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4 Housing Finance in the United States

Patric H. Hendershott

4.1 Introduction

During the 1960s and the 1970s, the U.S. government closely regulated the single-family housing finance system. The regulation manifested itself in a highly specialized system with four notable characteristics. First, because federally chartered depository institutions were prohibited from originating adjustable-rate mortgages (ARMs), virtually all home buyers used the long-term (twenty- to thirty-year) fixed-rate mortgage (FRM). Second, portfolio restrictions and tax inducements led nonbank depository institutions (savings and loans [S&Ls] and mutual savings banks [MSBs]) to supply two-thirds of all funds to the home mortgage market. Moreover, the tax inducement caused home mortgage rates to be roughly a half percentage point lower than they would otherwise have been. Third, because depository institutions were funding their FRMs with short-term deposits, deposit rate ceilings were imposed when interest rates rose significantly. Fourth, because the capital market could not compete with "cheap" deposit money, few conventional mortgages (those not government insured) were pooled into mortgage pass-through securities. As a result of these four characteristics, the U.S. housing sector was extremely vulnerable to increases in interest rates that caused deposits to flow out of the depository institutions, thereby restricting credit availability.

Portfolio restrictions, tax inducements, prohibitions against ARMs, and deposit rate ceilings were all removed in the 1980s, and, not surprisingly, the housing finance system changed markedly. Between early 1982 and 1989, two-fifths of all new loans had adjustable, not fixed, rates, and S&Ls *reduced* their holdings of FRMs (both whole loans and mortgage pass-throughs) by 15 to 20

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percent. Moreover, the fraction of conventional FRM originations that have been pooled into pass-throughs rose from less than one-twentieth before 1981 to over one-half after 1985. With the opportunity of borrowers to shift to lower coupon ARMs when rates rise and with the integration of the home mortgage market with capital markets generally, one would expect that the U.S. housing sector is now less sensitive to rising interest rates than it was in the 1960s and 1970s.

In this paper, I begin by documenting these changes in the U.S. housing finance system and then describe the impact of these changes on the FRM market in the 1980s. In sections 4.4 and 4.5, I attempt to relate changes in real house prices and home ownership to these changes and survey recent studies of housing demand and supply in the United States to determine whether the interest sensitivity of housing production has been reduced. A final section offers some concluding thoughts.

4.2 U.S. Housing Finance, 1961–89

I begin with a general overview of U.S. housing finance, with emphasis on the pre-1982 period. I then examine the major finance evolutions of the 1980s: the widespread securitization of conventional FRMs, the development of a national primary market for ARMs, and the decline of the S&L industry.[1]

4.2.1 An Overview Emphasizing the 1960s and 1970s

Table 4.1 lists, for four-year periods from 1962–65 to 1986–89, the fraction of the increase in outstanding home mortgages absorbed by each of three investor groups: nonbank depository institutions (S&Ls, MSBs, and credit unions), commercial banks, and others. S&L and MSB net purchases of agency securities are assumed to be purchases of mortgage pass-throughs and are thus included in their mortgage absorptions.

The far right column gives the ratios for the total 1962–77 period. As can be seen, the nonbank depository institutions absorbed two-thirds of the increase in outstandings (S&Ls alone accounted for 60 percent between 1969 and 1977) and the other third was split about equally between commercial banks and other investors (federally sponsored credit agencies, predominantly Federal National Mortgage Association [Fannie Mae], contributed over half of the other). There is some variation within the four four-year subperiods. In particular, thrifts absorbed only 54 percent of the increase in outstandings during the 1966–69 period, when deposit rate ceilings limited their ability to attract funds, and a full 72 percent in the 1970–73 period, when deposits surged (see figure 4.1). The other sector picked up the slack in 1966–69 (over half by the sponsored agencies) and added few home mortgages in 1970–73, when insurance companies liquidated a quarter of their holdings.

1. This overview draws, quite heavily at times, on Hendershott (1991).

Table 4.1 **Ratio of Increases in Home Mortgage Holdings to Increases in Total Home Mortgages Outstanding**

	1962–65	1966–69	1970–73	1974–77	1978–81	1982–85	1986–89	1962–77
Nonbank depository institutions[a]	.67	.54	.72	.66	.41	.38	.23	.66
Commercial banks	.16	.18	.22	.17	.16	.10	.17	.18
Other	.17	.28	.06	.17	.43	.52	.60	.16

[a]S&Ls, MSBs, and credit unions (the latter did not purchase as much as 1 percent of the increase in outstandings until the 1980s). Data for the S&Ls and MSBs include increases in agency securities, which are assumed to be mortgage pass-throughs.

Source: "Financial Assets and Liabilities Year-End, 1966–1989," Flow of Funds Accounts, Board of Governors of the Federal Reserve System, Washington, D.C., September 1990 (and Year-End, 1961–84, October 1985 for pre-1966 data).

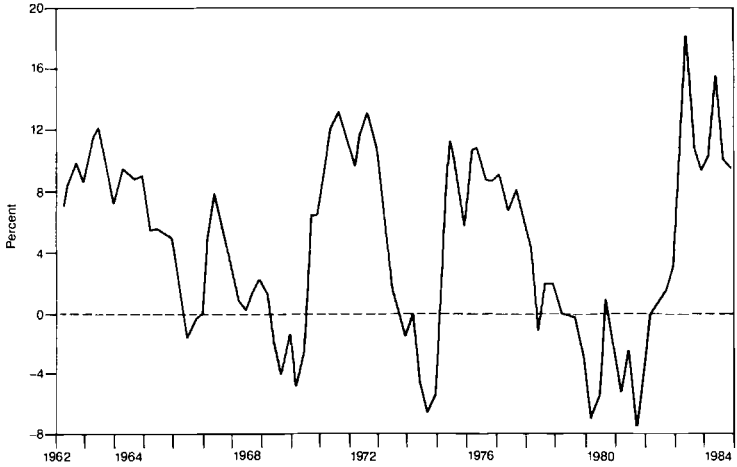

Fig. 4.1 Real deposits at thrift institutions (quarterly percentage of change at annual rates)
Source: Throop 1986, chart 1.

