demand curves. Let c_j be the marginal cost for securitizing jumbo mortgages and let c_c be the marginal cost for securitizing conforming mortgages. Because of the cost advantages granted Fannie Mae and Freddie Mac, $c_c < c_j$. Finally, let P be the premium that investors are willing to pay for Fannie Mae's and Freddie Mac's securities due to the perceived government guarantee.[84] Competition in the jumbo market means that the price in that market is approximately c_j (yielding zero profit to the private labels). The maximum premium that Fannie Mae and Freddie Mac can charge is, therefore, $c_j + P$ (i.e., the spread between the rate paid by the GSEs for the mortgages and what they charge investors). Through tacit collusion Fannie Mae and Freddie Mac can charge close to this premium, so their per-unit profit is $c_j + P - c_c > 0$.

From this model we can see that if privatization lowers or eliminates P, then the premium Fannie Mae and Freddie Mac can charge falls towards c_j. We can also see that Fannie Mae's and Freddie Mac's profits are reduced if privatization reduces the federal guarantee premium, raises their costs, or both. We take up the welfare consequences of these changes in Part 5 of this report.

PART 3: SOURCES OF COMPETITIVE ADVANTAGE AND DISADVANTAGE FOR FANNIE MAE AND FREDDIE MAC

The objective of this part of the report is to analyze the strengths and weaknesses of Fannie Mae and Freddie Mac both today, in the conforming market, and tomorrow, in a post-privatization conventional market.

We argued in Section 2.2.3 above that Fannie Mae and Freddie Mac are currently earning positive economic profits. This suggests that their strengths must currently outweigh their weaknesses. What are these strengths? And will they persist in a post-privatization market? Moreover, if privatization deprives Fannie Mae and Freddie Mac of some of their strengths, will their remaining strengths still outweigh their weaknesses?

3.1. Natural Barriers to Entry Revisited

From Sections 2.2.2 and 2.3.5 above, Fannie Mae and Freddie Mac are profitable because they are duopolists in a market protected by natural barriers to entry that, *on the whole*, are absolutely effective in deterring entry. These natural barriers are thus obvious strengths enjoyed by Fannie Mae and Freddie Mac.

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[84] Technically, we still need some additional assumptions to ensure that only a finite amount of mortgage-backed securities are traded. A host of assumptions would do (including just noting that there is a finite amount of mortgage origination). However, for our purposes, we do not need to go into this amount of modeling detail.

As we noted above, it is difficult to assess these barriers individually. This is a critical issue because many of these barriers would disappear given effective privatization; that is, privatization that convincingly stripped Fannie Mae and Freddie Mac of the implicit guarantees and left them, in terms of the law, on the same playing field with the private-label conduits.

Suppose that effective privatization occurs. In light of the analysis in Section 2.3, possible natural barriers (strengths) left to Fannie Mae and Freddie Mac are as follows:

(1) Depth of experience.

(2) Buyer preference due to greater liquidity.

(3) Large-scale economies (high MES).

With regard to (1), we have previously argued that there are reasons to believe that production-related experience barriers are low in this industry, but admittedly the available evidence is inconclusive. Arguably Fannie Mae's and Freddie Mac's depth of staff, lender relations, and technology are much greater than those of the private-label conduits. On the other hand, staff can be raided, vertical integration into origination (see Section 4.2) may give some private conduits better lender relations, and technology is readily copied in this industry. Consequently, although we concede that the evidence is ambiguous, our best estimate is that depth of experience will not prove to be a significant barrier to entry.

Whether (2) is a post-privatization barrier depends somewhat on whether the implicit guarantee remains with past Fannie Mae and Freddie Mac securities. If it does, then the GSEs' established base of securities would be, to a degree, different products from their new, riskier securities. Consequently, the liquidity preference would be greatly reduced. If the guarantee is lifted, then the liquidity preference would remain. Regardless of how privatization is carried out, we do not believe this premium is particularly significant (see Section 2.3.5 above); that is, its value is small. In terms of the simple model sketched out in Section 2.8, this would correspond to a small value of P. If, in addition, privatization caused the gap between the former GSEs' costs and the private labels' costs to close, then Freddie Mac's and Fannie Mae's profits would be only slightly greater than the private labels; in large measure they would then be in the midst of the competitive private-label market.

This leaves (3). As we discussed in Sections 2.3.2 and 2.3.3, it is difficult to determine whether Fannie Mae and Freddie Mac enjoy scale economies relative to the private-label conduits. The evidence from the jumbo market suggests that if scale economies exist they are not effective as barriers to entry. In this sense the evidence from the jumbo market suggests that scale economies are minimal. Unfortunately, since Fannie Mae and Freddie Mac operate at an order of magnitude greater than the private-label conduits, there is a danger in extending this conclusion to them. In particular, there is the possibility that significant scale economies arise somewhere between the output levels of the private labels and the output levels of Fannie Mae and Freddie Mac.

3.2 The "Quiet-Life" Hypothesis and the Efficiency of Fannie Mae and Freddie Mac

Economic theories have long existed that relate the structure of a firm's product market to the way it operates.[85] In particular, theory argues that the structure of the product market can affect a firm's efficiency and thus its costs. Because Fannie Mae and Freddie Mac's market structure (tacitly colluding duopoly) is fairly different from the private label's market structure (competition), it is worth reviewing these theories to see whether the differences in their markets translate into greater or less efficiency; that is, are Fannie Mae and Freddie Mac at an advantage or disadvantage vis-à-vis the private labels because of differences between their market structures?

One theory that seeks to relate the structure of its product market to a firm's efficiency is the so-called quiet-life hypothesis based on Hicks (1935). Hicks noted that one of the possible benefits to market power and little competition was what he called the "quiet life": A lack of competition allowed managers of firms in such situations to take it easy; that is, free from the survival of the fittest, they could relax. The price for this relaxation is loss of efficiency and, hence, higher costs.[86]

Modern *theoretical* examinations of this hypothesis have found that this hypothesis ignores two factors: First, since cost minimization is necessary to profit maximization, all firms, regardless of the intensity of competition that they face, should seek to minimize costs; that is, to be efficient. Second, the greater a firm's output, the more it benefits from cost-reducing efficiency (e.g., the value of reducing unit costs by $1 is greater if one produces one million units than if one produces one thousand units). Since firms with market power are typically large firms, while competitive firms are typically small firms, the incentive to promote efficiency could be increasing as market power increases. Hermalin (1992) shows that theory alone cannot determine which of these three effects (the quiet-life effect, the cost-minimization effect, and the size effect) is dominant.

The answer, therefore, must be uncovered empirically industry by industry. The empirical paper that is most relevant to our analysis is Berger and Hannan (1994). They find evidence that commercial banks operating in more concentrated (i.e., less competitive) markets are much less efficient than commercial banks operating in less concentrated (i.e., more competitive) markets. Moreover, they estimate the cost of this inefficiency to be large: Depending on their estimation technique, additional costs due to inefficiency account, on average, for between 1.3% and 4.6% of operating costs. On a nationwide basis, the cost of inefficiency could be as much as $4.477 billion.

Admittedly, Berger-Hannan is just one study, which, moreover, does not directly address the conduit industry.[87] Nonetheless, at a minimum it indicates that investigating whether Fannie Mae and Freddie Mac's "cozy" environment has left them less efficient than the survivors of the "rough and

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[85] See Hermalin (1992) for a partial overview.

[86] A related concept is Leibenstein's (1966) X-inefficiency.

[87] Whether or not the quiet-life hypothesis applies to Fannie Mae and Freddie Mac is an empirical question that no one can answer: All the empirical techniques of which we are aware for assessing efficiency are useless given a sample of just two firms.

tumble" jumbo market has merit. At a maximum it indicates that a privatized Fannie Mae and Freddie Mac could actually suffer serious cost disadvantages versus the private labels: Carrying over the most extreme set of Berger and Hannan's estimates would indicate that Fannie Mae and Freddie Mac could lower their post-privatization costs by 6.1% if they could match the greater efficiency of the private labels. Whether this is indeed true cannot be known for sure. Moreover, it should be remembered, when speculating on the costs of the quiet-life hypothesis, that at least one author (Woodward 1987) has argued that Fannie Mae and Freddie Mac are efficient conduits. Finally, since we feel confident from 2.2.3 that Fannie Mae and Freddie Mac are making positive economic profits, the magnitude of the quiet-life effect (if it exists) cannot be exceptionally great.

3.3. Capital Adequacy and Deep Pockets

The loss of federal guarantees will increase the riskiness of Fannie Mae's and Freddie Mac's securities. This will have two main, negative, effects on Fannie Mae and Freddie Mac:

- It will raise their cost of funds.[88]
- It will reduce the premium they can charge for their mortgage-based securities.

How big these effects will be depends on just how risky Fannie Mae and Freddie Mac are perceived to be. It is not within the scope of this report to answer these questions and the reader is directed to Ambrose and Warga (1996). What we can consider, albeit theoretically, is how these changes will affect the competitive standing of Fannie Mae and Freddie Mac vis-à-vis potential competitors.

How risky Fannie Mae and Freddie Mac are perceived to be will depend on how well capitalized these firms are. Both firms are currently solvent; that is, assets exceed liabilities. This, however, has not always been the case: Kane and Foster (1986) estimate that Fannie Mae was technically insolvent in the late 1970s and early 1980s. Both firms currently exceed the minimum capital level under FHEFSSA. Had this standard, however, been in place in the past, then both Fannie Mae and Freddie Mac would have fallen below the standard: Fannie Mae was below the standard in 1990 (although above it ever since), and Freddie Mac was below it in 1990 and 1991 (although above it ever since).[89]

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[88] Ambrose and Warga (1996) estimate that Fannie Mae's weighted cost of capital will increase by 1.5%.

