Adjustments of Selected Markets in Tight Money Periods

Working Paper No. 10

Adjustments of Selected Markets in Tight Money Periods

Roger W. Spencer

June 1969

ADJUSTMENTS OF SELECTED MARKETS IN TIGHT MONEY PERIODS

Roger W. Spencer
St. Louis, Missouri

B.S., Virginia Military Institute, 1961

A Dissertation Presented to the Graduate
Faculty of the University of Virginia in
Candidacy for the Degree of
Doctor of Philosophy

James Wilson Department of Economics

University of Virginia

June

1969

ACKNOWLEDGEMENTS

I would like to acknowledge the assistance of the members of my dissertation committee and the economists of the St. Louis Federal Reserve Bank. The Bank made it possible for me to obtain the services of two experts in their respective fields--computer co-ordinator, Linda Hoffmaster, and head chartist, Pearl Lutteke. Special thanks are extended to research analyst, Kathy Thiel, and typist, Kathy Rudd, whose efforts effectively reduced the lag between the input of rough ideas and the output of the finished product. The contribution of a small group of relatives cannot be ignored. I am indebted to my parents for their years of inspiration and interest, to my daughter, Kara, for her months of restrained vocal expression and to my wife, Susan, for her constant encouragement and understanding.

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

LIST OF TABLES

LIST OF TABLES - Continued

LIST OF FIGURES

ABSTRACT OF THE DISSERTATION

Adjustments of Selected Markets in Tight Money Periods

Roger W. Spencer

Doctor of Philosophy in Economics
University of Virginia, 1969

The objective of this dissertation is to determine the response of credit-sensitive markets to changing economic conditions, especially those changes which occur in tight money periods. The study focuses on the behavior of commercial bank and non-bank financial institutions and changes which take place within other postulated credit-sensitive markets and the real sector of the economy. Non-bank financial institutions, for the purposes of this study, are comprised of savings and loan associations, mutual savings banks and life insurance companies. Other credit-sensitive markets examined include the residential construction market, state and local government borrowing, and consumer credit.

Although a number of studies have been devoted to investigation of portfolio behavior of a single financial institution (principally, commercial banks), few examine the intermediaries as a group or discuss the implications of collective portfolio changes for related sectors of the economy. This study takes the view that portfolio changes of financial intermediaries (brought about primarily as a response to stabilization policies) have significant consequences for other sectors of the economy, particularly in tight money periods. Whether non-bank financial institutions respond to stabilization policies or are

general, holdings of high-risk, low liquidity assets (such as mortgages) decline and holdings of low-risk, high-liquidity assets rise.

3) The effects of the curtailment of mortgages and other loans appear to be transmitted to other areas of the economy such as residential construction, consumer credit, and the real sector.

4) Basic differences in behavior exist between tight and easy money periods.

5) Changes in monetary policy variables display a stronger, more pervasive influence over all sectors than changes in Government spending or tax policies.

data for the third tight money period with predicted figures derived from partial analysis methods. The possibility of predicting the behavior of the markets in future tight money periods is examined in conjunction with an analysis of the similarity of previous such periods.

CHAPTER I

SPECIFICATION OF TIGHT MONEY PERIODS

The purpose of this chapter is to specify those periods since the Treasury-Federal Reserve "Accord" of 1951 during which "tight money" or "tight credit" has occurred. Some indicator or combination of indicators of tight money must be selected not only for the general analysis of portfolio adjustment in the succeeding chapter, but also to fulfill the data requirements of the econometric model presented in a later chapter. If an economic agency such as the widely respected National Bureau of Economic Research had delineated periods of tight money, as they have periods of recession, little discussion of a tight money definition would be necessary.

Considerable disagreement continues with regard to the meaning of tight money. One group, comprised principally of economists who adhere to some form of Keynesian Doctrine, believes that high and/or rising interest rates constitute the prime indicator of tight money periods.[1] A second group, mostly proponents

---

[1] James Tobin, for example, in "Money, Capital and Other Stores of Value," American Economic Review, LI (May, 1961), states that "the strategic variable--the ultimate gauge of expansion or deflation, of monetary tightness or ease--is the rate of return that the community of wealth-owners require in order to absorb the existing capital stock (valued at current prices), no more, no less, into their portfolios and balance sheets. This rate may be termed the supply price of capital." (p. 35).

of some version of the Quantity Theory, would recommend a literal interpretation of tight money based on the growth rate of the money supply either narrowly or broadly defined. Other possible indicators of tight or easy money periods are member bank free reserves and Federal Reserve Board policy actions. Much research has been directed towards determining changes in Federal Reserve policies, but little has been accomplished in delineating turning points of tight and easy money periods.

Tight money implies to some that the demand for credit exceeds the supply at some ex-ante interest rate. The implication would probably be acceptable to some economists because of the interest rate factor, but others might reject the implication on either of two grounds--the reference to "credit" rather than "money" and the failure to emphasize the supply aspect of the relationship.

For several reasons an indicator of overall credit conditions rather than the stock of money itself will be examined to determine tight money turning points. If borrowers go to financial intermediaries other than commercial banks to obtain loans, quite likely no new money will be created immediately as with bank loans, but money demand will be satisfied. Thus the money supply might remain constant while general credit conditions moved toward ease. Gurley and Shaw have contended that

> the monetary system is in some significant degree competitive with other financial intermediaries. The

> growth of these intermediaries in terms of indirect debt and of primary security portfolios is alternative to monetary growth and inhibits it. Their issues of indirect debt displace money, and the primary securities that they hold are in some large degree a loss of assets to the banks.[1]

Changes in velocity also complicate the interpretation of variations in the money supply.[2] If the velocity increases while the money supply is being reduced, the usefulness of changes in the money stock as an indicator of tight money may be somewhat impaired. In the post war period, however, velocity growth appears to be related more to secular than cyclical influences.

The principal reason that the supply of money is not used as the tight money indicator is the difficulty with lags. Changes in nearly all credit markets are probably linked either directly or indirectly to changes in the money supply, but the lags between money supply changes and responses of the various credit markets may vary considerably. A life insurance company, for example, to meet increased demand for loans, might lend funds

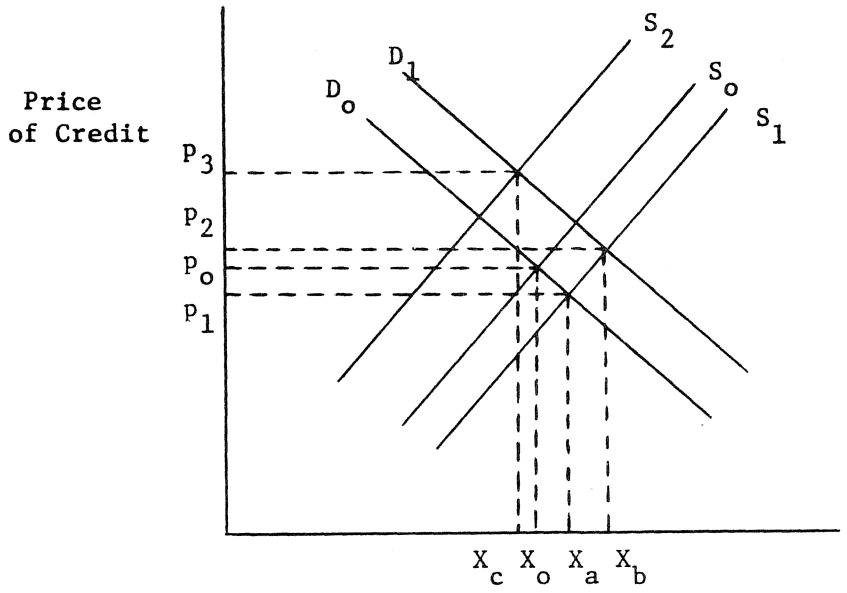
---

[1] John G. Gurley and Edward S. Shaw, "Financial Intermediaries and the Saving-Investment Process," The Journal of Finance, XI (May, 1956), p. 261.

[2] Warren L. Smith, "On the Effectiveness of Monetary Policy," The American Economic Review, XLVI (September, 1956), p. 601, suggested that "when credit conditions are tightened and the creation of new money through the banking system is restricted, the financial machinery of the country automatically begins to work in such a way as to mobilize the existing supply of money more effectively, thus permitting it to do most of the work that would have been done by newly created money had credit conditions been easier." It should be pointed out that the mobilization itself could be interpreted as an indication of tight money conditions or merely the disintermediation of the banking system.

previously obtained from banks when it built up an "inventory" of funds, or run off Treasury securities to meet immediate demand and later bring its cash balances into line. Many possible arrangements by non-bank financial institutions to secure additional funds could involve commercial banks, and therefore the money supply. The actual extension of a loan by the non-bank financial institution to a borrower might be related to past, present, or future changes in the money stock.

A potentially acceptable indicator would be accurate estimates of the supply and demand schedules of total loanable funds in the economy. From this knowledge, a single interest rate representing the going price on aggregated loanable funds could be derived. A hypothetical development of a tight money situation based on the loanable funds framework is presented below. Assuming the system begins at equilibrium, demands for and supplies of credit are as shown in the accompanying graph. The equilibrium price of credit, p_o, is expected to continue and constitutes an ex ante interest rate on which future credit decisions are made as well as a current rate describing current actions.



Graph I

A Hypothetical Example of the Development of Tight Money Conditions

An exogenous influence, such as an increase in the money supply, causes the supply of funds schedule to shift to the right to S_1 lowering the rate of interest to p_1 and increasing credit extended to X_a. Both the lower interest rate and the increase in credit indicate an easy money situation. Soon the lower interest rates and higher money incomes lead to an increase in the demand for funds causing a shift in the demand schedule from D_o to D_1. The increased demand for funds results in a higher interest rate, p_2, and an extension of credit increase to X_b. At this point the economic authorities determine there is an unsustainable boom underway which requires economic

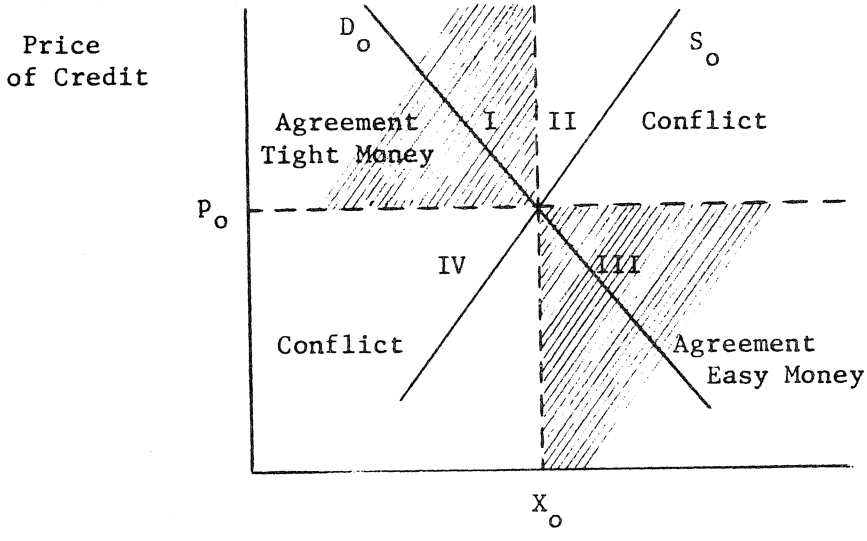
restraints. They apply braking action through some method such as contracting the money supply which leads to an upward shift in the supply schedule of loanable funds to S_2. The interest rate rises to p_3 and credit extended falls to X_c, both indicators signifying tight money conditions.[1]

Agreement on the state of credit conditions could be reached under the loanable funds framework by considering both the interest rate and the amount of credit extended. The two indicators could conflict, however, as in the previous hypothetical example. If, after a change from the original equilibrium conditions, the interest rate is higher and funds extended decrease, it could be said that a state of tight money exists. If the interest rate falls and funds extended increase, then there could be agreement that easy money conditions prevail. Graphically, a change from equilibrium to Sectors I or III in Graph 2 would

---

[1] One view holds that a series of events substantially similar to that depicted in the graph occurred in the period 1964-1966. The acceleration of the money supply in second half of 1964 was followed by a leveling off or decline in some interest rates in early 1965. Rates began rising in the second half of 1965, however and increased even more rapidly after the hike in the discount rate in December, 1965 and again after the contraction of the money supply which began in April, 1966. See Milton Friedman, "The Role of Monetary Policy," American Economic Review, LVIII (March, 1968), p. 6, who states that "the initial impact of increasing the quantity of money at a faster rate than it has been increasing is to make interest rates lower for a time than they would otherwise have been. But this is only the beginning of the process not the end. The more rapid rate of monetary growth will stimulate spending, both through the impact on investment of lower market interest rates and through the impact on other spending and thereby relative prices of higher cash balances than are desired. . . . These . . . effects will reverse the initial downward pressure on interest rates fairly promptly, say, in something less than a year."

produce agreement, but not to Sectors II or IV. The shifts in the previous example were from agreement in Sector III (X_a, p_1) to conflict in Sector II (X_b, p_2), to agreement in Sector I (X_c, p_3).



Graph 2

Criteria for Agreement on State of Credit Conditions

At a practical level, there is no single rate of interest representative of credit conditions throughout the economy. Although Keynes wrote of <u>the</u> rate of interest, he recognized differences in rates of return on diverse assets risks, expectations, maturities and other factors.[1] There is,

---

[1]Tobin, <u>op. cit.</u>, p. 30, points out that "for the nonmonetary assets of his system, Keynes simply followed the classical theory of portfolio selection . . .; that is, he assumed that capital, bonds, and private debts are perfect substitutes in investor's portfolios. The marginal efficienc· capital must equal <u>the</u> rate of interest. Keynes did not,

however, a reasonable approximation of the credit extended indicator. The Federal Reserve Board publishes in its monthly Bulletin a variable describing the flow of loanable funds in the economy. The variable encompasses both the demand and supply sides of fund transactions, labeling the former "net funds raised" and the latter "net sources of credit." Net changes in asset and liability holdings are analyzed in detail as shown in Table 1. Net sources of credit subsume changes in the money supply whether defined narrowly or broadly. For the five-year period 1963-1967, changes in the money supply, as narrowly defined, constituted an average of 9.8 per cent of net sources of credit.

The net sources of credit or net funds raised variable, although not an absolutely accurate index of current credit conditions even from a statistical point of view,[1] will be utilized as the primary indicator of tight and easy money periods. In general, upward movements of the credit variable will denote easy money and downward movements will indicate tight money.

---

course, envisage literal equality of yields on consols, private debt, and equity capital. Indeed, he provides many perceptive observations on the sources and cyclical variations of the expectations and risk premiums that differentiate market yields." In the same article Tobin states that four market-determined yields should be used in developing "[A] minimal program for a theory of the capital account relevant to American institutions."

[1]Examples of problems encountered in obtaining the credit variable are the handling of valuation of corporate stock and the discontinuities which arise with the addition of two states to the Union in the past fifteen years.

TABLE I-1

Financial Flows, 1967

(billions of dollars)

Net Funds Raised	83.1	Net Sources of Credit	83.1
U.S. Government	12.7	Change in U.S. Government cash balance	1.2
Short-term market	6.4	U.S. Government lending	4.5
Other securities	6.2	Foreign funds	5.4
Foreign borrowers	4.0	Private insurance and pension reserves	13.2
Loans	2.7	Sources n.e.c.	5.8
Securities	1.3	Private domestic nonfinancial sectors	53.0
Private domestic nonfinancial sectors	66.4	Liquid assets	49.1
Loans	18.0	Deposits	50.9
Consumer credit	4.4	Demand deposits and currency	12.0
Bank loans, n.e.c.	9.1	Time and savings accounts	39.0
Other loans	4.5	At commercial banks	22.4
Securities and mortgages	48.4	At savings institutions	16.6
State and local obligations	10.1	Short-term U.S. Government securities	-1.8
Corporate securities	17.4	Other U.S. Government securities	-1.2
1-to-4 family mortgages	11.5	Private credit market instruments	7.2
Other mortgages	9.4	Less security debt	2.2

Source: Federal Reserve Bulletin, September, 1968.

Previous studies of Federal Reserve monetary policies constitute the only detailed research into the specification of periods related to the tight credit concept. Kareken and Solow constructed a variable which reflected changes in commercial banks' maximum earning assets as controlled by Federal Reserve Board actions.[1] Brunner and Meltzer scored Federal Open Market Committee decisions as indicating intent to either tighten or loosen monetary conditions.[2] Hinshaw employed a similar technique.[3] Friedman and Schwartz dated policy reversals by overt actions such as discount rate changes, rather than using a more all-inclusive variable which incorporates all Federal Reserve actions.[4] Hendershott removed business cycle effects from money supply changes to achieve a cycle-free money supply, with which he was able to determine policy changes in the 1950's.[5] Meltzer constructed an index of monetary tightness by multiplying an interest rate (on new issues of Treasury bills) by

---

[1]John Kareken and Robert M. Solow, "Lags in Monetary Policy," Stabilization Policies, Commission on Money and Credit (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), pp. 14-96.

[2]Karl Brunner and Allan Meltzer, An Alternative Approach to the Monetary Mechanism, Prepared for the Subcommittee on Domestic Finance, Committee on Banking and Currency (Washington, D.C.: U.S. Government Printing Office, 1964).

[3]Elton Hinshaw, "The Recognition Pattern of the Federal Open Market Committee," Paper presented at the Southern Economic Association Meeting of November, 1967.

[4]Milton Friedman and Anna Jacobson Schwartz, A Monetary History of the United States, 1867-1960, National Bureau of Economic Research (Princeton: Princeton University Press, 1963).

[5]Patric H. Hendershott, "Monetary Policy, 1952-62," Paper presented at the Meetings of the Econometric Society on December 29, 1964.

what could be taken to be a Federal Reserve policy indicator--the ratio of free reserves to total reserves--thereby combining two possible indicators of tight money.[1]

In order to gauge the validity of the net sources of credit variable, its movements will be compared with movements of several other variables. The possibility exists that statistical and definitional obstacles in the Federal Reserve's formulation of the variable have not been sufficiently overcome. If such is the case, utilization of net sources of credit as the representative of the loanable funds framework would result in misleading interpretations of the actual state of credit.