The 1978–81 period was a replay of the 1966–69 period in that deposit growth slowed, but the period of reduced growth was far longer, owing to the more prolonged and sharper rise in market interest rates (see figure 4.1). Many thrifts were reluctant to bid for deposits, in spite of a loosening of deposit rate ceilings with the June 1978 introduction of money market certificates and the Deregulation and Monetary Control Act of 1980, because the spreads between their asset portfolio yields and the cost of deposits became so large. The surge in other net purchases reflected greater participation by a broad spectrum of investors, with households (largely through owner financing of house sales) being the largest purchasers. Relative to the 1974–77 period, households increased their share of the market by 8 percentage points, and the federally sponsored credit agencies, state and local governments, and insurance companies each increased their share by 4 percentage points.

The post-1981 period showed a continued decline in thrift absorptions, in spite of substantial real deposit growth, and a continued rise in the other share to 60 percent in the 1986–89 period. The post-1981 period is marked by unprecedented regulatory changes and will be discussed in detail shortly. Before turning to it, I first explain the motivation for the heavy S&L and MSB investment in home mortgages in the 1960s and 1970s.

Portfolio restrictions on S&Ls (no corporate loans, bonds, or equity issues) encouraged investment in residential mortgages prior to the 1980s. Moreover, residential mortgages were especially profitable to thrifts (S&Ls and MSBs), owing to a special tax preference. The preference was the ability of thrifts to compute loan loss reserves that far exceeded a reasonable provision for normal losses, as long as thrifts invested a large fraction of their assets in housing-

related loans or liquid assets (Hendershott and Villani 1980, appendix). That is, thrifts were allowed to transfer large portions of their pretax income to reserves, thereby reducing their tax liability. Between 1962 and 1969, the transfer was limited to 60 percent of taxable income; between 1969 and 1979, the fraction was gradually reduced to 40 percent; the 1986 Tax Reform Act lowered the fraction to 8 percent.

The incentive provided by the extraordinary loan loss provisions depends on the expected level of thrift taxable profits over the expected life of the investment (with no profits now or in the future, the incentive is zero), the income tax rate, and the statutory fraction of income that can be transferred to reserves. Assuming a 1 percent net pretax return on assets, the incentive was substantial in the 1960s and 1970s (Hendershott and Villani 1980). In the 1960s, S&Ls would have accepted a pretax return on tax-preferred housing-related assets 0.75 percentage point lower than on comparable nonpreferred assets. The maximum transfer fraction decline throughout the 1970s, and by 1979, when the transfer fraction was down to 40 percent, thrifts would have accepted 0.5 percentage point less. Of course, with a transfer fraction of only 8 percent, or minimal profit expectations, mortgages have virtually no advantage over other investments.

4.2.2 Securitization of Conventional Fixed-Rate Mortgages

In 1970, the Federal Home Loan Mortgage Corporation (Freddie Mac) was chartered to spur the development of a secondary market for conventional mortgages. Freddie Mac introduced the first conventional mortgage pass-through security in 1971. Fannie Mae initiated a conventional pass-through program similar to Freddie Mac's in 1981. Investors in pass-throughs receive a pro rata share of the underlying mortgage payments, both scheduled and early in the event of prepayment or default. A major attraction of these pass-throughs is that Fannie Mae and Freddie Mac guarantee the investors' payments even if the underlying mortgages default.[2]

The conventional loan volume that can be securitized by the sponsored agencies (Fannie Mae and Freddie Mac) is restricted by limits on the dollar value of loans that can be pooled into their pass-through securities. The dollar limit, known as the "conforming" limit, changes annually with a house price index and was $187,600 in 1989, up 63 percent since 1985 (the limit was virtually unchanged in 1990). In 1987, over 90 percent of home mortgage loans (80 percent of dollar volume) was eligible for pooling by the agencies, and this percentage has been fairly constant in the 1980s.

The best measure of the agencies' presence in the conforming FRM market is the share of new (generally defined as less than one year since origination) conventional FRMs eligible for agency securitization (under the conforming

2. The guarantee is especially attractive to investors because of the general view that the federal government implicitly stands behind the debt of these agencies.

limit) that is, in fact, securitized by Fannie Mae and Freddie Mac. This share rose from 4 percent in the 1977–81 period, to almost 25 percent in the 1982–85 period, and to over 50 percent since 1986, including 69 percent in 1989 (Hendershott 1990).[3] That is, in less than a decade, the agencies and their pass-throughs have gone from being a negligible factor to being the driving force in the market.

Two major factors drove the increase in conventional loan securitization in the 1980s.[4] First, thrifts maintained their share of mortgage originations but reduced their relative investment in home mortgages (sold some of the originated mortgages). Most strikingly, the share of S&L total assets in home mortgages and agency securities (largely Fannie Mae and Freddie Mac pass-throughs) fell from 72 to 59 percent during the 1982–84 period. This portfolio shift reflected the reduced profitability of S&Ls and the expansion of S&L asset powers. The reduced profitability eroded the tax incentives for residential mortgage investment, while the expansion of powers encouraged thrifts to invest more widely.[5] Second, Fannie Mae and Freddie Mac pass-throughs are excellent collateral for borrowing via Federal Home Loan Bank (FHLB) advances and security repurchase agreements, and in the 1980s these became cheaper marginal sources of funds than deposits for many S&Ls. During the 1984–88 period, S&Ls increased such debt by over $150 billion. That is, some loans were simply swapped for pass-throughs, and the pass-throughs were retained in portfolio and "repoed" or used as collateral for increased advances.