[89] Based on calculations using data from *Freddie Mac 1993 Annual Report* and *Fannie Mae Investor/Analyst Reports* for 1990–1993.

Their current capitalization—measured as the ratio of net worth to assets[90]—compares favorably to a small sample of securities firms that issue private-label MBSs:[91] Fannie Mae's ratio of net worth to assets was 3.7% in 1993, whereas the average for this sample was 3.3%; and Freddie Mac's ratio was 5.3%, which exceeds the ratio for all the firms in this sample. Admittedly, the GSEs' large portfolios and massive off-balance-sheet obligations mean this comparison with private-label firms should be taken as merely suggestive rather than conclusive.

In short, while Fannie Mae and Freddie Mac may have had capitalization problems in the past, their current capitalization exceeds the minimum level of capitalization and compares favorably with the capitalization of at least some of their potential product-market rivals (although it should be noted that their capitalization requirement is lower than that of depository institutions, to which they might also be compared).

Some of Fannie Mae and Freddie Mac's potential rivals, such as GE Capital Mortgage Services and Residential Funding Corporation, are subsidiaries of giant firms. This means that they may enjoy both easier access to the capital markets through their parents and, moreover, may be perceived as being implicitly backed by their parents. Certainly if one looks at the MBSs issued by these firms in 1993, one finds that they tend to be rated AAA.[92] On the other hand, if one looks at the securities offered by smaller firms, one finds that they too are often rated AAA. What this comparison omits, however, is possible differences in the cost of obtaining credit enhancements sufficient to achieve these high ratings. In particular, the larger firms may have lower credit-enhancement costs. We can find no evidence for or against this proposition; however, by revealed behavior it cannot serve as a serious barrier to entry or competition. Consequently, we probably do not want to put too much weight on the "deep pockets" of some of the GSEs' potential rivals.

There is also the question of whether Fannie Mae and Freddie Mac would be able to raise sufficient capital if they were privatized and lost the government's credit backing. Although Fannie Mae and Freddie Mac already face government-imposed capital standards, including an allocation for off-balance-sheet obligations, the required capital ratio is no doubt lower than the ratio that capital market investors would expect after the two firms were privatized. It is difficult to know how much additional capital would then be required, because it would depend on the post-privatization capital ratios with which the firms were left. However, we have just argued that the jumbo market conduit firms have dealt adequately with capital issues, and we know of no reasons why this would not be equally true for Fannie Mae and Freddie Mac.

In summary, Fannie Mae and Freddie Mac, absent federal guarantees, do not enjoy a capitalization advantage vis-à-vis their potential rivals. They therefore are exceedingly unlikely to be

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[90] This measure, unfortunately, does not account for mortgage-backed securities (i.e., off-balance-sheet items). On the other hand, the comparison group also has off-balance-sheet items (including mortgage-backed securities) so this is probably not too great a problem.

[91] Bear Stearns, Merrill Lynch, Paine Webber, and Salomon Brothers.

[92] Source: *The Mortgage Market Statistical Annual for 1994*, Inside Mortgage Finance Publications, Inc. Washington: 1994.

perceived as safer than their rivals. On the other hand, it is unlikely that they would suffer a capitalization disadvantage. On net, capital adequacy and deep pockets should be a source neither of competitive advantage nor disadvantage.

3.4. Conclusions

It is difficult to predict both whether Fannie Mae and Freddie Mac will enjoy any competitive advantages over their rivals and whether they will suffer any disadvantages. Although theoretical arguments can be made for their current size being an advantage, there is no empirical evidence with which to back up these arguments. Similarly, theoretical arguments based on the quiet-life hypothesis would suggest that Fannie Mae and Freddie Mac are inefficient and would therefore enter a post-privatization environment at a disadvantage. There is empirical evidence for these arguments, but it is tenuous.

In some sense—unless we want to run afoul of Sherlock Holmes's admonition against premature theorizing[93]—the purpose of this section is really to suggest what questions should be asked, rather than guessing at answers without data.

Of course the real question is not whether Fannie Mae and Freddie Mac enjoy or suffer advantages or disadvantages—almost surely they do—but whether these advantages or disadvantages are so great that they will have a significant impact on competition in the post-privatization conventional market. That is, for instance, are their advantages so great that they could "duopolize" this broader market? Or, for instance, are their disadvantages so great that they will be driven from the market? If either scenario were very likely, we suspect that the evidence for it would be stronger than it is now. Hence, we feel somewhat sanguine that a lack of definitive answers will not seriously affect the analysis below.

PART 4: POSSIBLE TRENDS IN VERTICAL INTEGRATION

In this part of the report, we investigate possible trends in vertical integration.[94] The next section outlines the basic theory. In Section 4.2 we investigate integration by private-label firms. In Section 4.3 we investigate possible integration by Fannie Mae and Freddie Mac.

4.1. Basic Issues

In industrial organization theory, there are three reasons firms vertically integrate:

(1) Eliminate double marginalization.

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[93] "It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts." (*Study in Scarlet*, Chapter 3, 1888).

[94] Vertical integration refers to either a merger between a firm and one of its suppliers or a firm's decision to do a supplier's function inhouse.

(2) Extend market power from one market to another.

(3) Achieve synergies, including economies of scope and the reduction of transaction costs.

Item (1) refers to situations in which both a firm and its supplier have market power in their respective markets. When the supplier exercises its market power, it captures some of the surplus that possibly could be gained from the supplier-and-firm exchange, but some of the surplus disappears as a deadweight loss; that is, the usual market power inefficiency exists. By merging the supplier and the firm, the supplier can be compelled to price at marginal cost, thereby allowing the full surplus to be captured.[95] Since, however, we have found no evidence of significant market power on the part of suppliers (originators, servicers, and credit enhancers)—see Section 2.4—the elimination of double marginalization cannot be an important motive in this context and we will not pursue it further.

Item (2) refers to situations in which a firm with market power in one market can, through a vertical merger, extend this market power into another industry. To see how this can be done, picture the vertically related industries as points on a river, with suppliers upstream and the ultimate consumers downstream. If a firm has market power at any point on this stream, then it can use its ability to determine passage through its point of control to give advantages to its vertically related subsidiaries. With these advantages the subsidiaries can gain market power at their point on the stream. A classic historical example of this was IBM's extension of its market power in the manufacture of computers into the manufacture of computer peripherals and computer software, because both had to be "plugged" into IBM computers.[96] The theoretical literature, however, has recently become more suspicious of the claim that firms can so extend their market power from one market to another.[97]

Synergies, item (3), refer to the reduction in costs from running a firm and its supplier as one company rather than two. One reason costs could be reduced is economies of scope: Experience with the industry broadly defined allows managers to control various points in the vertical stream; thus duplication of some management that would exist without integration is eliminated. Transaction costs refer to the idea, popularized by Coase (1937), Williamson (1975), and others, that contracting and other transactions costs can sometimes be reduced by going inhouse rather than relying on the market. For instance, a conduit may have fewer instruments at its disposal for dealing with a poorly performing mortgage servicer when it is an independent firm than it would if that servicer were inhouse (e.g., it can directly punish the servicer's management). Because of its greater control over the servicer when it is inhouse, the costs of the servicer's services could be less than when it was an independent firm.

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[95] For a more thorough introduction to double marginalization see Chapter 4 of Tirole (1988).

[96] Microsoft is alleged to use its strong market position in operating systems for personal computers in a similar manner to gain market power in application software, such as wordprocessing and spreadsheets.

[97] See, e.g., Chapter 4 of Tirole (1988).

4.2. Integration by Private-Label Conduits

Vertical integration is prevalent among private-label conduits. Among the 33 non-RTC private-label conduits operating in 1993, 8 are among the top 25 mortgage originators and 9 are among the top 25 mortgage servicers.[98] Moreover, these conduits are among the largest conduits. What explains this level of vertical integration?

We have already indicated above that we doubt this integration is an attempt to eliminate double marginalization. Given that neither the upstream (i.e., origination and servicing) nor the downstream (i.e., the market for securities backed by jumbo mortgages) has market power to begin with, explanation (2) from the beginning of this part cannot be valid. This leaves explanation (3). This idea that synergies, economies of scope, and reduced transactions costs are motives for integration is supported by Toevs and Zizka (1994), who argue that there are important synergies, particularly between origination and servicing.

What are the consequences of vertical integration for conduits specifically and the mortgage market generally? Presumably, one consequence is lower industry costs—a benefit also noted by Toevs and Zizka. This will improve welfare. Moreover, to the extent that these markets remain competitive, at least some of this improvement in welfare should be captured by homebuyers. There is, however, the possibility that this integration could lead to greater concentration in the various markets. Toevs and Zizka argue that this will indeed be one consequence of greater integration. Our own analysis (see Sections 2.2.4, 2.4.2, and 2.4.3) is consistent with this view: There has been a trend toward greater concentration in these markets coinciding with the trend toward greater integration identified by Toevs and Zizka. On the other hand, two points must be kept in mind: First, even as they get more concentrated, these markets continue to appear quite competitive. Moreover, as we discussed in Part 2, the fundamental structures of these markets (i) suggest a limit as to how concentrated these markets might become and (ii) suggest a limit as to how uncompetitive these markets might become as a consequence. Somewhat consistent with this view is Toevs and Zizka's prediction that profits will actually fall for mortgage originators. The second point to keep in mind is that, as Harberger (1954) pointed out long ago, the welfare loss from greater concentration is almost always small.[99] Indeed, we feel quite confident that whatever the welfare loss is from greater concentration resulting from greater integration, it will be outweighed by the welfare gain from lower costs resulting from greater integration.

4.3. Integration by Fannie Mae and Freddie Mac

Once privatized, Fannie Mae and Freddie Mac would presumably be free to integrate vertically into origination and servicing if they desired. Here we consider what reasonable motives for such integration would be and what the likely welfare consequences might be.

