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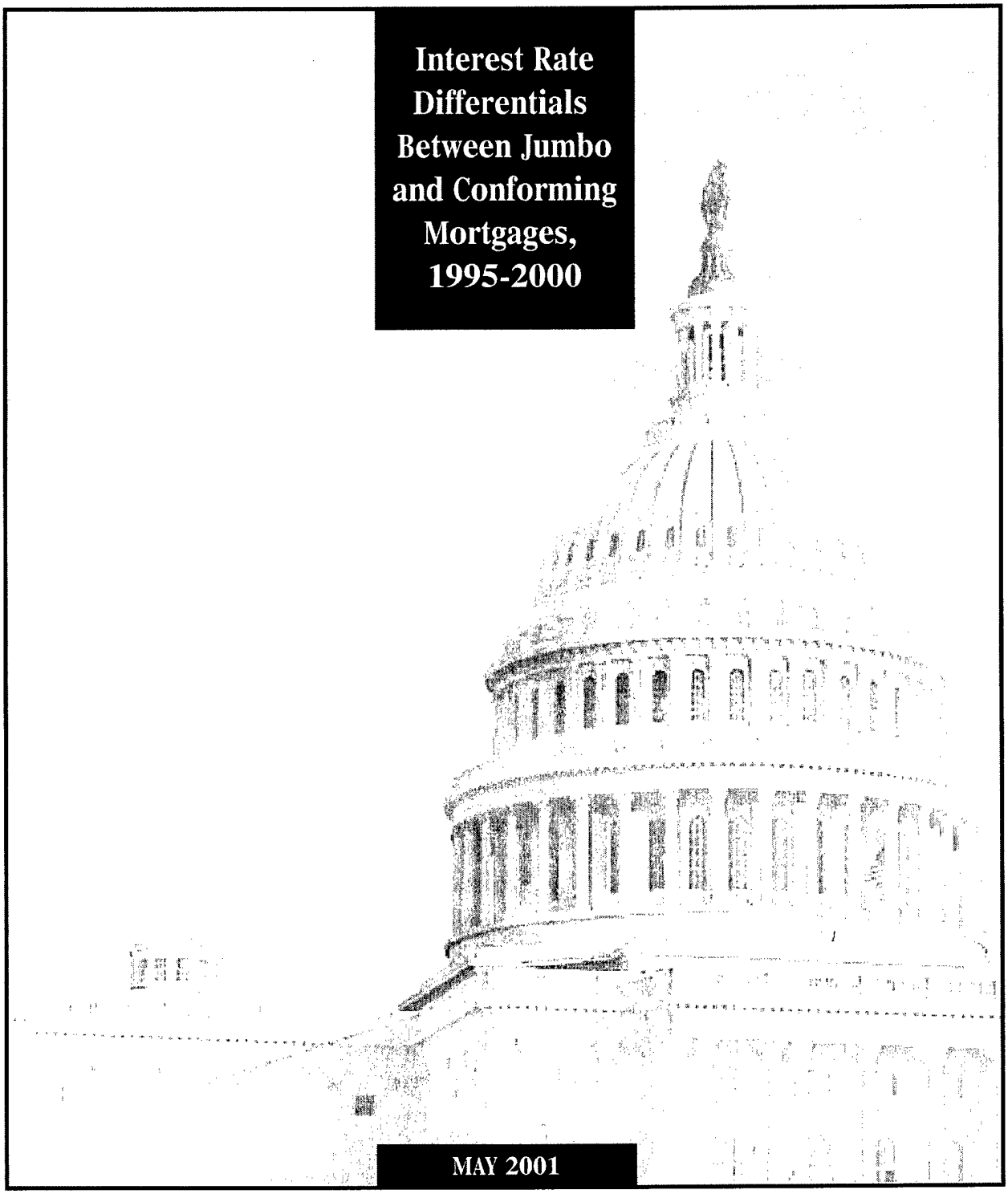
Interest Rate Differentials Between Jumbo and Conforming Mortgages, 1995-2000



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INTEREST RATE DIFFERENTIALS BETWEEN JUMBO AND CONFORMING MORTGAGES, 1995-2000

May 2001

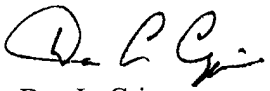
PREFACE

This Congressional Budget Office (CBO) paper estimates the difference between interest rates on two types of mortgage loans: conforming loans, which are for amounts of $275,000 or less, most of which are ultimately purchased by one of the three government-sponsored enterprises (GSEs) that deal with housing finance (Fannie Mae, Freddie Mac, and the Federal Home Loan Banks); and jumbo loans, which are larger than $275,000 and may not be purchased by the GSEs.

The degree to which interest rates on conforming loans are lower than rates on jumbo loans serves as a rough measure of the benefits that the housing GSEs pass on to borrowers in the mortgage market. This paper explains in more detail some of the estimates contained in CBO's new study *Federal Subsidies and the Housing GSEs*, prepared at the request of the Subcommittee on Capital Markets, Insurance, and Government-Sponsored Enterprises of the House Committee on Financial Services.

David Torregrosa of CBO's Microeconomic and Financial Studies Division wrote this paper under the supervision of Marvin Phaup and Roger Hitchner. Coleman Bazelon, Chuck Capone, Debbie Lucas, and Angelo Mascaro of CBO reviewed the analysis at many stages, as did Wayne Passmore of the Federal Reserve Board, Ron Feldman of the Federal Reserve Bank of Minneapolis, and Robert Seiler Jr. of the Office of Federal Housing Enterprise Oversight (OFHEO). Their assistance is greatly appreciated. Barry Anderson, Perry Beider, Arlene Holen, Susanne Mehlman, Preston Miller, David Moore, Nathan Musick, and Tom Woodward of CBO provided helpful comments, as did Patrick Lawler and Tom Lutton of OFHEO and Mario Ugoletti of the Treasury Department. Tim Forsberg and Joe McKenzie of the Federal Housing Finance Board provided the data used in this analysis and patiently responded to numerous questions. Eric Warasta and John McMurray of CBO and DaRon Ross and Sean Corcoran, formerly of CBO, provided research assistance at various stages of the analysis.

Chris Spoor edited the paper, and John Skeen proofread it. Rae Roy prepared the paper for publication, and Lenny Skutnik provided the printed copies. Annette Kalicki prepared the electronic versions for CBO's Web site (www.cbo.gov).



Dan L. Crippen
Director

May 2001

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INTRODUCTION AND SUMMARY

The federal government has a range of policies that promote home ownership. Most are aimed at lowering borrowing costs, either directly or indirectly. The tax deduction for mortgage interest payments, for example, is intended to make housing more affordable for most buyers. Likewise, mortgage guarantees provided by the Federal Housing Administration and the Department of Veterans Affairs are designed to improve access and make homes more affordable for moderate- and low-income borrowers. Indirectly, the federal government also subsidizes home mort-gages through three government-sponsored enterprises (GSEs)—Fannie Mae, Freddie Mac, and the Federal Home Loan Bank System—which serve as conduits between the capital markets and local housing markets.

This paper examines how those GSEs lower mortgage costs for borrowers; it also estimates the benefits that those enterprises pass through to borrowers. Specifically, the paper explains in detail some of the estimates used in the Congressional Budget Office's (CBO's) new report on the public benefits and costs of the housing GSEs.[1]

Introduction: The Role of Government-Sponsored Enterprises in Housing Markets

Government-sponsored enterprises are hybrid organizations, created by the federal government for a public purpose but with nongovernment ownership. Fannie Mae and Freddie Mac, whose shares are traded on the New York Stock Exchange, are owned by investors; the 12 Federal Home Loan Banks (FHLBs) are cooperatives owned by their members (mainly private financial institutions).[2] Those Congressionally chartered GSEs receive substantial benefits, or unpriced subsidies, from the government in return for accepting certain responsibilities in the housing finance markets and various restrictions on the scope of their business operations.

The GSEs do not originate mortgages; instead, they support a secondary (resale) market for mortgages by purchasing "conforming" mortgages that banks, thrifts, mortgage companies, and others originate. (Conforming mortgages are single-family loans that meet Fannie Mae's and Freddie Mac's underwriting standards and are eligible to be purchased by the GSEs.[3] Most of those mortgages are "conven-

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1. Congressional Budget Office, *Federal Subsidies and the Housing GSEs* (May 2001).

2. See Congressional Budget Office, *The Federal Home Loan Banks in the Housing Finance System* (July 1993).

3. For a description of how Fannie Mae views its role in housing markets and the risks it assumes, as well as its regulatory requirements, see Franklin D. Raines, "New Frontiers in Financial Institution Risk Management" (address given at the Brookings Institution, Washington, D.C., December 15, 2000), available at www.fanniemae.com/news/speeches/speech_158.html.

tional" mortgages, ones that have not been guaranteed or insured by the Federal Housing Administration or the Department of Veterans Affairs.) In addition, the GSEs guarantee securities backed by a pool of mortgages they purchase—a process known as securitization. Those securities entitle their buyers to a share of the cash flow of principal and interest from the underlying mortgages. In case of default on those mortgages, the GSEs guarantee payment to the holders of the securities. Unlike Fannie Mae and Freddie Mac, the FHLBs have only recently entered the secondary market on a limited, but growing, basis.[4] Their primary activity is making loans, or "advances," to their member institutions, including banks and thrifts (savings and loan associations and mutual savings banks). They also pay dividends to their members.

Although the federal government does not explicitly guarantee or insure the GSEs' securities, investors generally assume that an implicit government guarantee exists on the basis of numerous instances in which federal law treats GSE securities as no riskier than risk-free Treasury securities.[5] The GSEs' "agency" status effectively lowers their funding costs and allows Fannie Mae and Freddie Mac to offer loan originators attractive prices for mortgages. It also allows the FHLBs to pass their lower borrowing costs through to their member banks, which in turn pass part of that subsidy through to mortgage borrowers and other loan customers. How attractive the offering prices are and how much of the federal subsidy is passed through to borrowers depend in part on the extent of competition between Fannie Mae and Freddie Mac. Those two enterprises control almost all of the secondary market for conforming conventional loans, and the federal benefits they receive virtually preclude entry by completely private firms.[6] As a result of that limited competition, few analysts expect Fannie Mae and Freddie Mac to pass through all of the subsidy they receive.[7] Some of their federal benefits are retained as profits.

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4. Outstanding loans in the banks' Mortgage Partnership Finance Program increased from $1.8 billion in 1999 to $15.4 billion in 2000; see Federal Home Loan Bank of Chicago, "Federal Home Loan Bank of Chicago Reports Excellent 2000 Results" (press release, Chicago, Ill., February 20, 2001), available at www.fhlbc.com/2000_results.htm. For current details of the FHLBs' secondary-market activities, see Joy C. Shaw, "Fannie Mae, Freddie Mac Outweigh Rival: The FHLB Program Still Is Vying for Secondary-Mortgage Market," *Wall Street Journal*, February 6, 2001, p. B-15.

5. Congressional Budget Office, *Assessing the Public Costs and Benefits of Fannie Mae and Freddie Mac* (May 1996), pp. 9-12.

6. Fannie Mae and Freddie Mac purchased $1.1 trillion in fixed-rate mortgages in 1998 and 1999—more than two-thirds of the volume of conforming fixed-rate loans originated in those years. They also purchase adjustable-rate mortgages and multifamily loans. See Department of Housing and Urban Development, Office of Federal Housing Enterprise Oversight, *2000 Report to Congress* (June 15, 2000), p. 10.

7. For an analysis of the importance of industry structure in the secondary mortgage market, see John L. Goodman and S. Wayne Passmore, *Market Power and the Pricing of Mortgage Securitization*, Finance and Economics Discussion Series Working Paper No. 187 (Federal Reserve Board, March 1993); and Benjamin E. Hermalin and Dwight M. Jaffee, "The Privatization of Fannie Mae and Freddie Mac: Implications for Mortgage Industry Structure," in Department of Housing and Urban

At the request of the House Committee on Financial Services, CBO recently updated its 1996 estimate of the federal subsidy to the GSEs and the distribution of that subsidy among borrowers, the GSEs, and other beneficiaries.[8] An important component of that estimate—and the main focus of this paper—is determining the portion of the subsidy that benefits borrowers of conforming mortgages.

Summary: Determining the Benefits That the GSEs Pass Through to Borrowers

This analysis estimates the amount of subsidy that the housing GSEs pass through to borrowers by estimating a proxy measure—the average difference in interest rates (or adjusted spread) between conforming and jumbo mortgages that is attributable to the GSEs. (Conforming mortgages are currently subject to a ceiling of $275,000.[9] Jumbo loans are single-family loans larger than that amount.) The GSEs may provide other benefits to housing markets, such as increasing home ownership by moderate- and low-income families, but those benefits are not measured in this analysis.[10]

Following the analytic framework of previous researchers, CBO estimated the interest rate differential between 30-year fixed-rate jumbo and conforming mortgages using the Monthly Interest Rate Survey (MIRS) data set maintained by the Federal

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Development, Office of Policy Development and Research, *Studies on Privatizing Fannie Mae and Freddie Mac* (May 1996), pp. 225-302. For conditions under which secondary-market activities fail to lower mortgage rates, see Andrea Heuson, Wayne Passmore, and Roger Sparks, *Credit Scoring and Mortgage Securitization: Implications for Mortgage Rates and Credit Availability*, Finance and Economics Discussion Series Working Paper No. 2000-4 (Federal Reserve Board, December 21, 2000).

8. The 1996 estimate was published in Congressional Budget Office, *Assessing the Public Costs and Benefits of Fannie Mae and Freddie Mac*, pp. xi-xii and 18-20.

9. The conforming-loan ceiling is the same in all of the 48 contiguous states but is 50 percent higher in Hawaii and Alaska, which have substantially higher housing costs. That ceiling is adjusted each year for the change in housing prices (based on the average percentage increase in the value of homes with conventional mortgages over a 12-month period beginning in October, using the Federal Housing Finance Board's Monthly Interest Rate Survey).

10. Judging by the current distribution of credit risk, depository institutions, the Federal Housing Administration, and the Department of Veterans Affairs appear more willing to bear the mortgage credit risk of low-income families than the GSEs are. For a description of the affordable-housing goals that the Department of Housing and Urban Development sets for the GSEs, as well as a discussion of the types and characteristics of loans they purchase, see Department of Housing and Urban Development, "HUD's Regulation of the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac); Final Rule," *Federal Register*, vol. 65, no. 211 (October 31, 2000), pp. 65043-65229.

