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CREDIT AVAILABILITY AND ECONOMIC DECISIONS: SOME EVIDENCE FROM THE MORTGAGE AND HOUSING MARKETS

ALLAN H. MELTZER*

THE CONJECTURE that "credit rationing" plays an important role in decisions to purchase or consume recurs frequently in discussions of monetary policy, banking markets and consumption or investment decisions. Repetition of the phrase "cost and availability of credit" in official statements strengthens the impression that cost and "availability" have separable and independent effects on decisions to consume or invest. A large literature develops this theme.[1]

A common starting point of the argument is the observation that lenders use "non-price" rationing—terms and conditions of the loan contract—to allocate loans. One interpretation of the observation is that the theoretical terms "price" and "interest rate" have many dimensions, so the cost per unit time paid by the borrower includes more than the explicit rate of interest written in the loan contract. That this is not the only, or even the principal, interpretation is clear from the many proposals to offset the effects of "non-price" rationing or "availability conditions" by government action. Many of the Federal government's credit programs have this rationale.

Although "credit rationing" is invoked to rationalize many phenomena, the argument has had greatest influence on policy and legislation to encourage housing. Much "housing policy" in the U.S. and in Western Europe is "mortgage policy." The avowed purpose of the policies is to encourage the production of housing by increasing the "availability" of mortgage credit. The increased "availability" is financed by issuing bonds.

General economic theory suggests that changes in the composition of financial assets—e.g., a sale of bonds and a purchase of mortgages—can affect the composition of real assets and spending decisions only by changing relative prices and the market value of wealth. Elsewhere [Arcelus and Meltzer, 1973], I have argued that there is no evidence of any effect of mortgage policy or "availability" on the number of houses produced or purchased if proper allowance is made for the method of financing the government's mortgage program. Specifically, the effect on housing of financing the mortgage purchase (or sale) offsets the effect of the increased (or reduced) "availability" of credit in the form of mortgages.

The paper examines two additional types of evidence on "availability." One comes from data on wealth and the composition of assets and liabilities. If the form in which "credit" becomes available affects the composition of spending, the large increase in mortgage credit relative to wealth or other liabilities

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1. A summary of the literature is given in Jaffee [1971].

in the past fifty years should be accompanied by growth in the share of housing in total assets. Failure to find an increase in the share of housing in total assets implies that mortgage policy has no long-term effect on housing. Either there is no effect of increased "availability" or the effect is reversed subsequent to the increase in the stock of mortgages. If the latter is the correct inference, mortgage policy can smooth fluctuations in housing by increasing the supply of mortgages. Availability has a "short-term" but not a "long-term" effect.

The short-term effect of "availability" is generally said to influence the demand for housing by changing the terms and conditions of the mortgage contract or by reducing mortgage rates relative to other rates. A number of recent studies have investigated these effects. Below I summarize several of the studies and draw some conclusions.

Together, the long-term and short-term data provide evidence on the relation of mortgage policy to housing policy. In the final section, I summarize the principal findings and draw the implications for housing markets and housing policy.

I. Evidence from Long-Term Changes

Structural changes in mortgage contracts during the past forty years include the spread of amortization, the lengthening of contracts, insurance against default, and reduction in the use of subordinated debt. During the same period, there has been a substantial increase in the amount of government subsidies and in the role of government as lender and insurer. In response to these changes affecting borrowing and lending, there have been changes in the mortgage market. The most notable changes are growth in the number and size of specialized thrift institutions that buy mortgages and in the proportion of mortgages to total liabilities of financial institutions.

There is no dispute about the importance of many of these changes for the functioning of the mortgage market. At issue, is the effect on housing. If the form in which "credit" is provided affects the composition of spending and is not entirely reversed, the composition of assets provides evidence on "availability." We should expect to find an increase in housing relative to total assets accompanying or following any increase in the relative "availability" of mortgages. An alternative hypothesis is that the composition of spending is independent of the type of "credit" provided. The borrower substitutes one type of "credit" for another, not one type of asset for another.

The data in Table 1 bear on the alternative hypotheses. Because these data may contain substantial error, we have used two estimates of the housing stock. While there are marked differences between the series, there is no difference in the conclusion to be drawn from Table 1.