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[98] Source: *The Mortgage Market Statistical Annual for 1994*, Inside Mortgage Finance Publications, Inc. Washington: 1994.

[99] See Farrell (1995) for a survey of more recent work that reaches the same conclusion.

Again, since origination and servicing are reasonably competitive, motive (1) from the beginning of this part is not applicable. What about motive (2)? Clearly, the answer depends in part on how much market power we anticipate Fannie Mae and Freddie Mac having in the post-privatization conventional market. If their market power is limited, then motive (2) is not an issue. Suppose, therefore, that they will have considerable market power (e.g., their economies of scale allow them to nearly duopolize the conduit market). To attempt, then, to extend this market power to origination, for instance, they would have to offer their origination subsidiaries better deals on the mortgages they purchased from them than on those they purchased from other originators. That is, they would effectively cross-subsidize their origination subsidiaries. In this way their subsidiaries could grow at the expense of other originators. Eventually, their subsidiaries would have considerable market power.

There are a number of problems, however, with this scenario:

(1) As what they were doing became known, Fannie Mae and Freddie Mac would be vulnerable to antitrust action (brought either privately or by the government) under Section II of the Sherman Antitrust Act. They could also face private action under the Robinson-Patman Act.

(2) How do Fannie Mae and Freddie Mac preserve their market power in origination? Given the structure of this industry, particularly the ease of entry,[100] Fannie Mae's and Freddie Mac's origination subsidiaries could be constrained on how much they could charge consumers for mortgages—to attempt to exploit their market power could simply generate price-eroding entry (re-entry). Fannie Mae and Freddie Mac might be able to block entry, but only by continuing their costly cross-subsidization. In other words, given the lack of natural barriers to entry into origination, the cost of gaining and retaining market power would likely exceed the benefit of having market power.

(3) Were 100% of all mortgages securitized, then Fannie Mae and Freddie Mac would have no incentive to seek market power in origination: Industrial organization theory tells us that tacitly colluding duopolists who buy 100% of the output from a competitive supplier market are already capturing all the surplus that there is to be had from the supplier market.[101] They therefore cannot capture any more surplus through the direct application of market power in the supplier market. Admittedly, less than 100% of mortgages are securitized, but the proportion is so high that this argument should be approximately true.

Individually, these three problems are compelling arguments against motive (2) from the beginning of this part; together they are devastating. We feel, therefore, that it is very unlikely that Fannie Mae and Freddie Mac would integrate into origination or servicing with the intent of extending market power to these industries.

This is not to say that Fannie Mae and Freddie Mac would not integrate into origination or servicing. Presumably, synergies, economies of scope, and reduced transactions costs are motives for

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[100] See, e.g., Toevs and Zizka (1994) for evidence on the ease of entry.

[101] See, e.g., Chapter 4 of Tirole (1988).

them too. Moreover, by not integrating, Fannie Mae and Freddie Mac could put themselves at a competitive disadvantage vis-à-vis their integrated private-label rivals. We would, therefore, expect some degree of integration by Fannie Mae and Freddie Mac into these areas. As we concluded in Section 4.2, although such integration might contribute to increased concentration (including, possibly, quite high concentration), the negative welfare consequences due to increased concentration are likely to be outweighed by the positive welfare consequences.

4.4. Conclusions

Our analysis suggests that although greater integration is likely in this industry and although Fannie Mae and Freddie Mac can be expected to integrate if privatized, this integration will be motivated by synergies, economies of scope, and reduced transactions costs. Anticompetitive motives are not likely. As such, this integration will enhance welfare by reducing costs. Admittedly, this integration could have a secondary effect of greater concentration, but we expect this effect to (i) be small; (ii) leave these markets still fairly competitive; and (iii) have negative welfare consequences that are smaller than the welfare gains realized from more efficient operations.

PART 5: THE CONDUIT MARKET AFTER PRIVATIZATION

In this part of the report, we build on our previous analysis to make predictions about the possible structure of the conduit market after privatization and the welfare consequences of that structure. Making predictions about how an industry will look after a major change such as this is a difficult exercise (consider the predictions of the Airline Industry's structure after deregulation). Moreover, deregulation of the secondary mortgage markets is sufficiently different from other deregulations that it is difficult to make predictions based on close analogies. Consequently, where necessary, we will consider different scenarios for what might transpire after privatization.

5.1. What Does Privatization Mean?

It would generally be agreed that privatization means ultimately reducing government involvement in the conduit market, particularly to ensure, somehow, that the implicit federal guarantee is lifted in a manner that is convincing to the markets. How that is accomplished and the degree to which government involvement is reduced are, however, more contentious. As Stanton (1996) points out, there are many ways in which the mechanics of privatization could work. Because, to a large extent, these issues are outside the scope of this report, we will consider only two possible implementations of privatization:

(1) Fannie Mae and Freddie Mac are privatized "as is"; that is, they remain large, but their GSE status is removed, their activities are deregulated, and the implicit federal guarantee is lifted.

(2) Fannie Mae and Freddie Mac are shrunk prior to privatization; that is, they are small when privatized, their GSE status is removed, their activities are deregulated, and the implicit federal guarantee is lifted.

In considering (1), one must confront the question of whether the implicit federal guarantee can indeed be lifted. In particular, if Fannie Mae and Freddie Mac are considered "too big to fail," then the federal government may bail them or investors out in case of a collapse. Certainly, this is not without precedent: Both Continental Illinois and Chrysler are examples of large private corporations that were bailed out in some form or another after a collapse. It is therefore possible that lifting an *implicit* guarantee is impossible.

There are, however, four points to consider. First, a too-big-to-fail guarantee is probably not as good as Fannie Mae and Freddie Mac's current guarantee. Consequently, it may not be as much of a barrier to entry as the GSEs' current guarantee. Second, the intertemporal dynamics of the situation could erode this too-big-to-fail guarantee: As more conduits entered against Fannie Mae and Freddie Mac, they could seem less big, so the too-big-to-fail guarantee could shrink and thus be less of an entry barrier, so more firms could enter, reducing the barrier even further, and so forth. Third, many of Fannie Mae and Freddie Mac's private-label rivals could also be considered too big to fail. For instance, General Electric, General Motors, or Prudential could easily have that status. Consequently, the too-big-to-fail guarantee may not be an entry barrier against some of the largest potential competitors to Fannie Mae and Freddie Mac. Finally, the too-big-to-fail doctrine may not be viable in this era of reduced government and federal deficit cutting. Indeed, if the Balanced-Budget Amendment is passed, future governments may be unable to bail out firms even if they are considered too big to fail.

Although we find these four points persuasive, we admit that it is impossible to predict whether a privatized Fannie Mae or Freddie Mac will be protected by a too-big-to-fail guarantee that is (essentially) as good as their current guarantee. We can, however, say what the likely consequences of the two possibilities are. If the implicit guarantee can*not* be lifted, then the industry will be pretty much the same as in Part 2 of this report (except that Fannie Mae and Freddie Mac could also duopolize the jumbo market). The welfare analysis in that case will be similar to the analysis we present below in Sections 5.2.3 and 5.2.4.

5.2. A Theoretical Framework for Assessing Welfare and the Consequences of Market Power

Here we sketch out a simple model that allows us to assess welfare and the consequences of market power. A simple model provides the important insights without encumbering the reader with nonessential complexities.

(1) The Framework

In this model the designation of "demand" and "supply" is a semantic issue. Because, in contrast to Figure 18, it is most natural to have the (positive) interest rate on the vertical (price) axis, we will consider the suppliers to the conduits as being the demanders for mortgage funds. Let $R_D(m)$ be the rate they are willing to pay for m in mortgage funds (i.e., $R_D(\cdot)$ is the inverse demand sched-

ule).[102] Recall that the "competition" that the conduits face from originators who choose to hold mortgages in portfolio is reflected through this demand schedule (see Section 2.4.2). We will consider the buyers of MBSs to be the suppliers of mortgage funds. Let $R_S(m)$ be the rate they require to supply m in mortgage funds (i.e., $R_S(\cdot)$ is the inverse supply schedule).[103] Note that these schedules are the reverse of Figure 18. From Section 2.5.2, we believe that $R_D(\cdot)$ and $R_S(\cdot)$ are relatively flat *at least over the relevant range* (more on this later).[104] The interest rate can essentially be divided into two components: i the interest component determined by general macroeconomic conditions and $p_x(m) = R_x(m) - i$.[105] The schedule $p_D(m)$ is the interest premium that the demand side is willing to pay for mortgage funding, while $p_S(m)$ is the interest premium that the supply side requires for supplying mortgage funds.

Although $R_D(\cdot)$ and $R_S(\cdot)$ (and, thus, $p_D(m)$ and $p_S(m)$) are relatively flat over the relevant range, both demand and supply are ultimately finite. There must therefore be some level of mortgage funding, m^*, such that the slopes of these curves are significantly steeper for $m \geq m^*$.[106]

Let the conduits' aggregate marginal cost schedule exclusive of what they pay the security buyers be $c(m)$.[107] We can think of $c(\cdot)$ as the marginal "other-costs" schedule. The sum of $c(\cdot)$ and $p_S(\cdot)$ is the conduits' aggregate marginal cost schedule. As our discussion in Sections 2.3 and 3.1 makes clear, the shape of this schedule is unclear. It is flat if there are constant returns to scale, downward sloping if there are increasing returns to scale, and upward sloping if there are decreasing returns to scale. In the relevant regions, however, we cannot observe increasing returns to scale; otherwise we would see the emergence of natural monopolies. We therefore feel that it is reasonable to assume that $c(m) + p_S(m)$ is non-decreasing in m. Putting all the elements together and fixing i, we get a figure similar to Figure 19.

