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An Econometric Analysis of the Role of Financial Intermediaries in Postwar Residential Building Cycles

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The purpose of this paper is to develop a model of the residential construction sector of the U.S. economy, with particular emphasis on the financial factors that provide a link between construction activity and the monetary sector. The study was undertaken as part of a larger project to incorporate monetary policy variables into the econometric model constructed by the Research Seminar in Quantitative Economics at the University of Michigan.[1] As this is an annual model designed for short-run forecasting and policy analysis, the equations for the residential construction sector have been estimated from postwar annual data.

Our model consists of a set of equations which determine the flow of funds through financial intermediaries and their influence on construction activity. The rate of accumulation of savings deposits is assumed to depend on interest rates and personal financial saving. The inflow of deposits together with interest rates and other variables then determine the volume of commitments made by financial institutions

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[1] For a description of this model, see [14] and [16]. Numbers in brackets refer to Bibliography at end of paper.

to supply residential mortgage funds. The supply of mortgage commitments then affects housing starts and residential construction expenditures. Equations for housing starts and the supply of mortgage funds are formulated in section I of the paper and the empirical results are presented in section II. Equations for savings deposits are given in section III and the implications of the model for monetary policy are discussed in section IV.

I. Housing Starts and the Mortgage Market

The most striking feature of housing starts in the postwar period has been the countercyclical behavior of this series. Building has typically risen sharply during periods when the general level of economic activity was approaching a cyclical trough. During the early stages of an upswing, housing starts have continued to increase but have reached a peak well in advance of the peaks indicated by the National Bureau reference cycles.[2] Most students of the housing market have considered the supply of mortgage credit to be the major cause of this behavior. For example, Grebler[3] gives the following characterization of postwar residential building cycles: "Given long-run demand and supply forces favorable to residential building, short-run cycles in housing construction were associated for the most part with changes in the supply of mortgage funds and credit terms, which in turn were greatly influenced by the level of total economic activity. When that level was rising and high, the expanded demand for funds by business, which is relatively insensitive to increased cost of borrowing, tended to reduce the availability of funds for housing, which is highly sensitive to changes in the cost of borrowing."

Among the proponents of this view, there has been some disagreement over the importance of the legal maximum interest rates on mortgages insured by the Federal Housing Administration or guaranteed by the Veterans Administration. Guttentag [6] argues that the effect of the rate maxima has been greatly exaggerated. He emphasizes the demand side of the market for mortgage funds and argues that housing demand is more highly sensitive to changes in mortgage credit terms than to changes in the flow of current income. A similar view is expressed by Alberts [1].

A graphical exposition of this theory is given in Figure 1. For pur-

[2] See [17], Chart 1A.

[3] [5], p. 104.

FIGURE 1

Allocation of Funds Between Mortgages and Bonds

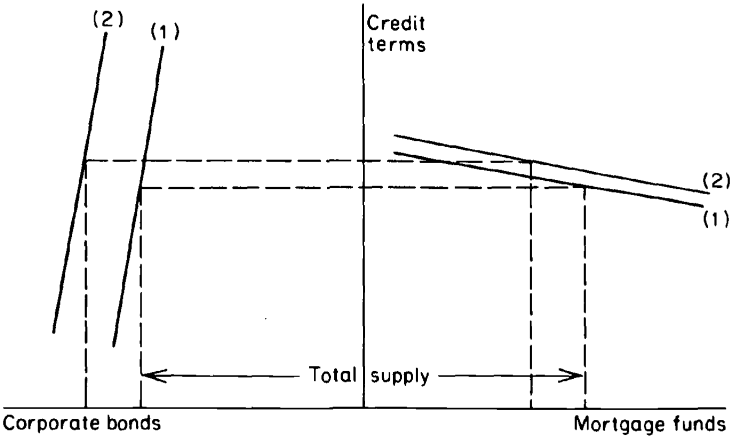
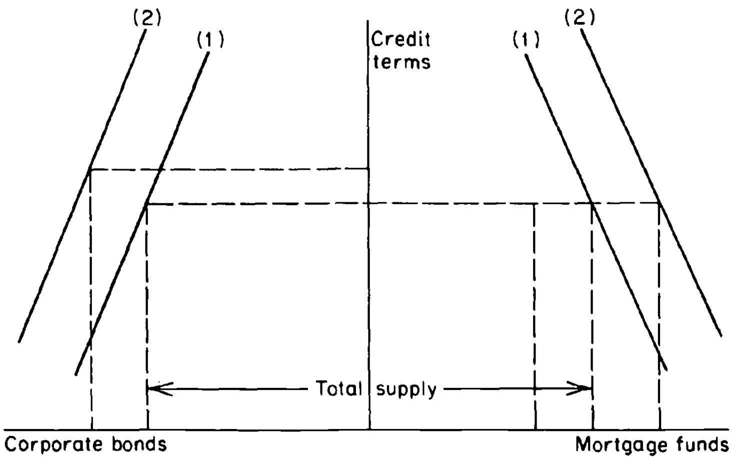


FIGURE 2

Fixed-Rate Theory



poses of illustration, we assume a fixed supply of funds to be allocated between corporate bonds and mortgages. The demand for mortgage funds is assumed to be highly responsive to changes in credit terms while the demand by corporations is assumed to be inelastic. A rise in income causes both schedules to shift upward but has a greater effect on corporate demand, resulting in a shift of funds away from mortgages.[4] The fixed-rate theory, advanced by Warren Smith [15] and others, is illustrated in Figure 2. According to this view, the spread between the ceiling rates on insured and guaranteed mortgages and yields on other securities has an important influence on the supply of mortgage funds. Assuming that the interest rate is at the statutory maximum at the initial equilibrium, an upward shift in the schedules results in a reallocation of funds from mortgages to corporate bonds, leaving an excess demand in the mortgage market.

A rather different approach to the explanation of fluctuations in housing starts is taken in a recent study by Maisel [12], who emphasizes the importance of changes in vacancies and the inventory of houses under construction. According to his theory, the lag in the response of builders to changes in demand and the lag between starts and completions lead to an inventory cycle. He includes among the determinants of housing starts, vacancies at the beginning of the period, net household formations, removals (from the housing stock), and the ratio of rents to construction costs as a measure of the income from building or owning houses. As a measure of the cost and availability of credit, he uses a lagged moving average of the Treasury bill rate. Maisel emphasizes that the impact of credit conditions is on the supply side of the housing market rather than on the demand side. He argues that there is little relationship between credit conditions and final demand as measured by net household formations, but that changes in credit conditions influence the willingness of builders to increase their inventories under construction.

We have attempted to combine Maisel's approach with a more detailed treatment of the supply of mortgage funds. Housing starts (*HS*) are assumed to depend on the following variables.

1. Inventory of houses under construction plus vacancies at the beginning of the period. In terms of first differences, the sum of these two variables was represented by housing starts less net household formations (*HF*), using the following identities and disregarding removals:

[4] Denoting the credit elasticities of demand for corporate funds and mortgages by e_{bc} and e_{mc}, respectively, and the income elasticities by e_{by} and e_{my}, respectively, the condition for a shift of funds away from mortgages is $e_{bc}/e_{mc} < e_{by}/e_{my}$.