Housing Finance Board.[11] Unlike most previous studies, CBO's analysis used pooled data from the entire nation, had less restrictive data screens, and compared effective mortgage rates (mortgage interest rates adjusted for any points and fees paid by the borrower). Thus, CBO's estimate was based on a larger sample of mortgages and a better measure of borrowing costs than previous estimates. To isolate the difference in mortgage rates that is attributable to the GSEs, CBO controlled for some of the factors that affect rates, such as the size of the mortgage (the average cost of originating and servicing a mortgage falls with loan size) and the loan-to-value ratio (a proxy for the risk of default). As a test of the robustness of the estimates, CBO fitted the MIRS data set to a variety of alternatively specified models and also estimated the differential between jumbo and conforming mortgages using only zero-point loans.

Controlling for differences in loan characteristics, CBO estimates that rates on fixed-rate jumbo mortgages exceeded those on similar conforming mortgages by an average of 18 to 25 basis points (0.18 to 0.25 percentage points) between 1995 and June 2000, depending on the estimation technique and the data sample.[12] The interest rate differentials varied significantly throughout that period, in part because of changes in liquidity and risk premiums in the financial markets. In particular, differentials widened during "flights to quality," when investors sought safe, liquid securities, including the GSEs' debt issues and mortgage-backed securities. Spreads tightened when liquidity and risk premiums dropped and thereby reduced the advantages of the GSEs' "agency" status.

CBO's analysis is subject to some of the same limitations as previous studies; thus, those estimates of differentials may not be as precise as they appear. Because the MIRS data set has no information on borrowers' credit history, income, or wealth—which affect the rates that borrowers pay—CBO could not control for all of the economic factors that influence the jumbo/conforming interest rate differential. Consequently, CBO's estimates assume that borrowers in the conforming and jumbo markets present the same risks. But research indicates that both the likelihood of prepayment and the risk of default may be greater for jumbo mortgages.[13] Thus, if

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11. Using an established analytic framework makes it easier for other researchers to evaluate CBO's results. Moreover, Fannie Mae has validated estimates based on this approach in the past. See Fannie Mae, "Fannie Mae Review of the Cotterman-Pearce and Ambrose-Warga Papers," in Department of Housing and Urban Development, *Studies on Privatizing Fannie Mae and Freddie Mac*, pp. 218-219.

12. CBO did not estimate spreads for adjustable-rate mortgages, which have a wide variety of pricing provisions that complicate any comparison. Those mortgages make up less than 5 percent of the GSEs' mortgage holdings.

13. For evidence about prepayment rates and default losses, see Kyle G. Lundstedt, "The Influence of Non-Option-Related Variables Upon Corporate Default and Residential Mortgage Termination" (Ph.D. dissertation, University of California, Berkeley, 1999), p. 37.

all other factors are held equal, rates on jumbo mortgages are likely to be higher than rates on conforming mortgages. In addition, CBO's estimates do not control for conditions in local housing markets. If, as one study has shown, housing prices are more volatile for expensive properties, which are more likely to have jumbo mortgages, lenders should be charging jumbo borrowers more for that additional risk.[14] In summary, the available evidence suggests that CBO's approach probably overstates the jumbo/conforming interest rate differential and thus the amount of subsidy that the GSEs pass through to borrowers.

THE SOURCES AND SIGNIFICANCE OF DIFFERENCES BETWEEN JUMBO AND CONFORMING MORTGAGE RATES

The mortgage rates that most borrowers pay are determined by prices and yields in the secondary market. Two secondary markets for conventional mortgages exist: one for conforming mortgages, the housing loans that the GSEs may purchase, and one for jumbo mortgages, which they may not purchase. Selling conforming loans to the secondary market is particularly attractive for loan originators because they receive better prices for those mortgages than for jumbo loans.[15] Most loan originators match their underwriting criteria to the GSEs' guidelines for purchases. Moreover, they frequently use the GSEs' own automated underwriting software to identify credit risk more efficiently, speed up the loan application process, and facilitate sales in the secondary market.[16] A variety of factors influence prices and yields in that market—and thus interest rates on mortgages.

GSE Status

The "agency" status of the housing GSEs can be expected to lower interest rates on conforming loans relative to those on jumbo loans because investors in mortgage-

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14. See Brent W. Ambrose, Richard Buttimer, and Thomas Thibodeau, "A New Spin on the Jumbo/Conforming Loan Rate Differential," *Journal of Real Estate Finance and Economics*, vol. 23, no. 3 (forthcoming).

15. For an analysis of which loans a bank chooses to sell, see Wayne Passmore, Roger Sparks, and Jamie Ingpen, *GSEs, Mortgage Rates, and the Long-Run Effects of Mortgage Securitization*, Finance and Economics Discussion Series (Federal Reserve Board, forthcoming); and Wayne Passmore and Roger Sparks, "Putting the Squeeze on a Market for Lemons: Government-Sponsored Mortgage Securitization," *Journal of Real Estate Finance and Economics*, vol. 13, no. 1 (1996), pp. 27-43.

16. Automated underwriting has also facilitated the GSEs' entry into the subprime market (which targets borrowers with poorer credit histories). But most of their purchases have been at the upper end of that market (so-called A- loans) rather than at the lower and riskier end (B and C loans). However, automated underwriting may also lead originators to reduce the quality of the loans they choose to sell to the GSEs. See Wayne Passmore and Roger W. Sparks, "Automated Underwriting and the Profitability of Mortgage Securitization," *Real Estate Economics*, vol. 28, no. 2 (2000), pp. 285-305.

backed securities are willing to accept lower interest rates on securities guaranteed by GSEs than on jumbo loans guaranteed by private institutions.[17] There are several reasons for that greater willingness. First, most investors perceive an implied federal guarantee of GSE securities, so they virtually ignore any risk of default on those securities. Second, those securities enjoy the full advantages of GSE debt, so they are highly liquid. (Liquidity, which is the ability to trade a security quickly with little impact on its price, is particularly important during periods of stress in the financial markets.) Third, federal regulators require banks and thrifts to hold two and a half times less capital against GSE securities than against privately guaranteed mortgage-backed securities and whole loans.[18] They also impose no limits on the amount of GSE debt and securities that banks and thrifts can hold.

The secondary market for jumbo mortgage-backed securities is becoming more liquid as the volume of those securities increases. As a result, interest rates in that market are falling.[19] To increase the attractiveness of those privately guaranteed securities to investors, investment bankers generally take bundles of jumbo loans and create different classes of securities with different levels of risk. Risk for those securities can also be reduced through private credit enhancements, such as additional guarantees or collateralization.[20] Nevertheless, even the least risky securities backed by jumbo mortgages will be issued at significantly higher interest rates than GSE securities will. In large part, that difference results from the superior liquidity of the GSE issues and the fragmented nature of the jumbo market rather than from differences in credit risk.

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17. For a general analysis of differences between the conforming and jumbo markets, see General Accounting Office, *Housing Enterprises: Potential Impacts of Severing Government Sponsorship*, AO/GGD-96-120 (May 1996), pp. 54-70; and Robert S. Seiler Jr., "Estimating the Value and Allocation of Federal Subsidies to Fannie Mae and Freddie Mac" (paper presented at the American Enterprise Institute conference "Fannie Mae and Freddie Mac: Public Purposes and Private Interests," Washington, D.C., March 24, 1999), revised April 1, 1999.

18. Regulators require a 50 percent risk weighting for individual (or "whole") mortgages versus a 20 percent risk weighting for GSE mortgage-backed securities. In contrast, other types of loans to individuals and firms, as well as corporate debt, receive a full risk weighting, which requires 8 percent capital backing.

19. Although the jumbo market has been growing, it is still several times smaller than the market for mortgage-backed securities guaranteed by the GSEs. For example, $133 billion in jumbo mortgage-backed securities were issued in 1998, whereas purchases of conforming loans by Fannie Mae and Freddie Mac totaled $637 billion in 1998, which was a big year for refinancing. See *The Mortgage Market Statistical Annual*, vol. 1, *The Primary Mortgage Market* (Washington, D.C.: Inside Mortgage Finance Publications, 1999), pp. 1-2.

20. The level of credit enhancements varies among issuers of jumbo mortgage-backed securities (MBSs). See Jeffrey Wolf and others, *Theme and Variation—Understanding Why Credit Enhancement Levels Vary Among Jumbo MBS Issuers*, Structured Finance Special Report (New York: Moody's Investors Service, September 17, 1998).

Other Determinants of Interest Rates and Spreads

Prices paid in the secondary market are generally negotiated between lenders and the GSEs (or between lenders and investment banks in the case of jumbo loans) and reflect the variation in expected returns on the mortgages. Interest rates on mortgages, plus fees and charges, must cover those parties' costs, including the cost of originating and servicing loans; the risks of default, changing interest rates, and prepayment; capital requirements; the cost of funds; and other cost factors. Because the cost of originating and servicing loans is basically fixed, it falls relative to the size of the loan, which makes larger loans cheaper to originate and administer.

The risk of default varies with the relative size of the down payment, the creditworthiness of the borrower, the presence or absence of mortgage insurance, and the price volatility of the property carrying the mortgage. The larger the down payment, the safer the loan.[21] In fact, if the down payment is large enough, the lender may devote less effort to evaluating the creditworthiness of the borrower. If the down payment is small, however, private mortgage insurance may be required. Stable housing markets present less risk to lenders than volatile markets because the value of the mortgages' collateral is more predictable. If home prices have been rising rapidly in an area, for example, lenders may be more cautious because the housing market could be more susceptible to price declines. Lenders can compensate for volatility in housing prices by raising interest rates.

Interest rate risk can arise when loan originators borrow in short-term markets and lend in long-term markets. That mismatch of maturities between liabilities and assets makes lenders vulnerable to a rise in interest rates.[22] When rates rise, the value of assets with a fixed stream of payments falls. For example, if rates increase, banks receive the same stream of income from 30-year fixed-rate mortgages but pay more interest on short-term deposits, which can reduce their profitability.

Mortgage lenders can also be vulnerable to unexpected drops in interest rates, because in those circumstances, borrowers may choose to prepay their mortgage and refinance it at a lower rate. Prepayments are costly to a lender because the institution must generally reinvest the funds at a lower rate. Most lenders do not impose penalties for prepayment, but they try to account for that risk in their pricing, which is one reason that fixed-rate loans are generally made at higher interest rates than

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21. For an analysis of delinquency and default, see Robert B. Avery and others, "Credit Risk, Credit Scoring, and the Performance of Home Mortgages," *Federal Reserve Bulletin*, vol. 82, no. 7 (July 1996), pp. 621-648.

22. Shifts in the yield curve (which reflects the maturity structure of interest rates) also present risks. Long-term rates are generally above short-term rates when the economy is expanding, but they have often been below short-term rates during the onset of an economic contraction. Interest rate risk measures the difference in sensitivity of the market value of assets and liabilities to changes in rates.

adjustable-rate loans.[23] The savings to borrowers from refinancing a loan rise with the size of the loan, so prepayment risk increases with loan size.

Lenders have several strategies for mitigating interest rate and prepayment risks. First, they can shift most of the interest rate risk to borrowers by making adjustable-rate loans. Even though adjustable-rate mortgages generally carry lower rates than fixed-rate mortgages, they are much less popular with most borrowers in most interest rate environments.

Second, lenders can attempt to hedge their interest rate and prepayment risks by purchasing derivative products or entering into interest rate swap agreements. Hedging can reduce the variability of their income streams; however, the fees, transaction costs, and personnel costs of hedging can be significant. In addition, prepayment models used to decide on optimal hedging strategies are not always reliable.

Third, originators can use the secondary markets to reduce or eliminate interest rate risk. Selling loans outright eliminates that risk, but most depository institutions swap loans in the secondary market for mortgage-backed securities from Fannie Mae and Freddie Mac. Holding those securities allows lenders to still use mortgages as investments while guaranteeing them against default, enhancing liquidity, and lowering the amount of required capital. In addition, institutions can purchase mortgage-backed securities with expected payment flows that match their risk preferences better than whole loans do.[24]

Using the Jumbo/Conforming Differential as a Proxy for the Benefits Passed Through to Borrowers

No direct measure exists of the benefits that the housing GSEs pass through to borrowers.[25] Although some analysts suggest that those benefits can be measured by comparing the advertized rates that lenders offer for conforming and jumbo loans, that measure fails to control for other important factors that affect rates and may not represent the mortgage rates used in transactions. To isolate the difference in rates that is attributable to the presence of the GSEs in the conforming market, analysts use statistical methods that first adjust gross spreads for the impact of loan size, down

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23. Prepayment penalties are common on subprime loans but not on conventional conforming loans.

24. Secondary-market transactions can also leave interest rate risk unchanged. In swap programs, banks exchange their mortgages for GSE securities that represent ownership in the same mortgages.

25. The subsidy passed through to borrowers reduces mortgage interest rates, which should benefit borrowers, but other parties may also benefit. Some of the value of the subsidy could be capitalized in higher home prices and flow to builders of new homes or owners of existing homes.

payments, and other factors on interest rates. This paper refers to that adjusted interest rate spread as the jumbo/conforming differential.

Spreads can change with investors' preferences for risk and the premium they place on liquidity, prepayment risk, and other factors.[26] During periods of financial crisis, investors often increase their demand for safe and liquid assets. That "flight to quality" benefits the market for GSE securities and conforming mortgages but penalizes privately guaranteed mortgage-backed securities and jumbo mortgages. Thus, the jumbo/conforming differential can be expected to widen during periods of financial stress. Increased competition between Fannie Mae and Freddie Mac would also be likely to widen that differential because the agencies would be bidding up the price of conforming mortgages, which would allow lenders to lower interest rates on those mortgages. For example, the two GSEs have been competing since 1999 to enter into special business arrangements with large mortgage originators.[27] Conversely, as the market for jumbo-mortgage-backed securities matures or broadens as more issues are funded, liquidity in that market should improve and more economies of scale be realized in creating and administering the securities. Those structural improvements should contribute to tightening the differential over time.