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[102] This demand, which stems ultimately from the demand of homebuyers and owners for mortgage funding, is also dependent on other factors (e.g., the demand and supply of housing). For our purposes, however, we can treat these other factors as if they are fixed.

[103] This supply is also dependent on other factors (e.g., the prices and returns on other securities). For our purposes, however, we can treat these other factors as if they are fixed.

[104] Zumpano et al. (1986) support our claim for a relatively flat $R_D(\cdot)$. They report on p. 93 that "[m]ortgage loan demand ... prove[s] to be highly responsive to small changes in mortgage interest rates."

[105] At some level the mortgage market must feed back on the determination of i. However, given that i is determined by the global macroeconomic economy, the impact of the American mortgage market is likely small enough for us to treat i as independent of m.

[106] Admittedly, m^* could vary for the two schedules. For convenience, however, we take it to be the same for the two schedules.

[107] The aggregation is done by horizontally summing the individual conduits' marginal cost schedules net of what the security buyers are paid.

FIGURE 19

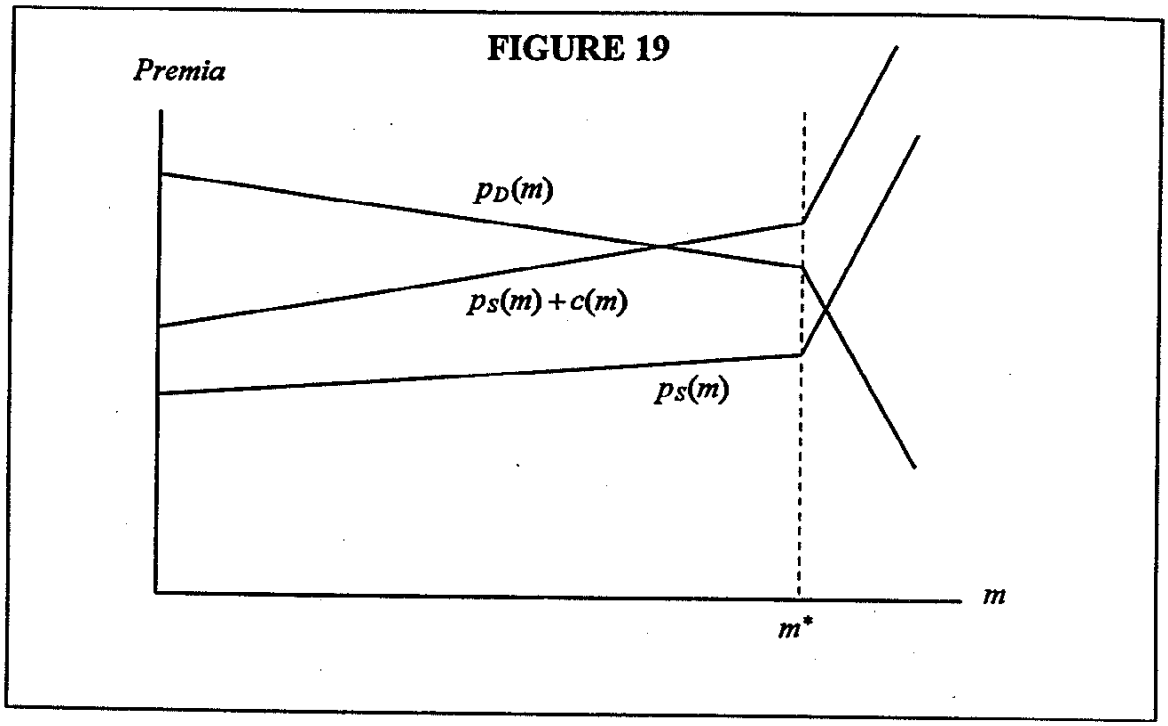
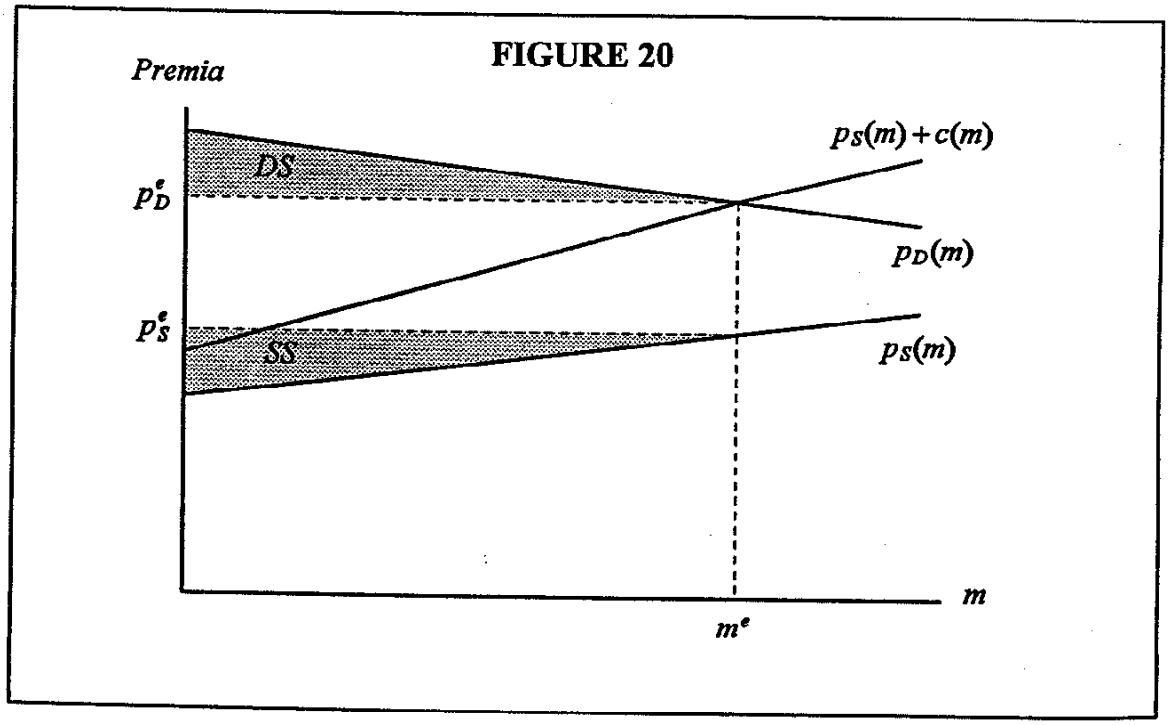


FIGURE 20



(2) Welfare in a Competitive Market (the Current Jumbo Market)

We consider first a competitive conduit market similar to the jumbo market. Because the market is competitive, the value of mortgages securitized is found by the intersection of $p_D(m)$ and $c(m) + p_S(m)$, an amount denoted by m^c in Figure 20. The premium paid by the demanders is $p_D^c = p_D(m^c)$ and the premium received by the suppliers is $p_S^c = p_S(m^c)$. These premia are illustrated in Figure 20. The division of surplus is as follows: The demanders' surplus, *DS*, is the triangular region below their demand schedule and above p_D^c from 0 to m^c (see figure); the suppliers' surplus, *SS*, is the triangular region above their supply schedule and below p_S^c from 0 to m^c (see figure); the remaining area—the rectangular region whose height is $p_D^c - p_S^c$ and whose width is m^c—belongs to the conduits. Much of this last region is just compensation that covers costs (indeed, if $c(\cdot)$ is flat, it is all just compensation to cover costs); the rest is the conduits' profits. Given that, as we argued in Section 2.4, origination, service, and other supply markets are fairly competitive themselves, some amount of *DS* is passed on to mortgage borrowers in the form of lower interest rates (a smaller premium).

(3) Welfare in a Fully Monopolized Market

Next we consider a monopolized conduit market (or, equivalently, a conduit market with a tacitly colluding duopoly). To keep the analysis straightforward, but without changing the conclusions, suppose that the other-costs schedule is constant; i.e., $c(m) = c$ for all m. The monopoly conduit seeks the level of securitization that maximizes its profit, that is, that maximizes

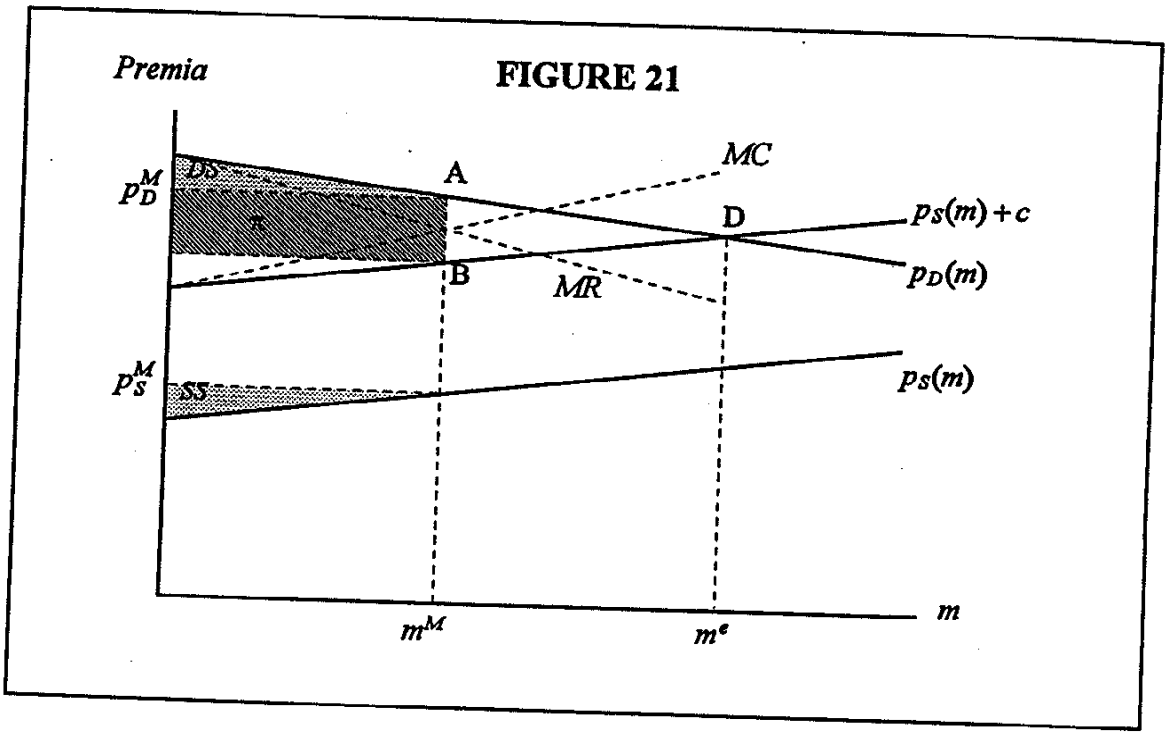
$$\pi(m) \equiv [p_D(m) - p_S(m) - c] \cdot m.$$