Δ(vacancies) equals completions minus net household formations minus removals.

Δ(inventories under construction) equals starts minus completions.

2. Ratio of rents (R) to construction costs (C) at the beginning of the period.

3. Mortgage credit terms (Cr).

4. Net household formations (HF). This variable was used with the reservation that the available data supplied by the Bureau of the Census is subject to considerable sampling variability [18]. As noted by Maisel [11], even the direction of change in net household formations may be in error.

5. Disposable income (Y). We have included an income variable as a determinant of the demand for owner-occupied as opposed to rental units. High income may stimulate the demand for home ownership and lead to an increase in single-unit starts. Total starts will be affected if, as is likely to be the case, there is a lag in the reaction to increased vacancies of rental units. Assuming a linear relationship, our equation for housing starts becomes

$$\Delta HS = \alpha_0 - \alpha_1(HS - HF)_{-1} + \alpha_2\left(\Delta \frac{R}{C}\right)_{-1} - \alpha_3\Delta Cr + \alpha_4\Delta HF + \alpha_5\Delta Y.$$

Since mortgage credit terms cannot be assumed to be exogenous to the housing market, a model of the mortgage market is also required. The demand for residential mortgage funds comes from three sources: builders, investors in rental units, and individuals purchasing existing or custom-built homes. The major sources of supply are the four main types of financial intermediaries: savings and loan associations, mutual savings banks, life insurance companies, and commercial banks—plus the Federal National Mortgage Association. An important institutional feature of this market is the use of forward commitments under which an investor agrees to lend a specific amount of money at a given interest rate within a specified period of time. A residential builder generally seeks a commitment for permanent mortgage financing from a financial institution before construction is begun. According to Klaman,[5] commercial banks will usually make short-term loans to finance construction only after a builder has obtained such a commitment. Thus, the willingness of financial institutions to enter into forward commitments is likely to have an important impact on housing starts. Accordingly, we have formulated the demand for mortgage funds in terms of the demand for

[5] [9], p. 168.

loans disbursed without prior commitment plus forward commitments. This variable, denoted by MC, is assumed to depend on the same factors as housing starts. Thus, we have

$$\Delta MC = \beta_0 - \beta_1(HS - HF)_{-1} + \beta_2\left(\Delta\frac{R}{C}\right)_{-1} - \beta_3\Delta Cr + \beta_4\Delta HF + \beta_5\Delta Y.$$

On the supply side of the mortgage market, our basic approach to the explanation of the mortgage lending of financial intermediaries is expressed by the following equation:

$$\Delta MC_i = \gamma_{i0} + \gamma_{i1}\Delta^2 SD_i + \gamma_{i2}\Delta REP_i - \gamma_{i3}\left(\Delta\frac{M_i}{SD_i}\right)_{-1} - \gamma_{i4}\Delta r + \gamma_{i5}\Delta Cr.$$

The volume of mortgage loans and commitments (MC_i) made by the i^{th} lender is assumed to depend on the inflow of savings deposits ($\triangle SD_i$) and repayments on outstanding mortgages (REP_i), the ratio of mortgage holdings (M_i) to deposits at the beginning of the period, mortgage credit terms (Cr), and a market rate of interest (r) which represents the yield on alternative investments.

In order to avoid the problem of simultaneous-equation estimation bias, we solved the above model to obtain a reduced form equation for housing starts, which did not contain the mortgage credit term variable explicitly. This procedure has the additional advantage of eliminating the need for a quantitative measure of credit terms. The interest return on mortgages is an inadequate indicator to the extent that changes in credit conditions are reflected in changes in loan-to-value ratios and maturities.

Equating supply and demand in the mortgage market, we obtain

$$\sum_i \Delta MC_i + \Delta\text{FNMA} = \Delta MC,$$

where the term FNMA represents net purchases of mortgages by the Federal National Mortgage Association. Substituting the supply and demand functions, we obtain an equation from which an expression for the variable ΔCr can be derived as follows:

$$\sum_i \left[\gamma_{i0} + \gamma_{i1}\Delta^2 SD_i + \gamma_{i2}\Delta REP_i - \gamma_{i3}\left(\Delta\frac{M_i}{SD_i}\right)_{-1} - \gamma_{i4}\Delta r + \gamma_{i5}\Delta Cr\right] + \Delta\text{FNMA}$$

$$= \beta_0 - \beta_1(HS - HF)_{-1} + \beta_2\left(\Delta\frac{R}{C}\right)_{-1} - \beta_3\Delta Cr + \beta_4\Delta HF + \beta_5\Delta Y$$

$$\Delta Cr = \frac{1}{\gamma_5 + \beta_3}\left\{\beta_0 - \beta_1(HS - HF)_{-1} + \beta_2\left(\Delta\frac{R}{C}\right)_{-1} + \beta_4\Delta HF + \beta_5\Delta Y\right.$$

$$\left. - \sum_i \left[\gamma_{i0} + \gamma_{i1}\Delta^2 SD_i + \gamma_{i2}\Delta REP_i - \gamma_{i3}\left(\Delta\frac{M_i}{SD_i}\right)_{-1} - \gamma_{i4}\Delta r\right] - \Delta\text{FNMA}\right\},$$

where $\gamma_5 = \sum_i \gamma_{i5}$. Substituting this expression in the housing starts equation we obtain

$$\Delta HS = \alpha'_0 - \alpha'_1(HS - HF)_{-1} + \alpha'_2\left(\Delta\frac{R}{C}\right)_{-1} + \alpha'_4\Delta HF + \alpha'_5\Delta Y$$

$$+ \alpha'_3\left\{\sum_i \left[\gamma_{i0} + \gamma_{i1}\Delta^2 SD_i + \gamma_{i2}\Delta REP_i - \gamma_{i3}\left(\Delta\frac{M_i}{SD_i}\right)_{-1} - \gamma_{i4}\Delta r\right]\right.$$

$$\left. + \Delta\text{FNMA}\right\},$$

where $\alpha'_j = \alpha_j - \dfrac{\alpha_3\beta_j}{\gamma_5 + \beta_3}$; $j = 0, 1, 2, 4, 5$; and $\alpha'_3 = \dfrac{\alpha_3}{\gamma_5 + \beta_3}$.

Because of the limited number of degrees of freedom provided by postwar annual data, the coefficients in the above equation were estimated in two stages. First the γ_{ij} were estimated from regressions using the $\triangle MC_i$ as the dependent variables.[6] The α_j were then estimated from a regression of housing starts on the estimated changes in the total supply of mortgage funds $\triangle(MC + \text{FNMA})$ along with the other independent variables appearing in the reduced form equation.[7] The results of these regressions are reported in the next section.

[6] These regressions do not represent the true reduced forms which would be obtained by substituting the expression derived above for ΔCr in the equations for the supply of mortgage funds. Since the expressions resulting from this substitution would contain all the exogenous variables in the model, a source of bias is introduced to the extent that the omitted exogenous variables are correlated with those included.