4.2.3 Adjustable-Rate Mortgages

Periodically in the 1960s and 1970s, increases in interest rates reminded thrifts of the problems of borrowing short and lending long, and thrifts lobbied for permission to offer borrowers an alternative to the FRM, the ARM, that would reprice more in line with thrift deposits. Congress made clear to the regulatory body (then the Federal Home Loan Bank Board) that it did not want borrowers to have that choice (Cassidy 1984). In December 1978, an exception was made for federally chartered S&Ls in California, allowing them to compete with state-chartered S&Ls, and in July 1979, nationwide authority to invest in ARMs with tight interest-rate caps was granted. However, tightly

3. The securitization of conventional conforming ARMs by Fannie Mae and Freddie Mac is less prevalent. It appears that only 2 to 3 percent were securitized in 1984–85 and that the percentage is still only 10 to 12 percent. The greater securitization of FRMs than ARMs likely reflects both the greater standardization of FRMs and the greater desire of originators to hold ARMs in their portfolio. (Some investment banks and large thrifts also securitize home mortgages, but these institutions largely—possibly exclusively—limit themselves to nonconforming or jumbo loans and they likely securitize only 10 to 20 percent of the market.)

4. Over 50 percent of new government-insured originations (Federal Housing Administration [FHA] and Veterans Administration [VA] mortgages) was securitized—put into GNMA pass-throughs—by 1976, 80 percent by 1981, and 100 percent by 1985. FHA/VA originations declined from 30 percent of the total FRM market in the early 1980s to 20 percent in the late 1980s.

5. The vengeance with which some S&Ls used the new asset powers was undoubtedly driven by a desire to "double their bets," given that the market value of their net worth was negative.

capped ARMs were not much of an alternative to the FRM, and these loans were not popular.

In April 1981, fairly liberal regulations were implemented for federally chartered thrifts, and in August 1982, these were loosened further and extended via the Deposit Institutions Act to all state-chartered institutions. Thrifts took advantage of this opportunity. In the middle of 1982, ARMs were only 10 percent of the single-family mortgage portfolio of FSLIC-insured S&Ls. By March 1989, 48 percent of the thrift single-family loan portfolio (including mortgage pass-throughs) was in ARMs (Hendershott and Shilling 1992). Moreover, over the 1984–89 period, ARMs accounted for 43 percent of the conventional single-family loan volume originated by all lenders.

The expansion of ARMs could significantly reduce the volatility of housing demand. At any point in time, the initial coupon on an ARM is less than that on a FRM, but the coupon on the ARM can easily rise above the original FRM contract rate during the life of the contract. Thus a borrower is faced with trading off a lower initial coupon against greater uncertainty about the coupon in later years. Borrowers prefer a lower initial coupon because it allows them to qualify for a larger loan and thus reduces the "affordability" problem, but they dislike interest-rate risk.

Which mortgage a specific borrower will choose at any point in time depends largely on the level and structure of interest rates. With high interest rates generally or with lower rates but a steeply upward-sloping yield curve, borrowers will be more likely to choose ARMs. High interest rates force the borrower to the ARM (there is great utility to lowering the initial rate); relatively low short-term rates induce the borrower to the ARM. However, with lower rates and a flat term structure, borrowers will tend to select the FRM: no affordability problem "forces" the ARM and no relatively low short rates induce the ARM.

Figure 4.2 illustrates both how the ARM share of conventional mortgages has varied over the 1984–89 period and the relationship between this variation and changes in the spread between the coupons on FRMs and ARMs. Large rate spreads (2.5 percentage points) in 1984–85 and mid-1987 to the end of 1988 were associated with 40 to 60 percent ARM shares, while small spreads (1.5 points) in 1986 to mid-1987 and in late 1989 were associated with 20 to 25 percent shares.

Research by Brueckner and Follain (1989) provides econometric evidence on ARM demand. Table 4.2 computes probabilities of the ARM being selected under different interest-rate assumptions, using the Brueckner-Follain estimates. In the first computation, the FRM rate and the FRM-ARM rate spread are put at their mean values over the 1984–89 period (commitment rate data collected by Freddie Mac in its weekly survey of 125 major lenders), and all other variables in their equation are placed at their mean values over the estimation period. The computed ARM probability, 31 percent, is slightly less than Freddie Mac's estimate that ARMs made up 39 percent of conventional

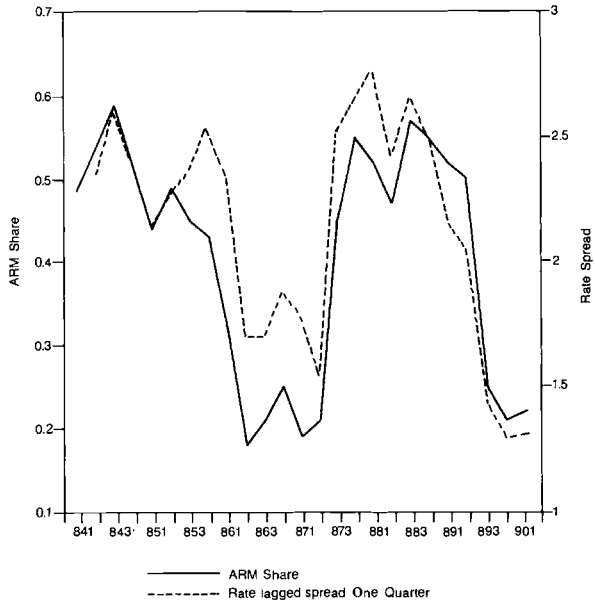

Fig. 4.2 ARM share and FRM minus ARM rate spread quarterly, 1984–89
Source: Federal Home Loan Mortgage Corporation.

Table 4.2 Probability of choosing an ARM in Different Interest-Rate Environments

Experiment	FRM Rate	FRM-ARM Spread	Probability of Choosing ARM
Mean values	11.23	2.15	.31
Changing FRM rate	10.00	2.15	.28
	15.00	2.15	.99
Raising spread, low FRM rate	11.23	1.30	.12
	11.23	2.75	.50
Raising spread, high FRM rate	14.00	1.30	.82
	14.00	2.75	.95

Source: Hendershott 1990, table 1.

mortgage originations during this period. The next two calculations show the sensitivity of the mortgage choice to the level of the FRM rate: an increase in the FRM rate to 15 percent would raise the ARM share from 31 to 99 percent (assuming an FRM-ARM initial coupon spread of 2.15), while a decrease to 10 percent would only lower the share to 28 percent. The last four rows show the impact of variations in the FRM-ARM rate spread at two different levels of the FRM rate. Raising the spread from its historic low (1.3 percent) to its

high (2.75 percent) increases the ARM share by 13 (high FRM rate) to 38 (low FRM rate) percentage points.