To maximize its profit, the monopoly securitizes up to the point where *marginal* profit from further securitization is 0; that is, mathematically, it securitizes to m^M, where m^M solves

$$[p_D(m^M) + mp'_D(m^M)] - [p_S(m^M) + mp'_S(m^M) + c] = 0.$$

(marginal revenue) (marginal cost)

As we have noted, the solution is also given by the familiar marginal revenue equals marginal cost condition. Because demand curves slope down—at least slightly—the marginal revenue schedule is more steeply sloped than the demand curve. This is indicated in Figure 21 by the curve *MR*. The difference between demand and marginal revenue reflects the usual monopoly tension: To securitize an additional mortgage, the monopolist must offer a better deal to originators (i.e., a lower premium), not only on the marginal mortgage but also on all the infra-marginal mortgages. Consequently, the benefit of securitizing an additional mortgage is less than the premium received from that additional mortgage. Similarly, because supply curves slope up—at least slightly—the marginal cost schedule is more steeply sloped than $c + p_S(m)$. This is indicated in Figure 21 by the curve *MC*. The difference between the curves reflects the monopsony tension inherent in this situation: To sell an additional security, the monopsonist must offer a better deal to security buyers (i.e., a higher premium), not only on the marginal security but also on all the infra-marginal securities. Consequently, the cost of selling an additional security is greater than the premium plus other costs that it must pay to sell that additional security.



Comparing Figure 21 to Figure 20, it is evident that a smaller quantity is traded under monopoly, the premium paid by the buyers is greater under monopoly, and the premium received by the sellers is less under monopoly; that is, $m^M < m^e$, $p_D{}^M = p_D(m^M) > p_D{}^e$, and $p_S{}^M = p_S(m^M) < p_S{}^e$. Because a smaller quantity is traded relative to the competitive situation, the monopoly situation must represent a welfare loss. The division of the surplus under monopoly is as follows: Demander surplus (*DS*) is reduced; seller surplus (*SS*) is reduced; the rectangular region denoted π (with width m^M, and height equal to $p_D{}^M - p_S{}^M - c$) is pure profit; the rectangular region with width m^M and height c is compensation for costs; and, finally, the triangular region ABD is the deadweight loss from monopoly.

As Figure 21 makes clear, monopoly reallocates the surplus vis-à-vis competition. This is presumably an important concern for policymakers. In particular, the reduction in the demanders' surplus, because this reflects higher borrowing costs for homeowners, is likely a major concern for policymakers.

Reallocation is not, however, a concern from the narrow perspective of welfare analysis. What is a concern is the deadweight loss: This is surplus that would be available under competition that is lost entirely under monopoly. Because we cannot estimate the demand, the supply, and the other-costs (i.e., $c(\cdot)$) schedules, we cannot estimate the size of the deadweight loss. We do know that in most situations this loss is typically small (see, e.g., Harberger 1954). Indeed, Farrell (1995) argues that issues such as the quiet-life hypothesis (see Section 3.2) have a bigger impact on welfare than does the deadweight loss.

(4) Welfare Given the Current Conforming Market Structure

The preceding monopoly analysis does not, however, describe Fannie Mae and Freddie Mac as they exist *today*, although it would describe them in the future were they able to monopolize the entire conventional market. To understand the market today, recall the simple model sketched in Section 2.8: Fannie Mae and Freddie Mac are tacitly colluding duopolists whose market power is limited, to some extent, by possible competition from private-label conduits. Although, as we discussed there, there are reasons to believe that Fannie Mae and Freddie Mac have lower costs than their private-label rivals, for convenience we will treat all conduits as having the same other-costs schedule. Indeed, to keep the analysis straightforward, we will assume that these other costs are constant (i.e., $c(m) = c$ for all m). These assumptions do not affect the fundamental aspects of our conclusions.

As in Section 2.8, let P denote the premium that investors are willing to pay for "guaranteed" securities from Fannie Mae and Freddie Mac. That is, the supply schedule for Fannie Mae and Freddie Mac is $p_S(m) - P$ (recall it is the supply of funds by investors). To forestall entry into the conforming market, Fannie Mae and Freddie Mac must set prices so that the private-label conduits would find it unprofitable to enter; that condition is

$$[p_D(m) - p_S(m) - c]\cdot m \le 0$$

(i.e., the private-label conduits' profits from entry are not positive).[108] This need not be a binding constraint (i.e., it could be optimal for Fannie Mae and Freddie Mac to price—equivalently, choose a level for m—such that the above expression is met as a strict inequality). We will consider both the possibility that it is binding and that it is not binding.

Assuming first that the above constraint is binding means that Fannie Mae and Freddie Mac price in such a way that m solves the above expression as an equality. That is, although they would like to limit quantity and increase profits, potential competition from private-label conduits constrains them from doing so. Let m^c be the quantity that solves the above constraint as an equality. Note, therefore, that m^c equals m^e, the equilibrium value of the competitive market (see Figure 20). It follows, therefore, that total welfare is the same in this situation as in the competitive market. Moreover, the demander and supplier surpluses will also be the same. The only difference is that Fannie Mae and Freddie Mac are making a profit:

$$\pi = [p_D(m^e) - p_S(m^e) + P - c]\cdot m^e = P\cdot m^e.$$

Note that their collective profit is due solely to the premium from their federal guarantee.[109]

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[108] Of course Fannie Mae and Freddie Mac could allow entry into the conforming conduit market, but this would not be profit-maximizing for them.

[109] If we allowed Fannie Mae and Freddie Mac to have a cost advantage, then part of their profit would stem from this as well—see Section 2.8.

This profit is not free (otherwise welfare would actually be greater in this situation) but is paid for by the federal guarantee. As Kane and Foster (1986) remind us, this federal guarantee is not free—it is a liability that is assumed by the federal government. Indeed, because this federal guarantee is a claim against taxpayers and federal taxation is distortionary and, hence, welfare reducing (see, e.g., Chapters 2 and 3 of Atkinson and Stiglitz (1980)), an analysis that fully accounted for the cost of the federal guarantee (i.e., a full general-equilibrium welfare analysis) would show that welfare in this situation is reduced vis-à-vis the true competitive situation because of the implicit increase in distortionary taxation. Moreover, since $P \cdot m^c$ is *a rectangle and not a triangle* (like monopoly deadweight loss), the general-equilibrium welfare consequences need not be negligible. For instance, Kane and Foster (1986) report estimates as high as $4.2 billion for the *annual* cost of Fannie Mae's guarantees; multiplying that by 5% to 30% (the range of estimates of taxation's distortionary cost)[110] yields an annual welfare cost of between $210 million and $1.26 billion.

From the perspective of policymakers, eliminating the federal guarantee would, in this case, affect only Fannie Mae and Freddie Mac (and, thereby, their shareholders and bondholders). Because, as we have noted, demander and supplier surplus are unaffected, these two groups could not be expected to object to this policy change. In particular, there should be a negligible impact on mortgage rates.

Now, suppose that the constraint is not binding. This means that

$$[p_D(m^c) - p_S(m^c) - c] \cdot m^c < 0;$$

which, in turn, means that $m^c > m^e$—in other words, *more* than the competitive amount of mortgages are traded.[111] This situation is illustrated in Figure 22. One consequence of this is that the premium paid by demanders is less than it would be given competition; i.e., $p_D(m^c) < p_D(m^e)$. Because, as we argued previously, a portion of any price decrease is likely to be passed on to homeowners, this means that homeowners pay lower rates than they would given competition. So the surplus of demanders and, thus, ultimately homeowners is greater than it would be given competition. Similarly, the premium received by investors is also greater than it would be under competition; i.e., $p_S(m^c) > p_S(m^e)$. Consequently, their surplus would be greater than it would be under competition.