It may be assumed that changes in the net sources of credit variable are related positively to changes in the money supply and inversely to changes in interest rates. If changes in the pace of economic activity are caused by the monetary sector (as opposed to the fiscal sector or other areas normally considered to be exogenous), it is hypothesized that variations in the money supply will either precede or occur concurrently with changes in the credit variable. For example, a sale by the Federal Reserve of Treasury securities in the open market would reduce the money supply by lowering demand deposits at commercial banks. Initially, the banks might avoid recalling loans or restricting new loans by liquidating some of their secondary

---

[1]Allan Meltzer, "Mercantile Credit, Monetary Policy, and Size of Firms," Review of Economics and Statistics, XLII (Nov., 1960), p. 430.

reserves or simply by permitting free reserves to vanish. The money supply would have dropped but there would have been little impact on net credit. The banks cannot continue to meet the new monetary policy in this manner for long, however. They must eventually curtail their lending as the tight policy continues. In all likelihood the institutions which borrow from commercial banks and make loans to their customers would, in turn, be forced to cut back their lending. If the institutions note the change of policy and act to restrict loans before they are directly affected, then the credit variable would respond that much more quickly to the policy change. It is unlikely that the institutions would anticipate the new policy to the extent that they would act before changes are noted in the money supply.

Friedman's comments (see footnote 1, page 6)imply that monetary actions have both short- and long-run impacts on interest rates. Consequently, relationships between movements in interest rates and the net sources of credit variable may be more difficult to discern.[1] Other indicators which will be used to check the validity of net sources of credit are free reserves, the adjusted monetary base, and a fiscal policy variable. The auxiliary indicators also assist in interpreting the occasional double tops or bottoms or anomalous observations which occur in the credit variable. The monetary base, which

---

[1]Two short-term interest rates have been chosen as a check on the credit variable. See John Kareken, "Lenders' Preferences, Credit Rationing, and the Effectiveness of Monetary Policy," Review of Economics and Statistics, XXXIX (Aug., 1957), pp. 292-311.

is expected to vary positively with the money supply and the credit variable, is a measure of policy actions taken by the monetary authorities.[1] To some analysts, net free reserves indicates easy money while net borrowed reserves denotes tight money. Since the Federal Government often obtains significant amounts of funds through borrowing, a budget deficit may be reflected in an increase in the net sources of credit variable.

The net sources of credit variable indicates that the four following tight money periods have occurred since the Treasury-Federal Reserve "Accord":

I /1953 - III/1954	Tight Money
III/1955 - IV /1957	Tight Money
III/1959 - I /1961	Tight Money
II /1966 - II /1967	Tight Money

Easy money periods were:

IV /1954 - II /1955	Easy Money
I /1958 - II /1959	Easy Money
II /1961 - I /1966	Easy Money

The credit variable fell from a peak of $33.2 billion in the fourth quarter of 1952 to a low of $17.4 billion in the fourth quarter of 1953 (the decline was marred by a $40.2 billion observation in the third quarter of 1953). Credit remained tight

---

[1]Karl Brunner, "The Role of Money and Monetary Policy," Federal Reserve Bank of St. Louis Review, L (July, 1968), pp. 8-24.

through the third quarter of 1954 when it reached $21.6 billion (See Chart 1-A). The tight credit period enveloped both a restrictive monetary policy (the money supply increased only $.1 billion from May, 1953 to April, 1954) and an NBER recession (March, 1953 to August, 1954). The development is unusual in that most recessions follow (and are probably caused to some extent by) periods of monetary restraint. Bank interest rates on short-term business loans and market yields on three-month Treasury bills rose during the several months preceding the credit downturn and continued to rise until March, 1954 and May, 1953 respectively. Another indicator, net free reserves, was surprisingly positive during most of the first tight money period.

The 1955-1957 period of restraint provides an era of near-unanimity of the tight money indicators. Almost all of them point to a tightening of credit sometime during 1955 and signs of ease occurring in late 1957. The credit variable fell unevenly from $43.2 billion in the second quarter of 1955 to $19.4 billion in the fourth quarter of 1957. The money supply rose only $1.1 billion between June, 1955 and January, 1958. Free reserves also conformed to expectations as they remained negative (net borrowed reserves) during the period that both the credit variable and the money supply indicated tight money conditions. The two interest rates plotted in Chart 1-B began rising somewhat before June, 1955 and reached their peaks in late 1957. Movements of the adjusted monetary base coincided closely with movements in the money supply throughout the entire 1953-1967 period.

In the third tight credit period, which occurred at the end of the decade, the indicators moved fairly closely together, although not so closely as in the preceding period of restraint. Net sources of credit fell from $64.6 billion in the second quarter of 1959 to $26.1 billion in the first quarter of 1961. The money supply contracted between August, 1959 and November, 1960, but free reserves became negative in December, 1958 and remained so until June, 1960, thereby leading the credit variable even more as they began to rise in June, 1958 and continued their climb through December, 1959.

The first three tight money periods were accompanied by recessions. Although an official recession did not occur during or after the fourth tight money period (real Gross National Product declined only one quarter in early 1967 instead of the two consecutive quarters required by the NBER), all the relevant indicators pointed to credit stress in 1966. The credit variable declined from a high of $84.1 billion in the first quarter of 1966 to $44.2 billion the second quarter of 1967. The money supply did not expand between April, 1966 and January, 1967. Free reserves turned negative as early as March, 1965 and did not become positive again for a full two years. As in all the previous tight money periods, interest rates began their rise before any sign of tightness was observed in either net sources of credit or the money supply. Both the rate on short-term business loans and the three-month Treasury bill rate began to accelerate in December, 1965 (the same month the Federal Reserve raised the discount rate) and moved upwards for approximately the next ten months.

A fiscal policy variable, deficit or surplus in the national income accounts budget, was examined to detect relationships with net sources of credit (See Chart 1-B). On the assumption that a deficit is associated with increases in credit, there appears to be some correspondence between movements of the two variables beginning with the second tight money period. While net sources of credit failed to expand in the 1955-1957 period, the national income accounts budget showed a surplus nearly the entire time. When credit increased during the 1958-1959 period of easy money, the budget was in deficit.

The fiscal variable did not perform quite as well as an indicator in the 1960's. During the third tight money period, the budget displayed a surplus approximately one-half the time. The record of the fiscal policy variable improved in the long, easy money period of the early 1960's as the budget ran deficits in fourteen of the twenty quarters. In the final tight money period, however, the national income accounts budget showed a surplus in only the first of the five quarters.

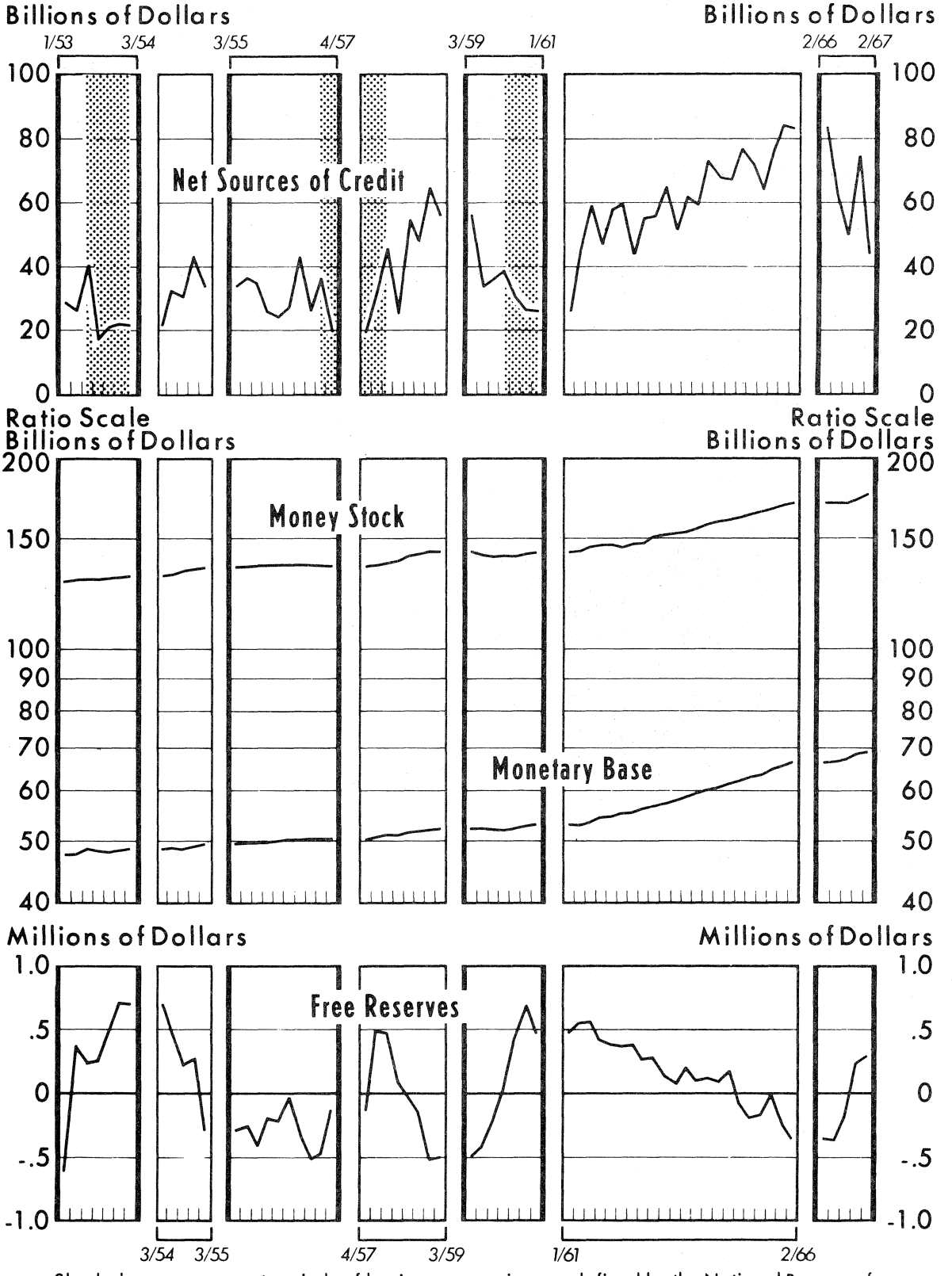
Summary

A theoretical framework was developed in this chapter for selection of a variable indicative of the state of credit conditions in the economy. The variable, net sources of credit, was compared with indicators representing two conflicting points of view (Keynesian and Quantity Theories) as well as various other indicators in attempting to gauge the accuracy of the Federal Reserve concept. In so far as the three primary indicators

(net sources of credit, interest rates, and the money supply) all point to four periods of tight money occurring in the early, middle, and late 1950's and the middle 1960's, it may be concluded that the net sources of credit variable provides results not inconsistent with more widely-recognized indicators. Alternative indicators, including free reserves and the national income accounts budget, provided less concurrence as to the number and dates of the tight money periods.

Chart 1-A

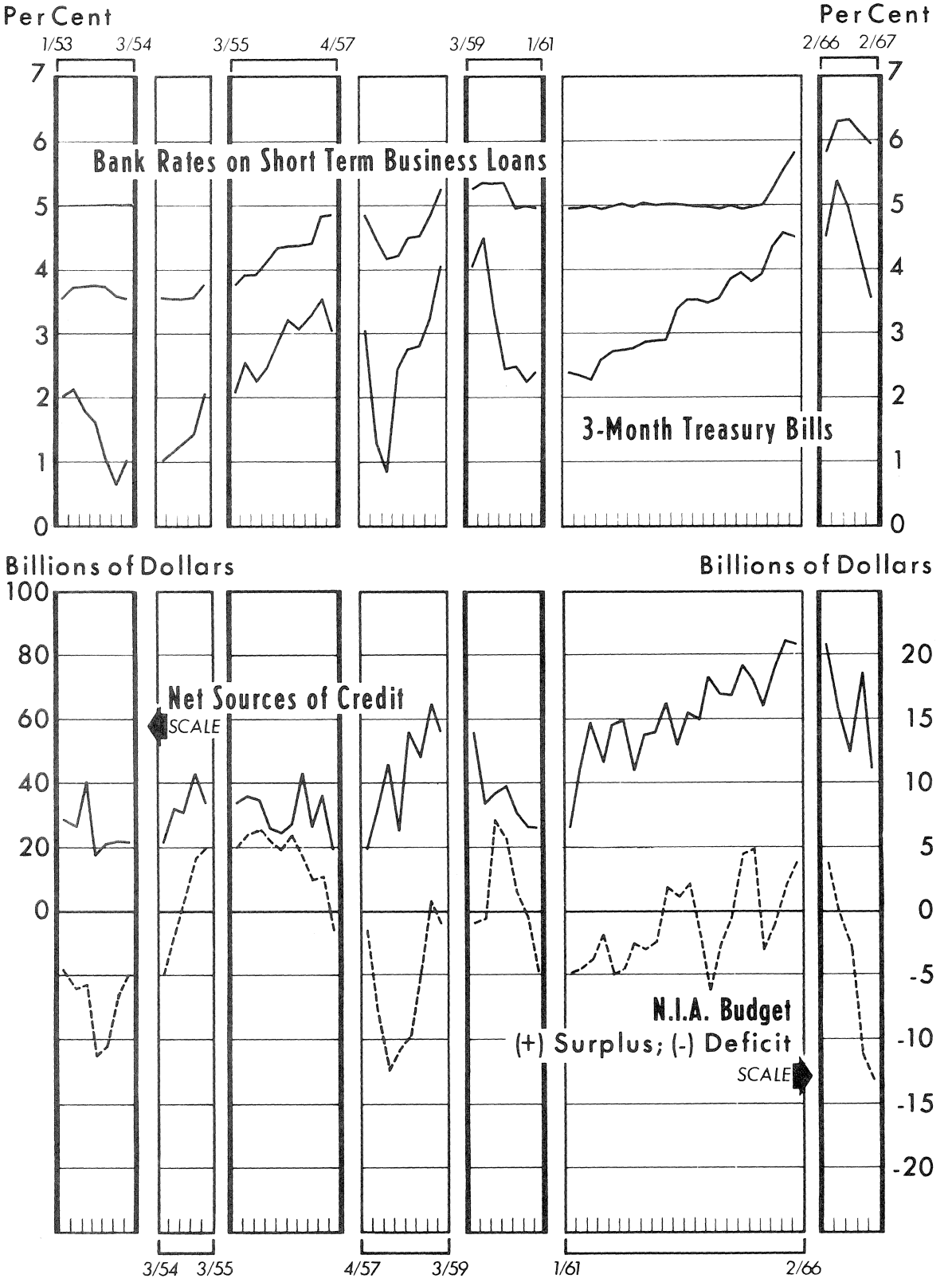
Tight Money Indicators



Shaded areas represent periods of business recessions as defined by the National Bureau of Economic Research.

Chart 1-B

Tight Money Indicators



CHAPTER II

THE MARKETS

The focus in this chapter is on the financial intermediaries, whose portfolio adjustments in periods of credit stress are of critical importance to the remainder of the economy. The financial intermediaries link savers and investors, the financial and the real segments of the economy, and the private and public sectors. Portfolio adjustments may come as a consequence of a change in the behavior of the public, the regulatory authorities, or the financial institutions themselves. It could not be expected that portfolio adjustments of each of the institutions would be the same among institutions or the same within a given institution over a period of time. However, similarities do exist in both instances and these similarities--as well as certain dissimilarities--will be examined in this chapter. Of major concern is the portfolio adjustments of the intermediaries in tight money periods as they react to or initiate changes in credit conditions.

A non-exhaustive list of such intermediaries would include commercial banks, life insurance companies, savings and loan associations, mutual savings banks, noninsured pension funds, finance companies, fire and casualty insurance companies, state and local pension

funds, investment companies, and credit unions. This study will deal directly with the first four intermediaries mentioned above, that is commercial banks, life insurance companies, savings and loan associations, and mutual savings banks. The concluding portion of the chapter summarizes the adjustments of the four intermediaries and examines tight money activities in the real sector and four other credit-sensitive areas.

TABLE II-1

Asset Shares of Main Types of Financial Intermediaries

	1945	1955	1965
	Per Cent of Total		
Federal Reserve Banks	18.8	9.1	5.6
Commercial Banks	43.3	35.4	31.8
Mutual Savings Banks	4.6	5.4	5.1
Savings and Loan Associations	2.4	6.6	11.5
Finance Companies[1]	.5	2.6	3.0
Investment Companies	1.0	2.4	4.2
Government Lending Institutions	5.0	3.7	4.1
Life Insurance Companies	12.1	16.1	14.5
Private Pension Funds	.7	3.1	6.2
State and Local Pension Funds	7.0[2]	1.9	2.9
Federal Insurance Funds		6.6	4.2
Property Insurance Companies	2.1	3.8	3.7
Other	2.5	3.3	3.2
	100.0	100.0	100.0

Column 1 Source: Raymond W. Goldsmith, The Flow of Capital Funds in the Postwar Economy (New York: National Bureau of Economic Research, 1965), p. 39.

Column 2 and 3 Source: Raymond W. Goldsmith, Financial Institutions (New York: Random House, 1968), p. 43.

[1]Sum of finance and mortgage companies asset shares.

[2]Sum of state and local pension funds and Federal insurance funds.