[7] A reviewer of this paper has objected to the use of sixteen observations to estimate the more than sixteen parameters appearing in the above equation. We have simply followed the usual method of estimating the reduced form coefficients in a simultaneous system and gained degrees of freedom by first obtaining direct estimates of the structural coefficients γ_{ij}. Our procedure differs from a straightforward application of two-stage least squares in that we have used the supply of funds in the first stage regressions rather than the credit term variable that appears in the structural equations. Because of this modification we have not attempted to adjust the standard errors in the second-stage regression to take account of errors in the estimates of the first-stage coefficients so that the former are likely to be biased downward.

II. Empirical Results

SAVINGS AND LOAN ASSOCIATIONS

The regression results for mortgage lending of savings and loan associations are shown in Table 1. The values of the dependent variable MC_1 were computed as the sum of mortgage loans made (ML_1) plus the change in outstanding commitments during the year. Since no data on outstanding commitments were available for the earlier years, the equations were fitted to the period 1957–64.

As a measure of the rate of return on alternative investments, the long-term U.S. rate was used since the nonmortgage security holdings of savings and loan associations consist mainly of U.S. government securities.[8] This variable did not obtain a significant coefficient as might be expected from the institutional considerations. According to Klaman,[9] "Compared with other major financial institutions in the mortgage market, savings and loan associations are singularly limited by law and tradition to the specialized role of home mortgage lenders. In home mortgage markets they specialize, also, in providing conventional loans directly to individual borrowers in local markets and thus are less flexible than other financial institutions in adjusting investment programs to changes in capital market conditions."

Between 1949 and 1963 the ratio of mortgage holdings to savings and loan shares varied within a fairly narrow range of 93 to 99 per cent while the average annual increase in shares has been about 15 per cent, indicating that the inflow of savings capital has been the major influence on mortgage lending. In addition, at the end of 1963, conventional as opposed to government-insured or guaranteed mortgages made up 87 per cent of total mortgage holdings. Thus, the ceiling rates have been of little importance.

The third equation in Table 1 was fitted with the coefficient on repayments constrained to be unity. The unconstrained coefficient obtained seems unreasonable and is likely to be biased upward. During periods when the level of mortgage lending and construction is high, advance payoffs of loans rise due to the sale of existing properties. Thus repayments are not exogenously determined but are influenced to some extent by the volume of mortgage loans made.

[8] Federal associations are restricted by law from holding state and local government or private securities, and state-chartered institutions are subject to similar limitations [4].

[9] [9], p. 18.

TABLE 1

Mortgage Lending of Savings and Loan Associations

Period	Dependent Variable (bill. $)	$\Delta^2 SD_1$ (bill. $)	ΔREP_1 (bill. $)	$\left(\Delta \frac{M_1}{SD_1}\right)_{-1}$	Δr_{us} (per cent)	Constant Term	$\bar{R}^2$	*df*
1957-64	ΔMC_1	1.106	1.482	−44.601	−.2197	−.1551	.969	3
		(.116)	(.141)	(11.067)	(.5789)			
1957-64	ΔMC_1	1.124	1.487	−42.840		−.2028	.976	4
		(.094)	(.124)	(8.908)				
1957-64	ΔMC_1	1.090	1.000	−37.760		.3117	.905	5
		(.185)		(17.342)				
1949-64	ΔML_1	.9159	1.000	−27.914		.2633	.848	13
		(.1836)		(9.191)				

TABLE 2

Mortgage Loans and Commitments of Mutual Savings Banks, 1952-64

$\Delta^2 SD_2$ (bill. $)	ΔREP_2 (bill. $)	$\left(\Delta \frac{M_2}{SD_2}\right)_{-1}$	Δr_{cb} (per cent)	$\Delta (r_m - r_{cb})$ (per cent)	Constant Term	$\bar{R}^2$	*df*
1.226	−.1086	−21.215	−1.338		.9880	.822	8
(.273)	(.7686)	(11.641)	(.762)				
1.230		−20.787	−1.331		.9533	.842	9
(.256)		(10.609)	(.718)				
1.331	.6203	−15.076		1.636	.5374	.858	8
(.205)	(.7350)	(11.169)		(.674)			
1.345		−19.038		1.430	.7593	.863	9
(.201)		(9.971)		(.618)			

Using a one-sided *t*-test with five degrees of freedom, both coefficients in the constrained regression are significant at the 5 per cent level and the coefficient on $\triangle^2 SD_1$ is significant at the 1 per cent level. Because of the limited amount of data available on outstanding commitments, the equation was fitted to the period 1949–64, using $\triangle ML_1$ as the dependent variable. In this case, both coefficients are significant at the 1 per cent level.

MUTUAL SAVINGS BANKS

In contrast to savings and loan associations, the portfolio regulations and policies of mutual savings banks permit them to take advantage of changing yield differentials. The laws of the seventeeen states in which mutual savings banks operate generally permit investment in bonds of state and local governments and corporations. Their portfolio choices are likely to be responsive to the level of the ceiling rates on government-insured and guaranteed mortgages since a relatively high percentage of their mortgage holdings are FHA and VA loans and they have generally been reluctant to resort to discounting.[10]

The equations were fitted to the period 1952–64 for which commitments data were available and the results are shown in Table 2. The corporate bond rate (r_{cb}) was used to represent the rate on competing assets. Slightly better results were obtained using the differential between the average of the FHA and VA ceiling rates (r_m) and the corporate bond rate. In both cases, the repayments variable was not significant.

LIFE INSURANCE COMPANIES

Like mutual savings banks, life insurance companies have a wide degree of flexibility in their choice of assets, but their responsiveness to short-run changes in available funds and yield differentials is limited by the practice of planning ahead a year or more.[11] They make extensive use of forward commitments which typically cover a time period from about three months on existing homes to six to twelve months for new construction and up to two and a half years for apartment houses.[12]

The regression results obtained for the period 1954–64 are shown in Table 3. The equations were fitted using the corporate bond rate and the differential between the average of the FHA and VA ceiling rates and the corporate bond rate. In contrast to the mutual savings bank

[10] [4], p. 175.

[11] [9], Chapter 6.

[12] [10], p. 186.

TABLE 3

Mortgage Loans and Commitments of Life Insurance Companies, 1954-64

$\Delta^2 SD_3$ (bill. \$)	ΔREP_3 (bill. \$)	$\left(\Delta \frac{M_3}{SD_3}\right)_{-1}$	Δr_{cb} (per cent)	$\Delta(r_m - r_{cb})$ (per cent)	Constant Term	$\bar{R}^2$	*df*
.6606	−.1708	−25.178	−2.689		1.0313	.640	6
(.8900)	(1.348)	(24.008)	(.986)				
.5966			−2.839		.7687	.681	8
(.3565)			(.619)				
.1050	1.428	−9.801		2.233	.2101	.553	6
(.8848)	(1.155)	(28.496)		(1.018)			
1.102				2.973	.4834	.562	8
(.445)				(.818)			

results, somewhat better equations were obtained using the former variable. In both cases, neither repayments nor the ratio of mortgages to deposits[13] was significant.