Differences in borrowers' behavior in the jumbo and conforming markets may also influence spreads, but in ways that are difficult to assess. For example, borrowers in the jumbo market are less likely to have fixed-rate mortgages than borrowers in the conforming market (as evidenced by the fact that fixed-rate loans make up a lower percentage of jumbo mortgages than of all conventional loans; see Table 1). Whether that difference means that jumbo borrowers are more willing to accept the risk of changing interest rates or that lenders are less willing to originate fixed-rate mortgages in the jumbo market is uncertain.[28]

The jumbo/conforming differential is merely a proxy for the benefits passed through to borrowers because it is impossible to know what the housing market would be like without the GSEs. In addition, some analysts argue that the GSEs push

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26. For an analysis of spreads in other financial markets, see John V. Duca, "What Credit Market Indicators Tell Us," *Economic and Financial Review*, Federal Reserve Bank of Dallas (Third Quarter 1999), pp. 2-13.

27. Smaller lenders may also be getting better deals; see Robert Julavits, "Fannie, Freddie Moving to Woo Small Lenders," *American Banker* (March 14, 2001), p. 9. Some analysts also argue that the decline in the average guarantee fee the GSEs charge is evidence that they are competing strongly. However, others contend that increased use of credit enhancements may explain much of the decrease in fees. See Office of Federal Housing Enterprise Oversight, *2000 Report to Congress*, pp. 25-26.

28. Some analysts argue that the GSEs have less effect on the rates of adjustable-rate mortgages than on the rates of fixed-rate mortgages. See James E. Pearce and James C. Miller III, *Freddie Mac and Fannie Mae: Their Funding Advantage and Benefits to Consumers* (prepared for Freddie Mac, January 9, 2001), available at www.freddiemac.com/news/analysis/pdf/cbo-final-pearcemiller.pdf.

TABLE 1. SINGLE-FAMILY CONVENTIONAL LOANS AND THE CONFORMING LOAN LIMIT, 1995-2000

	As a Percentage of All Conventional Mortgages[a]				Fixed-Rate Jumbo Loans as a Percentage of All Jumbo Loans	Conforming Loan Limit[b] (Dollars)
	Conforming Loans	Jumbo Loans	Fixed-Rate Loans	Fixed-Rate Jumbo Loans		
1995	92.2	7.8	68	2.6	32.7	203,150
1996	90.7	9.3	73	3.2	34.8	207,000
1997	90.4	9.6	78	5.1	52.7	214,600
1998	91.3	8.7	88	5.2	59.2	227,150
1999	90.8	9.2	79	4.8	51.7	240,000
2000	90.1	9.9	76	3.7	37.0	252,700

SOURCE: Congressional Budget Office based on data from the Federal Housing Finance Board and the board's Monthly Interest Rate Survey, Tables 24 and 25.

a. Excludes loans that are insured or guaranteed by the federal government. Jumbo loans would be a larger percentage as a share of the total dollar value of conventional mortgages.

b. The limit on conforming loans for single-family homes is 50 percent higher in Alaska and Hawaii.

up rates in the jumbo market, in which case the differential overstates the extent to which the GSEs lower rates in the conforming market. Those analysts' argument is that by segmenting the relatively small jumbo market from the rest of the mortgage market, GSEs reduce the liquidity, size, and diversification of the jumbo market. That point is particularly important because the greater geographic concentration of jumbo mortgages in high-cost housing markets probably increases credit risk for privately guaranteed mortgage-backed securities.[29] Rates in the jumbo market would fall, they argue, if those loans could be packaged with conforming loans and sold to investors.

Research also indicates that differences in volatility between high- and low-priced homes can produce rate differentials. If housing prices are generally more volatile in the jumbo market—particularly at the upper end of that market—lenders should be protecting themselves against that risk by charging higher rates on jumbo

29. Passmore, Sparks, and Ingpen, *GSEs, Mortgage Rates, and the Long-Run Effects of Mortgage Securitization,* argues that combining the jumbo and conforming markets might significantly improve the liquidity of jumbo mortgage-backed securities.

loans.[30] In addition, some researchers have found that jumbo mortgages have higher rates of prepayment and default.[31] If lenders are accounting for those factors in their pricing, the effect of the GSEs on interest rate differentials may be overstated.

Conversely, Freddie Mac and Fannie Mae argue that the jumbo/conforming differential understates the benefits of the housing GSEs.[32] They contend that the GSEs lower rates in the jumbo market because the additional capital from GSEs that flows into the conforming market allows depository institutions to increase their supply of funds to the jumbo market, reducing rates there. However, it is unclear why depository institutions and other investors would funnel the extra funds largely to the jumbo mortgage market rather than to the entire range of investment opportunities, including the conforming mortgage market. Consequently, that substitution effect is unlikely to have a significant impact on rates in the jumbo market.

The GSEs also offer a related version of the substitution effect to bolster their claim that the differential understates the benefits they confer. To the extent that home buyers can substitute between conforming and jumbo mortgages, competition from the conforming market may force down rates for some jumbo loans. Some borrowers take out a first mortgage at the conforming limit and a second and riskier (home equity) loan for the remainder of their mortgage rather than a single jumbo mortgage. That strategy works best for borrowers when the total amount of their loans is not too far above the conforming limit.[33] Whether jumbo rates fall to remain competitive with conforming rates for situations in which borrowers can substitute between jumbo and conforming mortgages depends on the ability of originators to absorb the lower returns that come from lower rates.

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30. Ambrose, Buttimer, and Thibodeau, "A New Spin on the Jumbo/Conforming Loan Rate Differential." That study looked only at the Dallas housing market, which may be atypical. Moreover, it found that conforming loan markets were more volatile than jumbo markets in the 1990s but less volatile in the 1980s.

31. Lundstedt, "The Influence of Non-Option-Related Variables Upon Corporate Default and Residential Mortgage Termination," p. 37. Analyzing a sample of more than 400,000 30-year fixed-rate conventional mortgages, Lundstedt found that 24 percent of conforming loans were prepaid and only 0.46 percent were defaulted on during the 1980-1997 period. In contrast, 37 percent of jumbo loans were prepaid and 1.06 percent were defaulted on.

32. Some analysts argue that deposit insurance could affect interest rate differentials. But to the extent that subsidized federal deposit insurance lowers banks' cost of funds, interest rates on all loans are likely to be equally affected, so the differential is unlikely to change. See Pearce and Miller, *Freddie Mac and Fannie Mae: Their Funding Advantage and Benefits to Consumers.*

33. For a discussion of the range of strategies that borrowers have at their disposal to avoid taking out a jumbo loan, see Patrick Barta, "Jumbo Mortgages? Not A Huge Problem," *Wall Street Journal*, December 7, 2000, p. C-1.

The observed spread may also understate the benefits that Fannie Mae and Freddie Mac pass through to borrowers if low-cost advances (loans from the Federal Home Loan Banks to their members) disproportionately reduce rates in the jumbo market. Some analysts argue that member banks and thrifts direct a significant portion of their subsidized advances to the jumbo market.[34]

PREVIOUS RESEARCH ON JUMBO/CONFORMING DIFFERENTIALS

The benefits that the GSEs pass through to borrowers in the form of lower interest rates are usually measured as the difference in rates for conforming and jumbo mortgages that exists after accounting for factors other than the GSEs that affect those rates. Estimates of that differential are sensitive to both the time period being examined and the methodological approach.

The simplest method for determining the rate spread is to compare the advertized, or "posted," rates that lenders offer for conforming and jumbo loans. (Those rates are readily available in newspapers and on various Web sites.) However, for various reasons, those rates are only a rough measure.[35] First, not all borrowers qualify for posted rates, which may be available only to the best credit risks. Second, buyers who are particularly sensitive to interest rates may shop for the best rate. In particular, borrowers in the jumbo market may have a greater incentive to spend time searching for the lowest rate. Third, some analysts contend that lenders use their posted rates to manage their flow of mortgage applications. For example, if lenders are receiving too few applications, they lower rates.[36] For those and other reasons, most analysts use "contract" rates instead—the interest rates actually agreed to by lenders and paid by borrowers.

To isolate the impact of GSEs on the jumbo/conforming spread, researchers use statistical methods (regression analysis) to control for some of the other factors that are thought to affect rates. In particular, they generally adjust for the overall size of the mortgage and for its size relative to the price of the house—the loan-to-value (LTV) ratio, which is a proxy for default risk (because the larger the loan as a percentage of the home's price, the smaller the down payment and the greater the risk of default).

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34. See Pearce and Miller, *Freddie Mac and Fannie Mae: Their Funding Advantage and Benefits to Consumers.*

35. See Department of the Treasury, *Government Sponsorship of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation* (July 11, 1996), pp. 70-75.

36. In addition, banks may raise their posted rates to discourage too many applicants and then offer rates below those posted rates to their best credit risks.

Controlling for loan size, LTV ratios, and other variables (such as the month in which the loan was originated), Patric Hendershott and James Shilling found that contract rates on conforming loans were approximately 25 to 35 basis points lower than rates on jumbo loans in 1986.[37] Their sample was restricted to California, the largest housing market, for the months of May, June, and July, which were chosen as the peak of annual housing sales. A study by ICF, a consulting firm, estimated the jumbo/conforming differential at 10 to 23 basis points in 1987 for a seven-state sample.[38] Robert Cotterman and James Pearce, using data from 1989 through 1993, found that interest rates on conforming loans were 15 to 60 basis points lower than rates on jumbo loans.[39] Their differential varied greatly over that period and was lowest in the second half of 1993. That study separately analyzed California and 11 other states with the largest jumbo markets. CBO's 1996 study of the housing GSEs used Cotterman and Pearce's central estimate of 35 basis points as the amount by which the benefits of GSE status lowered mortgage interest rates.[40]

The importance of controlling for factors other than the GSEs that affect interest rates is highlighted by looking at unadjusted rates. Raw data on effective rates (contract rates that factor in any initial fees paid to lenders) indicate that in four of the past six years, unadjusted rates on jumbo loans were lower, not higher, than rates on conforming loans (see Table 2). Thus, unadjusted data might suggest that borrowers in the conforming market received little, if any, benefit from the GSEs' presence in that market.

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37. The range of 25 to 35 basis points reflects the sensitivity of the results to how the model is specified; see Patric H. Hendershott and James D. Shilling, "The Impact of the Agencies on Conventional Fixed-Rate Mortgage Yields," *Journal of Real Estate Finance and Economics*, vol. 2, no. 2 (June 1989), pp. 101-115.

38. ICF Inc., *Effects of the Conforming Loan Limit on Mortgage Markets* (prepared for the Department of Housing and Urban Development, March 1990), pp. 23-26 and 53-58.

39. Robert F. Cotterman and James E. Pearce, "The Effects of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation on Conventional Fixed-Rate Mortgage Yields," in Department of Housing and Urban Development, *Studies on Privatizing Fannie Mae and Freddie Mac*, pp. 97-168.

40. Congressional Budget Office, *Assessing the Public Costs and Benefits of Fannie Mae and Freddie Mac*, pp. 18-20.

TABLE 2. UNADJUSTED DIFFERENCES IN INTEREST RATES BETWEEN JUMBO AND CONFORMING LOANS, 1995-2000

	Effective Rate on Fixed-Rate Jumbo Loans (Percent)	Effective Rate on Fixed-Rate Conforming Loans (Percent)	Differential (Basis points)[a]
1995	8.16	8.18	-2
1996	8.08	7.98	10
1997	7.88	7.89	-1
1998	7.32	7.18	14
1999	7.38	7.44	-6
2000	8.24	8.25	-1

SOURCE: Congressional Budget Office based on data from the Federal Housing Finance Board and the board's Monthly Interest Rate Survey, Table 21.

NOTE: Effective rates are contract rates adjusted for any initial fees and other charges paid to the lender (amortized over 10 years). These raw data are not adjusted for various other factors that affect mortgage interest rates.

a. A basis point is one-hundredth of a percentage point.

ESTIMATING NATIONAL JUMBO/CONFORMING DIFFERENTIALS FOR 30-YEAR FIXED-RATE MORTGAGES SINCE 1995

CBO recently produced new estimates of jumbo/conforming differentials in effective rates for the 48 contiguous states.[41] Following the approach of Cotterman and Pearce, CBO did not estimate differentials directly. Instead, it estimated the effective rate on individual mortgage loans as the dependent variable in a regression equation, with the natural logarithm of loan size, the LTV ratio, the month of origination, the type of lender, a conforming-loan indicator (to signify whether the mortgage is a conforming loan), and a new-house indicator serving as independent, or explanatory, variables. The coefficient on the conforming-loan indicator picks up the size of the differential. Because the differential is expected to vary considerably over time, CBO

41. As a matter of convenience, CBO's analysis excludes the housing markets in Hawaii and Alaska, where the ceiling on conforming loans is 50 percent higher than in the other 48 states. The estimate of differentials is a fixed effect calculated in a regression equation that controls for various other factors that might influence interest rates.

ran separate regressions for each quarter from 1995 through the second quarter of 2000.

The main regression equation that CBO used (Equation 1) takes the following form:

$$\text{Effective rate} = \text{constant} + b_1(\text{log loan size}) + b_2(\text{LTV}) + b_3(\text{Month}) + b_4(\text{Lender Type}) + b_5(\text{New House}) + b_6(\text{Conforming Loan}) + \text{error term}$$

with b_i as the coefficient on the explanatory variable that follows in parentheses.

Effective loan rates are contract rates adjusted for any points (initial fees and charges expressed as a percentage of the loan) paid to the lender. Lenders sometimes charge points to cover their origination costs. They also offer lower rates and higher points to appeal to buyers who are less likely to prepay a mortgage. In general, buyers who expect to stay in a home for a significant period (say, more than five years) often find it financially advantageous to "buy down" their interest rate by paying more points up front.[42]

Effective rates can be expected to decline as loan size increases because origination and servicing costs are essentially fixed and fall as a percentage of the loan amount as loan size rises. LTV ratios measure default risk, so effective rates should increase with higher LTV ratios. The constant term in the equation and the indicators for month of loan origination pick up the effect of the level of other interest rates, such as Treasury rates, on mortgage rates. (Given that CBO estimated equations using cross-section data, little would be gained by adding Treasury rates directly as an explanatory variable.)

CBO expects the coefficient on the indicator for lender type—whether mortgage companies (Lender 1), commercial banks (Lender 2), or thrifts (which serve as the benchmark for that variable)—to be statistically insignificant. Although some institutions, such as savings and loans, may have had comparative advantages in originating mortgages in the past, the playing field is widely believed to be more level now. The new-house indicator is intended to pick up the possibility that rates are lower for new homes than for older homes, either because of lower default rates or because builders sometimes offer access to preferential financing through an authorized lender as an incentive to buy rather than lowering the price of a home. For

42. The Federal Housing Finance Board computes effective interest rates by amortizing points over 10 years, which it assumes is the effective maturity of home mortgages. Because homeowners who use points to buy down their mortgage rate are likely to stay in their home longer than average, that method may overstate their effective rate. However, unless jumbo borrowers respond differently to points than conventional borrowers do, the method used to translate points into effective rates should not bias the estimate of the differential.

example, some builders induce buyers to use their lender in exchange for paying closing costs on the loan.