General Portfolio Considerations

Although the four financial institutions to be analyzed in detail in this chapter differ in a number of ways, they are similar in that each, obtaining generally short-term liabilities from the public, attempts to maximize profits by investing in predominantly long-term assets. This portfolio arrangement, undoubtedly centuries old, would appear to render the financial intermediaries vulnerable to credit crises such as that which occurred in 1966. Abstracting from legal and institutional safeguards, it is clear that if a large number of depositors or policyholders (in the case of life insurance companies) demand their short-term assets from financial intermediaries, the intermediaries can experience considerable difficulty in attempting to liquidate their own long-term assets to meet their customers' demands. If savers simply transfer deposits from say, savings and loan associations to commercial banks, the credit "crisis" will be limited primarily to savings and loans and the asset markets in which savings and loan associations operate, but if financial institutions as a group are disintermediated as savers transfer their funds to the open markets, serious consequences will ensue as the institutions simultaneously attempt to "unload" their long-term assets.[1]

---

[1]Hyman Minsky explains the disintermediation process in terms of portfolio adjustment to "make" a position. "The 'position' is a set of assets (loans and investments for banks, government debt for bond dealers, etc) title to which needs financing. The need to finance position may take the form of a need to acquire reserve money--either to pay for an acquisition or to meet a clearing drain, etc. The acquisition of a deposit via a certificate of deposit, the borrowing of reserves via the Federal Funds market, the sale of Treasury bills are ways in which positions can be made." Minsky notes that the sale of assets in order to make

Even with such safeguards as FDIC guarantees to bolster depositor confidence and lessen the need for portfolio shifts, the experience of 1966 demonstrates that financial intermediaries are not fully insulated from the perils of disintermediation. Their behavior in that year and in the three preceding periods of tight credit will be examined to determine if their portfolios undergo comparable alterations in such periods.

Nearly all economic units, in either tight or easy money periods, attempt to maximize return and minimize risk subject to a number of constraints. The legal, traditional, and expectational constraints vary over time and are different for each unit. Some constraints may be postulated to change in a somewhat predictable manner in tight money periods, but financial intermediaries do not necessarily react in the same manner to the changing constraints. The chief factors which they must consider are return, risk and liquidity. Risk refers to the degree of variance of an asset's market yield, not to the possibility of default. Liquidity, following Keynes and Hicks, in terms of a comparison of assets, refers to one asset being more liquid than another when it

---

position under certain circumstances may lead to a depression. "The emergence of a taut liability structure means that a not unusual short-fall of cash receipts can lead to a need to make position by selling assets. Rising interest rates mean that the assets available for sale may have market values less than face values. The combination of the transformation of paper losses into realized losses and the downward pressure upon asset prices due to the attempt to make position by selling assets can trigger a financial crisis. This breaks the euphoric expectations and a deep depression will follow unless the central bank effectively acts as a lender of last resort and stabilizes asset prices, and fiscal measures offset the initial fall in investment so that a cumulative decline in aggregate demand does not occur." Hyman Minsky, "Private Sector Asset Management and the Effectiveness of Monetary Policy: Theory and Practice," paper presented at the American Finance Association Meetings December 28, 1968, p. 3.

is "more certainly realisable at short notice without loss."[1]

Tight money is generally associated with high or rising interest rates. A simple Keynesian liquidity preference theory based on inelastic expectations would require that economic entities draw down their cash balances during such periods to increase their bond holdings. Tobin's reformulation of Keynesian liquidity preference theory permits the same inverse relation between cash holdings and the interest rate to hold.[2] A possible offset to this tendency to acquire more high-yield, high-risk assets in tight money periods derives from the liability structure of each economic unit. The more certain is the timing of the cash flow of an economic unit, such as a financial intermediary, the more likely the unit is to purchase assets whose market yield is subject to a high degree of variance. If, however, a financial intermediary is subject to a high degree of uncertainty regarding its cash flow (primarily that flow which stems from the emission of liabilities) when money becomes tight, it must maintain a higher proportion of funds in low yield-highly liquid assets than otherwise.

Because of the offsetting tendencies mentioned above, it cannot be certain how financial intermediaries will adjust

---

[1]Hicks notes that it may often be adequate " . . . to define the degree of liquidity of a liquid asset solely in the terms of the "certainty" of its expected value and so to say, in the manner described, that a rise in Liquidity Preference is expressed in an increased valuation of 'certainty' relatively to 'expectation' (or mean value)." J. R. Hicks, "Liquidity," Economic Journal, December, 1962, p. 794.

[2]J. Tobin, "Liquidity Preference as Behavior Towards Risk," Review of Economic Studies, XXV (February, 1958), pp. 65-86.

their portfolios in tight money periods. It might be assumed that intermediaries such as commercial banks, whose capacity to emit liabilities (primarily demand and time deposits) in order to "make position" is directly affected in tight money periods, would be more concerned with liquidity than return. Life insurance companies, on the other hand, whose cash flow is generally subject to less variation than commercial banks, might find tight money periods a propitious time to improve their "return" positions. The severity of the tight money period is another factor influencing the intermediaries' attitudes toward return, risk and liquidity. The succeeding sections of this chapter examine the portfolio adjustments of the selected financial intermediaries in four tight money periods in light of the above discussion.

Savings and Loan Associations

Savings and Loan Associations were organized in this country in 1831, and then, as now, had as their primary raison d'etre the financing of purchases of new and existing homes. Most of the associations, which may operate under either state or federal charters, are owned by the savers who delegate management to an elected board of directors. The savings associations, as with most other financial intermediaries, are heavily regulated and may find themselves under the supervision of the Federal Savings and Loan System, the Federal Savings and Loan Insurance System, the Federal Home Loan Bank System and/or a state regulatory authority.

Because savings and loan associations tend to be located in faster growing sectors of the country than mutual savings banks, they have been able to offer their depositors higher returns on their accounts.[1] Indeed, much of their rapid postwar growth can be attributed to the rising demand for their chief product, home mortgage loans. The higher the interest rates charged their borrowers, ceteris paribus the higher the rates which may be paid to attract savings capital. An additional reason explaining their ability to offer higher rates than the savings banks derives from the larger proportion of conventional mortgages which they hold. Savings and loans, although permitted to draw savings capital from any area, are generally required to limit their mortgage lending activity to a fifty mile radius of the main office. Such propinquity to their mortgage customers enables them to inspect individually each piece of property and not rely on the guarantee of the Federal Home Loan Insurance Corporation. Consequently, the associations have been able to traffic in conventional home mortgages which normally yield about .25% more than guaranteed home mortgages. Mutual savings banks, who would undoubtedly prefer the high-yield, conventional mortgages, have not found housing demand strong enough in their own areas, and have resorted to interstate activity and proportionally more guaranteed mortgages.

---

[1] Goldsmith, Financial Institutions, op. cit., p. 92.

The spread between rates offered savings association customers and commercial bank time and savings depositors has been even greater than that between the savings and loans and the mutual savings banks. Commercial bank laws have been relaxed over the years, however, to the point where the gap between savings and loan shares and commercial bank time and savings deposits has narrowed from 1.57 per cent in 1953 to 0.33 per cent in 1966.

Secular Trends

Nearly ninety per cent of savings and loan liabilities consist of savings deposits. The remainder are comprised primarily of borrowed money (chiefly Federal Home Loan Bank advances) and reserves and undivided profits. Similarly, mortgage loans constitute almost ninety per cent of assets with liquidity holdings (U.S. Government securities and cash) furnishing most of the rest. Not until 1966 did either savings accounts or mortgages meet with an absolute quarterly decline, and as Table II-1 indicates, savings and loan associations substantially increased, between 1955 and 1965, their share of total assets held by all financial intermediaries while commercial banks, mutual savings banks and life insurance companies declined relatively.

Home mortgages, which have long constituted the primary use of Savings and Loan funds, have become slightly less popular with fund managers since the early 1960's. High-yielding multifamily and other mortgages have found their way in increasing numbers into savings and loan portfolios (4.5 per cent of all mortgages in 1952 compared with 15.3 per cent in 1967). The

associations continue to find low-yielding, tax-exempt state and local government securities unattractive because, as with mutual savings banks and life insurance companies, savings and loan companies enjoy a relatively low tax rate.

Chart 2-A shows the secular rise of savings and loan asset holdings in each of their three main categories--mortgages, Federal Government securities and cash. Over a 15-year period, asset composition has changed little compared with other financial intermediaries. At the end of 1952, savings and loans held 81.1 per cent of their assets in mortgages, 8.4 per cent in Federal Government securities and 5.7 per cent in cash, whereas the distribution in 1967 was 84.9 per cent in mortgages, 6.4 per cent in government securities, and 2.4 per cent in cash. Both chart 2-A and Table II-2 indicate a secular decline in the rate of increase of savings and loan deposits and mortgage holdings.

TABLE II-2

Annual Rates of Change of Primary Assets and Liabilities of Savings and Loan Associations

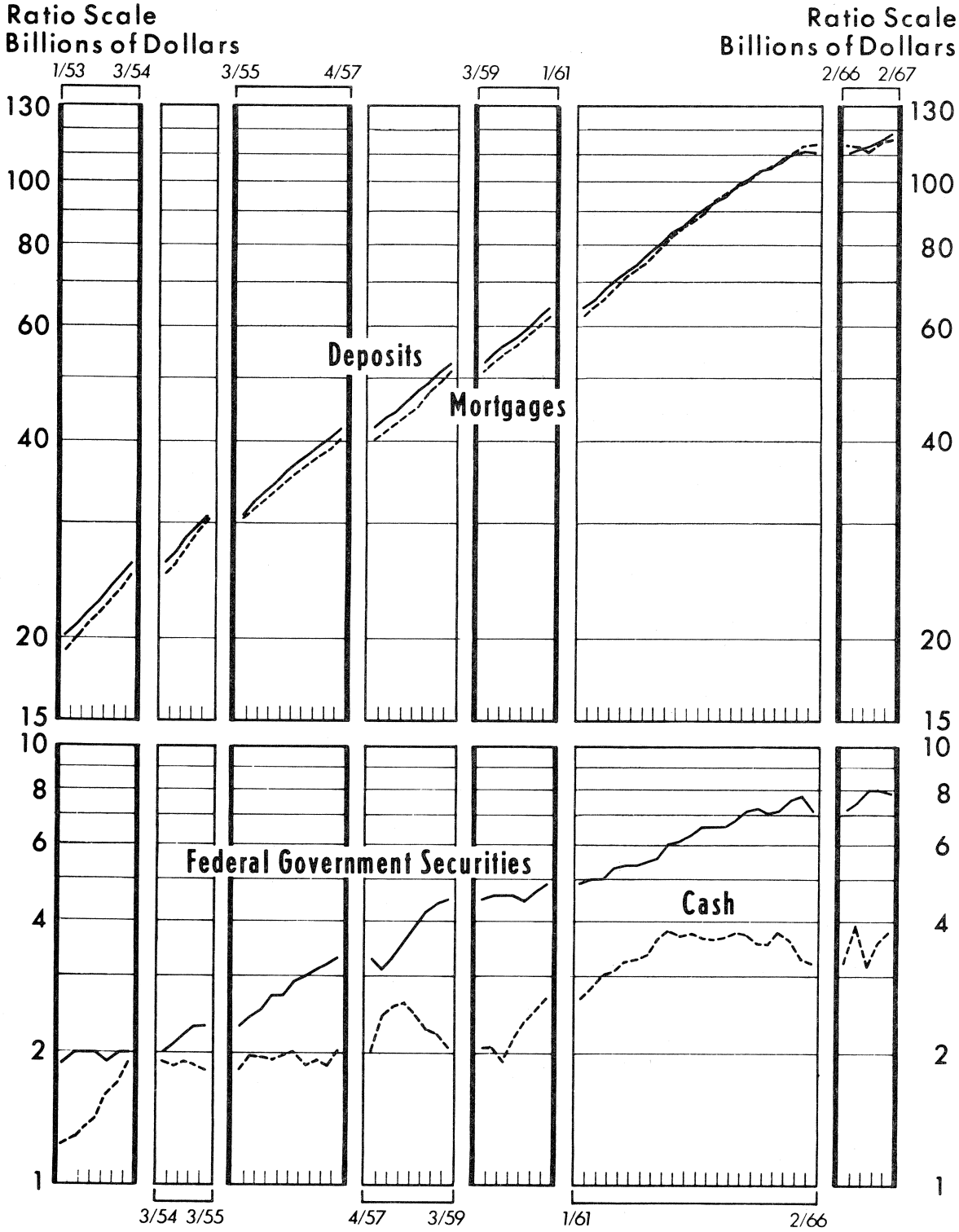
	Tight I 1953-III 1954	Easy IV 1954-II 1955	Tight III 1955-IV 1957	Easy I 1958-II 1959	Tight III 1959-I 1961
Deposits	19.0	18.4	14.6	13.7	13.7
Mortgages	19.2	23.4	12.9	15.2	13.6
Treasury Securities	3.5	20.0	17.4	32.3	5.8
Cash	24.2	- .3	4.5	- 6.9	18.6

	Easy II 1961-I 1966	Tight II 1966-II 1967	Average Tight Money Period	Average Easy Money Period
Deposits	12.4	6.7	13.5	14.8
Mortgages	12.7	2.8	12.1	17.1
Treasury Securities	9.8	9.7	9.1	20.7
Cash	3.3	18.2	16.4	- 1.3

Source: Federal Reserve Bank of St. Louis.

Chart 2-A

Primary Assets and Liabilities of All Savings and Loan Associations



Cyclical Patterns in Savings and Loan Liabilities

The above table indicates that growth in deposits slowed substantially in only the fourth tight money period. If the first quarter of 1966 had been delineated as the start of tight money, deposits in the fourth tight money period would have advanced at only a 4.9 per cent rate. Net savings receipts, that is gross receipts less withdrawals, give a somewhat different picture of deposit activity in tight money periods. The impact of tight money on savings and loan deposits, judging from the data presented in Table II-3, appears to be considerably greater than that suggested by the gross deposit figures.

TABLE II-3

Net Savings at Savings and Loan Associations
(millions of dollars)

Year	Net Savings	Year	Net Savings
1952	$ 1026	1960	$ 2512
1953	1110	1961	2905
1954	1466	1962	3109
1955	1624	1963	3677
1956	1661	1964	3532
1957	1582	1965	2842
1958	2015	1966	1208
1959	2194	1967	3563

Source: Federal Reserve Bank of St. Louis.

The above table shows that net savings (1) in wholly tight money year 1953 did not grow so rapidly as in mixed tight money years in 1954 and 1955; (2) growth slowed in wholly tight money year 1956 and net savings declined (year over year) in tight money year 1957; (3) rose in the predominantly easy money years 1958-1963

(the growth rate slowed in tight money quarters IV, 1959 and I, 1960; see Appendix A); (4) declined secularly in the years 1964-1966, 1966 being a particularly poor year and (5) recovered in 1967. Tight money apparently had some impact on net savings in the first and third tight money periods and considerable impact in the second and fourth periods, particularly the latter.

Both the withdrawal ratio and changes in length of time dollars remain in savings associations add to the evidence that savings and loans are affected during tight money periods. Table II-4 shows that withdrawal ratios generally rose in tight money

TABLE II-4

Measures of Savings Activity
at Savings Associations

Year	Withdrawal Ratio	Average Length of Time Savings Dollar Remains in Associations
1952	60.7%	3.75 Years
1953	61.4	3.67
1954	60.1	3.75
1955	63.7	3.42
1956	67.3	3.33
1957	71.0	3.42
1958	67.2	3.58
1959	69.7	3.42
1960	69.0	3.50
1961	68.6	3.50
1962	69.6	3.50
1963	69.1	3.50
1964	72.4	3.50
1965	78.5	3.42
1966	91.8	2.75
1967	77.6	3.33

Source: Savings and Loan Fact Book, 1968, pp. 66 and 68.

years (the 91.8% in 1966 means that for every $100 in new savings received, $91.80 was withdrawn) while the average length of time a savings dollar remained in an association declined.

There is little evidence that savings and loan associations increase their borrowing from the Federal Home Loan Banks during times of monetary stress. Table II-5 indicates that until the

TABLE II-5

Federal Home Loan Bank Advances
to Savings and Loan Associations

Year	Advances (in millions of dollars)	Year	Advances (in millions of dollars)
1952	$ 944	1960	$ 2,197
1953	1,027	1961	2,856
1954	950	1962	3,629
1955	1,546	1963	5,015
1956	1,347	1964	5,601
1957	1,379	1965	6,444
1958	1,444	1966	7,464
1959	2,387	1967	4,739

Source: Savings and Loan Fact Book, 1968, p. 97.

final year of the 1950's, borrowings followed no particular cyclical pattern. Much of the large increase in borrowings in 1959 can probably be attributed to the loss of potential or actual deposits when the Treasury Department issued its "Magic Fives."[1] Associations borrowed heavily throughout the 1960's. Increased taxes in 1963 probably contributed to the greater demand for FHLB funds during that year. Since interest rates charged savings and loans for

[1] Five per cent, four-year, ten-month notes.

borrowed funds were somewhat below the return which could be gained by employment of such funds, associations have been inclined to borrow more over the last decade.[1] Commercial bank borrowing activities over comparable periods provide an interesting parallel. Until recently it was felt by a majority of financial students that a large magnitude of net borrowed reserves indicated that money market conditions were tight. Many economists now regard the net borrowings or free reserves figure as an ambiguous indicator because banks seem to have dropped their traditional reluctance to borrow from the Federal Reserve when the discount rate stands below the Federal Funds and/or loan interest rates.

Cyclical Patterns in Saving and Loan Asset Holdings

Mortgages, the principal asset held by savings and loan associations, vary closely with deposits, the principal liability. The slowing in mortgage growth in tight money periods can be observed to some extent in Table II-2, but the "mortgage loans made" table below makes the point more clear. There is no evidence of a curtailment of mortgages in the first tight money period, but the data indicate a reduction in mortgage loans made in the three later periods, particularly the fourth.

Table II-2 indicates cyclical variability in the two "liquidity" assets of savings and loans, cash and Treasury securities. The tight money slowing in the growth of Treasury

---

[1] By 1967, the discount rate had been raised to 6 per cent, a significant factor in the 1967 decline in borrowings.