The long-term record shows very little relation between mortgage credit and housing. During most of this century, individuals appear to have kept between 20% and 25% of their assets invested in housing (cols. 1 and 2). There is no sign of a trend in the ratio of housing to assets during the years for which we have data. The relatively low rate of increase in housing stocks during the sixties occurred during a period of substantial increase in the

TABLE 1
HOUSING, MORTGAGES AND LIABILITIES OF NON-FARM HOUSEHOLDS

Year	Ratio of Housing to Total Assets		Ratio of Mortgage Debt to Housing		Ratio of Mortgage Debt to total Liabilities
	(1)	(2)	(3)	(4)	(5)
1912	25.2		13.3		47.8
1922	24.8		12.5		46.0
1929	22.3	18.4	18.0	25.8	43.0
1933	25.0	20.0	18.8	28.7	49.7
1939	26.0	20.8	16.1	22.7	52.0
1950	27.5	23.9	17.3	20.9	60.9
1955	25.6	23.2	25.6	29.0	63.2
1958	24.9	22.6	29.1	29.0	65.9
1960	n.a.	n.a.	30.9	33.6	65.5
1970	n.a.	n.a.		37.5	61.0

Sources:
Col. 1: Goldsmith and Lipsey [1963] Vol. I., Table 65, p. 257.
Col. 2: Net housing stock from Survey of Current Business (1971), p. 25. Total assets as in Col. 1.
Col. 3: Goldsmith and Lipsey [1963] Vol. I., Table 82, p. 292.
Col. 4: Total net housing from Survey of Current Business [1971]. Mortgage Debt from Goldsmith and Lipsey Vol. II, p. 340 lines 11 & 15 1912-39; 1950-70 from Federal Reserve Flow-of-Funds Accounts, May 1971, p. 2.
Col. 5: Goldsmith and Lipsey, Table 77, p. 283; 1960 and 1970, Flow-of-Funds.

market values of securities. This suggests that no sizeable increase in the ratio occurred during the sixties.

The ratio of mortgage debt to total housing stock of non-farm households (columns 3 and 4) shows a very different pattern. This ratio increased nearly three-fold during the years shown in the table. Some fluctuations in the ratio reflect the decline in the relative value of the housing stock during the thirties and early forties when housing production remained at a low level. Part of the increase between the earlier and the later years, however, appears to be a result of increased opportunity to borrow on mortgage contracts.

Making more mortgage credit available and terms more favorable encouraged borrowers to increase the amount of mortgage borrowing relative to other types of borrowing. Column 5 shows that a larger percentage of the total liabilities of nonfarm households now takes the form of mortgages. Since the proportion of housing to total assets has not changed, the increase in the ratio of mortgages to housing implies that the ratio of mortgage debt to total assets is now considerably higher than in the twenties or thirties. By multiplying columns (1) and (3) or columns (2) and (4), we obtain the ratios of mortgages to assets. Comparison with column 5 shows that much of the increase in the ratio of mortgage debt to liabilities reflects the way in which individuals now finance their total assets.

As crude as the data are, there is little doubt about the relevance of the alternative explanations. There is no evidence that the considerable increase in the relative use of mortgages has had any effect on the distribution between

housing and other assets. There is, therefore, no evidence that changes in the composition of "credit" have any long-term effect on the composition of assets. Comparison of columns (1) or (2) with columns (3) or (4) makes a strong case for the proposition that a main effect of housing policy has been to substitute borrowed funds for owner's equity in houses while leaving the share of housing to total assets unchanged.

Nothing in the data for sub-periods suggests that higher relative growth of mortgage credit and the change in the composition of liabilities had a positive effect on the growth of the housing stock. On the contrary, the period of greatest increase in the ratio of mortgage debt to housing, 1922-29, shows a slight decline in the ratio of housing to assets, and during the period of greatest increase in the ratio of housing to assets, 1929-1950, the ratio of mortgage debt to housing declined.

Table 2 provides more detail on the relative growth of various types of

TABLE 2

PERCENTAGE CHANGES IN LIABILITIES OF HOUSEHOLDS SELECTED PERIODS

Beginning Year	Terminal Year	Total Liabilities	Mortgage Debt	Consumer Credit	Security Credit
1900	1922	400%	320%	560%	500%
1922	1929	230	210	210	260
1929	1950	180	250	330	−75
1950	1970	630	650	590	400
1922	1970	2670	3530	4250	220
1929	1970	1150	1630	1970	−15

Sources: Goldsmith and Lipsey II, Tables 1 and 1a and Federal Reserve Flow-of-Funds, *op. cit.*

liabilities. For the period 1900-1970 as a whole, consumer credit increased much more than other types of liabilities. During the years 1929-1970 and during the post-war years, the growth rate of mortgage debt liabilities of non-farm households exceeded the growth rate of total liabilities. The rate of increase in mortgage debt was sufficient to raise the ratio of mortgage debt to total liabilities by 40 to 50% as shown in Table 1.

The rise in the ratio of mortgage debt to total liabilities after 1929 appears to be the result of substitution of mortgage credit for security credit. The higher loan-to-value ratio in housing and the unchanged ratio of housing to total assets are reconciled if a considerable part of the increased mortgage debt replaced security credit after 1929.