The Data Set

CBO's analysis used data from the Federal Housing Finance Board's Monthly Interest Rate Survey, which is the only large, publicly available sample of contract rates for first mortgages.[43] MIRS excludes several types of loans: those insured or guaranteed by either the Federal Housing Administration (FHA) or the Department of Veterans Affairs[44]; loans that refinance existing mortgages[45]; and loans above a certain size ($636,750 in 2000), which are likely to be in the thinnest segment of the mortgage market. Lenders who specialize in serving the subprime market (which targets borrowers with blemished credit histories) are excluded as well. Despite those exclusions, the sample is still large. In 1999, for example, it contained over 250,000 fixed- and adjustable-rate loans. All of those loans closed in the last five days of the month, which is the survey's sampling period. Fannie Mae and Freddie Mac use information from MIRS to determine the increase in the conforming-loan ceiling each year. (However, the survey does not indicate which conforming loans are purchased by Fannie Mae or Freddie Mac.)

The MIRS data set suffered from measurement errors in the 1980s and early 1990s. For example, lenders frequently misreported adjustable-rate mortgages as fixed-rate mortgages. Consequently, Cotterman and Pearce's 1996 study filtered out interest rates that appeared to be too low for fixed-rate mortgages. Because the Federal Housing Finance Board now screens the data more effectively for errors in reporting rates, the data quality is much higher.[46] As a result, CBO minimized the use of filters, although it did screen for "buydown" rates—rates that are lower in the first year than in subsequent years.[47]

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43. Complete details about the survey and its data set are available at the Federal Housing Finance Board's Web site (www.fhfb.gov/MIRS/MIRS.htm).

44. Fannie Mae and Freddie Mac can and do buy mortgages guaranteed by the FHA; however, those purchases are an insignificant part of their business.

45. The market makes little or no distinction between mortgages used to purchase a home and those used for refinancing. Purchases and guarantees of refinanced loans account for more than half of the GSEs' business in some years. See Office of Federal Housing Enterprise Oversight, *2000 Report to Congress,* p. 40.

46. The board screens out observations in which the contract rate is more than 100 basis points below the previous month's average rate.

47. "Teaser" rates are more prevalent on adjustable-rate mortgages; however, fixed-rate mortgages may have "buydowns," which act like teasers but are usually paid by the seller of the house.

MIRS also reports a weight for each lender that the board uses to adjust the sample's distribution to that of the general population. The board calculates those weights on the basis of the type of mortgages the institution holds relative to those of other lenders, the type of institution, and its geographic location. For instance, if the sample contains a smaller proportion of savings and loans in Texas than exists in the population, loans reported by Texas thrifts will receive a weight greater than 1. Cotterman and Pearce's 1996 study used the weighted observations, but CBO relied on the unweighted observations because the market for mortgages is now essentially a national one in which neither region nor type of lender is likely to be systematically related to interest rates.[48] (CBO did, however, run regressions using the sample weights as a test for robustness and comparability.)

Although CBO's analysis filtered out some observations believed to be misreported or unlikely to meet the GSEs' underwriting standards, in general, CBO screened out fewer observations than did some other studies to avoid erroneously discarding valid data. Cotterman and Pearce, for example, restricted their sample to loans with an LTV ratio of at least 70 percent. CBO's sample includes loans with LTV ratios between 20 percent and 97 percent. (Loans smaller than 20 percent of the home's value might be second mortgages, and until recently, the GSEs did not buy loans with LTV ratios over 97 percent.) CBO also restricted the data to loans between 25 percent and 200 percent of the conforming limit for technical reasons.[49]

The MIRS data set has no information about any of the characteristics of individual borrowers—such as credit history, income, or wealth—that affect the rates borrowers pay. It also lacks information about local real estate conditions. Since jumbo loans have higher default rates than conforming loans, those omissions could cause CBO's estimate of the differential to be too high. In addition, MIRS does not identify which loans have private mortgage insurance or its cost.[50] That omission

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48. Some analysts qualify that assertion—for example, by saying that the lack of uniformity in state laws covering bankruptcy and foreclosure may affect mortgage rates and loan size. See Karen Pence, "Foreclosing on Opportunity? State Laws and Mortgage Credit" (draft, University of Wisconsin at Madison, December 2000).

49. The log-linear specification of loan size in the regression makes both the loan-size variable and the conforming-loan variable sensitive to very small or large loans. Cotterman and Pearce also limited their sample for that reason, but with a higher upper bound.

50. No evidence exists that would allow CBO to judge whether omitting private mortgage insurance from the analysis affects the estimates of the interest rate differential. A typical fee for private mortgage insurance is 35 to 50 basis points per year for a 90 percent LTV mortgage. For an analysis of private mortgage insurance, see Stanley D. Longhofer, "PMI Reform: Good Intentions Gone Awry," *Economic Commentary*, Federal Reserve Bank of Cleveland (March 15, 1997); and Glenn B. Canner, Wayne Passmore, and Monisha Mittal, "Private Mortgage Insurance," *Federal Reserve Bulletin*, vol. 80, no. 10 (October 1994), pp. 883-899.

could affect the precision of the estimated coefficients on the LTV ratios. For example, a loan with a 10 percent down payment and private mortgage insurance may be as safe, or even safer, to the lender as one with a 20 percent down payment but no insurance.

Results

CBO's analysis found that interest rates on jumbo mortgages remained higher than rates on conforming mortgages after controlling for some of the other loan characteristics that affect those rates. Based on Equation 1, the average differential (or adjusted spread) between the first quarter of 1995 and the second quarter of 2000 was 23 basis points. The quarterly differentials ranged from 4 basis points to 35 basis points (see Table 3).[51] All but one of the quarterly estimates (the 4.1 basis point differential for the first quarter of 1995) were statistically significant—that is, statistically different from zero.

Spreads in other financial markets vary substantially over time as premiums for risk and liquidity change; consequently, the estimated differentials in the mortgage market can also be expected to vary. The high differentials in 1998, which averaged 32 basis points, stand out. The financial markets' early flight-to-quality response to the Asian currency crisis, which began in 1987, is the most likely explanation for the high differentials in the first half of 1998. Other analysts point to unusually heavy activity in mortgage markets.[52] The flight to quality more clearly explains the large differentials in the second half of the year, which persisted into the first quarter of 1999. The spreads between Treasury rates and interest rates for most

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51. The 22 quarterly estimates have an unweighted mean of 22.8 basis points and a standard deviation (a statistical measure of the distribution of observations around the mean) of 7.9 basis points. As a test for robustness and comparability, CBO ran the same regression with the weighted observations and found relatively little difference. Using the weighted observations raised the differential by less than 0.5 basis points, on average. One reason that CBO relied on unweighted observations is that it was uncertain how the weights were determined and how they should be interpreted.

52. Rates on Treasury securities, for example, fell in the first half of 1998, at least in part because of the effects of the Asian crisis. But spreads in other financial markets were relatively stable during the first half of 1998 compared with the second half. For a description of developments in international financial markets and domestic housing markets during that period, see Federal Reserve Board, "Monetary Policy Report to the Congress," *Federal Reserve Bulletin*, vol. 84, no. 8 (August 1998), pp. 586, 589-591, and 600-603.

TABLE 3. DIFFERENCES IN EFFECTIVE INTEREST RATES BETWEEN JUMBO AND CONFORMING 30-YEAR FIXED-RATE LOANS, BY QUARTER, WITH LOAN SIZE SPECIFIED AS A NATURAL LOG, 1995-2000 (In basis points)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Average
		1995			
Differential	4.1[a]	20.7	32.3	32.0	22.3
Standard Error of Differential	4.3	1.9	1.6	1.6	
Number of Observations	5,987	14,118	17,904	13,927	
		1996			
Differential	28.3	19.0	17.4	15.6	20.1
Standard Error of Differential	1.8	2.0	1.7	1.6	
Number of Observations	16,307	15,620	13,285	12,525	
		1997			
Differential	17.3	10.3	17.5	22.8	17.0
Standard Error of Differential	1.6	1.1	1.0	1.0	
Number of Observations	14,637	24,865	28,775	28,821	
		1998			
Differential	33.1	30.2	30.2	35.2	32.2
Standard Error of Differential	0.9	0.8	0.8	0.8	
Number of Observations	33,193	49,061	48,064	44,592	
		1999			
Differential	28.4	19.0	20.3	23.7	22.9
Standard Error of Differential	1.0	0.8	1.3	1.3	
Number of Observations	38,633	43,810	31,705	24,949	
		2000[b]			
Differential	19.5	25.5			22.5
Standard Error of Differential	1.5	1.3			
Number of Observations	20,860	33,539			
		1995-2000			
Average Quarterly Differential					22.8

SOURCE: Congressional Budget Office based on the Federal Housing Finance Board's Monthly Interest Rate Survey.

NOTES: Loans that were more than 25 percent below the conforming limit or 200 percent above the limit were dropped from the analysis, as were mortgages with loan-to-value ratios below 20 percent or above 97 percent.

A basis point is one-hundredth of a percentage point.

a. Coefficient is statistically insignificant at the 10 percent level (that is, it may be zero).

b. CBO's estimates cover only the first two quarters of 2000.

securities expanded greatly in the second half of 1998 after Russia defaulted on its bonds in mid-August and demand for U.S. government securities increased.[53]

In CBO's analysis, estimated differentials were as large at the end of the period as at the beginning. In contrast, Cotterman and Pearce found differentials generally narrowing over the period of their study as the secondary market for jumbo mortgage-backed securities became increasingly liquid.

The Role of Other Explanatory Variables

By specifying loan size in natural logarithmic form, Equation 1 embodies the premise that as the loan amount rises, the interest rate falls because of the declining average cost of originating and servicing loans. As expected, the results show effective mortgage rates declining with loan size. (A complete set of regression results for Equation 1 appears in Appendix A.)

By contrast, rates generally rise with loan-to-value ratios. The regression used several ranges of LTVs: 50 percent to 70 percent (LTV1), 70 percent to 80 percent (LTV2), 80 percent to 90 percent (LTV3), and 90 percent to 97 percent (LTV4). The excluded category of loans, those with LTV ratios of 20 percent to 50 percent, has the lowest default risk in the sample, so it serves as the benchmark. The coefficients on the variable LTV4 for 1999 indicate that the effective rates on loans with LTV ratios between 90 percent and 97 percent were 9 to 13 basis points higher than rates on loans with LTV ratios below 50 percent (see Table A-5 in Appendix A). However, over the 1995-2000 period, the coefficients on the LTVs were not always statistically significant.[54] That may not be surprising given that CBO could not identify the presence of private mortgage insurance, which can substitute for a higher mortgage rate. The GSEs generally require that private mortgage insurance be taken out on loans with LTV ratios above 80 percent.

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53. For analysis of the market's changing risk perceptions during that period, see Counsel of Economic Advisers, *Economic Report of the President* (February 1999), pp. 55-62; and Federal Reserve Board, "Monetary Policy Report to the Congress," *Federal Reserve Bulletin*, vol. 85, no. 3 (March 1999), pp. 147-177. First Manhattan, a consulting firm hired by Fannie Mae, argues that increases in Fannie Mae's monthly purchases significantly lowered rates for new conforming mortgages in September and October 1998. See Alden L. Toevs, "A Critique of the CBO's Sponsorship Benefit Analysis" (report submitted by the First Manhattan Consulting Group to Fannie Mae, September 6, 2000). Also see Capital Economics, "An Economic Analysis of Freddie Mac's (and Fannie Mae's) Contribution to Liquidity in the Residential Mortgage-Backed Securities Market During the Credit Crunch of 1998" (unpublished paper, May 2000). The Congressional Budget Office's estimates of both the size and the timing of the effect of those purchases differ from Toevs's estimates.

54. Tables for all of the regressions not shown are available from the author.

Interest rates also differ by type of lender in some periods, but those differences were not always statistically significant or persistent. For example, rates on loans originated by commercial banks were 2 to 6 basis points higher than rates on loans originated by thrifts in the third and fourth quarters of 1998 but 5 to 12 basis points lower than rates on loans originated by thrifts in 1999. Rates on loans originated by mortgage companies were slightly lower than those on loans originated by thrifts in the first two quarters of 1999 but significantly higher in the last two quarters.

Effective rates were not consistently lower on loans for new homes than on loans for existing homes; sometimes they were higher, as in the first quarter of 1999. Moreover, the new-home variable was often statistically insignificant.

Given that CBO could not control for differences in borrowers' credit quality or the expected price volatility of the house, CBO's method cannot be expected to explain much of the variation in effective rates. Still, it is noteworthy that it explains less than 10 percent of the variation in effective loan rates (as indicated by the low adjusted r-squares shown in Appendix A).[55] In contrast, Cotterman and Pearce were able to explain more than 25 percent of the variation in rates in their earlier sample using observations only from California and 20 percent of the variation in rates using observations from 11 states.[56] The lower explanatory power of CBO's approach may result from its focus on the national market, use of a slightly different dependent variable, and later time period.

THE ROBUSTNESS OF CBO'S ESTIMATES

As a check on the reliability of its estimates, CBO fitted the MIRS data to a variety of alternatively specified equations. The results varied slightly with changes in the form of the equation. For example, specifying loan size using a quadratic transformation, using 15-year mortgages rather than 30-year mortgages, and sampling loans with no fees or other charges produced small variations in the jumbo/conform-

55. When CBO ran the regression equation using annual rather than quarterly data, it was able to explain 37 percent of the variation in effective rates over the period. The adjusted r-squares ranged from 0.13 to 0.52.

56. See Cotterman and Pearce, "The Effects of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation on Conventional Fixed-Rate Mortgage Yields," pp. 161-62, Tables 16 and 17.

ing differential.[57] CBO also compared its results with raw nonregression measures of the differential and with recent estimates by other researchers.