TABLE II-6

Mortgage Loans Made During Year
(millions of dollars)

Year	Mortgage Loans	Year	Mortgage Loans
1952	$ 5,753	1960	$ 14,304
1953	7,767	1961	17,364
1954	8,969	1962	20,754
1955	11,255	1963	24,735
1956	10,325	1964	24,505
1957	10,160	1965	23,847
1958	12,182	1966	16,720
1959	15,181	1967	19,893

Source: Savings and Loan Fact Book, 1968, p. 79.

securities and the acceleration in the growth of cash holdings suggests a re-alignment of the liquidity portion of savings and loan portfolios in tight money periods. In general, it appears that the associations shift some funds from Treasury securities to cash to meet the higher rate of deposit withdrawals. Treasury securities are nearer the mid-point of the risk and liquidity spectra than mortgages (high-risk, low-liquidity) or cash (low-risk, high-liquidity). With the slackening in the growth of mortgage loans made and Treasury securities, and acceleration in cash holdings, savings and loan portfolios shift from risk toward liquidity in tight money periods.[1]

[1] A. Charnes and Sten Thore, "Planning for Liquidity in Financial Institutions: The Chance - Constrained Method", Journal of Finance, XXI (December, 1966), found in their programming approach to the determination of savings and loan portfolios that "Generally speaking, we will find that the association will now [when the cost of long-term borrowing rises, often a characteristic of tight money periods] have to hold more cash during the first periods than it did before . . . ", (p. 665).

Other Indications of Tight Money

Table II-7 gives some indication of the effects during tight money periods on savings and loan profits. In 1953, a tight money year, during which deposits and mortgages increased at a high rate, profits increased 20.8 per cent over the previous year.[1] Profits rose for the next two years, both of which were mixed tight and easy periods, but declined sharply over the next two, 1956 and 1957, both occurring in the second tight money period.

TABLE II-7

Savings and Loan Association Profits

Year	Profit (in $000's)	% Change from Previous Year
1952	$ 191,228	
1953	231,085	20.8
1954	284,058	22.9
1955	355,457	25.1
1956	386,730	8.8
1957	407,812	5.5
1958	476,255	16.8
1959	550,441	15.6
1960	559,543	1.7
1961	723,576	29.3
1962	828,859	14.6
1963	682,161	-17.7
1964	803,882	17.8
1965	809,663	0.7
1966	644,309	-20.4

Source: Combined Financial Statements of Savings and Loan Associations for the Selected Years.

[1]Profits were calculated by subtracting dividends on withdrawable accounts from net income after taxes.

Profits went up by 16.7 per cent in 1958, an easy money year, over 1957 and fell slightly to 15.6 per cent during the mixed year 1959. In 1960, a tight money year, profits increased over 1959 by only 1.7 per cent, but rebounded to a 29.3 per cent increase in 1961, a primarily easy money year. Profits readjusted to a more normal 14.6 per cent increase in 1962. Due to increased taxes levied on savings and loan associations in 1963 (total tax forty times greater than 1962) and accounting adjustments between 1962 and 1963 income, profits in 1963 fell at a deceptive 17.7 per cent rate from the earlier year. Profits made the expected recovery in 1964 from the previous low but gained less than 1 per cent in 1965 and dropped 20.4 per cent in 1966, a tight money year.

The lower profits in tight money years probably reflect the shift from risk (and return) to liquidity and the higher rates paid to attract deposits. Although mortgage rates are also generally higher in tight money periods, most mortgage holdings have a long-term fixed rate of return while the rate on all deposits can be varied quarterly or semi-annually. The higher deposit rates in tight money periods reflect not only the need to meet higher rates from close competitors (such as commercial banks,) but higher yields on a wide variety of instruments. Norman Strunk, Executive Vice President of the United Savings and Loan League stated:

> Gloom hit us on that Sunday in December (1965) when the Fed changed Regulation Q and since the first of the year we have been facing 4-1/2%, 5% and sometimes 5-1/2% bank CD competition . . . .
>
> So the commercial bank CDs have cut in, but this is not the whole picture. Certainly they have been an important competitive factor, but we do not think it is

> the principal factor in the poorer picture at our savings window. The principal competitive factor has been the spending of money by people for a wide variety of things, the stock market and, to some extent, the bond market. This is the effect of tight money.[1]

The usual sources of funds for savings and loan associations are savings inflows, mortgage repayments, government security holdings, cash on hand and in banks, and borrowings from Federal Home Loan Banks (and to some extent, commercial banks). Net savings gains over the years have provided a little less than half the funds available for mortgage lending, but in 1965 and particularly 1966, inflows from loan portfolios had to supply the majority of new funds. In fact, of the $17.1 billion of major inflows in 1966, mortgage repayments provided 75 per cent, while net savings accounted for only 22 per cent of the new funds available for mortgage closings.

To a small degree, tight money even affects mortgage payments.[2] Payments come to the associations as payments on the amortized principal, loan liquidations due to the sale of mortgaged properties and prepayments. In the case of prepayments, there probably is a tendency for this variable to rise when credit conditions are eased and interest rates fall. Prepayments, however, constitute only a small percentage of total mortgage payments. If

---

[1] Conference on Savings and Residential Financing, 1966 Proceedings, p. 136.

[2] Jack R. Vernon, "Savings and Loan Association Response to Monetary Policies, 1953-1961: A Case Study in Availability," Southern Economic Journal, January, 1965, found other indications of changes in savings and loan portfolios in tight money periods (defined somewhat differently by Vernon) in that "Standards of credit worthiness of borrowers and properties increased and loan-to-value ratios and loan maturities tended to decline. Some measure of 'base shelf' rationing may have been present." (p. 231).

an association has a substantial portion of its portfolio comprised of long-term mortgage contracts written at lower interest rates (e.g. FHA and/or VA loans), its mortgage payment inflow declines relative to costs as tight money forces the institution to pay higher dividend rates to attract funds.

Because savings and loans are so integrated with the housing market, a restrictive stabilization policy enacted in the summer would probably have less immediate effect than if the policy changes occurred just before the peak spring and summer building seasons. The actual impact of the policy change would depend also on its magnitude and the method of enactment.

Deposits, of course, are also subject to wide seasonal fluctuations since dividend rates can be changed for all savers only quarterly or semi-annually. Consequently, there is usually a large inflow and outflow of savings immediately after a dividend payment and a change of interest rate (substantially upward would attract more funds) or a decision to maintain the same rate (which could result in heavy withdrawals if competitive institutions are paying relatively higher rates). January and July are traditionally the months during which the flow of savings (both inward and outward) are the greatest. April and October generally rank second in magnitudes of fund flows. In each of these four months in 1966, net savings receipts were negative, a highly unusual development which can be traced primarily to a difference in interest rates paid by financial intermediaries, a difference which found

savings and loan associations at a comparative disadvantage.

In order to attract the large depositors who quickly shift funds with a small change in savings institutions' rates, and still not pay higher rates to retain the non-marginal savers, savings and loan associations have challenged commercial bank certificates of deposits with their own savings certificates. These certificates, first marketed in the fall of 1966, usually have a maturity of six or twelve months (less liquidity for the saver), are issued in denominations of $1,000 or more, and earn a higher interest rate than passbook accounts (greater return for the saver).

Savings and loan associations met with little difficulty in borrowing from the FHLB System during the first part of 1966, but found as the year progressed, that source of funds became both higher priced and less available. The Secretary of the Treasury, in attempting to relieve pressure on the financial markets, exercised a rarely used power, and restricted the FHLB System's ability to issue its obligations on the market, thereby reducing the System's funds for lending to its members. Federal Home Loan Banks subsequently required its members to draw from their liquid assets before extending them credit, and after mid-year, raised the rates on advances.

Some measures were taken in 1966 to ease the effect of the "Credit Crunch" on saving institutions. Accounts were insured for $15,000 rather than $10,000 as of October, 1966. New legislation gave the Federal Home Loan Bank Board authority to

determine maximum deposit rates paid by savings associations in different regions. The same legislation, the Stevens Act, fostered more cooperation between supervisors of savings intermediaries and granted the Federal Reserve Board and the Federal Deposit Insurance Corporation new controls over commercial banks and mutual savings banks, respectively.

Clearly, 1966 was not an ordinary year or even an ordinary tight money year for savings and loan associations. Tight money policies severely slowed the flow of deposits into the associations. Significant disintermediation is reflected in the highest withdrawal ratio in the 1952-1967 period, a sharp reduction in net savings, and a large increase in savings and loan borrowing in the face of unusual borrowing restrictions. The problems created in savings and loan liabilities by disintermediation brought about changes in the asset portfolio. Mortgage loan extensions were curtailed sharply, cash holdings rose and the growth in holdings of Treasury securities moderated slightly (for the fourth tight money period as a whole). The slowdown in the growth of assets held primarily for return and the rise in the rates paid to attract deposits caused a substantial drop in savings and loan profits. The 1966 (and early 1967) period serves to point up the changes which occur in tight money periods to savings and loan associations. The primary difference between the 1966 "Credit Crunch" and earlier tight money periods was the degree of severity of disintermediation.

Mutual Savings Banks

Mutual savings banks, like savings and loan associations are well into their second century of existence. Although the savings banks were formed originally to promote thrift among the working classes rather than make home loans (as was the initial intent of savings and loans), there are few differences today between the two types of savings institutions. Their balance sheets, and indeed, their approaches to portfolio choice, are decidedly similar. In effect, mutual savings banks are the savings and loan associations of the northeastern portion of the country, both institutions competing primarily against commercial banks (not each other) for deposits, and paying an interest rate for deposits slightly above that of commercial banks.

The savings banks are not permitted to sell stock to acquire capital funds, but must rely on their depositors, who function as creditors rather than as owners (as in the case of savings and loans). Since mutual savings banks are not federally chartered, the laws and regulations governing their operating procedures vary from state to state, although FDIC regulations assure some uniformity among liquidity practices of most banks. In general, savings banks possess greater flexibility than savings and loans in structuring their portfolios. They, as a group, hold proportionally less mortgages than savings and loans. Savings banks prefer to maintain some of their assets in high grade corporate bonds, state and local, and other securities to include a small amount of stocks.

During the past fifteen years, savings banks, like most other financial intermediaries, have oriented their portfolios toward

increased return (and away from liquidity). Between 1952 and 1967, the percentage of mortgages in savings banks' portfolios rose from 45 to 76 per cent, while Treasury security holdings fell from 38 to 7 per cent and cash dropped from 4 to 2 per cent. Corporate and other securities remained at approximately a 13 per cent level. Much of the large decline in Treasury security holdings can be attributed to the fact that savings banks, unlike savings and loans, had not "unloaded" most of their WWII bonds by the early 1950's and their liquidation by the 1960's should be expected. Also, marketable issues maturing within five years rose from 7 per cent (in 1946) to 47 per cent of total holdings in 1966. Short-term obligations are even more useful to savings banks than to savings and loans because the banks rarely resort to borrowing and must rely heavily on the liquidity provided by their Federal Government securities.

Mutual savings banks have responded to changes which have taken place in the capital market structure during the postwar era. The Federal Government has increased its mortgage underwriting and secondary mortgage market activities to the point where much of the risk has been removed from certain types of credit extension. Savings banks, limited geographically in their mortgage operations, have become major factors in the FHA and VA mortgage market. particularly since the 1950 legislation which permitted them to engage in interstate mortgage lending. FHA and VA officials provide on-the-premises inspectors for every area of the country and the Federal National Mortgage Association (FNMA or "Fannie Mae") supplies a secondary market for FHA and VA mortgages. In 1966 nearly 40 per cent of total mortgage holdings were placed out-of-state and 55 per cent were either

FHA or VA loans (compared with 37 per cent at the end of 1950).

TABLE II-8

Annual Rates of Change of Primary Assets and Liabilities of Mutual Savings Banks

	Tight I 1953-III 1954	Easy IV 1954-II 1955	Tight III 1955-IV 1957	Easy I 1958-II 1959	Tight III 1959-I 1961
Deposits	7.9	6.9	6.2	5.7	4.0
Mortgages	14.9	16.6	10.6	8.0	8.1
Treasury Securities	- 3.6	- 2.3	- 5.3	- 3.2	-5.6
Corporate Securities	13.5	.9	10.1	5.2	.8
Cash	9.8	- 2.0	- 5.6	-11.0	6.8

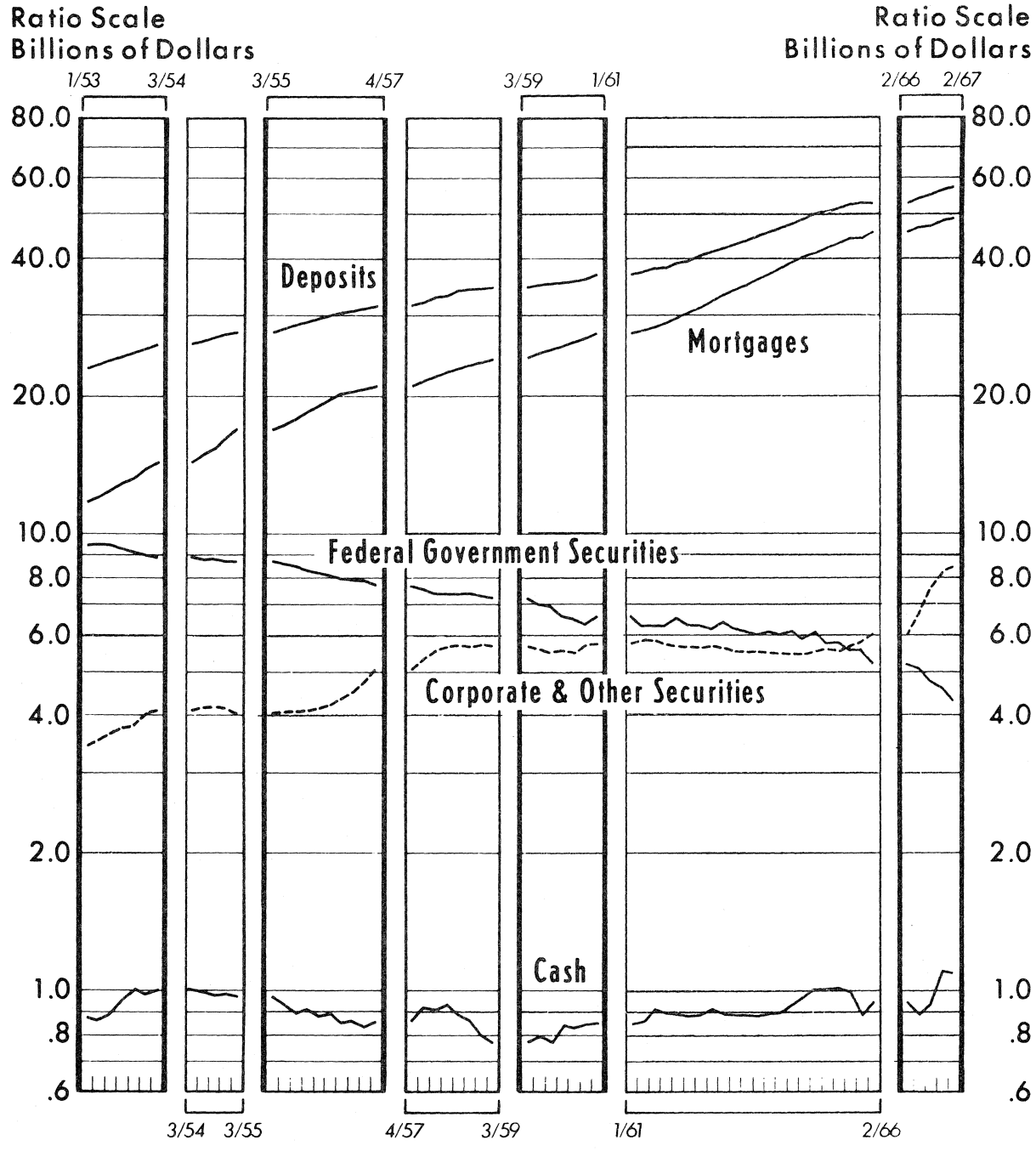
	Easy II 1961-I 1966	Tight II 1966-II 1967	Average Tight Money Period	Average Easy Money Period
Deposits	7.7	8.6	6.7	6.8
Mortgages	10.3	6.8	10.1	11.6
Treasury Securities	- 2.4	-17.3	- 8.0	- 2.6
Corporate Securities	- .7	33.0	14.4	1.8
Cash	.7	18.0	7.2	- 4.1

Source: Federal Reserve Bank of St. Louis

Chart 2-B and Table II-8 exhibits the secular and cyclical movements of mutual savings banks' principal assets and liabilities. A first glance reveals that deposits, mortgages, and corporate and other securities have been increasing over the past fifteen years, while Federal Government securities have declined and cash holdings have remained at approximately the same level. Of prime consideration here, however, is the changing structure of the asset portfolio during the periods of credit ease and restraint. On the whole, mutual savings banks appear to respond to changing capital market conditions in the same manner as savings and loans. The table indicates that Federal Government security holdings dropped more in every tight money period

Chart 2-B

Primary Assets and Liabilities of All Mutual Savings Banks



and cash grew more rapidly in every tight period than in easy ones (with the exception of the second tight money period). As market rates rise under the pressure of tight money, it can also be ascertained from Table II-8 that savings banks generally place larger amounts of funds in high grade corporate (and other) securities.

It can be seen that the most recent tight money period (1966-67) was not so distressing, in so far as deposits and mortgages were concerned, for mutual savings banks as for savings and loans. Deposits grew at a smaller annual rate in the third tight money period (1959-61) than in the last. However, savings banks, pressed like most other financial institutions for liquidity during the most recent tight money period, liquidated Federal Government securities and increased cash holdings at more than twice any previous annual rate. Such behavior emphasizes a major difference between mutual savings bank and savings and loan portfolio choice adjustments: savings banks prefer to run off their Federal Government securities to attain liquidity under pressure rather than borrow.

Until the 1960's, mutual savings banks exhibited a tendency to acquire during tight money years conventional mortgages rather than the less rewarding FHA or VA mortgages. As Table II-9 indicates, in wholly tight money years 1953, 1956, and 1957, savings banks increased their conventional mortgage holdings proportionally more over the previous year than their government insured/guaranteed mortgages while in wholly easy money year 1958, this pattern was reversed.