COMMERCIAL BANKS

Although commercial banks hold a considerable volume of mortgage loans, we decided to exclude them from our model because of the lack of available data comparable to those used for the other financial institutions. No data are published on outstanding commitments or mortgage loans made, except for the mortgage recordings series which covers only loans of $20,000 or less. In addition, the available figures on mortgage holdings include short-term credits in the form of construction loans or interim financing provided to builders and other real estate mortgage lenders, as well as long-term permanent loans.[14]

Regression equations relating changes in mortgage holdings to inflows of time deposits and market rates of interest yielded unsatisfactory results. For example, using the state and local bond yield (r_{s1}) as the rate on competing assets, the following was obtained for the period 1949–63:

$$\Delta^2 M_4 = \underset{(.0711)}{-.0908}\ \Delta^2 SD_4 - \underset{(7.825)}{28.870}\left(\Delta\frac{M_4}{SD_4}\right)_{-1} - \underset{(.5518)}{.8733}\ \Delta r_{s1} + .3340.$$

$$\bar{R}^2 = .522.$$

The coefficient on the state and local bond yield is significant at the 10 per cent level, but time deposits enter insignificantly and with a negative sign. We also tried the long-term U.S. rate and the Treasury bill rate but obtained insignificant coefficients in both cases.

Since most of the explanatory power in the above equation comes from the lagged ratio of mortgage holdings to time deposits, we reran the regression using lagged time deposits and the state and local bond yield. The following equation was obtained:

$$\Delta^2 M_4 = \underset{(.0600)}{.2856}\ \Delta^2(SD_4)_{-1} - \underset{(.4498)}{.9283}\ \Delta r_{s1} - .0883.$$

$$\bar{R}^2 = .648.$$

This result suggests that there is a lag of one year before a change in the rate of inflow of time deposits induces a change in the rate of

[13] Deposits in the case of life insurance companies were defined as reserves plus dividend accumulations less policy loans. See section III below.

[14] [8], p. 205.

accumulation of mortgages. However, to the extent that the significant coefficient on the lagged inflow of time deposits reflects the lag between commitments and the acquisition of mortgage loans, the equation is unsatisfactory for our purposes. Some estimate of the volume of commitments made by commercial banks would be required to incorporate their mortgage lending into our model.

HOUSING STARTS

On the basis of goodness of fit and significance of individual regression coefficients, the following equations were chosen to estimate mortgage lending of savings and loan associations, mutual savings banks, and life insurance companies, respectively:

$$\Delta MC_1 = \underset{(.185)}{1.090}\ \Delta^2 SD_1 + 1.000\ \Delta REP_1 - \underset{(17.342)}{37.760}\left(\Delta\frac{M_1}{SD_1}\right)_{-1} + .3117,$$

$$\Delta MC_2 = \underset{(.201)}{1.345}\ \Delta^2 SD_2 - \underset{(9.971)}{19.038}\left(\Delta\frac{M_2}{SD_2}\right)_{-1} + \underset{(.618)}{1.430}\ \Delta(r_m - r_{cb}) + .7593,$$

$$\Delta MC_3 = \underset{(.3565)}{.5966}\ \Delta^2 SD_3 - \underset{(.619)}{2.839}\ \Delta r_{cb} + .7687.$$

The estimated values from these equations plus net purchases of mortgages by the Federal National Mortgage Association were added together to obtain estimated changes in the total supply of mortgage funds, which were then used to estimate the housing starts equation.[15] Using the variables introduced in section I, the following regression was obtained from data for the period 1949–64:

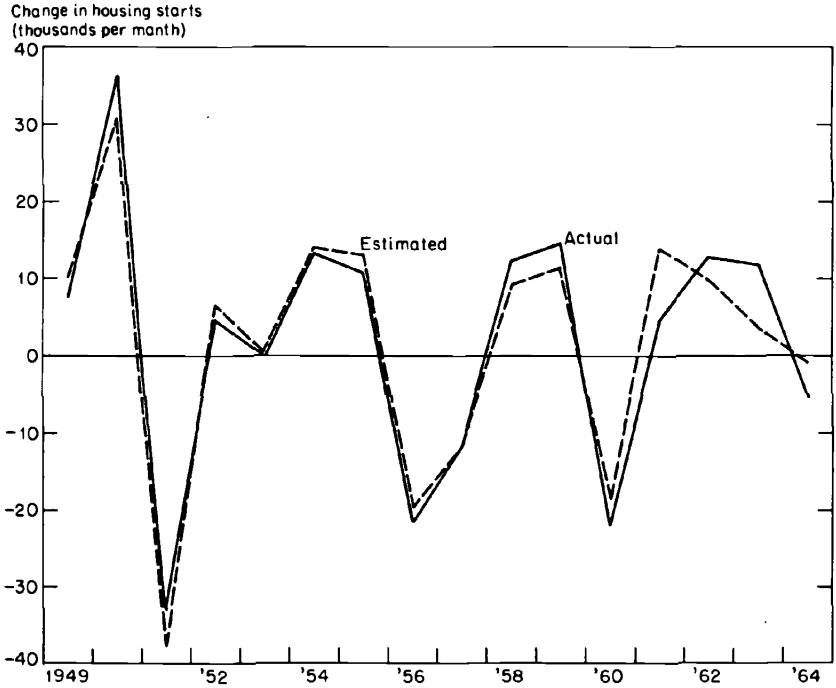
$$\Delta HS = \underset{(.0624)}{-.2372}\ (HS - HF)_{-1} + \underset{(.578)}{2.519}\left(\Delta\frac{R}{C}\right)_{-1} + \underset{(.0868)}{.3256}\ \Delta HF$$
$$+ \underset{(.2672)}{.6961}\ \Delta Y + \underset{(.859)}{3.159}\ \Delta(MC + \text{FNMA}) - 3.3902.$$

$$\bar{R}^2 = .904.$$

[15] It should be noted that no adjustment was made to take account of changes in the average amount loaned per dwelling unit. This will depend on such factors as the average price per dwelling unit, the loan-to-value ratios, and the mix between single- and multiple-unit starts.

FIGURE 3

Housing Starts, 1949-64



The variables are defined as follows: *HS* is housing starts (thousands per month); *HF* is net household formations (thousands per month); *R/C* is the ratio of the rent component of the Consumer Price Index to the Boeckh Index of residential construction costs for the month of December (1957–59 = 100); *Y* is personal disposable income (billions of 1954 dollars); and $MC + FNMA$ is the supply of mortgage funds (billions of dollars). All the coefficients are more than three times their standard errors with the exception of the coefficient on disposable income, which is 2.6 times its standard error. The actual and estimated values of the annual changes in housing starts are plotted in Figure 3. The estimated values are generally very close to the actual, but the relatively large errors in 1961 and 1963 are somewhat disturbing.

III. Savings Deposits

In order to measure the indirect effects of changes in interest rates on the supply of mortgage funds via changes in the flows of deposits into financial intermediaries, equations for these inflows were also estimated. Our basic approach was to relate the net increase in deposits ($\triangle SD_t$)

in the i^{th} institution to the following variables: (1) personal financial saving (FS); (2) stock of financial assets except corporate stock[16] held by households at the beginning of the year (FA_{-1}); (3) rate of interest paid on the deposits (r_i); (4) rate of interest paid on commercial bank time deposits (r_{td}); and (5) yield on short-term government securities (r_{sg}). Consumer credit outstanding at the beginning of the period (CC_{-1}) was also tried, but was significant only in the case of life insurance reserves. The regressions were fitted to first differences of the above variables and the results are shown in Table 4.