Alternative Ways to Specify Loan Size

Analysts have suggested that estimates of the jumbo/conforming differential may be sensitive to the way in which the explanatory variable for loan size is specified.[58] The reason is that some factors—such as origination and servicing costs, which are relatively fixed with respect to loan size—should cause mortgage rates to decline as loan size increases, but other factors may push up rates as loan size increases. As an example of the latter, because the benefits of refinancing rise with loan size, so does the risk of prepayment. In addition, the jumbo market, particularly at the high end, is smaller than the conforming market in almost all areas of the country, which means greater underlying volatility in home prices and thus higher risk of default. Greater prepayment and default risks would put upward pressure on rates as loan size increases.

If rates do start to rise with loan size beyond some point, that effect cannot be measured by the logarithmic functional form. CBO's analysis of raw MIRS data suggests that may be a problem. For example, the data for the second quarter of 1999—unadjusted for either month of origination or LTV ratio—indicate that rates (adjusted for points) fall steadily with loan size up to the conforming limit, make a discrete jump of 19 basis points as soon as the conforming limit is exceeded, then trend down slightly, before rising just at or immediately above 200 percent of the conforming limit.[59]

Specifying loan size in quadratic form is an alternative to the logarithmic form. CBO's equation with quadratic form uses loan size (Size) and the square of loan size

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57. Although CBO cannot be sure that the adjusted spreads are not sensitive to the presence of private mortgage insurance, one admittedly imperfect test suggests that any effect is likely to be fairly small. When CBO excluded loans with down payments of less than 20 percent, which are the loans most likely to carry private mortgage insurance, the estimated jumbo/conforming differential was 23.9 basis points, just 1 basis point higher than the estimates for Equation 1.

58. Department of the Treasury, *Government Sponsorship of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation* (July 11, 1996), p. 73. CBO's approach assumes that loan size is not affected by interest rates. In reality, however, borrowers are likely to adjust the size of their mortgage to changes in interest rates. For example, they may take out bigger loans when rates are lower. That potential endogenicity problem may bias CBO's coefficients on loan size and perhaps also spill over to the dummy variable for conforming loans.

59. That analysis, which is not a regression result, is available from the author. The data also show a relatively large number of loans either right at or just below the conforming limit and few loans immediately above or even 10 percent above the limit. That clustering is additional evidence that rates are lower for conforming loans.

(Size Squared) as explanatory variables. That functional specification allows rates to first fall and then rise with loan size. (The coefficient on the Size variable is negative and the coefficient on the Size Squared variable is positive.) According to regression analysis of that equation, the coefficients on the variables for loan size in the second quarter of 1999 indicate that rates fell with loan size until $341,600—about $100,000 above the conforming-loan limit in that year—and then increased (with all else held constant).[60] For most quarters, the quadratic specification of loan size does a better job of handling the more expensive loans in the sample than the log specification does, as indicated by coefficients on Size and Size Squared that generally are statistically significant. The estimated jumbo/conforming spread averages about 22 basis points over the period with a quadratic specification versus 23 basis points when loan size is specified in log form (see Table 4).[61] The similarity of those estimates is evidence of their robustness. (Complete regression results for the alternative equation appear in Appendix B.)

Differentials for 15-Year Fixed-Rate Mortgages Relative to 30-Year Mortgages

Annual estimates for 15-year fixed-rate mortgages show an average jumbo/conforming differential of 25 basis points over the 1995-2000 period (see Table 5). The fact that the differential is only about 1 basis point higher than the comparable spread for 30-year mortgages using annual estimates is another sign of robustness.[62] Some difference in spreads can be expected because the conforming and jumbo markets for 15-year fixed-rate loans are much smaller and therefore less liquid than the markets for 30-year loans.

Using Rates on No-Point Loans to Determine Differentials

Many ways exist to adjust mortgage interest rates for the fees, points, and other charges that most borrowers pay, and the method used might affect estimates of spreads. In the MIRS data, those additional costs are amortized over 10 years and

60. The quadratic transformation imposes a symmetry on rate changes; however, rates may fall more quickly than they rise with loan size. If that is the case, in the above example rates may start rising before a loan amount of $341,600.

61. When loan size was specified as a quadratic transformation, the mean for the 22 quarterly estimates of the spread was 21.8 basis points, with a standard deviation of 7.7 basis points.

62. The average of annual estimates is slightly different from the unweighted average of quarterly estimates because mortgage originations show some seasonal variation. For example, they tend to be lower than average in the first quarter.

TABLE 4. DIFFERENCES IN EFFECTIVE INTEREST RATES BETWEEN JUMBO AND CONFORMING 30-YEAR FIXED-RATE LOANS, BY QUARTER, WITH LOAN SIZE SPECIFIED IN QUADRATIC FORM, 1995-2000 (In basis points)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Average
		1995			
Differential	5.4[a]	18.4	34.4	29.4	21.9
Standard Error of Differential	6.1	2.8	2.3	2.4	
Number of Observations	5,987	14,118	17,904	13,927	
		1996			
Differential	28.7	23.7	18.0	12.7	20.8
Standard Error of Differential	2.5	3.0	2.5	2.3	
Number of Observations	16,307	15,620	13,285	12,525	
		1997			
Differential	18.7	8.3	17.2	21.5	16.4
Standard Error of Differential	2.3	1.6	1.4	1.3	
Number of Observations	14,637	24,865	28,775	28,821	
		1998			
Differential	32.0	28.6	29.5	29.3	29.9
Standard Error of Differential	1.3	1.1	1.1	1.1	
Number of Observations	33,193	49,061	48,064	44,592	
		1999			
Differential	27.2	17.2	17.0	16.8	19.6
Standard Error of Differential	1.4	1.1	1.9	1.8	
Number of Observations	38,633	43,810	31,705	24,949	
		2000[b]			
Differential	20.2	25.0			22.6
Standard Error of Differential	2.2	1.9			
Number of Observations	20,860	33,539			
		1995-2000			
Average Quarterly Differential					21.8

SOURCE: Congressional Budget Office based on the Federal Housing Finance Board's Monthly Interest Rate Survey.

NOTES: Loans that were more than 25 percent below the conforming limit or 200 percent above the limit were dropped from the analysis, as were mortgages with loan-to-value ratios below 20 percent or above 97 percent.

A basis point is one-hundredth of a percentage point.

a. Coefficient is statistically insignificant at the 10 percent level (that is, it may be zero).

b. CBO's estimates cover only the first two quarters of 2000.

TABLE 5. ANNUAL DIFFERENCES IN EFFECTIVE INTEREST RATES BETWEEN JUMBO AND CONFORMING 15-YEAR AND 30-YEAR FIXED-RATE LOANS, WITH LOAN SIZE SPECIFIED AS A NATURAL LOG, 1995-2000 (In basis points)

	1995	1996	1997	1998	1999	2000[a]	Average, 1995-2000
15-Year Mortgages							
Differential	24.6	19.2	22.1	29.2	26.8	29.7	24.9
Standard Error of Differential	2.5	2.4	1.6	1.1	1.5	3.2	
Number of Observations	7,903	9,151	12,531	23,835	15,774	4,516	
30-Year Mortgages							
Differential	27.0	20.3	17.4	32.0	23.4	22.9	23.9
Standard Error of Differential	1.0	0.9	0.6	0.4	0.5	1.0	
Number of Observations	51,936	57,737	97,098	174,910	139,097	54,399	

SOURCE: Congressional Budget Office based on the Federal Housing Finance Board's Monthly Interest Rate Survey.

NOTES: Regressions were run for each year using dummy variables for the months, with loan size specified in log form. The low standard errors indicate that all of the estimates of the coefficients for the differentials are statistically significant.

A basis point is one-hundredth of a percentage point.

a. CBO's estimates cover only the first six months of 2000.

added to the contract rate to determine the effective rate.[63] Whether that method overstates or understates effective rates is uncertain. CBO has no reason to believe that the adjustment distorts the jumbo/conforming differential (in the absence of different behavior by borrowers in the two markets).[64] Nevertheless, for the sake of

63. MIRS still assumes that 10 years is the average life of a mortgage, but that assumption may be dated. Many market participants argue that the average life of a 30-year fixed-rate mortgage is now closer to five to seven years. The cost of refinancing a loan has fallen, and borrowers are now more aware of the advantages of refinancing when interest rates decline.

64. Borrowers in the jumbo market may well behave differently than those in the conforming market. For example, borrowers in different tax brackets may respond differently to the trade-off between points and the interest rate paid. Points paid on a mortgage are generally fully tax-deductible in the year the mortgage is originated. Because jumbo borrowers are more likely to be in higher tax brackets than borrowers with conforming loans, they might find paying more points a more attractive trade-off than conforming borrowers would. However, the MIRS data set reveals no consistent pattern with respect to the points paid by jumbo and conforming borrowers. In some years, the average points paid on jumbo loans exceed the points paid on conforming loans, but between 1997 and 2000, fewer points were paid on jumbos. See MIRS Table 21, "Terms on Conventional Single-Family Mortgages, All Homes, Jumbo and Nonjumbo Mortgages," available at www.fhfb.gov/MIRS/MIRS_loans_downloads.htm.

comparison, CBO also estimated differentials using contract rates for loans with no points, fees, or other charges.

In general, the spreads for no-point loans were smaller than those for the entire sample (with loan size specified in natural logarithmic form and regressions run on quarterly data). During the 1995-2000 period, quarterly spreads for no-point loans averaged 18 basis points whereas those for the entire sample of 30-year fixed-rate loans averaged 23 basis points (see Table 6).[65] However, the number of observations used in that regression was significantly smaller, since no-point loans make up less than one-quarter of the loans in the entire sample. (Complete regression results for no-point loans appear in Appendix C.)

Nonregression Methods to Estimate Differentials

Comparing effective rates on loans just above the conforming limit with those at the limit provides a raw measure of spreads unadjusted for other factors (such as LTV ratios) that affect rates. CBO's analysis indicates that the difference between rates at 110 percent to 120 percent of the conforming limit and those at the limit averaged 22.5 basis points, or about 0.3 basis points less than the estimate of 22.8 basis points using regression analysis (see Table 7).[66] That result is based on the difference between the mean observations in those categories of loan size; however, given the size of the estimate's standard deviations, none of the differences are statistically significant.[67]

Comparisons with Other Estimates

CBO's finding of average jumbo/conforming differentials in the range of 18 to 25 basis points is consistent with several recent studies prepared for Fannie Mae and Freddie Mac, a study by academic economists, and another by the Federal Reserve

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65. The mean of the 22 quarterly estimates for no-point loans was 17.6 basis points, with a standard deviation of 9.7 basis points.

66. The range of 110 percent to 120 percent of the conforming limit was chosen to ensure a large number of observations. There is widespread evidence of borrowers clustering at or just below the conforming limit, with few loans made 10 percent above the limit. Most borrowers can easily avoid being just over the conforming limit by taking out a second mortgage. Consequently, the relatively few mortgages in the range of 100 percent to 110 percent of the limit may not be representative of all jumbo borrowers.

67. A full reporting of mortgage rates, including the adjustment for points, as a function of loan size by quarter is available from the author.

TABLE 6. DIFFERENCES IN EFFECTIVE INTEREST RATES BETWEEN JUMBO AND CONFORMING 30-YEAR FIXED-RATE LOANS WITH NO POINTS, BY QUARTER, 1995-2000 (In basis points)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Average
		1995			
Differential	9.9[a]	20.8	30.6	32.1	23.4
Standard Error of Differential	9.3	3.4	2.7	2.6	
Number of Observations	1,696	4,702	6,262	5,166	
		1996			
Differential	35.2	18.8	5.1[a]	5.3	16.1
Standard Error of Differential	2.8	3.4	3.2	2.7	
Number of Observations	5,530	4,790	4,102	4,199	
		1997			
Differential	12.1	3.1[a]	10.5	18.1	11.0
Standard Error of Differential	2.5	2.2	1.9	1.8	
Number of Observations	4,524	5,215	6,447	5,865	
		1998			
Differential	23.5	21.3	24.7	30.5	25.0
Standard Error of Differential	1.7	1.4	1.5	1.6	
Number of Observations	8,173	11,399	9,865	10,047	
		1999			
Differential	23.4	12.5	3.8[a]	22.2	15.5
Standard Error of Differential	2.2	1.9	3.3	3.1	
Number of Observations	8,859	8,487	5,635	5,084	
		2000[b]			
Differential	9.4	13.3			11.4
Standard Error of Differential	3.5	2.6			
Number of Observations	4,717	8,702			
		1995-2000			
Average Quarterly Differential					17.6

SOURCE: Congressional Budget Office based on the Federal Housing Finance Board's Monthly Interest Rate Survey.

NOTES: Loans that were more than 25 percent below the conforming limit or 200 percent above the limit were dropped from the analysis, as were mortgages with loan-to-value ratios below 20 percent or above 97 percent.

A basis point is one-hundredth of a percentage point.

a. Coefficient is statistically insignificant at the 10 percent level (that is, it may be zero).

b. CBO's estimates cover only the first two quarters of 2000.