To compute the amount of mortgage credit substituted for security credit in recent years, I use two estimates. Both procedures ignore the changes in the markets for home mortgages and security credit. The first assumes that security credit rose at the average rate of increase of total liabilities of non-farm households. The second procedure takes a "sources to uses" approach by assuming a fixed ratio of security credit to the value of common and preferred stock. The first method probably overestimates the extent of substitution, but the second most likely underestimates substitution. The reason is that liabilities of non-farm households increased more than assets. Extrapolating a constant

ratio of security credit to total liabilities ignores changes in borrowing arrangements that induced substitution of mortgage credit for security credit. Extrapolating a constant ratio of security credit to common and preferred stock ignores the rise in the ratio of liabilities to assets.

Between 1900 and 1922, security credit increased at a higher rate than total liabilities, as shown in Table 2. Suppose that after 1922, the ratio of security credit to total liabilities remained at the 1922 average, so that the ratio of security credit to total liabilities was the same in 1958 and 1970 as in 1922. Security credit would have been $38 billion larger in 1958 and $100 billion larger in 1970 than the values reported for those years. Suppose further that the hypothetical $38 billion of additional security credit in 1958 (or $100 billion in 1970) was entirely a substitution of security credit for mortgage credit so that total borrowing and the growth rate of consumer credit are as reported. The entire increase in security credit is then matched by a decrease in the stock of mortgage credit. If the growth rate of the housing stock is independent by these changes in financing as the data suggest, the ratio of mortgage debt to housing stock falls, on these assumptions, from 31% to approximately 20% in 1970 and from 29% to 19% in 1958. The revised ratio, 19% or 20%, is close to the ratios for 1929 and 1933.

A by-product of this calculation is the emphasis it gives to the timing of large changes in the ratio of mortgage debt to housing stock. Large increases in the ratio of mortgage debt to housing occurred in two periods, the twenties and the fifties. The first increase came before agencies like FHA fostered changes in the mortgage contract, so the first increase in loan-to-value ratios cannot be explained as a consequence of contract improvements or government guarantees. The second increase appears to be, at least in part, a consequence of the use of mortgage credit to replace security credit and other types of debt instruments after mortgage contracts and security loan contracts were changed in the thirties.

The ratio of security credit to the value of common and preferred stock held by non-farm households provides a second estimate of the substitution of mortgage credit for security credit. During the twenties security credit remained at approximately 8% of the value of common and preferred stocks of non-farm households. By 1950, the percentage had fallen to 4.5% and by 1958 to 2%.

If the ratio of security credit to holdings of common and preferred stock was the same in 1958 and in 1922, security credit liabilities of non-farm households would be $27 billion larger than reported in 1958. Reducing the stock of mortgage credit by $27 billion in 1958 lowers the ratio of mortgage credit to housing from 29% to 23.5%. The ratio of mortgage credit to total liabilities falls from 65% to 55%. Both percentages are higher than in the pre-war years. This estimate of the substitution is lower than the previous estimate.

Data are not available on a consistent basis to extend this calculation to 1970. Our two calculations for 1958 indicate that from $27 to $38 billion of the existing stock of mortgage debt, between ¼ and ⅓ of the total, has been used to finance ownership of common and preferred stock in that year. The two very different sets of assumptions furnish an upper and lower bounds

for the substitution of mortgage credit for security credit. At current levels, the substitution is in the neighborhood of $75 to $90 billion.[2]

The calculations are based on extrapolations and are no more than crude estimates of the dollar amounts. The conclusion that there has been substantial use of mortgage credit in the securities markets is consistent with the very large increase in mortgage credit, in the ratio of mortgage credit to housing, to total assets and to total liabilities and with the unchanged relation of housing to total assets. The many changes in mortgage contracts, terms and lending conditions made mortgage loans easier to arrange and less costly. The risk of foreclosure or non-renewability declined with the spread of monthly amortization. During the same period, security loans have been restricted by regulation of margin requirements. The effect of both sets of changes in law and regulation is to increase the demand for mortgage credit and to decrease the demand for security credit.

The findings and conclusion are inconsistent with the hypothesis that credit "availability" affects the composition of assets. With improvements in the mortgage market and restrictions on security credit, mortgage credit increased relative to total housing, and security credit declined relative to the value of outstanding securities. The opposite side of the coin is, of course, that owner's equity in housing declined relative to the stock of housing. This is the pattern to be expected only if the main effect of "availability" is to change borrowing arrangements and the composition of liabilities.