The increased surplus enjoyed by the demanders and suppliers is financed by the federal guarantee: Since $p_D(m^c) < p_D(m^e)$ and $p_S(m^c) > p_S(m^e)$, it follows that Fannie Mae and Freddie Mac are not fully capturing the guarantee; that is, their profits are

$$\pi = [p_D(m^c) - p_S(m^c) + P - c] \cdot m^c < [p_D(m^e) - p_S(m^e) + P - c] \cdot m^e = P \cdot m^e,$$

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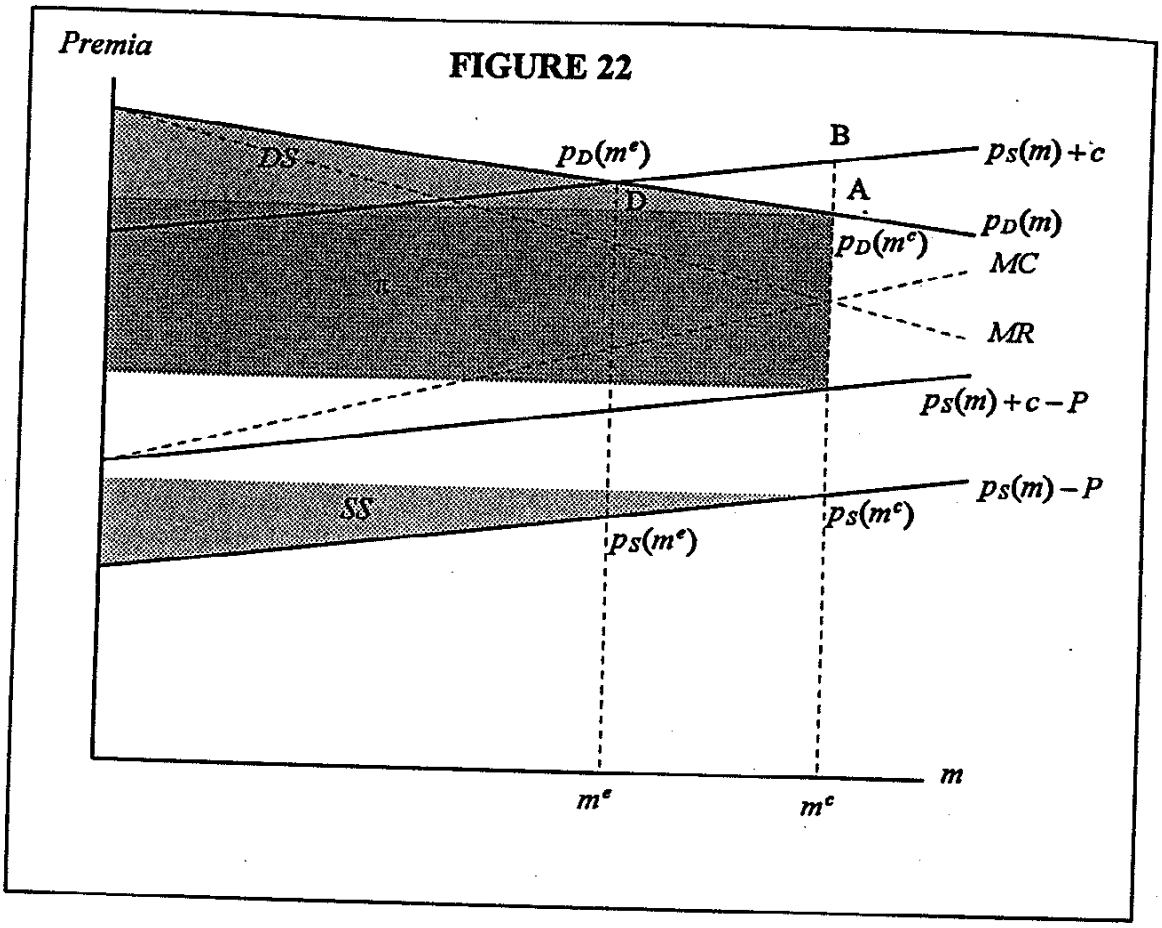
[110] Professors Alan Auerbach and Aaron Edlin, experts on public finance, private communication.

[111] It is readily shown that as P increases, the value of m that solves the monopoly problem of maximizing $[p_D(m) - p_S(m) + P - c] \cdot m$ also increases. Consequently $m^c > m^M$, where m^M is the solution from Section 5.2.3. Since the expression $[p_D(m) - p_S(m) - c] \cdot m$ is strictly decreasing in m for $m > m^M$ and since $m^e > m^M$, it follows, therefore, that $m^c > m^e$.



so some of the guarantee must therefore be going to the demanders and suppliers. Fannie Mae and Freddie Mac are willing to pass some of this guarantee on to the demanders and suppliers in exchange for the benefit of trading more mortgages. This passthrough could explain the 20- to 50-point difference between jumbo mortgage rates and conforming mortgage rates.

Because more than the welfare-maximizing quantity is being traded, there must be a welfare loss (i.e., a deadweight triangle).[112] That is, a partial-equilibrium analysis reveals a welfare loss (this loss is financed by the federal guarantee). Of course, because the guarantee is ultimately being financed by taxpayers, there is also a general-equilibrium welfare loss. For policymakers, eliminating the guarantee ultimately means making losers of demanders (and, thus, homeowners), suppliers, and Fannie Mae and Freddie Mac, while making winners of taxpayers.

[112] This is the triangle ADB.

5.3. Fannie Mae and Freddie Mac Are Privatized As Is

We consider first what might happen if Fannie Mae and Freddie Mac are privatized as is; that is, they remain large, but their GSE status is removed, their activities are deregulated, and the implicit federal guarantee is lifted. As earlier discussion has made clear, what happens then depends in large part on whether Fannie Mae and Freddie Mac enjoy significant economies of scale.

(1) Fannie Mae and Freddie Mac Enjoy Significant Economies of Scale

As discussed in Sections 2.3 and 3.1, significant economies of scale (a high MES) can serve as a natural barrier to entry. If Fannie Mae and Freddie Mac enjoy these economies of scale, then they may be able to block entry into the conforming market. They may even be able to duopolize the jumbo market.

Assume for the moment that Fannie Mae and Freddie Mac do not erect strategic barriers to entry (we take up that issue in Section 5.3.3). Then, given a high MES, the ultimate industry structure will consist of a small number of large firms (possibly two). The reason is that (i) any firm that is not large enough will be at too great a cost disadvantage to compete in the long run with the large firms; and (ii) dividing a finite market up among large firms means fewer firms than if the market were divided among small firms.

To the extent this small number of firms is small enough to facilitate tacit collusion, the equilibrium analysis will be similar to that in Section 5.2.3 if hit-and-run entry is not possible; otherwise it will be similar to that in Section 5.2.4 (except the conduits' profits will stem from their cost advantage rather than the now-removed federal guarantee). In terms of welfare, there will likely be a deadweight loss vis-à-vis the competitive situation. This loss, however, is likely to be small, at least if the experience of other industries is a guide (see our discussions of Harberger (1954) above). Moreover, this comparison between a tacitly colluding oligopoly and competition is somewhat misleading: To create competition in this setting, more firms would have to enter the market. Were this to occur, then some of the cost savings realized by exploiting economies of scale would necessarily be lost. In other words, if the industry does end up as a small oligopoly of large firms because of high MES, the welfare loss due to greater concentration will be offset to a large degree by the welfare gain from the exploitation of economies of scale. Indeed, Farrell (1995) argues that, from a theoretical perspective, this welfare gain would likely be greater than this welfare loss.

If, despite their small number, the competitors in the post-privatization market cannot tacitly collude, then the situation will resemble today's jumbo market. Since the equilibrium will be (at least approximately) the competitive equilibrium, there will be no welfare loss (see, e.g., Section 5.2.2). Moreover, since economies of scale will presumably be extended to what is now the jumbo market, there could even be a welfare gain from this new industry structure. That is, the artificial division of the conventional market into conforming and jumbo could mean that one segment, the jumbo segment, has been created that is now too small to enjoy economies of scale. Extending economies of scale to this segment would therefore increase welfare.

It should also be remembered that the elimination of the federal guarantee offers yet another welfare gain, as discussed in Section 5.2.

In summary, if high MES leads to a small oligopoly (including a Fannie Mae and Freddie Mac duopoly), there could be welfare losses. On the other hand, the exploitation of economies of scale is welfare improving. The elimination of the federal guarantee is also welfare improving. The net effect is therefore difficult to predict even if greater concentration leads to tacit collusion.

(2) Fannie Mae and Freddie Mac Do Not Enjoy Significant Economies of Scale

Absent economies of scale and strategic entry barriers, Fannie Mae and Freddie Mac will be in a market that will greatly resemble today's jumbo market. By analogy, then, we can expect this market to be quite competitive. This will be true regardless of the size distribution; that is, Fannie Mae and Freddie Mac may actually remain significantly larger than their competitors, but they will still be in a competitive market. The welfare analysis will resemble that in Section 5.2.2. Since the welfare in Section 5.2.2 exceeds the welfare in the current market (i.e., in Section 5.2.4), this entails a welfare improvement over the current market structure.

(3) Can Fannie Mae and Freddie Mac Erect Strategic Entry Barriers?

A necessary condition for Fannie Mae and Freddie Mac to be able to erect strategic entry barriers is that they have market power. Empirically, this means that they must be large vis-à-vis potential entrants. In other words, the question of whether they can erect strategic barriers arises only if they are privatized as is.

There are two types of strategic entry barriers that Fannie Mae and Freddie Mac could conceivably erect in this market:[113]

(1) They could attempt to lock up suppliers via merger or long-term contract.

(2) They could seek to develop a reputation for toughness.

Fannie Mae's and Freddie Mac's current profits arise because other conduits are effectively barred from the conforming market. Were Fannie Mae and Freddie Mac to restrict the suppliers of conforming mortgages to sell only to them, then other conduits would again be barred from the conforming market. Nothing would change (except the GSEs' profits would be less because the federal guarantee had been removed). Fannie Mae and Freddie Mac could restrict or lock up their suppliers either by buying their suppliers or inducing their suppliers to sign long-term exclusive-dealing contracts. There are a number of reasons, however, to believe that this strategy would not be successful.

[113] For a more complete discussion of strategic entry barriers, including a "full list," see Gilbert (1989) or Chapter 4 of Oster (1994).