4.2.4 A Closer Look at the Thrifts

Figure 4.3 provides data on both S&L behavior and the relative role of S&Ls as home mortgage investors over the past quarter century. The behavior of S&Ls is reflected in the proportion of S&L assets invested in home mortgages either directly or indirectly through holdings of agency securities. The S&Ls' presence in the home mortgage is measured as the ratio of S&L total (direct and indirect) home mortgage holdings to total home mortgage debt outstanding. This presence is the product of the other two series in the figure, the fraction of S&L assets invested in home mortgages and the ratio of S&L total assets to the book value of all outstanding home mortgages.

The share of S&L assets in home mortgages varied within a narrow 72 to 74 percent range until 1981, before plummeting to 59 percent at the end of 1984. The ratio slipped further to 57 percent at the end of 1987, but has since risen to 61 percent. The sharp decline in 1983 and 1984 reflected accelerated

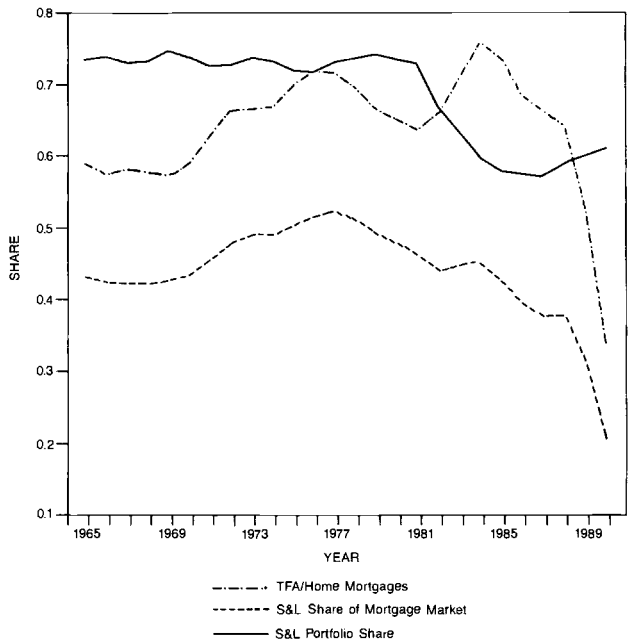

Fig. 4.3 Share of S&L total financial assets (TFA) in home mortgages, S&L share of total home mortgage market, and ratio of S&L TFA to total home mortgages outstanding

Source: Flow of Funds Accounts. First three quarters of 1990 annualized.

growth in the S&L industry (18 percent annual growth rate), not an actual shift out of mortgages.

Beginning in 1961 with 42 percent of the home mortgage market, the S&L presence rose gradually throughout most of the 1970s, reaching a peak of 51 percent in 1977. Since then the S&L presence has been halved. The increase between 1969 and 1977 and subsequent decline through 1981 reflected swings in the size of the S&L industry relative to the size of the home mortgage market. The ratio of the S&L total financial assets to total home mortgage debt outstanding rose from 0.56 in 1969 to 0.70 in 1977, before declining to 0.63 in 1981. While S&L total financial assets grew between 1984 and 1988, they grew at a slower rate than the home mortgage market; with a constant S&L mortgage portfolio share, the S&L share of the home mortgage market fell from 73 to 63 percent.

The role of MSBs is more straightforward. The MSB share of the home mortgage market was roughly constant between 1961 and 1972, as was the ratio of MSB total financial assets to home mortgages outstanding. Since then, this ratio has declined almost monotonically, and the MSB share has dropped from 15 percent to 6 percent. To a large extent, this decline is due to the shift of the U.S. population from the Northeast, where MSBs are relatively important, to the South and West, where MSBs are less important.

Since early 1989, S&L assets have been shrinking rapidly; in just a year and a half, the ratio of S&L total assets to home mortgage debt has fallen from 0.36 to 0.25. In this year and a half, S&Ls have liquidated nearly $90 billion in agency securities and over $50 billion in direct home mortgage holdings. The recent decline in S&L mortgage holdings follows directly from the increased capital requirements mandated by the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA).[6]

The decline of the S&L industry stemmed directly from their asset-liability maturity mismatch, the funding of FRMs with short-term deposits (Kane 1989). When interest rates surged to historic levels in the late 1970s and early 1980s, capital in the S&L industry was wiped out and the incentive for risk taking took over. It is perhaps noteworthy that the vulnerability of S&Ls to periods of sustained increases in interest rates continued to exist at least as late as 1989. S&Ls were still using roughly 40 percent of their short-term deposits to fund long-term FRM investments, and the $400 billion so funded slightly exceeded the volume so funded in 1978. Moreover, S&L ARMs have rate caps that would bind in a period of sustained interest-rate increases. If interest rates

6. FIRREA strongly encourages relative home mortgage investment by S&Ls. S&Ls must now keep 70 percent of assets in qualified loans, versus 60 percent formerly, and fewer non-housing-related loans are now classified as qualified than was previously the case. In addition, restrictions on non-housing-related loans are substantially increased. While some of these restrictions are not yet fully in force, the decline in the home mortgage portfolio share of S&Ls has already been arrested.

Table 4.3 **Correlation between Mortage Rates and Capital Market Rates**

Year	Correlation[a]	Year	Correlation[a]
1972	−0.22	1982	0.80*
1973	0.19	1983	0.81*
1974	0.46	1984	0.65*
1975	−0.18	1985	0.76*
1976	0.16	1986	0.58*
1977	−0.49	1987	0.90*
1978	0.42	1988	0.88*
1979	0.34	1989	0.91*
1980	0.33	1990	0.86*
1981	0.42		

Sources: Roth 1988, table 1, for 1972–87; after 1987, my computations.

[a]Correlations are between month-to-month changes in the Freddie Mac survey FRM rate and the ten-year Treasury rate.

*Significantly different from zero at a 5 percent confidence level.

should repeat their 1977–86 pattern, taxpayers could well lose another $50 billion or more in present-value dollars (Hendershott and Shilling 1992).