Other plausible explanations of the data showing (1) large increases in mortgage debt relative to housing, total assets and total liabilities and (2) an unchanged ratio of housing to total assets fail to account for both changes in a credible way. Higher tax rates and the deductibility of interest payments, anticipations of inflation, changes in the age composition of the population, each of these may provide a plausible explanation of the increase in the ratio of mortgage debt to housing stock. None can explain the rise in mortgage debt to total liabilities since the numerator and denominator are affected in much the same way by the changes.

Four conclusions seem to emerge from my analysis of the long-term data. First, the change in the ratio of mortgage debt to liabilities between the 1920's and 1950's or 1960's is partly a substitution of mortgage debt for other principal types of credit used by consumers, particularly security loans. Second, the increased ratio of mortgage debt to housing is too large to explain the rate of increase in mortgage debt to liabilities during each of the sub-periods in Table 1, for example 1950-55. Third, there is no evidence that any of the large changes in mortgage credit or in the ratio of mortgage credit to total liabilities has had any effect on the proportion of housing to total assets. The latter shows no effect of any of the credit programs or any of the changes in the mortgage contract. Fourth, none of our findings suggests that specific

2. After completing the paper, I found a data series called "Mortgage Debt for Non-Real Estate Purposes" [Conference Board, 1972, p. 13]. The series is constructed by taking the difference between "New Mortgage Debt" and "Aggregate Outlays for New Homes." The series is approximately zero in the late 1950's and is positive in the 1960's. The sum of the annual values from 1960 through 1970 is approximately $105 billion. This is an estimate of the stock of mortgage debt issued to finance acquisition of assets other than new houses including durables and equities.

liabilities finance specific assets. On the contrary, the long-term data are entirely consistent with the hypothesis that the asset purchases are independent of the form in which credit is made available.

One of the arguments for government credit programs to assist the mortgage market is that such programs encourage home ownership. The evidence here provides no support for the argument.

However, the evidence in this section does not deny that credit programs that are designed to encourage or assist housing purchases have a short- but not a long-term effect on the demand for housing. If this is correct, buyers purchase housing when the volume of mortgage credit increases and later respond to relative prices, tastes and endowments by adjusting the composition of asset portfolios. This line of argument implies that if there is any effect of "mortgage credit availability" on housing, the effect is temporary. In the following section we consider the evidence on the short-term response obtained from recent studies of the mortgage market.

II. Evidence from Recent Econometric Studies of the Mortgage Market

There have been numerous studies of the mortgage market and of the determinants of the liabilities and asset holdings of particular institutions. These studies are not of interest. Our interest is in housing, not the distribution of financial assets. In the previous section, we found no evidence of any long-run relation between increased availability of mortgage credit or improved mortgage contracts and housing. The long-run data are consistent with econometric evidence showing no significant relation between stocks of mortgages and either the demand for housing or the supply of housing [Arcelus and Meltzer, 1973].

This section discusses four recent econometric studies of the behavior of lenders and borrowers in the mortgage market to see whether the studies furnish additional support or partial disconfirmation of our findings. No attempt has been made to make the survey exhaustive, but the four studies include most, if not all, of the approaches to the analysis of the mortgage market that have been used in recent years.

As part of the *Study of the Savings and Loan Industry* commissioned by the Federal Home Loan Bank Board, Phoebus Dhrymes and Paul Taubman studied the effect of large changes in monetary policy on savings and loan associations [Dhrymes and Taubman, 1969]. A main purpose of their study was to investigate the extent to which large, sudden changes in monetary policy affect the assets and liabilities of savings and loan associations and the rates of interest on deposits and mortgages.

Since their analysis is limited to savings and loan associations, care must be taken not to treat the conclusions as relevant to the entire mortgage lending industry. Savings and loan associations provide only part of total mortgage lending, so it is not immediately obvious that a statistically reliable demand curve for mortgages at savings and loan associations can be estimated as a function of a few variables. If there is competition for loans, small change in the terms or conditions relative to the terms and conditions offered by other

lenders have large effects on demand. Or, to put the same point in another way, changes in the terms and conditions at other lending institutions shift the demand for mortgages at savings and loan associations.

Dhrymes and Taubman recognize this problem but proceed to estimate, separately, the demand for mortgages at western (mainly California) associations and at non-western associations. In place of a supply function, Dhrymes and Taubman estimate changes in the rate of interest charged by the associations. Part of their lengthy study discusses the relations estimated for 1964-65 and 1964-66, separately. Other parts of the study consider repayments, deposits and other aspects of the savings and loan business that are of little interest here.

A main finding on the demand for mortgages at non-western associations is that mortgage terms and conditions have no significant effect on demand. Dhrymes and Taubman [1969, p. 115]write:

> In all equations where maturity was added, it had an incorrect negative sign. We concluded, therefore, that the *mortgage rate is the only term of the mortgage* important in determining the demand for mortgages. (Italics added.)