- Many of their largest current suppliers are vertically integrated with other conduits; they therefore could not be locked up. Consequently, this strategy would not fully prevent entry.
- Potential entrants would likely compete with Fannie Mae and Freddie Mac in a race to lock up suppliers, leaving Fannie Mae and Freddie Mac with only a partial barrier.
- By entering into long-term contracts that help Fannie Mae and Freddie Mac deter entry, suppliers risk becoming hostage to Fannie Mae and Freddie Mac at a later date when they are the only game in town. This will cause suppliers either not to sign these contracts or to extract a significant amount of Fannie Mae's and Freddie Mac's surplus while their bargaining position is good. Hence, the strategy will either fail or be exceedingly expensive.
- Buying up too many suppliers will greatly increase the level of concentration in the origination market, which would likely trigger antitrust action that would block this strategy.
- Unless carefully structured, exclusive-dealing contracts are often seen as being anticompetitive and thus being in violation of antitrust law (see Chapter VI–E of Posner and Easterbrook 1981). Consequently, there is a risk that antitrust action would block this strategy.

Because the strategy is unlikely to be successful, we doubt that it would be tried.

The second strategy, developing a tough reputation, means competing fiercely against any entrant (i.e., engaging in a price war) so that future potential entrants are scared off. After a few entrants had been driven out, Fannie Mae and Freddie Mac would have developed a reputation for toughness and, hence, would not be bothered by future entry. We doubt that this strategy would be successful either. For the strategy to work, entrants must be vulnerable for a period after they enter (e.g., they must be building customer loyalty or developing a reputation for high-quality goods). In particular, they must be small and growing. We saw in the jumbo market, however, that entrants can come in at a rather large scale. Furthermore, as previously noted, there is unlikely to be any customer loyalty among sophisticated security buyers. Finally, investors appear to rely on rating agencies, so developing a quality reputation is not particularly important. In short, entrants are not particularly vulnerable. Consequently, it would be very expensive to drive them out. Indeed, the size of Fannie Mae and Freddie Mac serves as a disadvantage for this strategy: Cutting prices[114] when you are large represents a tremendous loss. In essence, Fannie Mae and Freddie Mac would in effect be using an elephant gun to hunt flies.

In summary, we are doubtful that Fannie Mae and Freddie Mac can succeed in deterring entry by erecting strategic barriers to entry.

(4) Conclusion

If Fannie Mae and Freddie Mac are privatized as is *and* if there are significant economies of scale, then the resulting market will be highly concentrated. Given, however, (i) the high *current*

[114] Either lowering the price charged to security buyers or raising the price paid for mortgages.

market concentration, (ii) the elimination of the welfare-reducing federal guarantee, and (iii) the extension of economies of scale to the jumbo market, welfare in the post-privatization market could well be greater than it is now.

If Fannie Mae and Freddie Mac are privatized as is *and* there are no significant economies of scale, then the resulting market will be fairly competitive. In light of points (i)–(iii), welfare would definitely be greater after privatization in this case.

These conclusions stem in part from our belief that Fannie Mae and Freddie Mac will not be able to erect effective strategic barriers to entry.

5.4. Fannie Mae and Freddie Mac Are Shrunk Prior to Privatization

In this section we consider the second privatization option: Shrink Fannie Mae and Freddie Mac prior to privatization; that is, make sure that they are small when privatized, their GSE status is removed, their activities are deregulated, and the implicit federal guarantee is lifted. As in Section 5.3 what happens then depends in large part on whether there are significant economies of scale in this industry.

(1) There Are No Significant Economies of Scale

If there are no significant economies of scale, then the post-privatization market will greatly resemble today's jumbo market. By analogy, then, we can expect this market to be quite competitive. This will be true regardless of the ultimate size distribution; that is, some competitors may become larger than their competitors, but they will still be in a competitive market. The welfare analysis will resemble that in Section 5.2.2. Since the welfare in Section 5.2.2 exceeds the welfare in the current market (i.e., in Section 5.2.4), this entails a welfare improvement over the current market structure.

(2) There Are Significant Economies of Scale

If there are significant economies of scale, they should eventually be realized. As we discussed in 5.3.1, this could lead to market concentration and, correspondingly, some deadweight loss. Of course, because this situation replaces one of considerable market power—one with the welfare-reducing federal guarantees, and one in which the economies of scale are not realized in the jumbo market—welfare could well be greater after privatization.

The one difference between the situation here and the one considered in Section 5.3.1 is that there will be dynamic welfare effects. By shrinking Fannie Mae and Freddie Mac, the post-privatization market begins as a competitive market; thus, along its path to its more concentrated future, that component of welfare due to the competitive nature of the market will be greater than if the concentrated market arose immediately following privatization. On the other hand, by eliminating the GSEs' economies of scale, costs will be greater on this path than they will be in the long run. Consequently, that component of welfare due to economies of scale will be less than if the

concentrated market arose immediately following privatization. It is impossible to say ex ante which dynamic effect will be the larger.

(3) Conclusion

If Fannie Mae and Freddie Mac are shut or shrunk prior to privatization *and* if there are significant economies of scale, then the resulting market will still ultimately be highly concentrated. Given, however, (i) high *current* market concentration, (ii) the elimination of the welfare-reducing federal guarantee, and (iii) the extension of economies of scale to the jumbo market, welfare in this long-run equilibrium of the post-privatization market could well be greater than it is now. As the market moves toward this long-run equilibrium, there will also be dynamic welfare effects: There is a benefit to having the market start as a competitive one, but there is also a cost because economies of scale are not being exploited.

If Fannie Mae and Freddie Mac are shrunk prior to privatization *and* there are no significant economies of scale, then the resulting market will be fairly competitive. In light of points (i)–(iii), welfare would definitely be greater following privatization in this case.

5.5. Additional Welfare Issues

The removal of government guarantees from Fannie Mae and Freddie Mac could cause these firms to reduce their output in the conforming conduit market. This raises the possibility that other forms of mortgage origination and securitization could increase. Furthermore, these increases could use other forms of government guarantees, such as FHA/VA mortgage insurance or federal deposit insurance, thus offsetting the government's savings from eliminating the Fannie Mae and Freddie Mac guarantees. We do not consider this line of argument relevant or important for two reasons:

(1) Fannie Mae's and Freddie Mac's production would decline following privatization only if their output had previously exceeded the competitive equilibrium output level. Thus, there is no reason to expect other market participants, operating in competitive markets, to have incentives to increase their output levels to make up for the Fannie Mae and Freddie Mac reductions.

(2) Other forms of government subsidies to the mortgage market should also be evaluated as to their public policy benefits. We suspect this will be more likely to happen, and the conclusions will be more transparent, with Fannie Mae and Freddie Mac already privatized. To be clear, although we expect that some of these other forms of subsidies will also be removed, many others are likely to remain. The key point is that each would be evaluated on the basis of its impact on the mortgage market and other parts of the financial system.

The economic justification for government intervention in markets is that government can sometimes overcome market imperfections. If government intervention in the secondary mortgage markets, in the form of establishing Fannie Mae and Freddie Mac, was economically justified, we must ask before ending this intervention what has changed to make this intervention no longer necessary. We consider this issue here.

Two *possible* market failures could have warranted government intervention:[115]

(1) Overcoming "thin" markets (i.e., network externalities).

(2) Overcoming asymmetries of information concerning risk.

Failure (1) refers to the idea that if the market for MBSs is thin, then they are less liquid. Consequently, investors will be more reluctant to hold them. Indeed, the premium they might require in that case could be so great that the market fails to exist.[116] Moreover, it might be difficult for private firms to come into the market in a large enough scale to offset this problem. The government, by coming in at a large scale—and, possibly, by offering an additional inducement in the form of the federal guarantee—could overcome this market imperfection.

Given how well established the secondary market has become, in particular given the growth of the fully private jumbo market, we strongly doubt that this first market failure is a danger if the conforming market were similarly privatized. Undoubtedly, without the federal guarantee, some investors would switch to other assets, but the resulting reduction in liquidity should not cause the market to collapse.[117]

Failure (2) refers to the idea that if investors cannot easily observe the quality (i.e., risk and return) of the assets offered to them, then they will heavily discount them. Consequently, the market may fail to exist.[118] By guaranteeing these securities, the government may overcome this problem, thereby allowing the market to flourish.

The success and growth of the fully private jumbo market, as well as emerging markets for the securitization of other debt instruments, shows that this second potential market failure is not (is no longer) a problem. The rating agencies (e.g., Standard and Poor's or Moody's) serve to eliminate much of the asymmetry of information, thereby allowing these markets to function. There is no reason to suspect that the rating agencies could not do the same for conforming mortgages.

One of the statutory purposes of Fannie Mae and Freddie Mac is to promote stability in the primary mortgage market. Although volatility in mortgage rates is not, per se, a market failure,

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[115] A third failure could exist with respect to the provision of mortgage credit to "underserved" borrowers. An analysis of this potential failure is beyond the scope of this report.

[116] In terms of earlier model, the problem could be expressed as follows. Let $p_S(m;L)$ be the premium required by investors as a function of the amount securities offered, m, and the liquidity of the market, L. The problem is, then, that low liquidity (e.g., $L = 0$) could mean that $p_S(m;0) + c(m) > p_D(m)$ for all m.

[117] Indeed, from a general-equilibrium perspective these investors should be switched; there is ultimately no welfare gain if they hold mortgage-backed securities solely because of the federal guarantee. That is, these "guaranteed" mortgage-backed securities are likely crowding out, to one degree or another, other securities. Ironically, the securities most likely affected by this crowding out are the closest substitutes for the guaranteed mortgage-backed securities in terms of risk, namely Treasury securities.