SAVINGS AND LOAN SHARES

The results obtained for savings and loan shares indicate a high degree of responsiveness to changes in yields on alternative financial assets. The significant coefficient on the commercial bank time-deposit rate reflects the shifts that occurred in 1957 and 1962 in response to the increases in the time-deposit rate, which resulted from raising the maximum allowable rate under Regulation Q. Similarly, the coefficient on the yield on short-term government securities reflects shifting into marketable securities during periods of high interest rates as a result of the short-run stickiness of the rate paid on savings and loan shares. The unwillingness of these institutions to raise their rates in periods of tight credit conditions arises from the nature of their role as intermediaries. A rise in market rates of interest increases the yield obtainable on newly acquired securities but does not affect the outstanding portfolio, while an increase in the rate paid on deposits must be extended to all accounts.[17]

This sensitivity of savings and loan shares to interest rate differentials may be questioned on the ground that savings and loan associations cater to small unsophisticated investors. However, survey data published by the United States Savings and Loan League indicates that this may not be the case.[18] For each of the three associations surveyed, over 50 per cent of the accounts contained less than $1,000, but over 60 per cent of the deposits were in accounts of $5,000 or more.

Because of the insignificant and implausible coefficient obtained on the savings and loan rate, the equation was rerun with this coefficient constrained to be equal in magnitude but opposite in sign to the coefficient on the time-deposit rate. This regression is shown in the second row of Table 4.

[16] Corporate stock was excluded because of the large year-to-year changes in market value which tend to dominate the changes in total financial assets.

[17] [7], pp. 112–113.

[18] [19], pp. 18–19.

TABLE 4

Savings Deposits, 1949 - 63

Dependent Variable	ΔFS (bill. $)	ΔFA_{-1} (bill. $)	ΔCC_{-1} (bill. $)	Δr_i (per cent)	Δr_{sg} (per cent)	Δr_{td} (per cent)	Δr_{sd} (per cent)	Constant Term	$\bar{R}^2$	*df*
$\Delta^2 SD_1$ (savings and loan shares)	.0362 (.0340)	.0351 (.0102)		−.5271 (1.607)	−.3412 (.1117)	−1.619 (.716)		.1255	.609	9
$\Delta^2 SD_1$ (savings and loan shares)	.0614 (.0308)	.0259 (.0084)		1.569	−.3862 (.1133)	−1.569 (.754)		.0513	.565	10
$\Delta^2 SD_2$ (mutual savings bank deposits)	.0466 (.0303)	−.0071 (.0093)		2.355 (.935)	−.5126 (.1149)	.4610 (.6824)		−.1460	.683	9
$\Delta^2 SD_2$ (mutual savings bank deposits)	.0440 (.0280)			2.360 (.829)	−.5043 (.1052)			−.2363	.721	11
$\Delta^2 SD_3$ (life insurance reserves)	.0685 (.0276)	.0073 .0077	−.0912 (.0446)		−.0426 (.0875)		−1.620 (.938)	.4299	.630	9
$\Delta^2 SD_3$ (life insurance reserves)	.0710 (.0237)		−.0728 (.0391)				−1.190 (.747)	.4592	.659	11

MUTUAL SAVINGS BANK DEPOSITS

Mutual savings bank deposits also appear to be quite sensitive to interest rates. Significant coefficients were obtained on the rate paid on the deposits and the short-term government security rate. Since the rate on commercial bank time deposits and the stock of financial assets did not enter significantly, the regression was rerun omitting these variables.

LIFE INSURANCE RESERVES

As a measure of the savings of policyholders held by life insurance companies, we used reserves plus the accumulated value of dividends left on deposit less policy loans outstanding. Policy reserves are amounts set aside according to legal requirements to meet future obligations, net of future premium payments and interest earnings, prescribed under currently outstanding insurance contracts. Unlike deposits in other financial institutions, they are accumulated according to an agreed schedule of premium payments, only part of which represent additions to reserves, the remainder being the cost of insurance provided. However, a policyholder may at any time terminate his contract and withdraw his reserve, or he may use his reserve as collateral for a loan from the company.[19] Thus, life insurance reserves should be included among the financial assets of households, but they are undoubtedly viewed differently from other savings deposits.

In contrast to savings and loan shares and mutual savings bank deposits, the regression results obtained for life insurance reserves did not indicate a significant relationship to market rates of interest. However, significant coefficients were obtained on financial saving and consumer credit outstanding at the beginning of the period. A weighted average of the interest rates paid on savings and loan shares, mutual savings bank deposits, and commercial bank time deposits (r_{sd}) was also included in the regressions. The coefficient obtained was significant at the 10 per cent level and may reflect a shift toward low-reserve insurance plans in response to increases in the rates of interest paid by other financial institutions.

[19] In practice, the cash value of a policy is not exactly equal to the reserve because the calculation of the reserve makes no allowance for administrative expenses incurred by the company.

IV. Conclusions and Policy Implications

ANALYSIS OF THE SAMPLE PERIOD

The effects of changes in interest rates and other exogenous variables can now be analyzed by substituting the equations for mortgage lending and savings deposits into the housing starts equation. Lumping together the exogenous factors affecting the supply of funds other than market rates of interest into a single term denoted by *E*, we obtain the following relationship:

$$\Delta HS = -.2372\,(HS - HF)_{-1} + 2.519\left(\Delta\frac{R}{C}\right)_{-1} + .3256\,\Delta HF + .6961\Delta Y$$
$$+ 3.159\,\Delta \text{FNMA} - 3.473\,\Delta r_{sg} - 13.486\,\Delta r_{cb} + E - 3.3902 + u,$$

where u represents the unexplained residual variation. The contributions of each of these variables to the explanation of housing starts are given in Table 5. The figures shown were computed by multiplying the regression coefficients by the observations for each year expressed as deviations from their means. The β-coefficient for each column was computed as the ratio of the standard deviation of the numbers in the column to the standard deviation of the dependent variable, the sign being determined by the sign of the regression coefficient.[20] This statistic provides a summary measure of the relative importance of each factor.

As can be seen from the table, the supply-of-funds hypothesis is confirmed by the behavior of housing starts in the recession years of 1954 and 1958. In both of these cases, the low rate of increase of final demand, as measured by the household formations and disposable income terms, was offset by the effect of a sharp decline in interest rates. However, it should be noted that this process was reversed in the recovery years of 1955 and 1959 when the rise in interest rates was offset by the upturn in final demand. Furthermore, during the mild downturn of 1960, the decline in interest rates did not compensate for the sharp fall in demand which occurred, resulting in a considerable decline in housing starts from the 1959 level.