The results for the western associations were too poor to use and were discarded by the authors. I interpret their results as showing that they failed to isolate a stable demand for mortgages.

The equations used to estimate changes in the mortgage rate produced results no more reliable than the results for the demand equations. The measures of terms and conditions on mortgages had no consistent effect from one equation to another. Dhrymes and Taubman's ambitious study provides no evidence that terms and conditions of mortgage contracts such as maturity or loan-to-value ratio have an independent effect on the demand for mortgages or on the change in mortgage rates.

Two main conclusions can be drawn from the Dhrymes and Taubman study. First, terms and conditions of mortgage contracts appear reliably reflected in the rates charged. Dhrymes and Taubman present some evidence showing that the mortgage rate rises or falls by .30 to .40 points for every .10 change in the loan-to-value ratio, although they assign no causal effect to the estimate. Second, whenever the authors find a statistically reliable response of the demand for mortgages to mortgage rates, the response is large and negative. Small changes in the rate charged by a savings and loan association sharply reduce the demand for mortgages at the association. Borrowers apparently believe—and act as if—there are close substitutes for mortgage credit offered at savings and loan associations.

Dhrymes and Taubman's findings that credit terms and conditions have no independent effect on the demand for mortgages is entirely consistent with the long-term evidence showing that changes in mortgage terms and conditions have little if any effect on the demand for housing Their tentative finding that the demand for mortgages at savings and loan associations is very responsive to changes in mortgage rates is consistent with the conclusion that the demand for housing is very responsive to interest rates. In fact, the estimated response of mortgage credit to mortgage rates is of approximately the same

size as the response of the demand for housing to market interest rates in a recent study of housing markets [Arcelus and Meltzer, 1973]. Nothing in their study of mortgage rates or the demand for mortgages implies or supports a conclusion that changes in the availability of mortgage credit are a dominant or even an important determinant of the demand for housing.

William Silber's study of the financial sector of the economy analyzes the portfolio decisions of six types of financial institutions and embeds the result in a small model of output, consumption and production [Silber, 1970]. Housing is one of the items produced, and mortgage credit is one form of lending and borrowing. Mortgage lenders include commercial banks, mutual savings banks, life insurance companies and savings and loans. Other mortgages are treated as if they were given or known. Quarterly data from 1953 through 1965 are used to obtain estimates.

Mortgage interest rates have a very large, immediate effect on the supply of mortgages credit that the public offers to lending institutions. According to Silber's study, a one percentage point increase in mortgage rates decelerates the growth of mortgages by more than $2 billion in the same quarter, and a one percentage point reduction in mortgage rates accelerates the stock of mortgage credit by the same amount. The long-term effect is about five times larger than the short-term effect.

The public's supply of mortgages is much more responsive to mortgage interest rates than is housing expenditure, according to Silber's equations, and the effects of mortgage rates on the demand for mortgages by the principal lenders is also considerably smaller than the effect on the public's supply. Silber finds a larger effect of mortgage rates on life insurance companies than on any other lender, and he is unable to find any significant effect of mortgage rates on the demand for mortgages at commercial banks or savings and loan associations.

The implication of Silber's findings is that government purchases of mortgages have very little effect on mortgage rates. The reason is that the public's supply of mortgages is very elastic with respect to mortgage rates. A large change in the government's rate of purchase has a large effect on the outstanding stock and small effect on the mortgage rate. Since changes in mortgage rates do not have a very large effect on housing expenditure in Silber's model, mortgage purchases by government agencies have very little effect on housing.

Silber did not find any effect of loan-to-value ratio on housing expenditure or on the supply of mortgage credit.[3] The only effect of the loan-to-value ratio in his equations is on the demand for mortgages by life insurance companies, and this effect is weak. Interest rates are the only important statistically significant measure of mortgage terms and conditions in Silber's mortgage

3. Silber also studied the effect of lengthening the amortization period. He does not mention the units in which "amortization period" is measured. If the units are years, his findings show that the immediate effect of increasing the average length of mortgages by five years is to increase residential construction by $460 million, no more than 25,000 houses at current prices. The long-run effect is only slightly larger. Moreover, the calculations overstate the expected effect by holding the rate of interest constant while increasing term to maturity.

equations. If his findings on "credit conditions" serve as the basis for a conclusion, the conclusion must be that terms and conditions other than mortgage rates have a negligible effect, if they have any effect at all.