[118] This is known in the literature as the "lemons" problem. See Akerlof (1970).

market volatility can affect various participants in the market. In particular, it can make planning difficult, which could adversely affect potential homeowners and, to an extent, those that lend to them. There is no evidence (that we are aware of) that Fannie Mae and Freddie Mac have reduced market volatility. One way they could reduce volatility would be to price in a countercyclical manner, but Goodman and Passmore (1992) find evidence that they price in a procyclical manner. As we noted previously, however, this evidence is far from conclusive. Moreover, a monopoly (or, equivalently, a tacitly colluding duopoly) absorbs some of the cost shock vis-à-vis a perfectly competitive market.[119] A reduction in Fannie Mae and Freddie Mac's market power could, therefore, lead to greater volatility in mortgage rates. This effect is, however, greatly mitigated if Fannie Mae and Freddie Mac's pricing is constrained by the pricing in the competitive jumbo market (see Section 5.2.4). Putting these points together, we conclude that the impact of Fannie Mae and Freddie Mac on mortgage-rate volatility is likely to be quite small, so the increase in volatility—if any—from their privatization should be small as well. Certainly it is too small to outweigh the welfare benefits of privatization.

In summary, there is no reason to believe that the government intervention is still needed in the secondary mortgage markets. Privatization will not, therefore, generate welfare losses because it represents an end to direct government intervention.[120]

5.6. Conclusions

This part of the report considered the likely consequences of privatization. As a reference point, we carried out a welfare analysis of today's jumbo market in Section 5.2.2 and today's conforming market in Section 5.2.4. Since today's jumbo market is competitive, it is likely close to welfare maximizing (unless there are significant economies of scale that are not being exploited). An analysis of today's conforming market revealed that, from a partial-equilibrium perspective, it could also be welfare maximizing. It could, however, also be the case that the conforming market is inefficiently large (that is, more than the welfare-maximizing amount of mortgages are traded). In addition, from a general-equilibrium perspective, the conforming market is inefficient because it is being implicitly subsidized at the taxpayers' expense.

The ultimate market structure following privatization depends heavily on whether there are significant economies of scale in this industry. If there are, then the industry will likely become quite concentrated; that is, dominated by a few large firms. Because the conforming market is already concentrated, this aspect of privatization should not have a large impact on welfare. Moreover, privatization will also have welfare benefits: economies of scale will be extended to the jumbo market and the federal guarantee will be removed.

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[119] For instance, if demand is linear and the variance of marginal cost is σ^2, then the variance of price is $\frac{1}{4}\cdot\sigma^2$.

[120] There will, of course, still be government regulation. This, however, should remain constant between the pre- and post-privatization regimes.

If there are not significant economies of scale, then the secondary market should become fairly competitive. This would represent a welfare gain.

We do not anticipate that Fannie Mae and Freddie Mac could successfully block entry into a post-privatized market by erecting strategic barriers to entry. Nor do we anticipate that the ending of direct government intervention in the secondary mortgage markets will give rise to welfare-reducing market imperfections.

Without a crystal ball, it is impossible to predict the exact post-privatization market structure. We feel confident, however, that privatization will be, on net, welfare improving. This is not to say that it will not create winners and losers. Almost surely the American taxpayers will be winners. If there is a shake-out in the industry (a likely possibility if there are significant economies of scale), then the private labels that die will be losers, but the private labels that survive will be winners. If there is no shake-out, then the private labels will be little affected. The gains or losses conferred on the shareholders (and debtholders) of Fannie Mae and Freddie Mac will depend on the financial and other related terms of their privatization. Based on Section 5.2, investors and homeowners could be winners or losers. If the markets become more competitive, then they will either be no better off (recall one possibility is that the current allocation is welfare maximizing) or they will be worse off (recall the other possibility is that they capture part of the federal guarantee). If, however, there are large economies of scale, then investors and homeowners may benefit to the extent they capture some of the resulting cost savings.

PART 6: CONCLUSIONS

As Part 1 made clear, the mortgage market in general, and the secondary mortgage market in particular, are important components of the U.S. financial system. Changes in policy that affect these markets can therefore have large and widespread effects. The change in policy that we have considered in this report is the privatization of Fannie Mae and Freddie Mac. This change will have many effects, but we have focused on the industrial-organization effects in this report.

To study privatization's possible effects on the industrial organization of the secondary markets, we began by studying the conventional mortgage market as it exists today. We did so both to gain a benchmark against which to compare possible future scenarios and to uncover clues that could help us make predictions about a post-privatization future. Our conclusions from this analysis are these:

(1) The conforming conduit market is a tacitly colluding duopoly. This conclusion is supported by the positive economic profits being earned by Fannie Mae and Freddie Mac.

(2) The jumbo market is a competitive market.

(3) Entry into the conforming market is blocked by the advantages afforded Fannie Mae and Freddie Mac by their GSE status. Of particular importance is the implicit federal guarantee that they enjoy.

(4) The jumbo market is open to entry.

(5) Neither suppliers nor buyers have market power vis-à-vis the conduits.

(6) The number and availability of substitute securities, as well as some empirical evidence, indicate that the demand curve for MBSs is likely to be relatively flat.

(7) Fannie Mae's and Freddie Mac's profits are determined largely by the premium investors are willing to pay for the federal guarantee.

Given the GSEs' dominance of the conventional markets today, there is reason to suspect that they could be dominant players after privatization, at least initially. We therefore sought to identify the strengths and weaknesses that Fannie Mae and Freddie Mac would bring to a privatized market. A possible strength could be the GSEs' economies of scale—*if they exist*. Our examination of the jumbo market revealed no evidence of economies of scale, but the fact that Fannie Mae and Freddie Mac operate at an order of magnitude greater than the private-label conduits raises doubts about the applicability of this evidence. A potential weakness is Fannie Mae's and Freddie Mac's possible inefficiency because of their having lived the quiet life. Whether or not the quiet-life hypothesis actually applies to Fannie Mae and Freddie Mac is not a question that we can answer, however. We found no evidence that Fannie Mae and Freddie Mac would have capital problems in a privatized environment. In short, we found no strong evidence to believe that Fannie Mae and Freddie Mac would either dominate or be dominated by private-label conduits after privatization.

Vertical integration is a trend in secondary markets. Many of the largest private-label conduits are integrated into origination and servicing. Although the theoretical literature offers a number of motives for vertical integration, we concluded that the ones that best explained this integration were synergies, economies of scope, and reduction in transactions costs. In particular, anticompetitive (market dominance) motives are unlikely to explain this integration. We also concluded that privatization would lead Fannie Mae and Freddie Mac to integrate vertically as well. Given the size of Fannie Mae and Freddie Mac, anticompetitive motives would at first seem to be a more reasonable concern. Upon examination, though, we concluded that Fannie Mae's and Freddie Mac's vertical integration would occur for the same reasons as the private labels' and not for anticompetitive reasons. One consequence of greater vertical integration appears to be greater concentration in the relevant markets. Although this greater concentration could lead to a lessening of competition and thus a reduction in welfare, we believe that the cost savings realized by vertical integration will outweigh any reduction in welfare due to a lessening of competition.

Finally, in the previous section, we considered the possible market structures and corresponding welfare consequences of privatization. To set a welfare benchmark, we began with the conventional market as it currently exists. We concluded that from a *partial*-equilibrium perspective (i.e., one that omitted the distortionary impact of taxation or possible crowding-out effects) trade was either at the welfare-maximizing level or *exceeded* the welfare-maximizing level. There is no question, however, that from a broader *general*-equilibrium perspective, welfare is not currently being maximized.

After privatization we foresaw two possible scenarios. One, there are not significant economies of scale, so the post-privatized market will be fairly competitive, increasing welfare over its level today. Two, there are significant economies of scale, in which case we predict a more concentrated market. The resulting lack of competition will have a negative impact on welfare. Offsetting this, however, are the following gains: (i) the elimination of the negative general-equilibrium consequences of the federal guarantee and (ii) the extension of the benefits of economies of scale to the jumbo market. Moreover, it is not clear that the degree of concentration in the post-privatized market would be any worse than the degree of concentration in today's market.

We could find no evidence that continued direct government intervention in the secondary markets (i.e., *not* privatizing) was necessary to correct any market imperfections.

The effect of privatization on homeowners is uncertain. As taxpayers, they benefit from the implicit reduction in taxation (because of both the direct transfer and the distortions). If the *current* level of trade *exceeds* the welfare-maximizing level (recall this is a possibility), then the mortgage rates paid by homeowners could go up under privatization. If the current level of trade equals the welfare-maximizing level (recall this too is a possibility), then their mortgage rates would be unchanged by privatization. If there are significant economies of scale, then mortgage rates might fall—particularly for jumbo mortgages—following privatization. Finally, if privatization increases the volatility of mortgage rates, homeowners or potential homeowners could be made worse off due to the increased uncertainty.

In summary, we conclude that it is highly likely that the privatization of Fannie Mae and Freddie Mac will be welfare improving. The small possibility of a negative welfare outcome arises more as a theoretical curiosity than as a serious issue for concern. Moreover, these conclusions are consistent with what has happened in other industries and other nations.[121]

Two final points need, however, to be kept in mind. First, privatization and laissez-faire are not the same concepts. In particular, as Vickers and Yarrow (1988) point out, maximizing the benefits of privatization can sometimes require vigilant antitrust oversight. Although some of the possible scenarios outlined above do not require antitrust oversight, it must be remembered that some could. If Fannie Mae and Freddie Mac are privatized under a lenient antitrust regime, then the welfare benefits of privatization could be reduced, although we think it unlikely that they would turn negative.

The second point to remember is that although privatization should increase welfare, it will create some losers. In particular, if the current level of trade exceeds the welfare-maximizing level, then the mortgage rates paid by homeowners could go up under privatization. To the extent that policymakers are concerned with distributional issues, this may have an impact on how they perceive privatization.

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[121] See, e.g., Morrison and Winston (1986) for a discussion of the benefits of airline deregulation or Vickers and Yarrow (1988) for a discussion of the benefits of privatization in Great Britain.

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