TABLE II-9

Mortgage Holdings of Mutual Savings Banks

Year	Net Change in FHA and VA Mortgages (Millions of Dollars)	Per Cent Increase Over Previous Year	Net Change in Conventional Mortgages (Millions of Dollars)	Per Cent Increase Over Previous Year
1952	1,112		176	
1953	1,137	2.3 %	314	778.4 %
1954	1,520	33.7	357	13.7
1955	1,861	22.4	496	38.9
1956	1,625	-12.7	510	2.8
1957	911	-43.9	396	- 22.4
1958	1,403	54.0	522	31.8
1959	1,003	-28.5	549	5.2
1960	1,195	19.1	624	13.7
1961	1,252	4.8	782	25.3
1962	1,713	36.8	1,128	44.3
1963	2,149	25.5	1,388	23.1
1964	2,234	4.0	1,535	10.6
1965	1,791	-19.8	1,818	18.4
1966	535	-70.1	1,714	- 5.7

Source: Mutual Savings Bank Fact Book, 1967, p. 19.

No clear trend is discernible in the 1960's. In tight money year 1960, savings banks increased their government-backed mortgages slightly more on a percentage basis than their conventional mortgages, but the conventional mortgages grew more in every other year but one, demonstrating a conspicuously smaller decline (as would be expected), in tight money year 1966.

Mutual savings bank profits -- as measured by retained earnings -- conform fairly well with expectations by increasing more in easy money years than in tight ones. Interest rates paid to depositors rise, but deposit totals slacken thereby causing the savings banks to

curtail their most profitable activity, mortgage lending. Retained earnings and the percentage increase over the previous year are presented in Table II-10.

TABLE II-10

Profits of Mutual Savings Banks
As Measured by Retained Earnings

Year	Retained Earnings (In Million Dollars)	Per Cent Increase Over Previous Year
1953	$ 73.6	
1954	121.5	65.1
1955	108.9	-10.4
1956	121.0	11.1
1957	105.6	-12.7
1958	145.1	37.4
1959	145.4	0.2
1960	134.3	- 7.6
1961	195.3	45.4
1962	167.3	-14.3
1963	192.4	15.0
1964	209.6	8.9
1965	237.7	13.4
1966	180.0	-24.3

Source: Mutual Savings Bank Fact Book, 1967, p. 26

The above picture of mutual savings bank profitability, if compared with the similar table for savings and loan associations would be misleading due to different measures of profits and the fact that the number and total assets of associations have been expanding more rapidly than savings banks (in fact, the number of savings banks declined between 1950 and 1966 from 529 to 506 while the number of associations rose from 5,992 to 6,213).

Mutual savings banks, historically paying lower interest rates on deposits than savings and loans, have not been able to match the associations' deposit growth rate over the past fifteen years, but they also did not suffer as serious a setback in deposits as did the associations in the most recent tight money period. One reason is that the savings banks' interest rates have risen more rapidly over the last five years than the savings and loans, and they therefore, were not affected as much by the strong challenge of the commercial banks in 1966. Another reason would be that more of the savings banks' depositors are working class individuals who do not change their banking habits as quickly as do more affluent savers. In the ten-year period ending in 1965 sizes of accounts at mutual savings banks were approximately twenty-five per cent smaller than at savings and loans. Savings banks attract few of the very large savers who transfer funds from one institution to another with small interest rate changes and are therefore more insulated against cyclical changes in economic activity. In every year since 1952, accounts at savings banks have turned over less rapidly than at either savings and loans or commercial banks (considering savings deposits). That savings banks are not free of competition, however, even from Federal Government securities is illustrated by noting the effect of the Treasury's October, 1959 offering of the five per cent, four-year, ten-month notes known as the "magic five's." One estimate places the net deposit loss to the "magic five's" at $200 million.[1] Table II-11 below, listing sources of investible funds of mutual

---

[1] Mutual Savings Banking, Commission on Money and Credit, Prentice-Hall, Inc., 1962, p. 71.

savings banks, shows that deposits, as a per cent of investible funds, generally fall during tight money years and rise during the easy money years.

TABLE II-11

Investible Funds of Mutual Savings Banks
(amounts in millions of dollars)

Year	Net Deposit Gain	Mortgage Repayments	Net Sales of U.S. Gov't. Securities	All Other	Net Deposit Gain As Per Cent of Total
1953	1,778	1,451	252	121	49.4
1954	1,963	1,663	436	188	46.2
1955	1,831	2,104	291	165	41.7
1956	1,844	2,145	482	191	39.6
1957	1,658	2,040	399	177	38.8
1958	2,347	2,274	313	221	45.5
1959	1,236	2,563	337	245	28.2
1960	1,366	2,449	628	260	29.0
1961	1,934	2,697	83	211[1]	39.3
1962	3,059	3,091	53	178	47.9
1963	3,271	3,755	244	197	43.8
1964	4,243	4,184	72	224	48.6
1965	3,594	4,551	306	274	41.2
1966	2,563	4,366	720	160	32.8

Source: Role of Mutual Savings Banks In the Savings Market, by the Commission on Money and Credit, p. 232 and Mutual Savings Bank Fact Book, 1967, pp. 26, 35.

[1]Method of calculation was changed due to lack of availability of continuous data.

Life Insurance Companies

Life insurance companies, the largest class of non-bank financial intermediaries, compete for savings flows more with other contractual intermediaries than with primarily deposit institutions such as savings and loans and mutual savings banks. Life insurance companies are affected by changes in capital market conditions and are examined here as being somewhat representative of the group of financial institutions which includes corporate pension funds, state and local government retirement systems, and fire and casualty insurance companies.

The long-term contractual nature of life insurance policies provides the companies with a stability of funds inflow unknown to most savings intermediaries. Although life insurance saving is motivated principally by the desire for family financial protection in the event of untimely death, a large portion of insurance funds can be withdrawn by policy holders at any time just as in the case of savings and loans or mutual savings banks. Although term insurance policies involve no saving on the policyholders' part, those who do pay level premiums and build up a reserve account with life insurance companies may cash in the reserve account by surrendering their policy. Moreover, policyholders may exercise their privilege of borrowing up to a stated amount on their reserve account at a specified rate of interest.

States charter, regulate and supervise life insurance companies. The majority of the companies are organized on the mutual, rather than the stock principle, which means they must return

most of their excess premium deposits and investment income to their policyholders each year. Since each insurance company doing business in a state must abide by the laws of that state, most major companies (which seek to operate in the larger states) shape their investment policies to conform with the regulations of the populous states, particularly New York.

As with the other financial institutions, life insurance companies have reduced their government security holdings over recent years in comparison with changes in their other assets. Most of the reduction has been compensated for, again in a manner similar to comparable institutions, by increases in mortgage holdings. Table II-12 shows asset distribution by percentages in 1952 and 1967.

TABLE II-12

Percentage Distribution of Life Insurance Company Assets at End of the Selected Years

	1952 Percent	1967 Percent
Mortgages	29.0%	38.1%
Federal Government Securities	14.0	2.6
Corporate Bonds	40.0	36.7
State and Local Securities	2.3	1.7
Stocks	2.9	5.1

Source: Selected Federal Reserve Bulletins.

Despite considerable legal constraints, life insurance companies hold probably the most diverse of all financial institutions' portfolios. Among their bond holdings are U.S. Government,

foreign government, state and local, railroad, public utility and industrial securities. Other assets include common and preferred stocks, mortgages, real estate and policy loans. About 75 per cent of their assets, however, are composed of corporate securities and mortgages.

Chart 2-C and Table II-13 show that dominant movements in life insurance company assets are secular rather than cyclical. With the exception of Federal Government securities and policy loans, the evidence suggests that the companies are less affected

TABLE II-13

Annual Rates of Change of Primary Assets and Liabilities of Life Insurance Companies

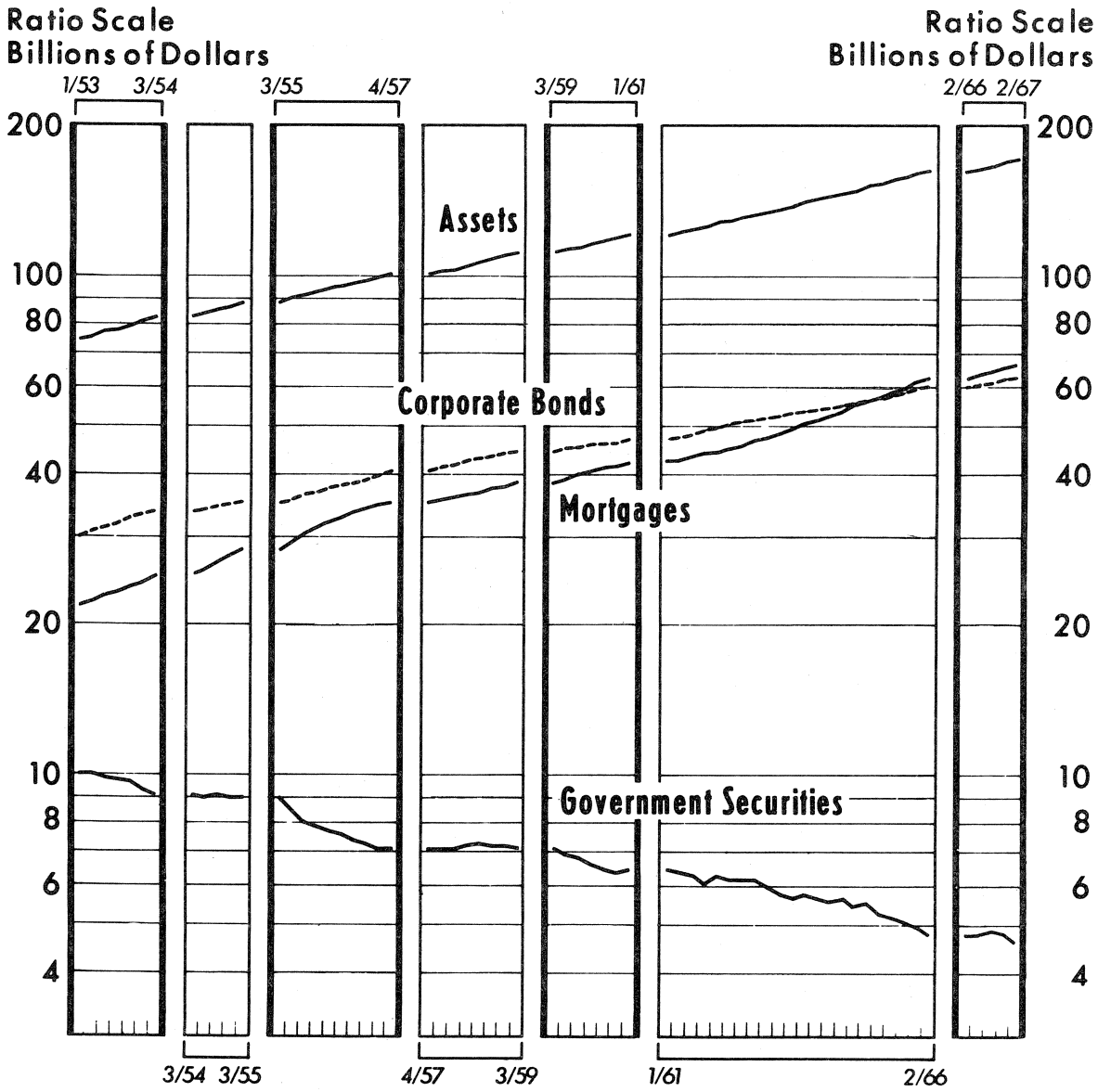
	Tight I 1953- III 1954	Easy IV 1954- II 1955	Tight III 1955- IV 1957	Easy I 1958- II 1959	Tight III 1959- I 1961
Assets	7.2	7.5	6.1	6.0	5.6
Corporate Bonds	8.3	5.3	6.4	5.8	3.8
Mortgages	10.2	12.7	10.0	4.9	6.5
Treasury Securities	- 6.1	0.0	- 10.0	1.1	- 5.7
Policy Loans	7.2	7.1	7.9	7.8	13.6

	Easy II 1961- I 1966	Tight II 1966- II 1967	Average Tight Money Period	Average Easy Money Period
Assets	5.8	5.8	6.2	6.4
Corporate Bonds	4.8	4.8	5.8	5.3
Mortgages	7.8	6.2	8.2	8.5
Treasury Securities	- 5.1	- 4.2	- 6.5	- 1.3
Policy Loans	7.8	18.8	11.9	7.6

Source: Federal Reserve Bank of St. Louis.

Chart 2-C

Primary Assets of All Life Insurance Companies



by changing credit conditions than other financial institutions. The primary reason is the stability of inflow of policy reserves. This stability permits the companies to make commitments to borrowers up to three years in advance of the actual loan extension. The duration of the "forward" commitment generally varies directly with the size of the borrower (and the lender). A mortgage commitment on a home varies from three to twelve months depending on whether the home exists or is to be constructed. Apartment house commitments may be made up to three years in advance and large corporations may desire commitments on bonds from large life insurance companies for approximately the same length of time. Since the forward commitment binds the life insurance company to lend a specified amount of money at a set interest rate for a certain number of years, the company makes commitment decisions on the basis of interest rates and the state of economic activity prevailing up to three years before funds actually flow from the company's portfolio. Conflicting expectations by fund investment officers over periods of one, two, or three years may partially account for the relatively mild changes in assets over the cycles. Savings and loan officials, for example, must respond quickly to capital market changes, and the present state of the market is known much better than the state two years hence. Most savings and loans then, would tend to act in a fairly similar manner, while life insurance company officials would more likely have conflicting, and thereby compensating, views as to how their funds should be committed.

Such behavior could well lead to the steady rise in mortgages and corporate bonds as displayed in Chart 2-C. Assets have risen, on the average, only slightly less rapidly during tight money periods than easy ones. Life insurance companies have found mortgages more attractive over the last fifteen years than corporate bonds while no particular cyclical patterns have been observed. As with savings and loans associations and mutual savings banks, life insurance companies have run off their Treasury obligations much more rapidly during tight money periods.[1] Federal Government security holdings have fallen more during all tight money periods (at an annual rate) than any easy money period.

The most recent tight money period, during which other financial institutions, particularly savings and loans, were severely affected, differs from others in its impact on life insurance companies primarily in the effect on policy loans. As a per cent of total assets, policy loans reached a level unattained

---

[1]According to Wehrle, if insurance companies were to follow cyclical policies, they would "(a) Go short in low interest periods, possibly sell currently high priced long maturities. (b) Go long in high interest periods, possibly sell short maturities." Assuming that most of the Treasury securities held have a shorter maturity than bonds or mortgages, life insurance activity in Federal Government bonds is consistent with Wehrle's cyclical policy criteria for the 1952-1967 period. Wehrle (p. 241) found a lack of evidence to substantiate the existence of cyclical policy behavior on the part of life companies. His data, however, reflect the activities of only four life insurance companies for the 1947-1958 period. Federal Government bond holdings reflect some cyclical behavior on the part of life companies in that period (as well as in the 1960's) and policy loans, in particular, have brought about an increased awareness of the effects of high interest rates on life insurance companies in the 1960's. See Leroy S. Wehrle, "Life Insurance Investment: The Experience of Four Companies," Studies of Portfolio Behavior, ed. by Donald D. Hester and James Tobin (New York: John Wiley and Sons, Inc., 1967), p. 196.

since WWII. Liquidation of Federal Government securities proceeded at a rate similar to the other three tight periods. From a 1945 high of 46 per cent of their assets, Treasury obligations have declined to less than three per cent, reflecting life insurance companies' bolstering of the war effort and their present need for comparatively little liquidity due to the consistency of their flow of funds. What cash and Federal Government securities are kept on hand are primarily for the purpose of meeting loan commitments and investment opportunities.[1] Return is furnished by their other asset holdings which are characterized by long-term, high-yield loans and securities.

Foreign government bonds, which have constituted about one-half of one per cent of life insurance company assets since the early 1950's, are primarily liabilities of the Canadian government. Relative holdings of state and local bonds rose from the early 1950's to a high of 4 per cent in 1961-1962, but steadily declined to 3.1 per cent in 1966. Railroad bonds represented over 30 per cent of life insurance company assets in 1917, but fell gradually to 2 per cent in 1966 reflecting the long-run decline of the railroad industry. Holdings of public utility and industrial bonds also reflect secular trends but of a more recent nature. Since 1950, public utility holdings

---

[1] Wehrle, ibid., p. 274 suggests, "It may be that the pressure from the borrowing side of the market forces the life companies to try to meet the loan demands in periods of tight money so that when the companies are in need of placements they can count on developed outlets for their funds. This 'residual' theory of demand for Governments is similar to the 'availability doctrine' whereby banks take care of their regular loan customers first and purchase Governments only when they have 'residual' demand."

have decreased from 16.5 to 10 per cent while industrial (and miscellaneous) bonds have risen from 14.9 to 24.7 per cent. Yield differentials explain most of the movements. Life insurance company holdings of corporate bonds have changed collectively only to a small extent in recent years. As the dominant supplier of funds to the corporate bond market (they now hold about one-half of all corporate long-term debt outstanding), life insurance companies have moved into private placements, an arrangement by which an institution or group of institutions make a loan in security form. Because terms agreed on between borrower and lender are more flexible than if the transaction were registered with the Securities and Exchange Commission, life insurance companies have found such arrangements increasingly profitable. This sort of financial technique is also quite well suited to the companies' future commitment practices as they are able to match their stable inflows with investment outflows often on a staggered schedule of "takedowns." By minimizing the length of time their inflows remain idle or in low-yield, highly-liquid assets, the companies maximize return. The borrowers, correspondingly, appreciate the fact that they are guaranteed funds at a specified interest rate regardless of changes in the capital market between the time the loan is closed and the period when the funds are extended.