[20] This formula yields the usual β-coefficient for those columns which involve a single independent variable. If y_i and x_i denote the observed values of the dependent variable and a particular independent variable, expressed as deviations from means, and b is the regression coefficient, we have

$$\beta = \frac{\sqrt{\Sigma(bx_i)^2}}{\sqrt{\Sigma y_i^2}} = b\frac{\sqrt{\Sigma x_i^2}}{\sqrt{\Sigma y_i^2}}.$$

TABLE 5

Contributions of Exogenous Variables to Explanation of Changes in Housing Starts
(thousand units per month; deviations from means)

Variable	ΔHS	$(HS-HF)_{-1}$	$\left(\Delta \frac{R}{C}\right)_{-1}$	Final Demand, ΔHF & ΔY	ΔFNMA	Interest Rates	E	u
β-coefficient		−.410	.479	.419	.135	−.339	.297	
Contribution								
1949	5.3	17.7	−2.5	−5.8	1.4	4.1	−7.0	−2.6
1950	34.1	14.8	19.7	−5.7	−.2	2.0	−1.9	5.4
1951	−35.4	−2.5	−19.6	−7.2	0	−3.0	−7.8	4.7
1952	2.7	1.3	2.3	−2.7	−.3	.3	3.5	−1.7
1953	−2.3	−1.0	4.1	−3.5	−.5	−2.2	1.4	−.6
1954	11.2	−5.1	10.6	.6	−.7	9.9	−3.5	−.6
1955	8.6	−4.6	3.8	11.9	.8	−3.6	3.2	−2.9
1956	−23.8	−2.6	−7.0	−2.5	.8	−5.4	−5.2	−1.8
1957	−13.9	−2.0	−3.0	−.2	1.5	−7.7	−2.6	0
1958	10.1	1.4	.8	−2.7	−3.0	8.2	2.3	3.0
1959	12.4	−.5	−1.0	13.6	5.6	−13.1	4.7	3.1
1960	−24.3	2.8	−4.5	−13.2	−3.2	3.4	−6.3	−3.5
1961	2.4	−.9	2.8	1.9	−1.9	4.9	4.7	−9.2
1962	10.6	−1.6	0	−1.1	−.1	1.8	8.7	3.0
1963	9.7	−9.0	−2.2	7.0	−3.4	1.9	6.9	8.4
1964	−7.6	−8.3	−4.5	9.5	3.2	−1.7	−1.3	−4.6

As indicated by the β-coefficient, the level of inventories of units under construction and vacancies, and the relationship between rents and construction costs also make an important contribution to the explanation of housing starts. Increases in construction costs during periods of rapid increase in building and decreases during periods of declining activity have had a considerable impact on the subsequent volume of starts. The contribution of the inventory variable indicates the presence of a backlog of demand relative to available housing in the years 1949 and 1950 and an accumulation of inventories resulting in a downward pressure on new starts during the periods 1953–57 and 1961–64.

The column in the table headed by the symbol E includes all the variables in the equations for mortgage lending and savings deposits except rates of interest on marketable securities. The significant positive influence indicated in the expansionary years of 1955, 1959, 1961, and 1962 reflects the effect on personal financial saving of the sharp increases in disposable income that occurred. The figures also suggest that the substantial increase in the rate of accumulation of savings deposits by households during the recent period of 1961–63 has played a key role in maintaining the high volume of housing starts that took place. This increase in the flow of funds through financial intermediaries occurred as a result of the rapid increase in household holdings of financial assets in general, rather than as a result of shifting out of marketable securities in response to a decline in interest rates, as was the case in earlier periods of increasing building activity such as 1954 and 1958.

COMPARISON WITH MAISEL'S MODEL

In a recent study of the residential construction sector [12], Maisel obtained the following regression equation using quarterly data for the period 1950–62:

$$St_0 = -172.9 - \underset{(6.73)}{20.25}\left(\frac{1}{3}\sum_{j=2}^{4} i_{-j}\right) - \underset{(.0367)}{.1441}\ V_{-1} + \underset{(.1420)}{.3177}\ St_{-1}$$

$$- \underset{(.0780)}{.2357}\ St_{-3} + \underset{(.905)}{2.673}\left(\frac{R}{C}\right)_{-1} + \underset{(1.500)}{2.456}\ Rem_0 + \underset{(.3330)}{.5908}\ \Delta HH_0.$$

$$R^2 = .85.$$

The variables were defined as follows: *St* is housing starts; *i* is the Treasury bill rate on new issues; *V* is the deviation of vacancies from a straight trend at the start of the quarter; *R* is the rent component of the Consumer Price Index; *C* is the residential cost component of the GNP implicit price index; *Rem* is an estimate of net removals; and $\triangle HH$ is net household formation in the quarter.

This model differs from our own in several important respects. First, the large role played by demand in our equation conflicts with the statistical results obtained by Maisel, who argues that final demand is relatively stable in the short run and thus is not an important factor in cyclical fluctuations. He uses net household formations and net removals from the stock of houses to represent final demand, while we have included an income variable as a determinant of the demand for owner-occupied as opposed to rental housing. In addition, we have used the series on household formations published by the Bureau of the Census, which indicates much greater year-to-year variation than the series used by Maisel.

The inventory variable is also treated somewhat differently in our model. We assume that housing starts depend on the inventory of units under construction and vacancies at the beginning of the period, while in Maisel's model housing starts are assumed to be a function of vacancies and the change in inventories under construction during the previous quarter, the latter being represented by starts lagged one and three quarters. Furthermore, in the regression equations presented, starts lagged one quarter enter with a positive sign implying that a buildup of inventories has a stimulating rather than depressing influence on new starts. This result is not surprising because of the presence of serial correlation in the quarterly data but constitutes a serious weakness in Maisel's statistical model.

The effect of credit conditions is represented in Maisel's model by a lagged moving average of the Treasury bill rate. He experimented with mortgage yields and the spread between mortgage yields and bond yields but obtained better results using a short-term rate. He argues that the latter variable provides a better measure of the cost and availability of credit. In our model, the short-term rate affects the availability of credit through its influence on the flow of deposits into financial intermediaries. Our results also indicate that long-term rates have an important influence in a model which takes account of other factors affecting the supply of funds.

INTEREST RATE MULTIPLIERS

In order to calculate the effect of changes in interest rates on expenditures, we estimated residential construction expenditures (H), measured in billion 1954 dollars, as a linear function of housing starts during the current year (HS), and housing starts during the last six months of the previous year (HS^*_{-1}). Using annual first differences for the period 1949–64, the following regression equation was obtained:

$$\Delta H = \underset{(.0079)}{.0930}\ \Delta HS + \underset{(.0077)}{.0343}\ \Delta HS_{-1}^* + .3368. \qquad \bar{R}^2 = .925.$$

Using this equation and an estimate of 1.629 billion 1954 dollars for the additional expenditures induced by an exogenous change of $1 billion in construction expenditures, we obtained the multipliers shown in Table 6. This figure was obtained from the inverse of the most recent version of the University of Michigan econometric model of the U.S. economy. It indicates the magnitude of the income effects of the increase in construction expenditures but does not take account of the feedback to the housing sector through interest rates, disposable income, or financial saving.