4.3 The Impact of Securitization on FRM Coupon Rates

Mortgage securitization should cause mortgage rates to be more closely connected to capital market rates. The impact of securitization on the general level of mortgage rates is less clear. Empirical evidence relating to each of these impacts is discussed below.[7]

4.3.1 Timing of Conventional FRM Rate Adjustment to Capital Market Rates

Roth (1988) analyzed the integration of mortgage and capital markets by looking at trends in the month-to-month correlation of changes in coupon rates on conventional mortgages and ten-year Treasuries annually from 1972 to 1987. His results are reproduced and extended to include 1988–90 in table 4.3. Prior to 1982, the correlation of the changes ranged from −.5 to +.5 and was never statistically different from zero. After 1981, the correlation was never less than .58 and was always statistically positive. Moreover, after 1986, the correlation has been nearly .9.

A potential problem with Roth's analysis is that the mortgage rate incorporates a call premium while the Treasury rate does not, and in some periods the value of the call premium may have changed markedly, possibly disguising a close relationship between the noncall components of the mortgage coupon

7. This section, too, draws heavily on Hendershott (1991).

and the Treasury coupon. Hendershott and Van Order (1989) attempted to eliminate this problem by constructing a perfect mortgagelike capital market rate and estimating the adjustment of conventional mortgage rates to this perfect rate (rather than to a Treasury rate). The analysis consisted of two parts. First, they estimated a price equation for government-insured mortgage passthrough. Second, they regressed conventional mortgage coupon rates on current and past values of the estimated perfect-market coupon rate taken from the Government National Mortgage Association (GNMA) equation.

The price equation was estimated on weekly GNMA price and coupon data from the January 1981–July 1988 period. In this equation, the GNMA price was regressed on the coupon (adjusted to a bond-equivalent basis), the seven-year Treasury rate, and two determinants of the value of the borrower's call option—the term structure slope (seven-year rate less six-month rate) and an estimate of the volatility of the seven-year rate. Various interactions of these variables were included to allow for nonlinear price responses.

To obtain the perfect-market rate, the estimated price equation was solved for the coupon rate after the mortgage price was set equal to one hundred less the actual points charged in the conventional market (less one point presumed to equal origination costs). This coupon was then converted to a mortgage (rather than bond-equivalent) basis, and fifty basis points were added for servicing and other costs. As the degree of integration increased, changes in the perfect-market coupon rate should have been reflected more quickly in the conventional rate (the data are again from Freddie Mac's survey of 125 major lenders).

Conventional rates were regressed on the current and lagged one-to-eight-week values of the perfect-market rates for various parts of the 1971–88 period. Table 4.4 reports the cumulative adjustment of the conventional rate currently and over lags of two, four, six, and eight weeks. The shift toward integrated markets is striking. The percentage of the change in the perfect-market rate that is reflected instantaneously in the conventional rate rose monotonically from effectively 0 in the 1970s to 8 in the 1980–82 period, 16 in the

Table 4.4 **Time Response of Conventional Rates to Fictional Perfect-Market Rates**

	Adjustment to One-Point Rise in Perfect Rate				
Period	Current	3 Weeks	5 Weeks	7 Weeks	9 Weeks
1986–88	0.59	0.95	0.96	0.87	0.84
1983–85	0.16	0.55	0.68	0.83	0.88
1980–82	0.08	0.45	0.75	0.93	1.05
1976–79	0.01	0.36	0.62	0.66	0.86
1971–75	0.06	0.17	0.37	0.56	0.74

Source: Hendershott and Van Order 1989, table 5.

Table 4.5 **Actual and Perfect-Market Effective Conventional FRM Rates (%)**

	Actual	Perfect Market	Difference
1971	7.54	8.33	−.79
1972	7.38	7.92	−.53
1973	8.04	8.97	−.93
1974	9.19	9.78	−.60
1975	9.05	9.92	−.87
1976	8.86	9.22	−.35
1977	8.84	9.09	−.24
1978	9.64	10.08	−.44
1979	11.20	11.34	−.14
1980	13.76	14.24	−.48
1981	16.69	16.55	.13
1982	15.97	15.24	.73
1983	13.23	12.86	.37
1984	13.89	13.52	.37
1985	12.43	11.95	.48
1986	10.19	9.69	.49
1987	10.21	10.01	.20
1988	10.23	10.21	.02

Source: Hendershott and Van Order 1989, table 6.

1983–85 period, and 59 in the 1986–88 period. The fraction of the change in the perfect-market rate reflected in the conventional rate within two weeks rose monotonically from a sixth in the first half of the 1970s, to almost half in the early 1980s, to over half in the 1983–85 period, and to nearly one in recent years.

4.3.2 Securitization and the Level of Mortgage Rates

Table 4.5 lists annual values of the actual conventional rate, the Hendershott–Van Order fictional perfect-market rate, and the difference between them for the 1971–88 period. The precise differences are, of course, subject to some error: the actual rate is a survey rate and the perfect rate is computed from an empirical equation estimated with error. Nonetheless, the overall pattern of the differences seems both systematic and plausible. The actual rate was three-quarters of a percentage point below the perfect-market rate in the 1971–75 period; a third of a point below in the 1976–80 period; and roughly half a point above the perfect rate in the 1982–86 period.

As explained earlier, the low mortgage rate in the 1970s can be attributed to tax advantages for thrift mortgage investments and portfolio restrictions against nonmortgage investments, and the switch in the 1980s reflects a sharp

relative shift of thrifts out of home mortgage investments owing to the reduced (non-) profitability of S&Ls and the expansion of S&L asset powers. The half-percentage-point premium in the early 1980s provided the incentive for the securitization of conforming conventional FRMs. The premium covered the start-up cost of the securitizers and the liquidity premium demanded by investors.

Beginning in the middle of 1986, the actual rate is very close to the perfect-market rate, the conventional conforming mortgage market seemingly being fully integrated into capital markets. That is, as the volume of mortgage pools grew, bid/ask spreads were bid down (and thus the liquidity premium fell), and the per dollar costs of the securitizers declined. This suggests that the rates on conforming loans, which are eligible for purchase by the agencies, should have declined relative to rates on nonconforming or jumbo loans.