Life insurance companies compete with the large private and state and local pension funds for such investment outlets as well as competing with them and other financial intermediaries (the

usual savings institutions in addition to commercial bank trust departments and independent trustees) for fund inflows. Although increased life expectency has contributed to the demand for services provided by life insurance companies, other financial institutions have been organized to meet the rising demand and have flourished to the extent that they have slowed the once rapid growth rate of life insurance companies. As Goldsmith observed of the postwar era, "There seems . . . little doubt that the introduction and expansion of the various retirement and pension fund schemes adversely affected the position of life insurance companies as users of funds, and hence also their importance as suppliers of funds, although not to a decisive degree."[1]

Stock market investments appear to be one of the most promising methods by which life insurance companies might meet their expanding competition. Since yields on certain stocks are potentially much higher than alternative uses of funds, it is no wonder that the companies have recently decided to organize their own mutual funds for stock investment purposes. The question is why they have not made greater use of this market earlier. Although legal restraints to stock holdings were relaxed by New York law in 1957 and 1962, only five per cent of their assets were held in this form in 1966. By comparison, private pension funds held 56 per cent - $70 billion - of their portfolio in stock form in 1965. It would appear that traditional constraints

---

[1]Goldsmith, Financial Institutions, op. cit., pp. 102, 104.

augment the legal restrictions binding life insurance stock investments. There is little indication that life insurance stock investments follow cyclical patterns except in so far as the stock market itself responds to capital market movements. Between 1953 and 1967, the correlation coefficient between changes in life insurance stock holdings and changes in the Standard and Poor's 500 stock index is a positive .38.

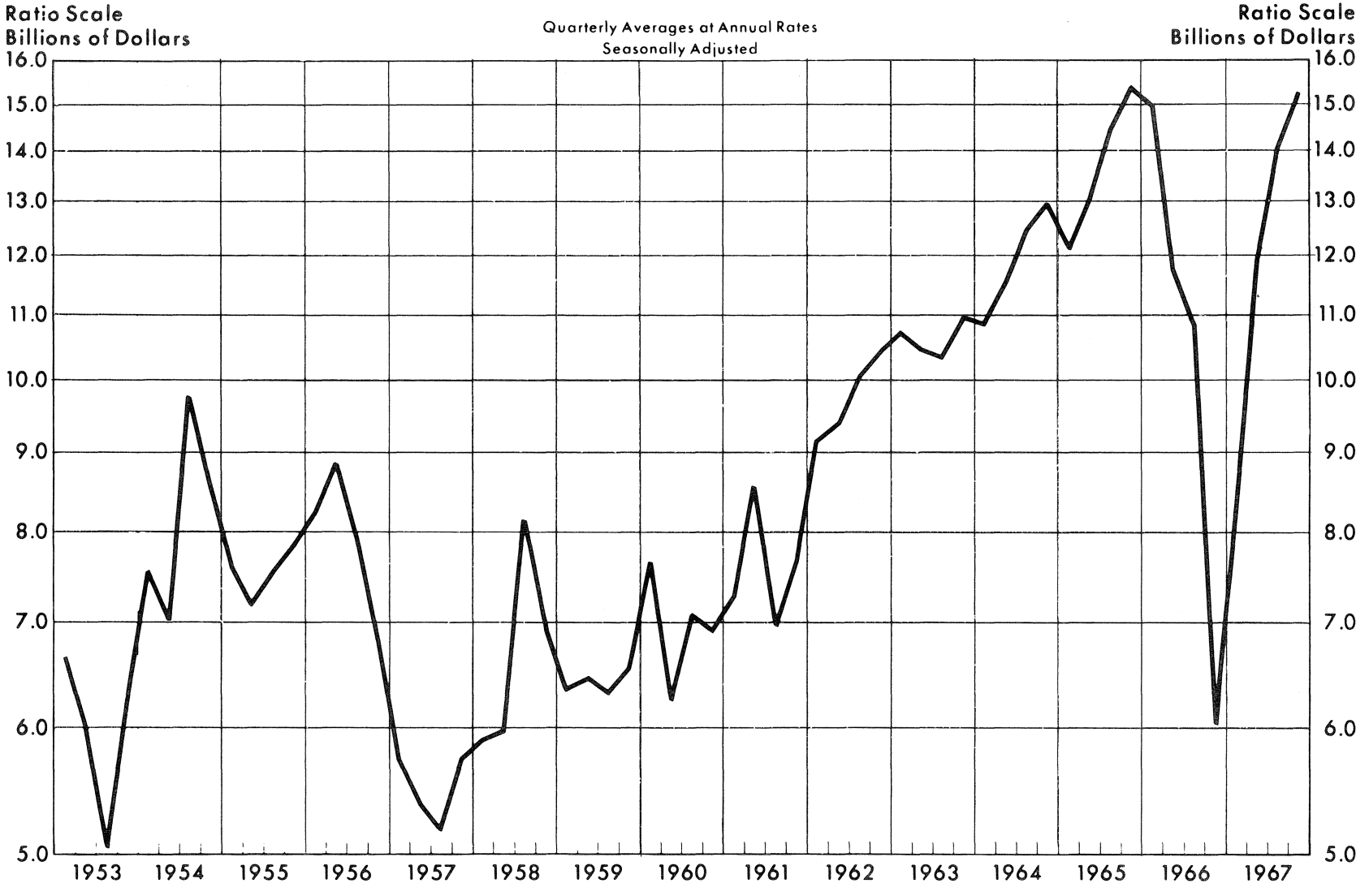
Life insurance companies have not hesitated in altering their mortgage portfolio to include higher yielding assets. They, like similar financial institutions operating in the mortgage market, have found FHA and VA backed loans less attractive as the gap between interest rates on these and conventional mortgages widened since the 1950's. FHA and VA mortgages (by value) comprised 41 per cent of total life insurance company mortgages in 1950 and 43 per cent in 1955, but by 1966 the figure had declined to 29 per cent. Because of the government inspections (and sponsorship) made on property often located far from a company's offices, life insurance companies remain, however, a major investor in FHA and VA mortgages. A great deal of the funds formerly placed in the low-yield mortgages has gone not only to single-family conventional mortgages, but in increasing amounts to high-yield, multi-family mortgages. The trend became evident near the beginning of the present decade and does not appear to be cyclically oriented.

The portion of life insurance company assets which is often affected by capital market changes is policy loans. In effect, the companies have little control over this segment of their portfolio since they agree to loan up to the policy's surrender

value at a moderate interest rate. As long as the loan rate set in the policy is above or even near market interest rates, policyholders are reluctant to exercise their borrowing privilege, but when market rates rise substantially above the fixed policy rate, life insurance companies have found that policy reserves are drawn down in large amounts and often never replenished. Since life insurance companies attempt to operate on reasonably narrow margins, an unexpected change in their carefully computed cash flows tends to be very upsetting for them. 1966 provides an excellent example. As the market rate rose above the 5 per cent loan rate specified in most policies, policyholders borrowed on their reserves in unprecedented amounts. Such behavior forced the companies to forego profitable investment opportunities (rates on nearly all types of investments were high) in order to become liquid enough to provide policy borrowers with cash, an asset normally of minimal importance in the life insurance portfolio. In experiencing an unexpected volatility of their cash flows, life insurance companies glimpsed some of the problems ordinarily peculiar to such institutions as savings and loan associations and mutual savings banks. Insurance companies, however, are not organized to function in such a manner, and they, consequently, found their portfolios profoundly disturbed. New commitments began falling in second half 1965 as market interest rates rose to new heights. Between fourth quarter, 1965 and fourth quarter, 1966 new commitments declined from over $15 billion to approximately $6 billion (see Chart 2-D).

Chart 2-D

Total New Commitments of Life Insurance Companies



Orson H. Hart analyzes the impact of recent high interest rates in the following manner:

> There is an obvious explanation for this growing response of policy loans to monetary conditions. Although interest rates of today are much higher than they were 10 years ago, the right of most policyholders to borrow from the companies is pegged by contract at not more than 5 per cent. This of course is a valuable right available from no other financial institution, and its value rises the higher interest rates go. The result is that when funds become sufficiently tight in normal channels, a natural consequence of monetary restraint, policyholders resort to borrowing from the companies on an increasing scale. Apparently the funds are used mostly for business purposes and hence are diverted from the companies but not from the capital market itself--a form of direct investment that has the effect of disintermediating the life insurance business.
>
> Because of these developments, little in evidence 20 years ago, the investment operations of the life insurance companies are becoming increasingly responsive to the influence of monetary policy. Changes in cash flow very soon are reflected in commitment policy. Most of the larger companies commit ahead and rely on their cash flow to meet the eventual takedowns. If the flow falls short of expectations, additional sums can usually be generated from sales of securities or from bank loans, but these are temporary havens of limited resources. Unless an early recovery in cash generated is confidently expected, commitments must be curtailed.[1]

---

[1] Orson H. Hart, a statement before the Joint Economic Committee, Standards for Guiding Monetary Action (Washington: U.S. Government Printing Office, 1968), pp. 176-177.

Commercial Banks

As indicated in Table II-1 at the beginning of this chapter, assets of the banking system, including both commercial banks and Federal Reserve Banks, have declined relative to other financial intermediaries over the past twenty years. The least specialized of all the intermediaries, commercial banks have faced expanding competition in all sectors of their many areas of interest. Since time and savings deposits in the post-war period have increased from one-tenth to one-eighth of all funds committed to financial intermediaries, the diminishing attractiveness of demand deposits has been a principal factor contributing to the decline, in terms of financial asset (or liability) shares, of the banking system.

As Table II-14 indicates, the portfolio of commercial banks has swung heavily over the past fifteen years from liquidity-emphasis to greater earning assets. Loans of all types increased from 34.0 to 52.3 per cent as total Treasury security holdings fell from 28.3 to 11.6 per cent of the portfolio. Cash holdings dropped from 23.7 to 17.3 per cent while holdings of state and local bonds rose from 7.5 to 13.6 per cent.

The relative decline in commercial bank holdings of Treasury securities has occurred despite the fact that commercial banks have remained the chief support of the Treasury Department and its financial obligations. The Treasury-Federal Reserve "Accord" of 1951 released the banking system from its automatic underwriting of Treasury issues at low interest rates and ushered in a new era of monetary policy, but commercial banks have remained the largest investors in and underwriters of U.S. Government securities.

TABLE II-14

Proportion of Commercial Bank Holdings in Selected Assets at End of 1953 and 1967

Asset	1952	1967
Loans	34.0%	52.3%
Treasury Securities		
Less than 1 year maturity	7.7	4.1
Greater than 1 year maturity	20.6	7.5
State and Local Bonds	7.5	13.6
Cash	23.7	17.3

Source: Federal Reserve Bulletins for the selected years.

As the Treasury Department's primary financial executor, commercial banks are not quite as free as other financial institutions to determine the proportion of Treasury securities to be held in the portfolio.[1] The Treasury effects changes in the commercial bank portfolio in a number of ways including offering only certain maturity ranges in its newly-issued securities and shifting Federal Government deposits among various classes of banks.

Treasury and Federal Reserve policies have a more direct influence on commercial banks then on other financial intermediaries. If policy is directed (for example) towards tightening credit conditions, the banks are probably the first financial institution to receive the impact and some compensating shift in their asset

[1] As Goldsmith observed, "The years in which commercial banks substantially increased their holdings of Treasury securities were also the years of heavy net issues by the Treasury, so that the banks may be regarded as directly supplying a large part of the external funds needed by the Treasury--over nine-tenths in 1958 and in 1961." Goldsmith, Financial Institutions, op. cit., pp. 148-149.

portfolio is probably necessary. The emission of commercial bank liabilities (demand and time deposits) can be slowed by increases in Regulation Q, Federal Reserve sales of securities in the open market and increases in reserves required against time and demand deposits.

A hike in the discount rate might slow the deposit creation process if banks are borrowing from the Federal Reserve at a low rate and lending at some higher rate. On the other hand, banks may be able to draw down their excess reserves, borrow in the Federal Funds market, or liquidate Treasury securities in order to continue lending.[1] A principal goal of the Federal Reserve in tight money periods, ceteris paribus, is to reduce bank lending, and if pressure is applied with sufficient severity and/or duration, the goal will be achieved. The banks may be able to adjust their portfolios to thwart the tight policy for a short time, but their methods of evading the restrictions are limited.[2]

Because of the direct influence over the banks exercised by Federal Reserve and Treasury authorities, it would be expected that commercial bank portfolios would demonstrate more responsiveness in tight money periods than other financial intermediaries. Chart 2-E and Table II-15 show that certain bank liabilities and assets do exhibit strong cyclical patterns.

---

[1] These alternatives could similarly be explored by the banks if Federal Reserve tightening were attempted by exercise of some policy tool other than a hike in the discount rate.

[2] New techniques of evading restrictive Federal Reserve policies have arisen in recent years. For example, Eurodollars (on which no reserves need be kept) were an inexpensive source of funds for large commercial banks in 1966 as they were throughout the 1960's.

TABLE II-15

Annual Rates of Change of Primary Assets and Liabilities of Commercial Banks

	Tight I 1953- III 1954	Easy IV 1954- II 1955	Tight III 1955- IV 1957	Easy I 1958- II 1959	Tight III 1959- I 1961
Demand Deposits	2.0	3.7	.1	4.4	- .7
Loans	2.1	16.0	7.9	9.0	5.9
Time Deposits	9.3	3.8	6.7	8.5	8.0
Long-term Treasury Securities	10.9	15.1	- 7.9	11.8	- 8.6
Short-term Treasury Securities	- 2.6	- 77.4	20.2	- 27.9	44.8
State and Local Securities	7.4	2.4	3.4	8.4	2.9
Excess Reserves	13.3	- 34.6	- .8	- 28.9	28.9

	Easy II 1961- I 1966	Tight II 1966- II 1967	Average Tight Money Period	Average Easy Money Period
Demand Deposits	3.2	2.6	1.0	3.8
Loans	12.2	5.7	5.4	12.4
Time Deposits	14.7	12.0	9.0	9.0
Long-term Treasury Securities	- 1.4	8.2	.6	8.5
Short-term Treasury Securities	- 6.3	- 16.3	11.5	- 37.2
State and Local Securities	16.5	17.5	7.8	9.1
Excess Reserves	- 12.3	30.3	17.9	- 25.3

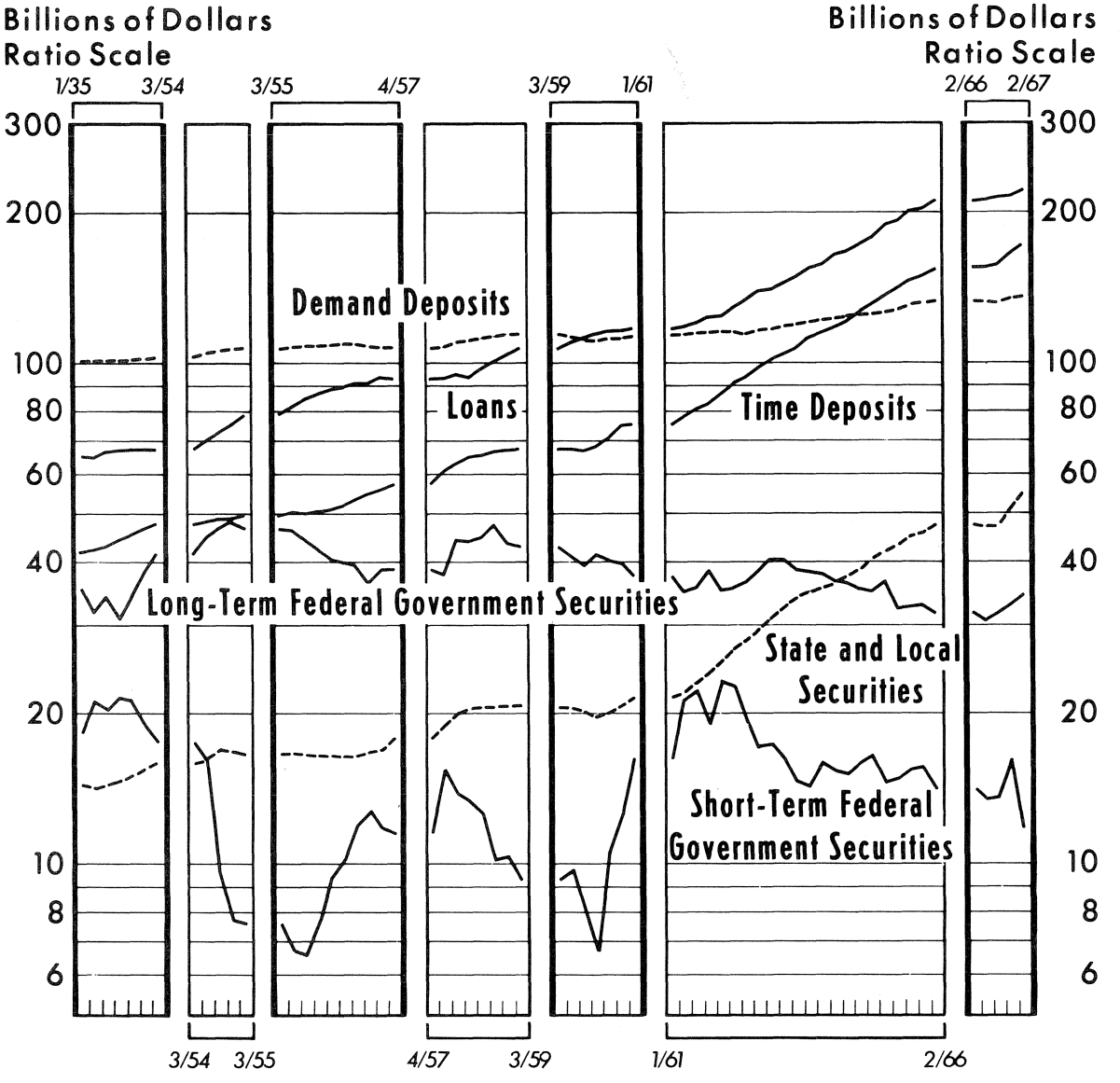
Source: Federal Reserve Bank of St. Louis.