TABLE 7. UNADJUSTED DIFFERENCES IN INTEREST RATES BETWEEN JUMBO AND CONFORMING 30-YEAR FIXED-RATE LOANS, BY QUARTER, 1995-2000
(In percentage points)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Average
			1995		
Effective Rate at 100 Percent	9.07	8.27	7.88	7.63	
of the Conforming Limit	(0.46)	(0.49)	(0.38)	(0.35)	
Effective Rate at 110 to 120 Percent	9.07	8.36	8.23	7.92	
of the Conforming Limit	(0.65)	(0.58)	(0.37)	(0.40)	
Unadjusted Differential (Basis points)	0	9	35	29	18.3
Regression Differential (Basis points)	4.1	20.7	32.3	32.0	22.3
	(4.3)	(1.9)	(1.6)	(1.6)	
			1996		
Effective Rate at 100 Percent	7.52	8.17	8.34	8.09	
of the Conforming Limit	(0.41)	(0.38)	(0.31)	(0.33)	
Effective Rate at 110 to 120 Percent	7.78	8.50	8.52	8.19	
of the Conforming Limit	(0.47)	(0.58)	(0.43)	(0.45)	
Unadjusted Differential (Basis points)	26	33	18	10	21.8
Regression Differential (Basis points)	28.3	19.0	17.4	15.6	20.1
	(1.8)	(2.0)	(1.7)	(1.6)	
			1997		
Effective Rate at 100 Percent	7.90	8.14	7.72	7.49	
of the Conforming Limit	(0.30)	(0.32)	(0.33)	(0.31)	
Effective Rate at 110 to 120 Percent	8.13	8.24	7.92	7.76	
of the Conforming Limit	(0.39)	(0.36)	(0.34)	(0.37)	
Unadjusted Differential (Basis points)	23	12	20	27	20.5
Regression Differential (Basis points)	17.3	10.3	17.5	22.8	17.0
	(1.6)	(1.1)	(1.0)	(1.0)	
			1998		
Effective Rate at 100 Percent	7.20	7.21	7.05	6.84	
of the Conforming Limit	(0.26)	(0.26)	(0.29)	(0.27)	
Effective Rate at 110 to 120 Percent	7.55	7.51	7.33	7.24	
of the Conforming Limit	(0.36)	(0.32)	(0.33)	(0.43)	
Unadjusted Differential (Basis points)	35	30	28	40	33.3
Regression Differential (Basis points)	33.1	30.2	30.2	35.2	32.2
	(0.9)	(0.8)	(0.8)	(0.8)	
			1999		
Effective Rate at 100 Percent	6.94	7.15	7.73	7.88	
of the Conforming Limit	(0.30)	(0.31)	(0.36)	(0.31)	
Effective Rate at 110 to 120 Percent	7.22	7.30	7.87	8.14	
of the Conforming Limit	(0.35)	(0.36)	(0.50)	(0.51)	
Unadjusted Differential (Basis points)	28	15	14	26	20.8
Regression Differential (Basis points)	28.4	19.0	20.3	23.7	22.9
	(1.0)	(0.8)	(1.3)	(1.3)	

(Continued)

TABLE 7. CONTINUED

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Average
		2000[a]			
Effective Rate at 100 Percent of the Conforming Limit	8.26 (0.32)	8.33 (0.29)			
Effective Rate at 110 to 120 Percent of the Conforming Limit	8.40 (0.52)	8.57 (0.45)			
Unadjusted Differential (Basis points)	14	24			19.0
Regression Differential (Basis points)	19.5 (1.5)	25.5 (1.3)			22.5
		1995-2000			
Average Quarterly Unadjusted Differential (Basis points)					22.5
Average Quarterly Regression Differential (Basis points)					22.8

SOURCE: Congressional Budget Office based on the Federal Housing Finance Board's Monthly Interest Rate Survey.

NOTE: The standard deviations for the effective rates are shown in parentheses, and the standard errors for the conforming dummy variable are shown in parentheses for the estimate of the differential using regression techniques and specifying loan size in log form.

a. CBO's estimates cover only the first two quarters of 2000.

Board.[68] However, researchers disagree about whether those adjusted spreads underestimate or overestimate the impact of the housing GSEs on mortgage interest rates.

Alden Toevs of First Manhattan Consulting Group, under contract with Fannie Mae, concludes that the jumbo/conforming differential for the 1994-1999 period was 19 basis points, but he argues that the figure understates the benefits passed through to borrowers by 10 basis points.[69] He and James Pearce and James Miller also contend that to the extent that investments in the conforming and jumbo markets are substitutes, some investors and depository institutions may react to the lower rates and yields on GSE securities and conventional mortgages by increasing their demand

68. That range of 18 to 25 basis points includes the average differentials with the two alternative specifications for loan size, with annual estimates, and with no-point loans (shown in Tables 3 through 6).

69. Toevs, "A Critique of the CBO's Sponsorship Benefit Analysis," p. 10.

for privately guaranteed mortgage-backed securities and supplying more funds to the jumbo market.[70]

That argument makes little sense, however. The credit enhancement of conforming mortgages does not make jumbo mortgages a more attractive investment. Consequently, no reason exists that Fannie Mae and Freddie Mac would cause more investors to fund jumbo mortgages. The mortgage-backed securities guaranteed by the GSEs do provide investors with a safer investment than would otherwise be the case, but the risk-adjusted return should not change. Thus, without a portfolio reallocation, rates on jumbo mortgages should be unchanged. Depository institutions might reallocate some capital to the jumbo market, but they would have the entire range of investment opportunities available to them and would probably direct their funds where the risk-adjusted returns were highest. CBO does not know how much funding would shift to the jumbo mortgage market or how significant any impact on mortgage rates might be.[71]

Pearce updated his and Cotterman's 1996 study and found that the jumbo/conforming differential over the 1992-1999 period averaged 27 basis points in California and 24 basis points for an 11-state sample. Differentials were higher in 1998, averaging nearly 32 basis points in California and 30 basis points in the 11-state sample.[72] However, Pearce and Miller argue that their regression estimates most likely understate the full effect of Freddie Mac and Fannie Mae on conforming loans. They contend that indirect estimates of the adjusted spread, based on inferences from borrowers' decisions on adjustable-rate versus fixed-rate jumbo mortgages, suggest that the full effect could be considerably greater—perhaps as much as 65 basis points. Such indirect estimates are speculative and are based on restrictive assumptions about why borrowers choose adjustable-rate mortgages.[73]

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70. Pearce and Miller, *Freddie Mac and Fannie Mae: Their Funding Advantage and Benefits to Consumers*, pp. 12-13.

71. The market for GSE securities is very deep and highly liquid, so it is unclear whether much capital would be reallocated to other markets. Moreover, the market for jumbo mortgage-backed securities is very different from the market for conforming securities. That segmentation may limit the extent to which any of the reallocation is directed to the jumbo market.

72. That study filtered the MIRS data to create a more homogeneous set of observations for 30-year fixed-rate loans. For example, Pearce used only loans with LTV ratios between 70 percent and 90 percent and excluded loans with balances below 20 percent or above 200 percent of the conforming limit. In contrast to Cotterman and Pearce's previous study, the update did not use the MIRS weights because they could have distorted the results in some cases. Pearce's regression models accounted for about 25 percent of the variation in effective mortgage rates. See James Pearce, "Conforming Loan Differentials: 1992-1999" (Welch Consulting, November 22, 2000).

73. Pearce and Miller assume a stable relationship between the adjustable-rate and fixed-rate differential and the share of adjustable-rate mortgages (ARMs). Specifically, their indirect estimate assumes that a decline of 30 basis points in the spread between ARMs and fixed-rate mortgages will produce a

Academic economists Brent Ambrose, Richard Buttimer, and Thomas Thibodeau estimate that conforming loan rates were an average of 25 basis points lower than jumbo rates in Dallas during the 1990-1999 period.[74] However, they argue that a considerable portion of that difference probably resulted from differences in the risk of the underlying collateral and was not necessarily associated with liquidity factors. After adjusting for the underlying price volatility of the homes backing the loans, they found that, at most, 16 basis points of the differential could be attributed to Fannie Mae and Freddie Mac. Any rate adjustments for volatility in other local housing markets are likely to be significantly smaller because the Texas market, particularly during that period, was probably more volatile than most. However, the finding does establish the importance of the link between housing price volatility and mortgage interest rates.

Looking just at selected slices of the California market, Wayne Passmore and Jamie Ingpen of the Federal Reserve Board and Roger Sparks, an academic economist, found that the average differential ranged from 18 to 23 basis points, with a sizable standard error.[75] They suggest that their spread probably overstates the benefits that Fannie Mae and Freddie Mac pass through to borrowers primarily because segmenting the market makes the pools of jumbo mortgages that back privately guaranteed mortgage-backed securities necessarily smaller, less diversified, and more unpredictable than pools of conforming mortgages. Those qualities raise the risk and reduce the liquidity of jumbo mortgage-backed securities, which increases the rates that investors require as well as the rates that jumbo borrowers must pay for a mortgage.

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decline of 10 percentage points in the share of ARMs. Because the share of ARMs in the conforming market is more than 20 percentage points less than the share of ARMs in the jumbo market, Pearce and Miller contend that the difference is consistent with the GSEs' reducing interest rates on fixed-rate conforming mortgages by 60 basis points or more. However, that bivariate relationship is too simplistic a model of borrowers' behavior. For example, expectations about future interest rate changes and mobility also affect the decision to take out an adjustable- or fixed-rate mortgage. Moreover, some analysts believe that borrowers in the jumbo market are more income constrained and thus are pushed into taking out adjustable-rate mortgages in order to qualify for a larger mortgage. Because the interest rates charged on ARMs are generally below those on fixed-rate mortgages at origination, the initial mortgage payments are generally lower on ARMs than on fixed-rate mortgages. Finally, some analysts argue that the relatively illiquid secondary market for jumbo mortgages may lead some lenders to offer fixed-rate jumbo mortgages at less attractive rates.

74. Ambrose, Buttimer, and Thibodeau, "A New Spin on the Jumbo/Conforming Loan Rate Differential."

75. The authors focused on California because they concluded that it had the most fully developed market for jumbo loans. Moreover, jumbo loans in states with very small jumbo markets might be qualitatively different from jumbo loans in California. The authors note that the substantial variation in the spreads lowers their confidence in the point estimates. (Spreads were negative for part of 1994.) Using a confidence interval of two standard deviations, they suggest that spreads of zero to 50 basis points are possible. Passmore, Sparks, and Ingpen, *GSEs, Mortgage Rates, and the Long-Run Effects of Mortgage Securitization*.

CONCLUSIONS

CBO's analysis confirms that the housing GSEs pass some of the subsidy they receive from the federal government through to borrowers. Controlling for several other factors that affect mortgage interest rates, CBO found that rates on jumbo mortgages exceeded those on conforming loans by an average of 18 to 25 basis points between January 1995 and June 2000, depending on the estimation technique and the data sample used. Those differentials were fairly volatile throughout the period. When conditions in other financial markets caused investors to place a high premium on liquidity and show less tolerance for risk, the jumbo/conforming differential increased.

CBO's analysis is subject to some of the same limitations as previous studies, which means that its estimated jumbo/conforming differential is an imperfect proxy for the benefits that the GSEs deliver. The major deficiency of the differential is that factors other than subsidies from the GSEs can create differences between jumbo and conforming rates. CBO could not control for some important factors—including the creditworthiness of borrowers and the price volatility in the local housing market —that affect the rates that borrowers pay. Other researches have found higher default rates and greater underlying volatility in home prices for jumbo mortgages. Moreover, CBO's estimates do not account for the adverse effects that the GSEs may have on liquidity in the jumbo market. In summary, the available evidence suggests that CBO's approach most likely overstates the jumbo/conforming differential and thus the size of the subsidy that the housing GSEs pass through to borrowers.

APPENDIX A: REGRESSION ESTIMATES WITH LOAN SIZE SPECIFIED IN LOGARITHMIC FORM

The regression results from Equation 1 support the notion that interest rates vary consistently with the size of the mortgage and with whether it is below the conforming limit. The coefficients on the loan-to-value (LTV) indicators were generally positive but frequently statistically insignificant, particularly in the early years of the sample (see Tables A-1 through A-6). In particular, the rates for mortgages with LTV ratios between 50 percent and 70 percent (LTV1) were often statistically indistinguishable from those for loans with LTV ratios below 50 percent, the benchmark range. That result may simply reflect the likelihood that default probabilities are extremely low for borrowers who make down payments of 30 percent to 50 percent, and thus, those probabilities have little room to decline when down payments exceed 50 percent.

Rates on new homes were lower than those on existing homes only in 1995; otherwise, they were generally higher. That result is inconsistent with the hypothesis that rates are usually lower on new homes.

TABLE A-1. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN LOG FORM, 1995 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	9.09 (0.52)	8.31 (0.42)	7.97 (0.41)	7.78 (0.38)
	Independent Variables			
Intercept	10.13 (0.24)	10.49 (0.13)	9.65 (0.11)	9.17 (0.11)
Log of Loan Size	-0.684 (0.019)	-0.143 (0.010)	-0.128 (0.009)	-0.085 (0.009)
LTV1	-0.034[a] (0.043)	0.045 (0.022)	0.051 (0.019)	0.032 (0.019)
LTV2	-0.071 (0.040)	0.015[a] (0.020)	0.032 (0.017)	-0.001[a] (0.018)
LTV3	-0.045[a] (0.041)	0.056 (0.021)	0.070 (0.018)	0.038 (0.019)
LTV4	-0.040[a] (0.040)	0.076 (0.020)	0.087 (0.018)	0.024[a] (0.018)
Lender1	0.102 (0.014)	0.070 (0.007)	-0.025 (0.006)	-0.028 (0.007)
Lender2	0.039[a] (0.033)	-0.045 (0.018)	-0.116 (0.016)	-0.106 (0.017)
New Home	-0.108 (0.018)	-0.022 (0.010)	0.009[a] (0.009)	-0.018 (0.009)
Conforming Loan	-0.041[a] (0.043)	-0.207 (0.019)	-0.323 (0.016)	-0.320 (0.016)
Adjusted R-Square	0.094	0.362	0.048	0.092
Number of Observations	5,987	14,118	17,904	13,927

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE A-2. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN LOG FORM, 1996 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.53 (0.43)	8.21 (0.46)	8.41 (0.38)	8.11 (0.38)
	Independent Variables			
Intercept	7.74 (0.12)	7.83 (0.13)	9.21 (0.12)	9.68 (0.12)
Log of Loan Size	-0.003[a] (0.010)	0.038 (0.011)	-0.050 (0.009)	-0.114 (0.010)
LTV1	0.053 (0.021)	-0.004[a] (0.023)	0.013[a] (0.019)	0.053 (0.019)
LTV2	0.024[a] (0.020)	-0.024[a] (0.021)	-0.004[a] (0.018)	0.046 (0.018)
LTV3	0.051 (0.020)	-0.007[a] (0.022)	0.020[a] (0.019)	0.046 (0.019)
LTV4	0.037 (0.020)	-0.044 (0.021)	0.013[a] (0.018)	0.027[a] (0.018)
Lender1	-0.065 (0.007)	-0.099 (0.008)	-0.007[a] (0.007)	0.033 (0.007)
Lender2	-0.109 (0.019)	0.004[a] (0.022)	-0.011[a] (0.021)	-0.075 (0.018)
New Home	0.039 (0.010)	0.007[a] (0.011)	0.042 (0.009)	0.112 (0.008)
Conforming Loan	-0.283 (0.018)	-0.190 (0.020)	-0.174 (0.017)	-0.156 (0.016)
Adjusted R-Square	0.108	0.120	0.024	0.136
Number of Observations	16,307	15,620	13,285	12,525