Hendershott and Shilling (1989) explained the relationship between rates on individual loans and a number of factors, using California data during the May–June period of 1978 and 1986. The factors were loan-to-value ratio, loan size, precise month the loan was closed, dummy variables for geographic regions in the state, and whether the loan was on a new property, was under the conforming limit, or was just above the limit. The loan-to-value ratio had the expected positive impact; the loan size and the new property dummies had the expected negative impacts; and the responses in the two years were remarkably similar. For those two years, however, the effects of the conforming limit differed markedly. In 1986, conforming loans had a rate thirty basis points lower than well-above-the-limit loans, and soon-to-be-conforming loans had a rate fifteen basis points lower (standard errors were only five basis points). In 1978, however, the point estimate for the conforming loan coefficient was only three basis points.

It should be emphasized that the perfect-market rate listed in table 4.5 is computed from a GNMA price equation, not from an equation explaining prices on seven- or ten-year Treasury bonds. The working assumption of Hendershott and Van Order was that the GNMA market has been integrated with capital markets since 1981. This assumption seems plausible because GNMAs have full faith and credit guarantees and have traded like Treasuries, with comparably low transactions costs and high volume, at least since 1981.

4.4 Real House Prices and Home Ownership, 1960–89

Systematic deviations of the conventional FRM commitment rate from the perfect-market estimates—0.33 to 0.75 percentage points prior to 1981 and +0.5 point in the 1982–86 period—provided a general stimulus for owner-occupied housing in the 1970s and a deterrent in the first half of the 1980s. This would translate into higher real house prices and home ownership rates in the 1970s and lower real prices and ownership in the first half of the 1980s. Of course, many other things, such as changes in real capital market interest

rates, tax law, and so forth, can affect real prices and ownership (Hendershott 1988). Thus, we certainly would not want to attribute all observed behavior to relative changes in mortgage rates. Nonetheless, a look at changes in real prices and home ownership is interesting.

4.4.1 Real House Prices

Figure 4.4 contains two alternative measures of U.S. real house prices, as well as a measure of real after-tax interest rates for the 1963–89 period: the residential investment deflator divided by the GNP deflator and the constant-quality new house price series computed by the Bureau of Census (old series through 1977, new one thereafter) divided by the GNP deflator. The latter relates to single-family housing only and includes a land component. The two series tell basically the same story. Real house prices rose sharply between 1965 and 1980 (by 21 to 26 percent) and fell in the first half of the 1980s by 6 percent.

The real after-tax interest rate in figure 4.4 equals an after-tax adjusted ten-year Treasury rate less the average appreciation rate in the residential investment deflator during the previous three years. The adjustment reflects the earlier evidence of deviations between the actual and perfect-market home mortgage rates; the ten-year Treasury rate is lowered by three-quarters of a percentage point for the years before 1976 and by one-third point for the 1976–80 period, and is raised by one-half point for the years 1982–86. The tax rate is the average marginal tax rate on interest income and varies between 0.24 and 0.3.

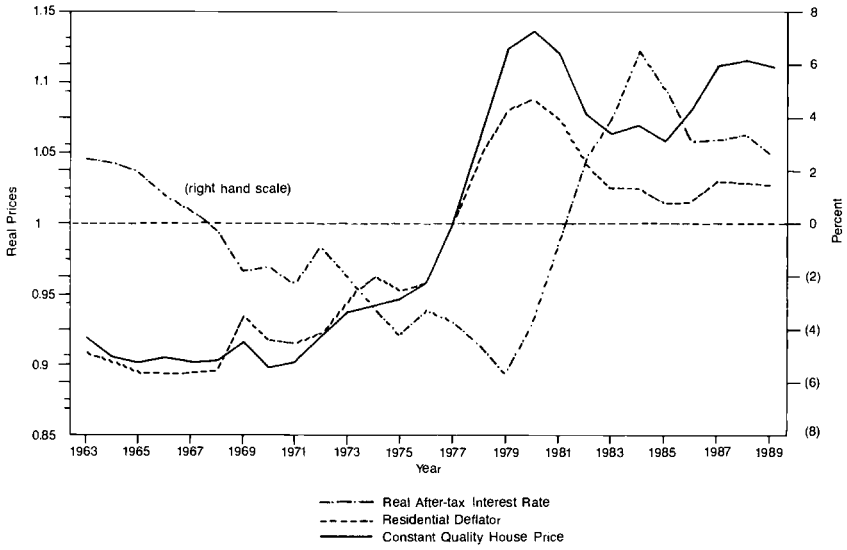

Fig. 4.4 Real house prices and after-tax interest rate

Hendershott (1991) relates the rate of change in real house prices (the change in the logarithm) to both the level and change in the unadjusted real after-tax interest rate, as well as the rate of change in real GNP and a demographic demand variable. Reestimation using the adjusted interest-rate variable (*RAT*) yields

$$d\ln p = z - \underset{(.00222)}{.00419}\ \Delta RAT - \underset{(.00135)}{.00281}\ RAT, \qquad R^2 = 0.58,\ DW = 2.00,$$

where z represents the contribution of the other variables and 1960–89 is the estimation period. Coefficients on both interest-rate variables are statistically negative at the 0.05 confidence level.

I have used these coefficients to compute what real house price inflation would have been over the 1956–89 period if the real after-tax interest rate had stayed at its 0.24 percent average value over the entire period. The observed real residential investment deflator rose by 21 percent between 1965 and 1980 and then fell by 6 percent between then and 1985. The recomputations say that two-thirds of the real increase is attributable to the low real after-tax rate during the 1966–79 period and that all of the real decrease is attributable to the high real after-tax rates in the first half of the 1980s.

4.4.2 Home Ownership

Home ownership varies enormously with age and household type. The average ownership rate of married couples age 35–44 years has exceeded that of couples under age 25 by roughly 50 percentage points over the past quarter century. The rates for singles and other household heads increase similarly with age, but the rates are 20 to 40 percentage points lower for comparable-age singles than for marrieds. Rates for young other household heads are comparable to those of singles, but those of older other heads are closer to those of older married couples.