The main problem with Silber's equations, for present purposes, is that, with rare exceptions, his estimates do not separate the effect of changes in mortgage rates from the effect of changes in all other rates. There is no way to decide whether the policies designed to increase housing are able to reduce mortgage rates relative to rates on corporate or government bonds. The very small response of mortgage rate to changes in the demand for mortgage credit suggests that the government's ability to reduce mortgage rates relative to other rates is very limited, but more evidence on this point is desirable.

Silber simulated the response to changes in a number of policy variables. The effects of two changes are shown in Table 3. His results show that, contrary to the belief of policymakers, changes in Regulation Q ceiling rates have very little effect on residential construction. A one percentage point increase in ceiling rates increases construction by $2 million at the end of a quarter. By the end of one year, construction declines by $7 million. The effect on mortgage credit, though small, is from five to seven times larger than the effect on construction. Changes in the rates paid by savings and loans for advances or loans from the Home Loan Bank have slightly larger—but still very small—effects on the mortgage market. The effects on the mortgage rate and total mortgage credit at the end of the year are 3 basis points and $263 million, and the total effect on construction is only $29 million. Assuming an average housing price of $20,000, the total effect at the end of one year of a one percentage point decrease in the FHLB lending rate is less than 1500 houses nationwide, if Silber's estimates are correct.

TABLE 3
EFFECT OF SELECTED POLICIES IN SILBER'S MODEL

	Policy Change			
	An Increase of One Percentage Point in Regulation Q Ceiling Rates		An Increase of One Percentage Point in the FHLB Lending Rate	
	End of One Quarter	End of One Year	End of One Quarter	End of One Year
Effect on:				
Stock of Mortgages	.011	−.050	−.108	−.263
Mortgage rate	−.005	.013	+.047	+.031
Corp. bond rate	−.059	−.042	+.003	−.006
Residential Construction	.002	−.007	−.015	−.029

All dollar magnitudes in billions of dollars, all rates in percentage points.
Source: Silber, pp. 83-90.

One of the most detailed studies of the effect of mortgage credit and interest rates on housing was completed by David Huang [Huang, 1969] for the Home Loan Bank Board. Huang separated housing and mortgages according to type of loan—FHA, VA and conventional—instead of type of lender. He estimated

the effect of a number of credit terms, and the effect of interest rates, on four different measures, two measures of housing units produced and two measures of expenditure. His twelve equations contain twenty-eight measures of "credit terms" and interest rates.[4] Included in his equations are changes in the loan-to-value ratio, the time to maturity, changes in the proportion of loans payable per annum, the inflows at thrift institutions, the advances made by the Federal Home Loan Bank, the amount of purchases made by FNMA, changes in the ratio of mortgages to deposits at thrift institutions and various interest rates.

Twenty of the twenty-eight variables have no reliable effect in Huang's equations. The eight variables that have a reliable effect include mainly the measures of interest rates. Increases in interest rates reduce housing starts and housing expenditure. Reduction in interest rates increase housing. Specifically Huang found that:

(1) the commercial paper rate has a negative effect in four equations;
(2) the difference between ceiling rates on VA mortgages and the rate on corporate bonds has a positive effect on VA financed starts in two equations;
(3) changes in the ratio of mortgage debt to financial assets have a negative effect in one equation;
(4) FNMA purchases have a small positive effect in one equation.

These findings, if correct, suggest that the effect of "credit conditions" has been exaggerated. An increase in the ratio of mortgage debt to financial assets reduces the demand for conventionally financed homes. An increase of $1 billion in FNMA advances increases the value of VA financed starts by only $50 million in the same quarter and about $150 million after full adjustment. No other starts are significantly affected. Raising ceiling rates on VA mortgages increases VA financed starts, and raising conventional rates increases conventional starts, although the latter effect is not significant using standard statistical tests.[5]

Dwight Jaffee's [Jaffee, 1972] study of the mortgage market is part of a large econometric model of the economy sponsored by the Federal Reserve System. The mortgage market equations are in the same tradition as Silber's.

4. In a later study [Huang, 1971], Huang found the responses of mortgage borrowers to mortgage rates to be very similar to the responses reported by Silber [Silber 1970], despite important differences in the arguments of the equations. He finds no significant effect of FNMA operations or of changes in Regulation Q.

5. Huang [1969, pp. 1228 and 1235] reaches a different conclusion. He writes (p. 1228): "Most conspicuous in the above [demand] equations is the effect of the loan to value ratio and the average mortgage maturity variables . . . ." Later (p. 1235) he adds: "In the FHA and conventional equations, the loan-to-value ratio appears consistently to exert positive influence on the flow demand for new housing units." "Consistently" must refer to the frequency with which the sign is positive. The statistical significance of the finding is well below usual standards as shown by the ratios of the four coefficients to the estimated standard errors of the coefficients: 0.288, 0.107, 0.299, 0.037.