In the last column of Table 6, we have shown the effect on GNP of a decrease of one percentage point in the short-term rate accompanied by

TABLE 6

Interest Rate Multipliers

	Short-Term Government Security Rate (Δr_{sg}=−1.00)	Corporate Bond Rate (Δr_{cb}=−1.00)	$\Delta r_{sg} = -1.00$ $\Delta r_{cb} = -.23$
Housing starts (thousands per month)	3.473	13.486	6.574
Residential construction expenditures (billion 1954 dollars)	.3230	1.254	.6114
GNP (billion 1954 dollars)	.5262	2.043	.9960
GNP (billion 1964 dollars)[a]	.6351	2.466	1.202

[a] Calculated from the constant dollar figures by multiplying by 1.207, the GNP deflator for 1964 obtained from the *Survey of Current Business*, February 1965.

a decrease of .23 in the corporate bond rate. This relationship between the two interest rates represents the historical average which was derived from a regression of changes in the corporate bond rate on changes in the short-term rate. As can be seen from the table, a decrease in the short-term interest rate of 1 percentage point (e.g., from 4 to 3 per cent) will lead to an increase in GNP of about a half billion 1954 dollars, assuming no change in the corporate bond rate, and an increase of about one billion 1954 dollars, assuming an induced change of .23 in the corporate bond rate. Similarly, the multiplier for a 1 percentage point decrease in the corporate bond rate is about two billion 1954 dollars. These figures indicate that monetary policy has a substantial impact on the residential construction sector, but that the resulting changes in GNP will be small relative to the cyclical fluctuations experienced in the postwar period. For example, the largest year-to-year change in interest rates occurred in 1959 when the short-term rate rose by 2.02 per cent and the corporate bond rate by .59. According to the above multipliers, this rise in interest rates reduced the growth of GNP by 2.3 billion 1954 dollars from $29.6 billion to the observed increase of $27.3 billion. Thus the residential construction sector exerts some stabilizing influence but does not provide a mechanism by which monetary policy alone can be expected to achieve short-run stabilization.

Statistical Appendix

Financial flows are in billion dollars and interest rates are in per cent per annum. The source of the data is the *Federal Reserve Bulletin,* unless otherwise noted.

RESIDENTIAL CONSTRUCTION DATA

1. Nonfarm residential construction expenditures, billions of 1954 dollars (*H*). Source: *Survey of Current Business.*

2. Nonfarm private housing starts (*HS*) and housing starts during the last six months of the year (*HS**), thousands per month. Source: Housing and Home Finance Agency, *Housing Statistics,* January 1965, and *Historical Supplement,* October 1961. Data for 1947–58 multiplied by the following factors, derived from those given in [12]: 1947–56—1.200; 1957–I—1.188; 1957–II—1.175; 1958–I—1.163; 1958–II—1.150.

3. Net household formations, thousands per month (*HF*). Source: U.S. Bureau of the Census, *Current Population Reports,* Series P-20, No. 130. Calendar year changes in the number of households were

obtained by interpolation. The figure for March 1961 was adjusted upward by 1 per cent to make it comparable with succeeding years.

4. Ratio of the rent component of the Consumer Price Index to the Boeckh Index of residential construction costs for the month of December, 1957–59 = 100 (R/C). Source: *Housing Statistics.*

5. Personal disposable income, billions of 1954 dollars (Y). Source: *Survey of Current Business.*

6. Estimated mortgage funds supplied by financial intermediaries (MC). Source: regression equations for mortgage lending of savings and loan associations, mutual savings banks and life insurance companies.

7. Net purchases of mortgages by the Federal National Mortgage Association (FNMA).

SAVINGS AND LOAN ASSOCIATIONS

1. Mortgage loans made (ML_1).

2. Mortgage loan commitments outstanding at the end of the year (COS_1).

3. Mortgage holdings at the end of the year (M_1).

4. Mortgage repayments (REP_1). Source: computed as the difference between mortgage loans made and the change in mortgage holdings during the year.

5. Savings and loan shares (SD_1).

MUTUAL SAVINGS BANKS

1. Mortgage loans made (ML_2). Source: 1948–60: [13], p. 169; 1961–64: estimated from changes in mortgage holdings by assuming repayments to be 10 per cent of total mortgage holdings at the beginning of the year.

2. Mortgage loan commitments outstanding at the end of the year (COS_2). Source: 1951–58: interpolated from data given in [13], p. 229; 1959–64: *Federal Reserve Bulletin.* Total commitments were estimated from data for New York state by multiplying by 1.7.

3. Residential mortgage holdings at the end of the year (M_2).

4. Mortgage repayments (REP_2). Source: 1951–60: computed as the difference between mortgage loans made and the change in mortgage holdings during the year; 1961–64: assumed to be 10 per cent of total mortgage holdings at the beginning of the year.

5. Mutual savings bank deposits (SD_2). Source: *Federal Reserve Bulletin; Supplement to Banking and Monetary Statistics,* Section 1, Banks and the Monetary System, 1962.

LIFE INSURANCE COMPANIES

1. Nonfarm mortgage loans made (ML_3).

2. Mortgage loan commitments outstanding at the end of the year (COS_3). Source: Life Insurance Association of America. Total commitments were estimated from the available data by multiplying by 1.5.

3. Nonfarm mortgage holdings at the end of the year (M_3). Source: *Federal Reserve Bulletin;* Institute of Life Insurance, *Life Insurance Fact Book,* 1964.

4. Mortgage repayments (REP_3). Source: computed as the difference between mortgage loans made and the change in mortgage holdings during the year.

5. Life insurance reserves plus dividend accumulations less policy loans (SD_3). Source: *Federal Reserve Bulletin; Life Insurance Fact Book.* Dividend accumulations for 1948–52 were estimated from dividends paid.

COMMERCIAL BANKS

1. Residential mortgage holdings at the end of the year (M_4).

2. Time deposits adjusted at commercial banks at the end of the year (SD_4). Source: *Federal Reserve Bulletin; Supplement to Banking and Monetary Statistics.*

INTEREST RATES

1. Long-term U.S. government bond rate (r_{us}).

2. Aaa corporate bond rate (r_{cb}).

3. Average of FHA and VA ceiling rates (r_m). Source: *Federal Register.*

4. Standard and Poor's state and local bond yield (r_{s1}). Source: *Survey of Current Business; Business Statistics.*

5. Rate on nine- to twelve-month U.S. government notes and bonds (r_{sg}).

6. Rate paid on savings and loan shares (r_1). Source: [19]. Rates paid 1948–1957 were estimated from dividends paid.

7. Rate paid on mutual savings bank deposits (r_2). Source: 1948–60: [13], p. 87; 1961–63: [19].

8. Rate paid on commercial bank time deposits (r_{td}). Source: [19].

9. Weighted average rate on savings and loan shares, mutual savings bank deposits and commercial bank time deposits (r_{sd}).