Cyclical Patterns in Commercial Bank Liabilities

Demand deposits at commercial banks increased chronologically during the three easy money periods at 3.7, 4.4 and 3.2 per cent rates. Movements over tight money periods were almost as consistent, changing by 2.0, 0.1, -0.7, and 2.6 per cent rates respectively (all figures are

Chart 2-E

Primary Assets and Liabilities of All Commercial Banks



annual rates of change). Since, as pointed out in Chapter One, changes in net sources of credit and the money supply vary together rather well, the strong cyclical pattern of demand deposit movements is not surprising.

The average rate of change in tight and easy money periods is the same for time (including savings) deposits, indicating little cyclical variability. Time and savings deposit growth, however, flattens out in the early portion of the tight money periods when interest rates are rising rapidly, and accelerates in the second half of the tight money periods as interest rates level off. The emergence of commercial bank certificates of deposit as an important component of time deposits in the 1960's is reflected by the 14.7 per cent rate of growth in the third easy money period.

Cyclical Patterns in Commercial Bank Assets

Table II-15 indicates that commercial banks do vary their asset holdings in response to tight money policies. Bank loans are curtailed in tight money periods; loans increased more in every easy money period than in any tight money period. The composition of Treasury security holdings varied over the cycle as banks increased short-term holdings in tight money periods and long-term holdings in easy money periods. State and local bonds were, in general, somewhat less attractive in tight money periods.

Commercial banks appear to be reluctant to reduce their most profitable activity, the extension of loans in tight money periods. In the four tight money periods, banks continued to lend at rapid rates in the early part of the period (particularly the second and

third periods), but slowed the growth of loans as the period progressed. Whether the eventual slowing of loans was a supply or demand phenomenon is difficult to discern. Since interest rates were generally rising and/or high in the earlier quarters of tight money periods, it appears that high loan costs did not seriously deter borrowers.[1]

According to Table II-16, banks increase, proportionately, their lending in tight money periods to their commercial and industrial customers. That is, banks do not like to reduce the flow of credit to their best (and probably oldest) customers in any period; therefore, in tight money periods, banks curtail loans to other groups.[2]

---

[1]A more detailed investigation into commercial bank operations would be necessary to determine whether loan cost or availability is the more important factor in the determination of loan extensions. Donald Hester believes the availability doctrine is inadequate in explaining the lending patterns of commercial banks. He defines a more complete loan offer function as " . . . a relation which specifies the terms at which a bank with particular characteristics is willing to lend to a borrower with a known profit, balance sheet, credit history and with particular prospects for the future. It is a generalized supply function for loans in the sense that, instead of merely having the amount of loans determined by a set of exogenous variables, it has a set of loan terms including the amount of loans determined by the set of exogenous variables." Donald D. Hester, "An Empirical Examination of a Commercial Bank Loan Offer Function," Studies in Portfolio Behavior, edited by Donald D. Hester and James Tobin (New York: John Wiley and Sons, Inc., 1967), p. 119.

[2]Kane and Malkiel disagree with the general availability doctrine and conclude, "In sharp contrast to the architects of availability, we find that on the basis of lender reactions, there exist solid reasons for expecting banks to stretch accustomed liquidity limits a long way in order to accommodate certain customers." Edward J. Kane and Burton G. Malkiel, "Bank Portfolio Allocation, Deposit Variability and the Availability Doctrine," Quarterly Journal of Economics, LXXIX (February, 1965), p. 129. It may be that some credit rationing is accomplished in tight money periods, but the rationing is apparently selective.

TABLE II-16

Commercial Bank Loans,
for Average Tight and Easy Money Periods[1]

	Tight	Easy
Commercial and Industrial	38.4%	35.7%
Agricultural	5.2	5.0
For Purchasing and Carrying Securities	4.5	4.8
Real Estate	24.7	24.7
Individual	21.4	21.7
Financial Institutions and Other	5.8	8.1
Total Hours	100.0	100.0

Source: Selected Federal Reserve Bulletins.

[1]Semi-annual data.

Banks curtail lending in tight money periods primarily to that class of borrowers labeled "financial institutions and other," of which about three-fourths is comprised of financial institutions. Between June, 1965 and June, 1967, commercial and industrial loans rose from 34 per cent to 37.5 per cent of all loans while loans to financial institutions declined steadily from 8 per cent to 6.2 per cent. This two-year period spans the "Credit Crunch" of 1966 when financial institutions were vigorously seeking funds.

Highly-liquid, short-term (less than one year) Treasury security holdings were increased by commercial banks in tight money periods. These secondary reserves of commercial banks may be similar

to cash holdings of other financial intermediaries in that increases in both assets indicate increased liquidity in tight money periods for each institution.[1] Commercial banks, on the other hand, increased their holdings of long-term Treasury securities at a more rapid rate in easy money periods than in tight money periods.

In order to continue making loans in the early portion of tight money periods, banks have run-off holdings of both long- and short-term Treasury securities (especially in the second and third tight money periods). The long- and short-term securities were built up in the latter portion of tight money periods, and, on balance for the four periods, short-term holdings were restored more fully. The reason for the more rapid rise in holdings of short-term Treasury securities may be that banks desire somewhat more liquidity at such times or simply that more securities of a shorter maturity are offered in tight money periods (the rate of change of the average maturity of marketable Treasury securities declined at an average of -3.7 per cent in tight money periods and increased at a 6.7 per cent rate in easy money periods). The above data do not suggest the presence of a "lock-in" effect in Treasury security holdings. Interest rates rise (prices fall) most rapidly in the first portion of tight money periods and banks

---

[1] Since cash and short-term Treasury security holdings often rise in the latter half of tight money periods when the public's demand for loans and mortgages may be diminished, it is difficult to ascertain whether the increased liquidity is desired (to offset possible "runs" on institutions' liabilities) or unintentional (a lack of public demand for mortgages, bonds, etc.) Excess reserves rise in tight money periods (see Table II-15) and decline in easy money periods, but it is a moot point whether banks want to carry the excess reserves or whether demand is inadequate.

apparently do not hesitate to run-off Treasury securities during such times.

State and local securities have become increasingly attractive to commercial banks in recent years. During periods of generally low interest rates, bankers have found that the tax-exempt privilege concomitant to state and local government securities make them especially attractive assets. Because most other financial institutions are not subject to the full corporate income tax, they have little use for these pre-tax low-yield securities, but commercial banks, property insurance companies, and wealthy individuals have found them highly remunerative. Banks increased their holdings during the 1950's at the greatest rates in late 1954-early 1955 and 1958, both easy money periods during which interest rates stood at relatively low levels. As state and local governments, beginning sometime in the early 1960's, have sought to obtain more funds through increased bond offerings, commercial banks have added the tax-exempts in increasingly greater amounts. In fact over the 1960-1967 period, commercial bank holdings of state and local government securities have risen at a steady annual rate of approximately 16 per cent. The trend was interrupted only in 1966 when banks became pressed for liquidity and responded by slowing the growth rate of all their security holdings.

In general, holdings of state and local bonds have slowed in the early portion of tight money periods when all interest rates, particularly open-market rates, are rising rapidly. At this time, banks are continuing to make loans at the high rates and slowing their bond

(Treasury and municipal) acquisitions. In the latter half of tight money periods, banks again find bonds attractive. Holdings of state and local bonds also appear to vary closely with commercial bank time deposits. When interest rates are generally rising, regulations on both time deposits and state and local bonds make them relatively unattractive assets to hold. When other interest rates level off or decline, the demand for time deposits and state and local securities rises.

Summary of Bank and Non-Bank Financial Institutions' Asset and Liability Activities

Table II-17 presents a summary of the activities of bank and non-bank financial institutions in an annual rate of change format. Rates for each of the seven periods are repeated for convenience, and averages for the three easy and four tight money periods are also given. From the averages for savings and loan associations, it can readily be seen that the associations curtail their acquisitions of Federal Government securities in tight money periods and build-up their cash holdings. Mortgage holdings, as noted particularly in the 1966 "Credit Crunch" period, do not increase so rapidly in tight money periods.

Mutual savings banks, who have been running down their Treasury security holdings for years, sell securities most rapidly in tight money periods while concurrently augmenting their cash balances. Except for a similar shift towards increased cash holdings, the savings banks apparently were not affected in 1966 as much as the savings and loan associations; savings bank deposits and mortgage holdings also varied less in other tight money years. The savings

TABLE II-17

Annual Rates of Change of Financial Intermediaries
Primary Assets and Liabilities

	Tight I '53-III'54	Easy IV'54-II'55	Tight III'55-IV '57	Easy I '58-II'59	Tight III'59-I '61	Easy II'61-I '66	Tight II'66-II'67	Average Tight Money Period	Average Easy Money Period
Savings and Loan Associations									
Deposits	19.0	18.4	14.6	13.7	13.7	12.4	6.7	13.5	14.8
Mortgages	19.2	23.4	12.9	15.2	13.6	12.7	2.8	12.1	17.1
Gov't Securities	3.5	20.0	17.4	32.3	5.8	9.8	9.7	9.1	20.7
Cash	24.2	-.3	4.5	-6.9	18.6	3.3	18.2	16.4	-1.3
Mutual Savings Banks									
Deposits	7.9	6.9	6.2	5.7	4.0	7.7	8.6	6.7	6.8
Mortgages	14.9	16.6	10.6	8.0	8.1	10.3	6.8	10.1	11.6
Gov't Securities	-3.6	-2.3	-5.3	-3.2	-5.6	-2.4	-17.3	-8.0	-2.6
Corp. Securities	13.5	.9	10.1	5.2	.8	-.7	33.0	14.4	1.8
Cash	9.8	-2.0	-5.6	-11.0	6.8	.7	18.0	7.2	-4.1
Life Insurance Companies									
Assets	7.2	7.5	6.1	6.0	5.6	5.8	5.8	6.2	6.4
Corporate Bonds	8.3	5.3	6.4	5.8	3.8	4.8	4.8	5.8	5.3
Mortgages	10.2	12.7	10.0	4.9	6.5	7.8	6.2	8.2	8.5
Gov't Securities	-6.1	0.0	-10.0	1.1	-5.7	-5.1	-4.2	-6.5	-1.3
Policy Loans	7.2	7.1	7.9	7.8	13.6	7.8	18.8	11.9	7.6
Commercial Banks									
Demand Deposits	2.0	3.7	.1	4.4	-.7	3.2	2.6	1.0	3.8
Loans	2.1	16.0	7.9	9.0	5.9	12.2	5.7	5.4	12.4
Time Deposits	9.3	3.8	6.7	8.5	8.0	14.7	12.0	9.0	9.0
Long-term Gov't Sec.	10.9	15.1	-7.9	11.8	-8.6	-1.4	8.2	.6	8.5
Short-term Gov't Sec.	-2.6	-77.4	20.2	-27.9	44.8	-6.3	-16.3	11.5	-37.2
State and Local Sec.	7.4	2.4	3.4	8.4	2.9	16.5	17.5	7.8	9.1
Excess Reserves	13.3	-34.6	-.8	-28.9	28.9	-12.3	30.3	17.9	-25.3

banks did find corporate securities much more attractive in the last tight money period than in others and they, in general, acquire such securities at a more rapid rate in tight than in easy money periods.

If, by the rates of change analysis, mutual savings banks appear to be less responsive than savings and loan associations to changing credit conditions, life insurance companies, because of their more stable fund flow, are affected less than any of the financial institutions considered. Life insurance companies do sell Treasury securities at a somewhat faster rate in tight money periods than in easy, but their principal concern becomes, in tight money, the increasing number of policy loans extended. Changes in mortgage and corporate bond holdings and overall assets occur at about the same rate in tight as in easy money periods.

Commercial banks, like most other financial institutions, have found it necessary to alter their portfolios in response to changing credit conditions. Since demand deposit growth slackens in periods of tight money, commercial banks must curtail their loan extensions. The cut back in bank loans would probably be more severe than indicated in Table II-17 if banks were not permitted to compete effectively for time deposits in the latter portion of tight money periods. The table shows the secular (since the early 1960's) growth in commercial bank time deposits--due in large measure to the success of the banks' certificates of deposits--and holdings of state and local bonds--probably due to tax considerations. The Treasury security portion of the commercial bank portfolio varies with respect to the tight-easy money cycle. Typically, banks slow

their acquisition of long-term Federal Government securities and build-up their short-term holdings in tight money periods much as the savings institutions sell Treasury securities and expand their cash holdings to attain increased liquidity.

Other Credit-Sensitive Markets and the Real Sector

The same type of rate-of-change analysis can be applied to two other areas which will be examined in somewhat more detail in the succeeding chapters; that is, other credit-sensitive markets and the real sector. Portfolio adjustments of the financial institutions in tight and easy money periods have a sizeable impact on these other areas. For example, actions which cause savings and loans or mutual savings banks to lose deposits (to say, credit unions or the stock market--a form of disintermediation) result in a drop in mortgage holdings of such institutions, and in turn, a fall in residential construction expenditures. With fewer homes being built, outlays on consumer durables--such as refrigerators, washing machines and carpeting--will decline. A similar chain of events can be traced out for commercial banks, consumer credit and other consumer durables. As banks feel the pinch of tight money, they curtail consumer instalment loans. With less credit, the consumer cuts back his purchases of such durable goods as automobiles and television sets or those mentioned above. Entrepreneurs, noting the slackened demand for their goods, reduce investment outlays.

A pattern of chain events of the sort outlined above may be, according to Table II-18, entirely plausible. Of the four credit-sensitive markets discussed, consumer credit and residential

TABLE II-18

Annual Rates of Change of Real Variables
and Other Credit-Sensitive Markets

	Tight I '53-III'54	Easy IV'54-II'55	Tight III'55-IV '57	Easy I '58-II'59	Tight III'59-I '61	Easy II'61-I '66	Tight II'66-II'67	Average Tight Money Period	Average Easy Money Period
Real Variables									
Consumption of Nondurables	.7	4.7	4.8	4.6	3.1	5.9	4.9	3.4	5.1
Consumption of Durables	-2.0	34.1	-1.3	14.7	-5.8	11.1	6.3	.7	20.0
Change in Inventories ($ Billion)	.3	4.0	3.5	2.8	2.3	6.6	10.3	4.1	4.5
Fixed Investment	2.9	20.4	2.3	10.8	-3.8	9.6	.1	.4	13.6
Other Credit Sensitive Markets									
State and Local Borrowings	15.8	11.9	10.1	8.3	7.8	7.9	7.8	10.4	9.4
Consumer Credit	5.8	20.6	8.7	6.6	8.0	10.6	5.2	6.9	12.6
Household Money Holdings	.3	3.8	-1.0	3.2	0.0	6.0	4.9	1.1	4.3
Expenditures on Residential Construction	8.5	18.1	-6.6	25.1	-8.8	4.7	-8.0	-3.7	16.0

construction expenditures expand at a considerably lower rate in tight money periods than easy, while household money holdings grow at a moderately slower pace in tight money and state and local borrowing increases at approximately equal rates for tight and easy money periods. The ability of state and local governments to borrow in tight money periods may be somewhat hampered in the first portion of tight money periods and the governments, like competing financial institutions, must pay higher rates to attract funds.

In the real sector, the marked variance in rates between periods of credit ease and stress occurs, as expected, in the consumer durables and investment areas. Purchases of nondurable goods also slow in tight money periods, but not nearly so much as durables. Inventory investment (in billions of dollars in the table) increases slightly less in tight money periods than in easy money periods--with the exception of the last tight money period when businesses amassed exceptionally large inventories.