As noted in the text, in one equation the coefficient of a composite variable, loan-to-value ratio divided by length of maturity is significantly different from zero by the usual standards. However, the variable is difficult to interpret. If availability and mortgage terms and conditions are important determinants of housing demand, why does an increase in the number of years to maturity *lower* the demand for housing?

There are four main lenders—savings and loans, commercial banks, mutual savings banks and life insurance companies. Each has a demand for mortgages that depends on interest rates, but the dependence is usually indirect operating by changing mortgage commitments and repayments. Home Loan Bank advances affect the demand at savings and loan associations directly, and changes in the Banks' lending rates influence demand by changing commitments.

The stock of mortgages supplied by home buyers or home owners depends on mortgage rates, other market interest rates and the stock of housing. If mortgage rates rise relative to other rates, homeowners increase down payments. Jaffee summarizes the reasons that led him to exclude terms and conditions of the mortgage contract as a separate influence [Jaffee, 1972, p. 40 n. 35].

> [I]n principle the desired mortgage-house ratio will depend on non-rate terms of the contract, such as the maturity of the loan. These factors have generally not been found important in previous empirical studies of mortgage demand, perhaps because of the quality of the data . . .

The current flow of mortgages offered to mortgage lenders depends, in Jaffee's model, on the amount invested in new housing, interest rates, the ratio of mortgages to housing stock (or loan-to-value) existing in the recent past and on new commitments.

One appealing feature of Jaffee's model is that his borrowing equation implies that on the average the amount of mortgage borrowing is approximately three-fourths of the investment in housing. As open market rates rise relative to mortgage rates, the ratio rises and as open market rates fall relative to mortgage rates, the ratio declines. Consequently the loan-to-value ratios on new loans and on outstanding contracts depend on the costs of borrowing and the returns from lending. Loan-to-value ratios are not separate features of a contract; they are a consequence of lender and borrower decisions. This finding is consistent with the findings in our discussion of long-term changes in mortgages relative to housing.

Jaffee finds that the loan-to-value ratio is very responsive to the mortgage rate. A ten basis point change in mortgage rates, with other rates unchanged, lowers the loan-to-value ratio on new housing by more than seven percent. This finding, and others in Jaffee's study, is consistent with the very small effect of increases in mortgage credit on mortgage interest rates. Consequently, it casts doubt on the effectiveness of increasing the availability of mortgage credit to stimulate housing. Jaffee investigated some of the effects of mortgage policy using simulation to capture all the interactions between interest rates, housing starts, mortgages and deposits at financial institutions that his model takes into account. Many adjustments occur very slowly in his model, so the effects of policy changes occur gradually and some responses are not completed in five years. Generally, a substantial part of the response occurs within a year.

Table 4 shows that in Jaffee's simulation about one-half the amount of mortgages purchased by FNMA are offset within a year (and the total amount is offset within two years) by a decline in private lending. One reason is that FNMA purchases lower mortgage rates, as shown, and reduce the profitability

TABLE 4
RESULTS OF POLICY AND OTHER CHANGES ON MORTGAGES AND MORTGAGE RATES

	Policy Change					
	$1 Billion Purchase by FNMA		$1 Billion Advance from FHLBB		1 Percentage Point Rise in the Rate on FHLBB Advances	
	After 1 Year	After 2 Years	After 1 Year	After 2 Years	After 1 Year	After 2 Years
Effect on:						
Mortgage Loans of Private Financial Institutions (in billions	−.46	−1.12	+.83	+.81	−2.00	−2.97
Mortgage Rates (in percentage points)	−.11	−.12	−.01	0	+.04	+.02

of mortgage lending. Commitments decline, and the decline is followed by a decline in mortgage loans.

Advances from the Home Loan Bank to member associations have a more expansive effect on the amount of mortgage loans. Jaffee's finding is consistent with other work, including Huang's, showing that Home Loan Bank advances are a more potent form of assistance to the mortgage market than FNMA purchases.

Jaffee recognizes, however, that the responses overstate the effect of Home Loan Bank advances and the effect of FNMA purchases because no allowance is made for the effect of increased FNMA and FHLBB borrowing on open market rates. The additional borrowing raises market rates relative to mortgage rates and, therefore, reduces mortgage commitments and loans in Jaffee's model. The changes in mortgage rates and in market rates also affect the demand for and the supply of housing. Jaffee shows that for every one percentage point increase in open market rates, lenders reduce mortgage lending by $720 million within a year. Mortgage rates respond relatively quickly to the change in open market rates; most of the adjustment of mortgage rates to market rates occurs within the first three quarters following a change in market rates.