Research on home ownership indicates a strong correlation with economic factors such as income (Haurin, Hendershott, and Ling 1988), wealth (Jones 1989) and the relative costs of owning versus renting (Hendershott and Shilling 1982; Rosen and Rosen 1980). These factors are correlated with age and family structure to varying degrees and thus explain at least part of the overall correlation of ownership with age and family type.

Table 4.6 shows a sharp increase in the ownership rate of married couples between 1960 and 1980. For every age class, the increase is 11 to 14 percentage points, with two-thirds of the increase coming in the 1970s. Table 4.7 contains data for married couples and single households for five age classes for three years: 1974, 1980, and 1987. These data indicate an even greater surge to ownership between 1974 and 1980 by single households than by married couples. For the four cohorts between ages 25 and 44, the increase was 7 to 11 percentage points in these six years alone.

These movements are consistent with those of real after-tax interest rates.

Table 4.6 **Home Ownership Rates of Married Couples (%)**

Age of Head	1960	1970	1980
Under 25	23	26	37
25–29	44	49	58
30–34	62	66	75
35–44	73	77	84
45–64	75	81	88
Over 64	78	79	84

Source: Census of Housing, 1960, 1970, 1980.

Table 4.7 **Home Ownership Rates by Household Types and Age of Head, Selected Years (%)**

	Married Couples			Singles		
Age of Head	1974	1980	1987	1974	1980	1987
Under 25	32.7	34.9	29.9	7.0	11.5	9.7
25–29	54.2	58.2	52.5	13.0	20.2	19.4
30–34	71.9	74.7	69.2	22.5	30.5	28.8
35–39	78.1	82.2	78.0	26.2	37.1	35.7
40–44	82.4	84.7	83.1	29.2	36.6	44.0
45–49	85.1	86.2	86.0	35.3	35.5	44.0
Over 49	83.7	87.1	88.9	54.4	57.4	59.5

Sources: Annual Housing Survey and *Housing Vacancy Survey.* Data kindly supplied by David Crowe of the National Association of Home Builders.

As figure 4.4 indicates, the 1970s were a period of negative and declining real after-tax rates. In contrast, these rates jumped sharply in the early 1980s, and the home mortgage rate rose especially, moving from a third of a point "below market" in 1980 to a half point above in 1982. Ownership by married couples under age 40 fell by roughly 5 percentage points.

4.5 The Interest Sensitivity of Housing Production

Increases in market interest rates have traditionally been viewed as restricting housing demand through two channels. First, higher interest rates raise the ratio of mortgage payments to income. Because lenders set qualification standards in terms of this ratio, borrowers will be constrained to purchase smaller houses when interest rates rise, if they are unable to provide a larger down payment. (Households will want to purchase smaller houses if the real after-tax interest rate has risen.) Second, with deposit rate ceilings in place, substantial increases in market interest rates cause deposit outflows and lead depository lenders to ration credit—to require sufficiently larger down payments so that the demand for their credit is reduced to the available supply. In

the absence of a ready supply of other credit, such as is supplied by a secondary mortgage market, the total volume of credit is reduced. With both of these channels operating, some households will be unable to move up to larger houses, and some households will not be formed. Housing starts will drop, the average real value of starts will decline, and real house prices will soften. Arguably, the prominent changes in housing finance in the 1980s—the removal of deposit rate ceilings, the widespread introduction of ARMs, and the securitization of conforming FRMs—should have reduced the sensitivity of housing demand to increases in interest rates.

4.5.1 Multiple Regression Analysis

Three relatively recent studies have used multiple regression analysis to examine possible changes in the sensitivity of housing activity to increases in interest rates. Akhtar and Harris (1986–87) and Throop (1986) both explain quarterly real residential investment over roughly the 1960–85 period. Ryding (1990) explains quarterly real single-family residential investment over the 1965–88 period. The models are similar in that real disposable income, real after-tax interest rates, and a variety of disintermediation or credit-rationing dummy variables are the primary determinants of investment demand.[8]

One advantage of regression analysis is that it allows a direct test of the impact of thrift deposit contraction in the early 1980s, the last period of contraction prior to 1989–90. If the 1979–82 contraction did not lead to credit rationing, subsequent contractions are not likely to do so. The empirical results are mixed. Ryding estimates only one-third as large a response to his rationing proxy—the spread between the three-month bill rate and the passbook savings rate—in 1979–82 as in the 1969–70 and 1973–75 periods. Akhtar and Harris estimate two-thirds as large a response in 1979–82 as in the earlier period, using zero-one dummies for periods of credit rationing. Finally, Throop finds no rationing in 1979–82.

Figure 4.5 reproduces a simulation of Ryding's model (the residential investment equation plus some interest-rate relationships) for different regimes. A permanent one percentage point increase in the federal funds rate reduced investment by about 15 percent between the late 1960s and middle 1970s, but by only 7 percent in the early 1980s. Moreover, if one assumes that credit rationing will no longer occur, the reduction is only 3 percent. That is, housing may only be a fifth as sensitive to interest rates now as it was in the 1970s.

4.5.2 Vector Autoregressions

An alternative to multiple regression analysis is estimation of vector autoregression models. Kahn (1989) and Pozdena (1990) both compare models

8. The existence of credit rationing in some periods does not mean that the housing stock will be lower in the long run. Increased production after the rationing may make up for reduced production during the rationing period (Hendershott and Van Order 1989).