TABLE 7

Residential Construction Data

Year	ΔH	HS	ΔHS	ΔHS^*	HF	ΔHF	$\Delta(R/C)$	ΔY	ΔMC	ΔFNMA
1948		91.4		− 9.9	132.8		− .9			
1949	− .2	98.9	7.5	24.0	127.9	− 4.9	7.9	2.3	1.436	.454
1950	4.3	135.2	36.3	18.7	91.4	−36.5	−7.7	17.2	2.422	− .077
1951	−2.6	102.0	−33.2	−32.9	74.2	−17.2	1.0	6.0	−1.050	− .009
1952	− .1	106.9	4.9	11.2	69.5	− 4.7	1.7	6.6	3.571	− .084
1953	.8	106.8	− .1	− 6.4	52.2	−17.3	4.3	11.4	2.111	− .161
1954	1.8	120.2	13.4	25.6	67.6	15.4	1.6	1.9	4.410	− .232
1955	2.8	131.0	10.8	− 3.7	86.6	19.0	−2.7	16.5	2.244	.260
1956	−2.0	109.4	−21.6	−20.1	67.7	−18.9	−1.1	13.5	− .975	.255
1957	− .9	97.7	−11.7	− 5.4	70.2	2.5	.4	6.9	− .894	.489
1958	.9	110.0	12.3	23.9	74.4	4.2	− .3	2.5	5.721	− .952
1959	3.3	124.6	14.6	− 1.9	103.3	28.9	−1.7	14.4	− .281	1.761
1960	−1.3	102.5	−22.1	−21.6	65.5	−37.8	1.2	7.1	1.479	−1.011
1961	0.0	107.1	4.6	12.8	67.0	1.5	.1	10.4	5.428	− .617
1962	1.9	119.9	12.8	9.9	48.8	−18.2	− .8	15.2	5.680	− .032
1963	1.1	131.8	11.9	12.4	63.5	14.7	−1.7	11.5	5.185	−1.066
1964	.1		− 5.4			2.3		20.9	1.451	1.003

TABLE 8

Financial Intermediaries

Part A: Savings and Loan Associations

Year	ΔML_1	$\Delta^2 COS_1$	$\Delta^2 SD_1$	ΔREP_1	$\Delta(M_1/SD_1)$
1948					.032
1949	.029		.297	.167	−.009
1950	1.601		.012	.871	.045
1951	.013		.595	.147	−.010
1952	1.367		.973	.442	−.008
1953	1.150		.563	.416	.003
1954	1.202		.837	.536	−.003
1955	2.286		.370	1.251	.019
1956	− .930		.098	.069	−.015
1957	− .165	.009	− .192	− .175	−.007
1958	2.022	.594	1.300	.680	−.004
1959	2.969	−.803	.543	1.075	.023
1960	− .847	.264	.952	− .262	−.007
1961	3.060	.475	1.184	1.225	.004
1962	3.390	−.227	.608	2.218	.011
1963	3.980	.061	1.618	1.837	.014
1964	− .151	−.296	−2.174	1.777	

Part B: Mutual Savings Banks

Year	ΔML_2	$\Delta^2 COS_2$	$\Delta^2 SD_2$	ΔREP_2	$\Delta(M_2/SD_2)$
1951					.059
1952	− .052	.942	.822	.140	.026
1953	.217	.207	.071	.116	.028
1954	.711	.587	.184	.211	.036
1955	.825	− .675	− .133	.439	.051
1956	− .128	− .665	.017	.034	.037
1957	− .977	.194	− .182	−.113	.011
1958	.899	1.304	.682	.229	.015
1959	.081	−1.823	−1.402	.446	.028
1960	.002	.891	.427	−.212	.026
1961	.467	.721	.764	.200	.015
1962	1.186	.748	.910	.221	.019
1963	1.046	−1.518	− .059	.317	.032
1964	.743	.765	1.409	.390	

(continued)

TABLE 8 *(concluded)*

Part C: Life Insurance Companies

Year	ΔML_3	$\Delta^2 COS_3$	$\Delta^2 SD_3$	ΔREP_3	$\Delta(M_3/SD_3)$
1953					.009
1954	1.006	1.118	.115	.404	.016
1955	1.177	−1.680	.309	.425	.023
1956	.093	− .003	− .122	.001	.022
1957	−1.378	.160	− .176	−.186	.006
1958	.016	.875	.238	.417	.000
1959	.633	− .588	.731	.401	−.001
1960	.150	− .035	−1.047	−.294	.008
1961	.611	.162	.464	.786	.004
1962	.626	.639	.315	.401	.005
1963	1.447	− .045	.507	.666	.009
1964	1.044	− .139	.075	.590	

Part D: Commercial Banks

Year	$\Delta^2 M_4$	$\Delta^2 SD_4$	$\Delta(M_4/SD_4)$
1948		− .886	.028
1949	− .523	− .213	.015
1950	1.145	− .174	.047
1951	− .916	1.377	.011
1952	.079	1.262	.002
1953	− .181	.186	−.004
1954	.490	.192	.006
1955	.509	−1.670	.027
1956	− .620	.703	.007
1957	− .973	3.344	−.031
1958	1.301	1.465	−.011
1959	.285	−4.309	.014
1960	−1.687	2.778	−.023
1961	.821	5.269	−.027
1962	1.394	4.530	−.017
1963	.737	−1.941	

TABLE 9

Interest Rates

Year	Δr_{us}	Δr_{cb}	$\Delta(r_m - r_{cb})$	Δr_{sl}	Δr_{sg}	Δr_1	Δr_2	Δr_{td}	Δr_{sd}
1949	.13	−.16	.16	−.19	.00	.08	.16	.00	.09
1950	.01	−.04	−.04	−.23	.12	.00	.08	.00	.04
1951	.25	.24	−.28	.02	.47	.06	.06	.20	.16
1952	.11	.10	−.10	.19	.08	.12	.35	.00	.15
1953	.26	.24	.01	.53	.26	.12	.09	.00	.08
1954	.39	−.30	.42	−.35	−1.15	.08	.10	.20	.17
1955	.29	.16	−.16	.16	.97	.05	.14	.10	.12
1956	.24	.30	−.28	.40	.94	.11	.13	.20	.18
1957	.39	.53	−.25	.67	.70	.22	.17	.50	.33
1958	.04	−.10	.27	−.04	−1.44	.10	.13	.11	.12
1959	.64	.59	−.37	.39	2.02	.16	.12	.15	.15
1960	.06	.03	.28	−.22	−.56	.31	.33	.20	.27
1961	.11	−.06	−.12	−.27	−.64	.06	.22	.15	.13
1962	.05	−.02	−.05	−.28	.11	.23	.33	.47	.34
1963	.05	−.07	.07	.05	.26	.06	.05	.13	.08
1964	.15	.14	−.14	−.01					

TABLE 10

Household Financial Variables

Year	ΔFS	ΔFA	ΔCC
1948		7.2	2.828
1949	-1.852	7.4	2.907
1950	4.644	11.0	4.090
1951	2.121	14.1	1.222
1952	5.176	20.0	4.784
1953	.344	20.3	3.992
1954	-2.918	21.6	1.071
1955	3.759	27.7	6.343
1956	2.187	26.4	3.527
1957	- .895	25.6	2.636
1958	.172	29.8	.159
1959	4.921	38.0	6.413
1960	-4.596	24.7	4.486
1961	4.996	38.6	1.650
1962	5.174	42.7	5.486
1963	3.157		

HOUSEHOLD FINANCIAL ASSETS AND LIABILITIES

1. Personal financial saving (*FS*). Computed from the formula *FS* equals (personal saving plus imputed depreciation) minus (purchases of houses for owner-occupancy plus alterations and repairs minus net increase in mortgage debt) plus (increase in consumer credit). Source: personal saving and imputations: *Survey of Current Business;* other variables: *Federal Reserve Bulletin* and *Flow of Funds Supplement,* 1963.

2. Stock of financial assets except corporate stock at the end of the year (*FA*).

3. Consumer credit outstanding at the end of the year (*CC*).

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