Jaffee's findings provide additional evidence that the public's mortgage borrowing is very responsive to rate changes. The evidence on the point is the most consistent result of the four studies.

Two implications of the very small response of mortgage rates to changes in lenders' demand for mortgage credit are of importance here. One is that large changes in mortgage credit "availability" have very little effect on mortgage rates. If the intent of mortgage policy is to affect the demand for housing by changing mortgage rates relative to market rates, the scope for mortgage policy is limited. The estimated effects are small and are, in each case, overstated because no allowance is made for the effects on market rates and mortgage rates of the increased stock of government or agency securities.

Second, a main effect of government intermediaries in the mortgage market is to transfer ownership of mortgages from private to public or quasi-public institutions. There is little evidence of any increase in the amount of mortgage lending and borrowing.

Taken as a group, or individually, the econometric studies of mortgage credit provide very little evidence to reverse the conclusion reached in our discussion of long-term effects. Generally, the studies support our earlier conclusion that manipulation of mortgage rates and availability have little if any effect on the demand for housing.

Some short-term effects may occur. Home Loan Bank advances to savings and loan associations appear to have enough effect on mortgage rates to leave open the possibility that the spread between mortgage rates and market rates increases temporarily with advances. If so, housing purchases increase with Home Loan Bank advances and decline with repayments. An effect of this kind has not been ruled out, but we have found no evidence that the effect on housing is either large or reliable.

III. Conclusion

The principal argument about the role of mortgage credit "availability" as a determinant of the demand for housing was stated most clearly by Guttentag [Guttentag, 1961]. After studying the data from early postwar cycles, Guttentag concluded that the housing sector obtains what is left after other borrowers —particularly corporations—finance capital expenditures. In this view, housing is a residual claimant operating at a disadvantage. A main piece of evidence is a graph showing a very strong negative relation between new mortgages and corporate bond issues.

Guttentag's evidence is suggestive but incomplete. The problem is to explain why mortgage lenders do not raise lending rates to eliminate the excess supply of mortgages. No satisfactory explanation has been given. The importance of "availability" has been accepted widely, and most writers concerned with the mortgage market and housing either accept the conclusion without comment or invoke "credit rationing" as part of their explanation.

In this paper, we considered two types of evidence on the effect of availability. Neither supports the standard view. Long-term data show that housing stocks have grown at approximately the same rate as other assets and much less than mortgage credit. As a result, the ratio of housing to total assets remained unchanged during a period in which the ratio of mortgage credit to housing (and to total liabilities) rose markedly.

Econometric studies of the mortgage market show no substantial or reliable effect of mortgage terms and conditions, other than mortgage rates, on the supply or demand for mortgage loans. Three principal findings are reproduced consistently by a number of very different studies. One, the borrowers' supply of mortgage loans to lending institutions is highly interest-rate elastic. Two, small changes in the stock of mortgages have very little effect on the mortgage rate. Three, terms and conditions other than mortgage rates have little, if any, independent effect.

The studies of quarterly or annual changes in mortgage rates and mortgage

lending are consistent with the long-term data. Making credit "available" for housing by regulating interest rates, selling bonds to finance advances to thrift institutions or by purchasing mortgages does not appear to have much effect on housing. Nor is there evidence of a substantial indirect effect from reducing mortgage interest rates relative to open market rates.

The two most neglected pieces of information about the mortgage market are: (1) mortgage loans finance acquisitions of financial assets and real assets other than houses; (2) the size of a down payment determines the percentage of equity invested in a house, not the amount that individuals spend for housing. Increasing the amount of lending and borrowing that takes the form of mortgage contracts finances the purchase of additional housing only to the extent that individuals do not substitute one form of borrowing for another.

Our findings show substantial substitution between types of borrowing. A subsidy to mortgage borrowing increases the amount of such borrowing by lowering the cost to the borrower and encourages substitution of mortgage debt for other types of debt on the borrowers balance sheet. It is reasonable to expect, therefore, that the loan-to-value ratio on housing purchases rises as the amount of mortgage borrowing increases, and available evidence supports this implication. This finding provides no basis for believing that the distribution of real assets is affected in any way—that more housing is produced and more housing services consumed as a result of the subsidy to mortgage borrowers or increased availability of mortgage loans.

Public policy toward housing is based on the conjecture that the "availability" of mortgage credit is an important—perhaps the most important—determinant of the demand for housing. Policy appears to be misconceived. We have found no evidence that the availability of the particular type of credit has any important or lasting effect on the type of assets individuals acquire. If the housing market is the market in which "availability matters" or matters most, there appears to be very little if any empirical basis for the conjecture or the public policies based on it.

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