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE A-3. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN LOG FORM, 1997 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	8.04 (0.38)	8.25 (0.36)	7.88 (0.38)	7.65 (0.38)
	Independent Variables			
Intercept	9.42 (0.11)	9.70 (0.08)	9.64 (0.08)	9.75 (0.08)
Log of Loan Size	-0.112 (0.009)	-0.125 (0.007)	-0.145 (0.007)	-0.166 (0.006)
LTV1	0.055 (0.019)	0.015[a] (0.014)	0.047 (0.014)	0.039 (0.013)
LTV2	0.043 (0.018)	0.029 (0.013)	0.070 (0.013)	0.062 (0.013)
LTV3	0.054 (0.019)	0.066 (0.013)	0.102 (0.013)	0.113 (0.013)
LTV4	0.031 (0.018)	0.048 (0.013)	0.086 (0.013)	0.095 (0.013)
Lender1	0.034 (0.007)	0.108 (0.005)	0.100 (0.005)	0.074 (0.005)
Lender2	0.020[a] (0.017)	0.023 (0.012)	0.016[a] (0.010)	-0.016[a] (0.011)
New Home	0.058 (0.007)	-0.005[a] (0.006)	0.039 (0.006)	0.022 (0.005)
Conforming Loan	-0.173 (0.016)	-0.103 (0.011)	-0.175 (0.010)	-0.228 (0.010)
Adjusted R-Square	0.021	0.051	0.042	0.066
Number of Observations	14,637	24,865	28,775	28,821

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE A-4. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN LOG FORM, 1998 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.34 (0.36)	7.33 (0.35)	7.20 (0.36)	6.96 (0.38)
	Independent Variables			
Intercept	8.95 (0.07)	8.89 (0.06)	9.02 (0.06)	8.60 (0.06)
Log of Loan Size	-0.116 (0.006)	-0.117 (0.005)	-0.137 (0.005)	-0.124 (0.005)
LTV1	0.016[a] (0.012)	0.035 (0.010)	0.043 (0.010)	0.042 (0.010)
LTV2	0.025 (0.011)	0.042 (0.009)	0.052 (0.009)	0.050 (0.009)
LTV3	0.063 (0.011)	0.086 (0.009)	0.104 (0.010)	0.087 (0.010)
LTV4	0.057 (0.011)	0.074 (0.009)	0.089 (0.009)	0.092 (0.009)
Lender1	0.057 (0.005)	0.054 (0.004)	0.082 (0.004)	0.051 (0.004)
Lender2	-0.003[a] (0.011)	-0.014 (0.008)	0.017 (0.008)	0.063 (0.010)
New Home	0.056 (0.005)	0.018 (0.004)	0.051 (0.004)	0.069 (0.005)
Conforming Loan	-0.331 (0.009)	-0.302 (0.008)	-0.302 (0.008)	-0.352 (0.008)
Adjusted R-Square	0.049	0.039	0.083	0.061
Number of Observations	33,193	49,061	48,064	44,592

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE A-5. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN LOG FORM, 1999 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.06 (0.39)	7.26 (0.35)	7.86 (0.37)	8.01 (0.36)
	Independent Variables			
Intercept	8.82 (0.07)	8.95 (0.06)	9.93 (0.07)	9.90 (0.08)
Log of Loan Size	-0.137 (0.006)	-0.142 (0.005)	-0.188 (0.006)	-0.157 (0.006)
LTV1	0.061 (0.012)	0.027 (0.010)	0.026 (0.012)	0.025 (0.013)
LTV2	0.060 (0.011)	0.036 (0.009)	0.059 (0.011)	0.050 (0.012)
LTV3	0.099 (0.011)	0.077 (0.010)	0.115 (0.012)	0.126 (0.013)
LTV4	0.095 (0.011)	0.093 (0.010)	0.129 (0.012)	0.128 (0.012)
Lender1	-0.021 (0.005)	-0.014 (0.004)	0.115 (0.006)	0.130 (0.007)
Lender2	-0.049 (0.010)	-0.062 (0.015)	-0.097 (0.012)	-0.119 (0.011)
New Home	0.112 (0.005)	-0.006[a] (0.005)	-0.043 (0.006)	-0.005[a] (0.006)
Conforming Loan	-0.284 (0.010)	-0.190 (0.008)	-0.203 (0.013)	-0.237 (0.013)
Adjusted R-Square	0.048	0.140	0.144	0.073
Number of Observations	38,633	43,810	31,705	24,949

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE A-6. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN LOG FORM, FIRST AND SECOND QUARTERS 2000
(Standard errors in parentheses)

	First Quarter	Second Quarter
Dependent Variable		
Effective Rate (Percent)	8.34 (0.37)	8.45 (0.38)
Independent Variables		
Intercept	10.03 (0.09)	10.27 (0.07)
Log of Loan Size	-0.158 (0.007)	-0.155 (0.006)
LTV1	0.017[a] (0.015)	-0.011[a] (0.012)
LTV2	0.055 (0.014)	0.033 (0.011)
LTV3	0.104 (0.015)	0.101 (0.012)
LTV4	0.125 (0.014)	0.117 (0.011)
Lender1	0.169 (0.008)	0.145 (0.006)
Lender2	-0.088 (0.011)	-0.107 (0.009)
New Home	0.015 (0.007)	0.031 (0.006)
Conforming Loan	-0.195 (0.015)	-0.255 (0.013)
Adjusted R-Square	0.132	0.098
Number of Observations	20,860	33,539

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

APPENDIX B: REGRESSION ESTIMATES WITH LOAN SIZE SPECIFIED IN QUADRATIC FORM

Equation 2 specifies loan size in quadratic form to permit effective rates to fall initially with loan size (because of economies of scale in origination and servicing) and then rise for larger loans (because of greater prepayment risk and more volatility in home prices). In general, the regression results for Equation 2 are consistent with that pattern of interest rates, as indicated by the negative coefficients on the loan-size variable and the positive coefficients on the loan-size-squared variable in most quarters (see Tables B-1 through B-6). On the basis of the estimated coefficients, it appears that, controlling for other factors, rates generally do not start to rise until loan size is significantly above the conforming limit, where the market is thin and potentially more volatile.

Comparing the results for Equation 2 with those for Equation 1 (in Appendix A) shows that the form in which loan size is specified also affects the coefficients on the loan-to-value (LTV) variables and the conforming-loan indicator. Overall, the two equations are similar in how much of the variation in effective mortgage rates they explain, as shown by comparing the adjusted r-squares.

TABLE B-1. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN QUADRATIC FORM, 1995 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	9.09	8.31	7.97	7.78
	(0.52)	(0.42)	(0.41)	(0.38)
	Independent Variables			
Intercept	9.43	9.02	8.34	8.28
	(0.07)	(0.03)	(0.30)	(0.03)
Loan Size ($1,000s)	-0.00081[a]	-0.00231	-0.00160	-0.00148
	(0.00055)	(0.00027)	(0.00022)	(0.00023)
Loan Size Squared ($1,000s)	8.28E-10[a]	4.19E-9	1.83E-9	2.99E-9
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LTV1	-0.035[a]	0.044	0.051	0.032[a]
	(0.043)	(0.022)	(0.019)	(0.019)
LTV2	-0.073	0.015[a]	0.030	-0.001[a]
	(0.040)	(0.020)	(0.017)	(0.018)
LTV3	-0.047[a]	0.055	0.068	0.038
	(0.041)	(0.021)	(0.018)	(0.019)
LTV4	-0.041[a]	0.075	0.085	0.024[a]
	(0.040)	(0.020)	(0.018)	(0.018)
Lender1	0.102	0.070	-0.025	-0.028
	(0.014)	(0.007)	(0.006)	(0.007)
Lender2	0.041[a]	-0.044	-0.116	-0.107
	(0.033)	(0.018)	(0.016)	(0.017)
New Home	-0.109	-0.022	0.009[a]	-0.018
	(0.018)	(0.010)	(0.009)	(0.009)
Conforming Loan	-0.054[a]	-0.184	-0.344	-0.294
	(0.061)	(0.028)	(0.023)	(0.024)
Adjusted R-Square	0.093	0.362	0.048	0.092
Number of Observations	5,987	14,118	17,904	13,927

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included indicators for the last two months of the quarter.

The coefficients on the Loan Size Squared variable are very small and thus are denoted in exponential notation. For example, 1.0E-5 = 0.00001.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE B-2. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN QUADRATIC FORM, 1996 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.53 (0.43)	8.21 (0.46)	8.41 (0.38)	8.11 (0.38)
	Independent Variables			
Intercept	7.71 (0.03)	8.25 (0.04)	8.70 (0.03)	8.50 (0.03)
Loan Size ($1,000s)	-3.23E-6[a] (0.00024)	0.00101 (0.00029)	-0.00063 (0.00024)	-0.00198 (0.00023)
Loan Size Squared ($1,000s)	-9.37E-11[a] (0.00000)	-2.80E-9 (0.00000)	7.68E-10[a] (0.00000)	3.87E-9 (0.00000)
LTV1	0.053 (0.021)	-0.004[a] (0.023)	0.013[a] (0.019)	0.053 (0.019)
LTV2	0.024[a] (0.020)	-0.024[a] (0.021)	-0.005[a] (0.018)	0.045 (0.018)
LTV3	0.051 (0.020)	-0.008[a] (0.022)	0.020[a] (0.019)	0.046 (0.019)
LTV4	0.037 (0.020)	-0.045 (0.021)	0.013[a] (0.018)	0.028[a] (0.018)
Lender1	-0.065 (0.007)	-0.099 (0.008)	-0.007[a] (0.007)	0.033 (0.007)
Lender2	-0.109 (0.019)	0.004[a] (0.022)	-0.011[a] (0.021)	-0.076 (0.018)
New Home	0.039 (0.010)	0.007[a] (0.011)	0.042 (0.009)	0.111 (0.008)
Conforming Loan	-0.287 (0.025)	-0.237 (0.030)	-0.180 (0.025)	-0.127 (0.023)
Adjusted R-Square	0.108	0.120	0.024	0.137
Number of Observations	16,307	15,620	13,285	12,525

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included indicators for the last two months of the quarter.

The coefficients on the Loan Size and Loan Size Squared variables are very small and thus are denoted in exponential notation. For example, 1.0E-5 = 0.00001.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE B-3. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN QUADRATIC FORM, 1997 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	8.04	8.25	7.88	7.65
	(0.38)	(0.36)	(0.38)	(0.38)
	Independent Variables			
Intercept	8.27	8.41	8.14	8.03
	(0.03)	(0.02)	(0.02)	(0.02)
Loan Size ($1,000s)	-0.00138	-0.00190	-0.00195	-0.00237
	(0.00022)	(0.00015)	(0.00014)	(0.00013)
Loan Size Squared ($1,000s)	1.65E-9	3.27E-9	2.87E-9	3.73E-9
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LTV1	0.054	0.014[a]	0.045	0.038
	(0.019)	(0.014)	(0.014)	(0.013)
LTV2	0.042	0.028	0.068	0.060
	(0.018)	(0.013)	(0.013)	(0.013)
LTV3	0.053	0.065	0.100	0.112
	(0.019)	(0.013)	(0.013)	(0.013)
LTV4	0.029[a]	0.048	0.083	0.094
	(0.018)	(0.013)	(0.013)	(0.013)
Lender1	0.034	0.108	0.100	0.074
	(0.007)	(0.005)	(0.005)	(0.005)
Lender2	0.020[a]	0.023	0.016[a]	-0.016[a]
	(0.017)	(0.012)	(0.010)	(0.011)
New Home	0.058	-0.005[a]	0.039	0.022
	(0.007)	(0.006)	(0.006)	(0.005)
Conforming Loan	-0.187	-0.083	-0.172	-0.215
	(0.023)	(0.016)	(0.014)	(0.013)
Adjusted R-Square	0.021	0.051	0.041	0.066
Number of Observations	14,637	24,865	28,775	28,821

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included indicators for the last two months of the quarter.

The coefficients on the Loan Size Squared variable are very small and thus are denoted in exponential notation. For example, 1.0E-5 = 0.00001.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE B-4. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN QUADRATIC FORM, 1998 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.34 (0.36)	7.33 (0.35)	7.20 (0.36)	6.96 (0.37)
	Independent Variables			
Intercept	7.74 (0.02)	7.67 (0.15)	7.59 (0.02)	7.28 (0.16)
Loan Size ($1,000s)	-0.00154 (0.00012)	-0.00159 (0.00009)	-0.00175 (0.00010)	-0.00217 (0.00011)
Loan Size Squared ($1,000s)	2.29E-9 (0.00000)	2.44E-9 (0.00000)	2.46E-9 (0.00000)	4.27E-9 (0.00000)
LTV1	0.015[a] (0.012)	0.034 (0.010)	0.042 (0.010)	0.041 (0.010)
LTV2	0.024 (0.011)	0.040 (0.009)	0.050 (0.009)	0.049 (0.009)
LTV3	0.061 (0.011)	0.085 (0.009)	0.102 (0.010)	0.088 (0.010)
LTV4	0.056 (0.011)	0.073 (0.009)	0.087 (0.009)	0.092 (0.009)
Lender1	0.058 (0.005)	0.054 (0.004)	0.082 (0.004)	0.051 (0.004)
Lender2	-0.002[a] (0.011)	-0.014 (0.008)	0.016 (0.008)	0.063 (0.010)
New Home	0.056 (0.005)	0.018 (0.004)	0.050 (0.004)	0.070 (0.005)
Conforming Loan	-0.320 (0.013)	-0.286 (0.011)	-0.295 (0.011)	-0.293 (0.011)
Adjusted R-Square	0.049	0.039	0.082	0.062
Number of Observations	33,193	49,061	48,064	44,592

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included indicators for the last two months of the quarter.