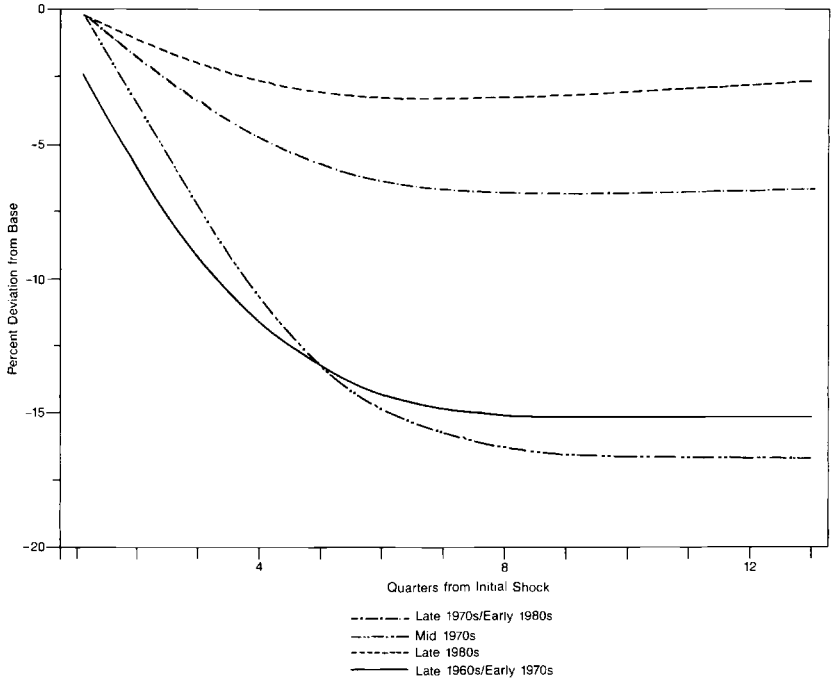

Fig. 4.5 Housing investment: response to a permanent monetary tightening
Source: Ryding 1990, chart 10.

estimated over the 1983–89 period with models estimated in earlier periods (1956–79 for Kahn and 1960–82 for Pozdena). Pozdena explains total housing starts (monthly), and Kahn explains total real fixed residential investment (quarterly). Both relate the activity variable to its lagged values and lagged short-term interest rates (three-month bills and the federal funds rate, respectively) over the prior year. Pozdena also includes lagged values of the term structure slope (his bill rate less the AAA corporate bond rate) in his second model.

Table 4.8 shows the percentage of variance in starts explained by Pozdena's models that is accounted for by lagged starts, lagged bill rates, and the lagged term structure spread (in his second model). As can be seen, lagged bill rates account for only a third to a half as much of the explanation in the 1980s as in the earlier period. Pozdena also traces out the effect on housing starts of a one-standard-deviation increase in bill rates for both the pre-1983 and post-1982 periods. For the pre-1983 period, the response peaks at a 60,000 decrease in starts over the fourth to sixth quarters. The post-1982 response is less stable, and the average decrease over these quarters is only about 20,000.

Kahn does not report empirical estimates, but he does trace out his results in a figure analogous to that of Pozdena. A permanent one percentage point

Table 4.8 **Interest-Rate Variation and Housing-Starts Variation (%)**

	VAR 1		VAR 2	
Explanation	Pre-1983	Post-1982	Pre-1983	Post-1982
Starts	39.6	78.5	32.9	43.9
T-bills	60.4	21.5	56.9	28.2
Lagged term structure spread	—	—	10.2	27.8

Source: Pozdena 1990, table 1.

Note: Variance decomposition of starts, from twelth-lag vector autoregressions (VARs); in percentage of variation explained, measured at twenty-four months.

increase in the federal funds rate reduces real residential investment by about 4 percent in the pre-1980 period versus 1.5 percent in the post-1982 period. The maximum decline is reached roughly seven quarters after the increase in rates.

The Pozdena and Kahn results are remarkably similar (and are also consistent with Ryding's results). Kahn has a slightly longer lag, but he is explaining expenditures, which slightly lag starts. Both find the 1980s' response to be only about a third of the earlier response. Not surprisingly, both authors conclude that mortgage securitization and the introduction of ARMs have significantly reduce the volatility of the housing industry. Further, greater contracyclical shifts in interest rates will be needed to obtain the same degree of monetary tightness and ease as was achieved with smaller movements in earlier decades. Finally, a less volatile housing industry could well lead to a more capital intensive and productive industry.

4.6 Concluding Thoughts

In the 1980s, the U.S. housing finance system was transformed from a one-instrument (FRM), deposit-based (and subsidized) system to a two-instrument (FRM and ARM), largely capital market system. In the 1960s and 1970s, mortgage rates were "too low" and real house prices and home ownership rose rapidly, but bouts of credit rationing led to severe housing production cycles. In the 1980s, mortgage rates have been relatively higher but more closely tied to capital market rates, and an ARM was introduced for households to shift to when housing became less affordable—when interest rates rose generally or when long rates rose relative to short rates. As a result, housing production is now less volative and (hopefully) will be more efficient.

Two uncertainties seem to exist today regarding U.S. housing finance. The first relates to the collapsing thrift industry. While no large impact seems likely for conforming FRM rates owing to the securitization of that market, a decline in the correlation between mortgage and Treasury rates in 1990 has been observed. More important, major disruptions could occur in the ARM and jumbo

FRM markets, with these rates getting out of line relative to capital market rates just as conforming FRM rates did in the first half of the 1980s. (Unfortunately, we have no evidence on whether or not this is occurring.) This could lead to reduced housing demand, real prices, and home ownership. At some point, though, securitization of these markets should occur, by Fannie Mae and Freddie Mac below the conforming limit and by fully private sector entities in the jumbo market.

The second uncertainty concerns the government-insured FHA/VA market. I have not discussed these FRMs because this market was effectively securitized prior to the 1980s and did not undergo major changes in the 1980s. However, in response to a marked deterioration in the soundness of the basic single-family insurance fund, legislation was enacted in 1990 to substantially increase the cost of this insurance (Hendershott and Waddell 1990). Insurance premiums are rising by 45 to 85 percent (greater percentage increases for higher loan-to-value loans), and borrowers are being required to supply more money up front. FHA loans are used more heavily by younger, less wealthy households; survey data indicate that the FHA/VA share of the total home mortgage market during the 1984–89 period was twice as great for married couples under age 25 as for those above age 34 (Hendershott 1990, table 2). I conclude that the changes in the FHA program are likely to lead to further shrinkage in the FHA share of the FRM market and declines in home ownership rates of younger households.

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