The coefficients on the Loan Size Squared variable are very small and thus are denoted in exponential notation. For example, 1.0E-5 = 0.00001.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE B-5. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN QUADRATIC FORM, 1999 (Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.06	7.26	7.86	8.01
	(0.39)	(0.35)	(0.37)	(0.36)
	Independent Variables			
Intercept	7.39	7.46	7.95	8.23
	(0.02)	(0.02)	(0.02)	(0.02)
Loan Size ($1,000s)	-0.00172	-0.00185	-0.00253	-0.00255
	(0.00012)	(0.0000001)	(0.00014)	(0.00015)
Loan Size Squared ($1,000s)	2.40E-9	2.70E-9	3.85E-9	4.75E-9
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
LTV1	0.060	0.025	0.024	0.024
	(0.012)	(0.010)	(0.012)	(0.013)
LTV2	0.058	0.034	0.056	0.049
	(0.011)	(0.009)	(0.011)	(0.012)
LTV3	0.097	0.075	0.112	0.126
	(0.011)	(0.010)	(0.012)	(0.013)
LTV4	0.093	0.091	0.127	0.128
	(0.011)	(0.009)	(0.012)	(0.012)
Lender1	-0.021	-0.014	0.115	0.130
	(0.005)	(0.004)	(0.006)	(0.007)
Lender2	-0.049	-0.061	-0.097	-0.119
	(0.010)	(0.015)	(0.012)	(0.011)
New Home	0.112	-0.006[a]	-0.043	-0.005[a]
	(0.005)	(0.005)	(0.006)	(0.006)
Conforming Loan	-0.272	-0.172	-0.170	0.168
	(0.014)	(0.011)	(0.019)	(0.018)
Adjusted R-Square	0.048	0.140	0.143	0.074
Number of Observations	38,633	43,810	31,705	24,949

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included indicators for the last two months of the quarter.

The coefficients on the Loan Size Squared variable are very small and thus are denoted in exponential notation. For example, 1.0E-5 = 0.00001.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE B-6. REGRESSION ESTIMATES WHEN LOAN SIZE IS SPECIFIED IN QUADRATIC FORM, FIRST AND SECOND QUARTERS 2000
(Standard errors in parentheses)

	First Quarter	Second Quarter
Dependent Variable		
Effective Rate (Percent)	8.34	8.45
	(0.37)	(0.38)
Independent Variables		
Intercept	8.38	8.64
	(0.03)	(0.02)
Loan Size ($1,000s)	-0.00171	-0.00179
	(0.00015)	(0.00014)
Loan Size Squared ($1,000s)	1.92E-9	2.25E-9
	(0.00000)	(0.00000)
LTV1	0.016[a]	-0.013[a]
	(0.015)	(0.012)
LTV2	0.052	0.031
	(0.014)	(0.011)
LTV3	0.102	0.098
	(0.015)	(0.012)
LTV4	0.122	0.115
	(0.014)	(0.011)
Lender1	0.169	0.144
	(0.008)	(0.006)
Lender2	-0.088	-0.107
	(0.011)	(0.009)
New Home	0.015	0.031
	(0.007)	(0.006)
Conforming Loan	-0.202	-0.250
	(0.022)	(0.019)
Adjusted R-Square	0.131	0.097
Number of Observations	20,860	33,539

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included indicators for the last two months of the quarter.

The coefficients on the Loan Size Squared variable are very small and thus are denoted in exponential notation. For example, 1.0E-5 = 0.00001.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

APPENDIX C: REGRESSION ESTIMATES FOR NO-POINT LOANS

Because borrowers face a trade-off between the amount of points they pay on a loan and the contract interest rate, estimates of the conforming/jumbo differential can be affected by the method used to adjust mortgage rates for the fees and charges that borrowers pay up front. In particular, the longer the amortization period, the smaller will be the contribution of points to the effective interest rate. Moreover, the amount of points paid by borrowers in the conforming market versus those in the jumbo market has differed over the 1995-2000 period. Since 1997, borrowers in the conforming market have paid higher points, on average, than borrowers in the jumbo market. In addition, the average amount of points paid on all loans has fallen during the 1995-2000 period.[1] Those trends are consistent with the notions that origination and servicing costs fall proportionately with the size of the mortgage and that technology lowers those costs over time. However, no public data exist comparing points paid and the duration of mortgages. For all of those reasons, the Congressional Budget Office also estimated the differential using contract rates for loans with no points or other charges (see Tables C-1 through C-6).

The jumbo/conforming differential for no-point loans averaged 18 basis points over the 1995-2000 period, whereas for the entire sample of 30-year fixed-rate loans, it averaged 23 basis points (using Equation 1). These estimates were more volatile than the ones using the full sample (shown in Appendix A). In four of the quarters, the differential was statistically insignificant. The quarterly differentials for no-point loans were highest in 1998, when they averaged more than 25 basis points.

The implications of these results are unclear. On the one hand, borrowers who choose no-point loans may be systematically different from other borrowers. They might expect, and be expected, to prepay their loan sooner than other borrowers. On the other hand, the findings could imply that amortizing points over 10 years rather than over a shorter period biases the estimate of the jumbo/conforming differential upward.

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1. For example, in 2000, borrowers in the conforming market for fixed-rate mortgages paid an average of 75 basis points for fees, points, and charges, whereas borrowers in the jumbo market paid an average of 59 basis points. In 1995, the corresponding figures were 100 basis points for conforming loans and 116 basis points for jumbo loans. See Federal Housing Finance Board, MIRS Table 21, "Terms on Conventional Single-Family Mortgages, All Homes, Jumbo and Nonjumbo Mortgages," available at www.fhfb.gov/MIRS/MIRS_loans_downloads.htm

TABLE C-1. REGRESSION ESTIMATES FOR NO-POINT LOANS, 1995
(Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	9.06	8.30	7.96	7.79
	(0.56)	(0.41)	(0.38)	(0.34)
	Independent Variables			
Intercept	10.39	10.24	9.28	9.02
	(0.51)	(0.21)	(0.18)	(0.18)
Log of Loan Size	-0.087	-0.122	-0.099	-0.074
	(0.040)	(0.017)	(0.014)	(0.014)
LTV1	0.019[a]	0.062[a]	0.036[a]	0.017[a]
	(0.091)	(0.039)	(0.030)	(0.028)
LTV2	-0.111[a]	0.032[a]	0.037[a]	-0.006[a]
	(0.083)	(0.036)	(0.028)	(0.026)
LTV3	-0.025[a]	0.088	0.082	0.059
	(0.085)	(0.036)	(0.029)	(0.027)
LTV4	-0.117[a]	0.119	0.113	0.072
	(0.083)	(0.035)	(0.028)	(0.026)
Lender1	0.017[a]	-0.000[a]	-0.037	-0.007[a]
	(0.029)	(0.012)	(0.010)	(0.010)
Lender2	-0.064[a]	-0.057	-0.032[a]	-0.031[a]
	(0.082)	(0.034)	(0.025)	(0.026)
New Home	-0.197	-0.051	0.017[a]	-0.019[a]
	(0.043)	(0.020)	(0.016)	(0.016)
Conforming Loan	-0.099[a]	-0.208	-0.306	-0.321
	(0.093)	(0.034)	(0.027)	(0.026)
Adjusted R-Square	0.042	0.374	0.049	0.097
Number of Observations	1,696	4,702	6,262	5,166

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE C-2. REGRESSION ESTIMATES FOR NO-POINT LOANS, 1996
(Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.54	8.24	8.40	8.08
	(0.38)	(0.40)	(0.35)	(0.34)
	Independent Variables			
Intercept	8.26	8.55	8.94	9.30
	(0.19)	(0.21)	(0.19)	(0.190)
Log of Loan Size	-0.043	-0.033	-0.038	-0.090
	(0.015)	(0.016)	(0.015)	(0.015)
LTV1	0.027[a]	0.063	0.043[a]	0.038[a]
	(0.031)	(0.036)	(0.034)	(0.031)
LTV2	0.016[a]	0.027[a]	0.017[a]	0.012[a]
	(0.029)	(0.033)	(0.032)	(0.029)
LTV3	0.080	0.064	0.078	0.061
	(0.030)	(0.034)	(0.033)	(0.030)
LTV4	0.106	0.123	0.121	0.092
	(0.029)	(0.033)	(0.032)	(0.029)
Lender1	-0.020	-0.027	-0.042	0.013[a]
	(0.011)	(0.012)	(0.011)	(0.011)
Lender2	-0.085	-0.141	-0.048[a]	0.016[a]
	(0.027)	(0.040)	(0.042)	(0.032)
New Home	0.036	-0.048	-0.042	0.048
	(0.019)	(0.020)	(0.018)	(0.015)
Conforming Loan	-0.352	-0.188	-0.051[a]	-0.053
	(0.028)	(0.034)	(0.032)	(0.027)
Adjusted R-Square	0.116	0.151	0.044	0.161
Number of Observations	5,530	4,790	4,102	4,199

SOURCE: Congressional Budget Office.

NOTES: The mean of the dependent variable is shown along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE C-3. REGRESSION ESTIMATES FOR NO-POINT LOANS, 1997
(Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	8.00	8.20	7.85	7.61
	(0.33)	(0.33)	(0.33)	(0.33)
	Independent Variables			
Intercept	9.32	9.17	8.61	8.70
	(0.18)	(0.17)	(0.15)	(0.16)
Log of Loan Size	-0.107[a]	-0.080	-0.054	-0.071
	(0.014)	(0.013)	(0.012)	(0.013)
LTV1	-0.002[a]	-0.026[a]	0.042	-0.026[a]
	(0.030)	(0.028)	(0.024)	(0.026)
LTV2	0.010[a]	-0.020[a]	0.022[a]	-0.033[a]
	(0.028)	(0.026)	(0.023)	(0.025)
LTV3	0.056	0.034[a]	0.069	0.034[a]
	(0.029)	(0.027)	(0.024)	(0.026)
LTV4	0.091	0.038	0.052	-0.022[a]
	(0.028)	(0.026)	(0.023)	(0.025)
Lender1	0.021	0.001[a]	-0.039	-0.007[a]
	(0.010)	(0.009)	(0.009)	(0.009)
Lender2	0.009[a]	0.022[a]	-0.008[a]	-0.047
	(0.030)	(0.027)	(0.029)	(0.027)
New Home	-0.009[a]	-0.009[a]	0.065	0.032
	(0.012)	(0.011)	(0.011)	(0.011)
Conforming Loan	-0.121	-0.031[a]	-0.105	-0.181
	(0.025)	(0.022)	(0.019)	(0.018)
Adjusted R-Square	0.031	0.046	0.036	0.066
Number of Observations	4,525	5,215	6,447	5,865

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE C-4. REGRESSION ESTIMATES FOR NO-POINT LOANS, 1998
(Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.31	7.30	7.15	6.89
	(0.33)	(0.32)	(0.34)	(0.33)
	Independent Variables			
Intercept	8.29	8.14	8.24	7.91
	(0.13)	(0.11)	(0.12)	(0.12)
Log of Loan Size	-0.064	-0.056	-0.071	-0.068
	(0.011)	(0.009)	(0.010)	(0.010)
LTV1	-0.015[a]	0.012[a]	0.059	0.007[a]
	(0.021)	(0.017)	(0.019)	(0.016)
LTV2	-0.018[a]	-0.012[a]	0.021[a]	-0.004[a]
	(0.020)	(0.016)	(0.018)	(0.015)
LTV3	0.023[a]	0.032	0.099	0.051
	(0.021)	(0.017)	(0.019)	(0.016)
LTV4	0.015[a]	0.014[a]	0.075	0.094
	(0.021)	(0.016)	(0.018)	(0.016)
Lender1	-0.002[a]	0.032	0.041	-0.010[a]
	(0.008)	(0.006)	(0.007)	(0.007)
Lender2	-0.155	-0.117	-0.062	-0.023[a]
	(0.021)	(0.017)	(0.019)	(0.019)
New Home	0.023	-0.051	-0.036	-0.021
	(0.010)	(0.008)	(0.009)	(0.009)
Conforming Loan	-0.235	-0.213	-0.247	-0.305
	(0.017)	(0.014)	(0.015)	(0.016)
Adjusted R-Square	0.032	0.033	0.100	0.064
Number of Observations	8,173	11,399	9,865	10,047

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE C-5. REGRESSION ESTIMATES FOR NO-POINT LOANS, 1999
(Standard errors in parentheses)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	Dependent Variable			
Effective Rate (Percent)	7.02	7.19	7.80	7.93
	(0.42)	(0.37)	(0.45)	(0.39)
	Independent Variables			
Intercept	8.43	8.24	9.29	9.26
	(0.16)	(0.15)	(0.21)	(0.19)
Log of Loan Size	-0.108	-0.095	-0.153	-0.102
	(0.012)	(0.012)	(0.017)	(0.015)
LTV1	0.027[a]	0.022[a]	-0.017[a]	0.034[a]
	(0.025)	(0.024)	(0.036)	(0.033)
LTV2	0.010[a]	0.014[a]	0.047[a]	0.064
	(0.023)	(0.022)	(0.033)	(0.030)
LTV3	0.119	0.068	0.121	0.107
	(0.024)	(0.023)	(0.034)	(0.031)
LTV4	0.095	0.103	0.103	0.072
	(0.024)	(0.023)	(0.033)	(0.030)
Lender1	-0.042	0.042	0.165	0.077
	(0.010)	(0.009)	(0.014)	(0.014)
Lender2	-0.084	0.010[a]	-0.058	-0.107
	(0.024)	(0.023)	(0.020)	(0.016)
New Home	-0.010[a]	0.029	-0.001[a]	0.013[a]
	(0.013)	(0.011)	(0.016)	(0.014)
Conforming Loan	-0.234	-0.125	-0.038[a]	-0.222
	(0.022)	(0.019)	(0.033)	(0.031)
Adjusted R-Square	0.039	0.091	0.117	0.051
Number of Observations	8,859	8,487	5,635	5,084

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.

TABLE C-6. REGRESSION ESTIMATES FOR NO-POINT LOANS, FIRST AND SECOND QUARTERS, 2000 (Standard errors in parentheses)

	First Quarter	Second Quarter
	Dependent Variable	
Effective Rate (Percent)	8.26 (0.41)	8.39 (0.40)
	Independent Variables	
Intercept	9.14 (0.22)	9.20 (0.16)
Log of Loan Size	-0.084 (0.017)	-0.071 (0.012)
LTV1	0.006[a] (0.037)	-0.029[a] (0.027)
LTV2	0.037[a] (0.033)	-0.007[a] (0.024)
LTV3	0.079 (0.034)	0.061 (0.025)
LTV4	0.040[a] (0.033)	0.039[a] (0.024)
Lender1	0.133 (0.016)	0.137 (0.012)
Lender2	-0.066 (0.018)	-0.089 (0.014)
New Home	0.045 (0.016)	0.054 (0.013)
Conforming Loan	-0.094 (0.035)	-0.133 (0.026)
Adjusted R-Square	0.074	0.077
Number of Observations	4,717	8,702

SOURCE: Congressional Budget Office.

NOTES: The table shows the mean of the dependent variable along with the root mean square error for the equation. Each regression also included month indicators for the last two months of the quarter.

LTV = loan-to-value ratio.

a. Coefficient is not statistically significant at the 10 percent level.