Chart 2-F

Real Sector

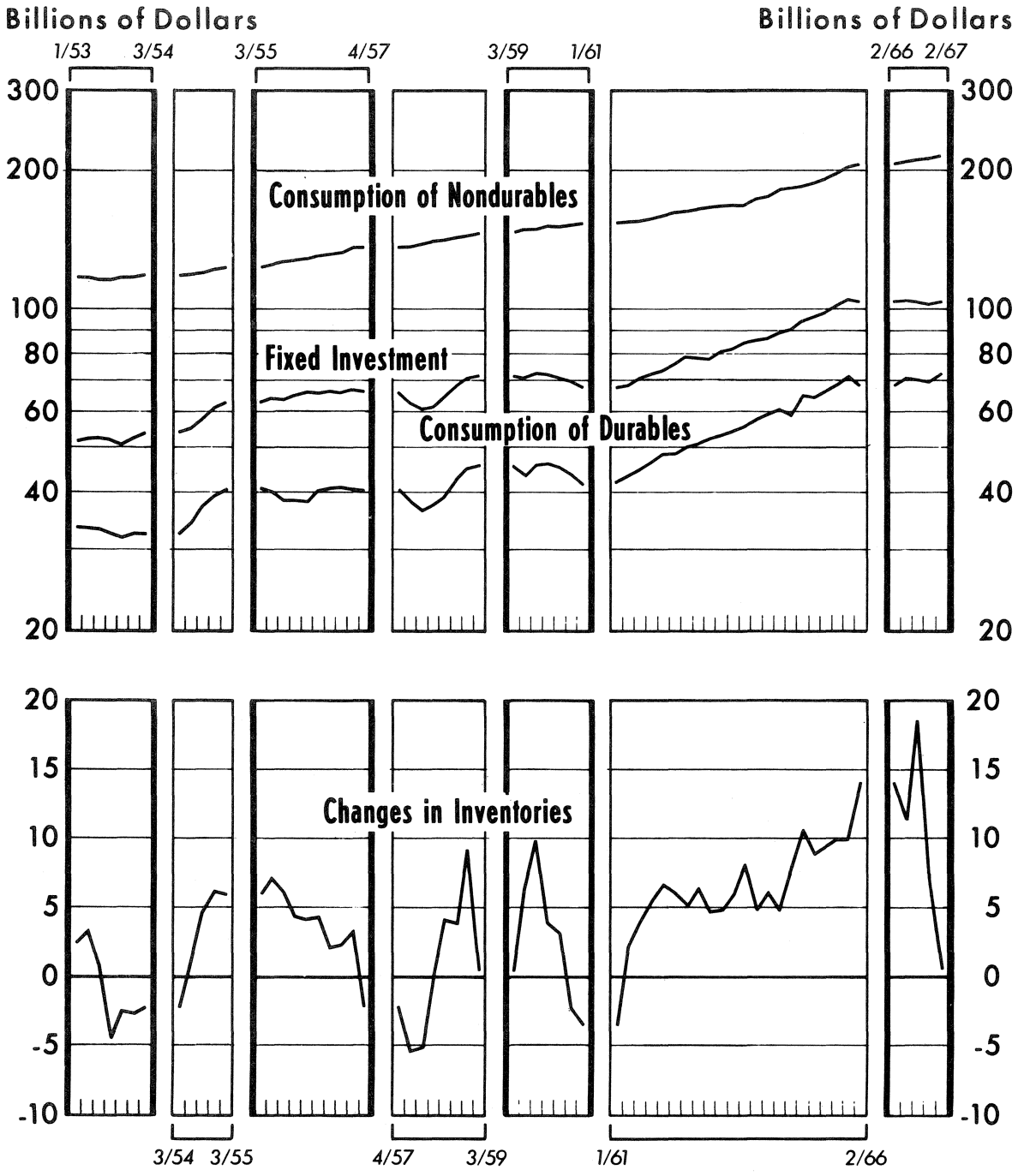
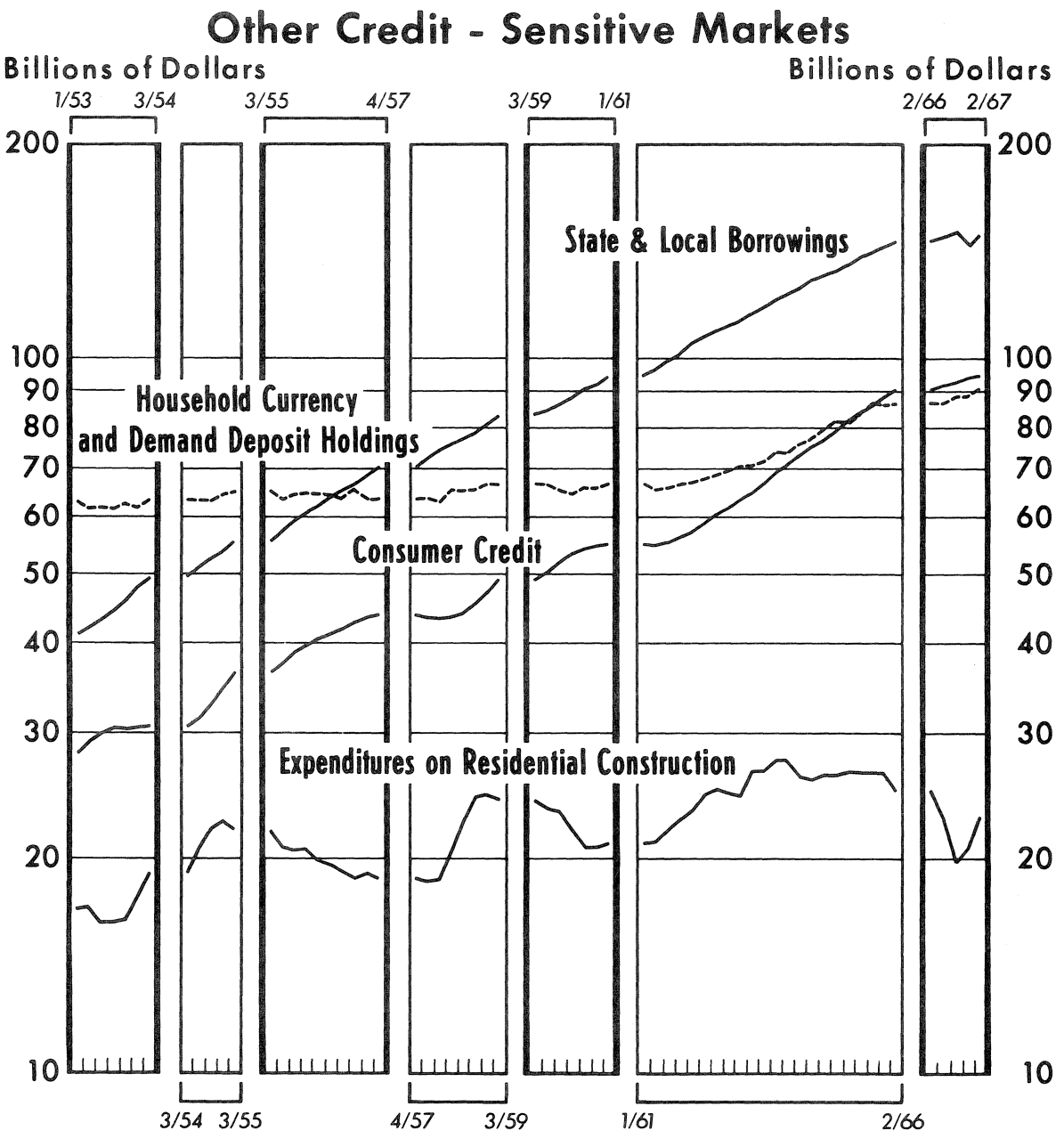


Chart 2-G


Other Credit - Sensitive Markets
Billions of Dollars
Billions of Dollars
1/53
3/54
3/55
4/57
3/59
1/61
2/66
2/67
200
100
90
80
70
60
50
40
30
20
10
State & Local Borrowings
Household Currency
and Demand Deposit Holdings
Consumer Credit
Expenditures on Residential Construction
3/54
3/55
4/57
3/59
1/61
2/66

CHAPTER III

PORTFOLIO ADJUSTMENT AND MARKET EQUATIONS

This chapter examines, through the use of regression analysis, the portfolio adjustments of financial intermediaries in tight money periods and the linkages between the financial and real sectors. A substantial body of portfolio adjustment literature has emerged in recent years. The first section of this chapter will be devoted to a discussion of a number of the more relevant studies to assist in the formulation of the market equations of the latter portion of the chapter and the complete tight money model of the succeeding chapter. The equations, which utilize data drawn from tight money periods, should provide substantive information on the tight money activities of financial intermediaries and allied markets.

Selected Portfolio Choice Literature

An article by A. C. Pigou, "The Value of Money," written over fifty years ago, will be taken as the point of departure for this investigation into portfolio choice theory.[1] Pigou divided

---

[1] A. C. Pigou, "The Value of Money," originally published in The Quarterly Journal of Economics, XXXII (1917) and reprinted in Readings in Monetary Theory (Philadelphia: The Blakiston Co., 1951), pp. 162-183.

assets into two categories--money and resources to be used in production--and spelled out the determinants of how much of each would be maintained in his money-capital model. The expected "fruitfulness of industrial activity" was Pigou's chief factor determining the attractiveness of capital.

> If a man understands that, in consequence of mechancial inventions or of an expected rise in the prices of commodities in whose production he is engaged, a given quantity of resources invested in his business will yield an abnormally large return, he will be more anxious than he otherwise would be to devote resources to production.[1] (Italics supplied)

Since Pigou's major concern was with money rather than capital, the above statement represents the major thrust of his treatment of the yield on capital. By introducing a two-asset model which included a place, though not a prominent one, for the yield on capital, Pigou laid groundwork for Keynes' money-bonds model and Tobin's supply-price-of-capital model.[2]

Pigou's discussion of the money component of the two-asset model included demand and supply considerations for money. The proportion of resources kept in titles to legal tender depended, according to Pigou, on the

---

[1]Pigou, ibid., p. 168.

[2]Tobin's principal criticism of Pigou and other Cambridge economists (aside from their disregard of close money substitutes) appears to be that their analysis of the yield on capital was not carried over into the demand for money. ". . . the authors of the Cambridge tradition, . . . regarded direct capital investment as the alternative to money holdings. Why did they fail to carry into their monetary theory the clear inference that the demand for money depends not only on the volume of transactions but also on the yield of capital?" He concludes that they probably assumed a constant short-run yield on capital. Tobin, "Money, Capital, and Other Stores of Value," op. cit., p. 31.

> convenience obtained and the risk avoided through the possession of such titles, by the loss of real income involved through the diversion to this use of resources that might have been devoted to the production of future commodities, and the satisfaction that might be obtained by consuming resources immediately and not investing them at all.[1]

Pigou's decomposition of the factors determining the money stock preceded by many years the studies of Cagan, Brunner-Meltzer, and Friedman-Schwartz.[2] Pigou cited the importance of the public and the banks in money stock determination,[3] attributing the public's choice among actual cash, bank notes and bank balances to custom and convenience factors and the bank's proportion of money to liabilities to the same factors as well as the economization of reserves, the temperament of the people in respect to liability to panic and the general state of confidence in the banking system. An increase in the supply of money had significance for Pigou in that the increase might permanently lower the demand schedule for money. In addition to money demand and supply theory integrated into a two-asset portfolio model, Pigou included a treatment of cash-flow

---

[1] Pigou, op. cit., p. 166.

[2] See Leonall C. Andersen, "Three Approaches to Money Stock Determination," Federal Reserve Bank of St. Louis Review, XLIX (Oct., 1967), pp. 6-13.

[3] Pigou did not consider the role of the monetary authorities and their influence over what has come to be called "high-powered" money in his factors determining money.

analysis.[1] What he did not include in his portfolio model was an adequate exposition covering interest rates, bonds, and financial institutions other than banks.

Keynes' money-bonds model assumed bonds and real assets to be perfect substitutes. Keynes assumed a constant differential between all rates other than money and bonds. The demand for money is associated positively with the volume of transactions and negatively with the interest rate. The monetary authorities may exercise some degree of control over "the" interest rate by altering the outstanding volume of bonds. An open market purchase of bonds, for example, removes (ceteris paribus) part of the capital stock (since bonds are perfect substitutes for real capital), increases the money supply and lowers the rate of interest.[2]

---

[1]"In the ordinary course of life, people are continually needing to make payments in discharge of obligations contracted in terms of legal-tender money. . . .Besides the flow of obligations that are thus continually maturing against them, most people have also a flow of claims that are similarly maturing in their favor. But the obligations and claims that become due at any moment seldom exactly cancel . . . ." Pigou, op. cit., p. 164. Minsky later emphasized the importance of cash-flow in portfolio analysis, particularly when a short-fall of receipts occurs. See footnote 1, p. 26.

[2]David I. Fand, "Keynesian Monetary Theories, Stabilization Policy and the Recent Inflation," a paper presented to the Conference of University Professors, Ditchley Park, Oxfordshire, England, September 13, 1968.

With the determination of the long rate, all other rates, including the marginal efficiency of capital, are also determined.

The Radcliffe Committee and Gurley and Shaw, found no special significance attached to "money." Gurley and Shaw emphasized the closeness of non-bank financial institutions' liabilities to money while the Radcliffe Committee returned to a Pigovian money-capital model, but assumed bonds to be a close substitute for money. According to the Radcliffe Committee, monetary policy actions, by increasing or decreasing the supply of money or bonds, can affect the composition of liquidity and cause a reshuffling of the public's portfolios, but total liquidity and capital outlays are not necessarily influenced.

Tobin has synthesized a number of the earlier portfolio studies.[1] He expanded the Pigovian and Keynesian two-asset models to include money (currency plus demand deposits), government debt, private debts, and physical capital, none of which are perfect substitutes. Yields on each depend on relative supplies and will vary from zero on currency up to the marginal productivity of capital. An increase in the money stock will lead to a change in asset prices and a substitution among assets, but if the supply price of capital is unaffected, there need be no effect in the real sector.[2] Tobin's

---

[1]Tobin, "Money, Capital and Other Stores of Value," op. cit.

[2]Tobin's supply price of capital is the link between the monetary and real sectors. If the supply price of capital "is lower than its marginal productivity, there will be excess demand for capital, stimulating increases in prices of capital goods and additions to the stock." Tobin, "Money, Capital and Other Stores of Value," ibid., p. 35. Like Keynes, Tobin assumes that interest rate changes influence total demand only if investment is affected.

minimal program for a theory of the capital account includes:

(1) four constituents of net private wealth: government demand debt, government short debt, government long debt, and capital stock;
(2) two intermediate assets: bank deposits and private debts;
(3) two institutionally or administratively fixed interest rates: zero on bank deposits and demand debt, and the central bank discount rate;
(4) four market-determined yields: the short-term interest rate, the long-term interest rate, the rate on private debts, and the supply price of equity capital.[1]

The transmission mechanism described by Brunner is quite similar to that of Tobin in regard to the initiator (a change in the outstanding supply of some asset), the shuffling of portfolios in response to changing asset yields, and the importance of capital in the transmission of impulses from the financial sector to the real sector.

> The interaction between banks and public, which forms the essential core of money-supply theory [Note the similarity to Pigovian money stock determination], generates the peculiar leverage or multiplier effect of injections of base money on bank assets and deposits and, correspondingly, on specific asset and liability items of the public's balance sheet. The readjustment process induces a change in the relative yield (or price) structure of assets crucial for the transmission of monetary policy-action to the rate of economic activity. The relative price of base money and its close substitutes falls, and the relative price of other assets rises.

---

[1] Tobin, ibid., p. 36. Demand debt, divided between currency held outside banks and unborrowed reserves of banks, is a concept very close to Friedman's high-powered money or Brunner-Meltzer's monetary base. According to Tobin, "A theory of the capital account concerns the proportions in which various assets and debts appear in portfolios and balance sheets", p. 28.

> The stock of real capital dominates these other assets. The increase in the price of capital relative to the price of financial assets simultaneously raises real capital's market value relative to the capital stock's replacement costs and increases the desired stock relative to the actual stock. The relative increase in the desired stock of capital induces an adjustment in the actual stock through new production. In this manner current output and prices of durable goods are affected by the readjustments in the balance sheets and the related price movements set in motion by the injection of base money. The wealth, income, and relative price effects involved in the whole transmission process also tend to raise demand for non-durable goods.[1]

Friedman and Schwartz[2] and Friedman and Meiselman[3] have spelled out transmission mechanisms which follow the same general lines, i.e., a change in the actual stock of real cash balances induced by the banks, the public, or the stabilization authorities, leads to economy-wide balance sheet adjustments and a change in the flow of total expenditures. The change in cash balances may influence consumer spending before investment expenditures or it may not; the particular pattern depends on the underlying technological conditions of the economy.

Summary

The purpose of this cursory review of portfolio choice literature was to obtain useful information for the development of a portfolio choice model and to learn something about the

---

[1]Karl Brunner, "The Report of the Commission on Money and Credit," Journal of Political Economy, LXIX (December, 1961), p. 612.

[2]Milton Friedman and Anna Schwartz, "Money and Business Cycles," The Review of Economics and Statistics XLV (Supplement: February, 1963), pp. 32-78.

[3]Milton Friedman and David Meiselman, "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States, 1897-1958," Stabilization Policies, Commission on Money and Credit (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1963), pp. 165-268.

mechanism by which various impulses (e.g., monetary impulses) are transmitted throughout the economy. The models of Pigou and Keynes included only two assets: money and either capital or bonds. Gurley and Shaw and the Radcliffe Committee contested that money is not a unique asset; financial institutions other than commercial banks emit liabilities which are quite similar to money. Tobin synthesized these views in enunciating the requirements of his portfolio choice model while Brunner and Friedman et al stressed the significance of money in economy-wide portfolio shifts rather than listing all specific variables which should be included in the model.

The tight money equations of this chapter and complete model of Chapter Four will be based, to a large extent, on the above eclectic survey of the literature. A number of variables recommended by Tobin in his synthesis of earlier models will be utilized including government demand debt (monetary base), short debt and long debt, investment, bank deposits and private debts, the central bank discount rate, the short-term and long-term interest rates and the rates on a number of private debts. Changes in holdings of assets will be explained by changing asset supplies (the initiating process) and relative interest rates (the essential part of the transmission mechanism which effects a re-shuffling of portfolios). Changes in the money supply will be employed directly in certain real and other credit-sensitive market equations following Friedman, et al. In the complete tight money model of Chapter Four, the actions of the public, banks and Federal Reserve (following Pigou and Brunner) will be permitted to enter as exogenous variables determining the money supply and influencing other sectors in tight money periods. The complete model also permits examination of specific hypotheses, such as Brunner's contention that an increase in the monetary base will, in the current period, effect increases in investment, and spending on consumer durables and nondurable goods.

The Equations

The foregoing review of the literature suggests that one factor contributing to adjustments of portfolios is changing asset prices. The asset prices respond to changes in policy instruments, changes in the relative supplies of various assets (a policy change, such as a change in the magnitude of the monetary base, may be, itself, a change in the supply of an asset) and less quantifiable influences such as expectations. Evidence from Chapter Two indicates that the ability of depository institutions to attract funds, or emit liabilities, may constrain desired portfolio adjustments, particularly in tight money periods. In other words, intermediaries who suffer substantial deposit withdrawals in tight money periods will desire to make additional mortgage loans at the higher tight money mortgage rates, but concern for their liquidity position may hamper their ability to do so.

Such conjectures will be tested in the following twenty-three tight money equations. Evidence will be developed concerning the particular asset prices to which institutional portfolio managers respond, the efficacy of deposit constraints and the interdependence of the various sectors. The equations also provide the foundation for inferences on the stability of the system drawn in the following section of this chapter and the complete tight money model of Chapter Four.

General Format of the Equations

The equations are divided into six subsets:

1.	Savings Institutions	(5 equations)
2.	Life Insurance Companies	(3 equations)
3.	Commercial Banks	(6 equations)
4.	The Real Sector	(4 equations)
5.	Other Credit-Sensitive Markets	(4 equations)
6.	Term Structure of Interest Rates	(1 equation)

The general form of the financial institutions' asset demand equations is given as:

$$\Delta M = a_o + a_1 M_{-1} + a_2 (R_m - R_n) + \ldots + a_n \Delta K$$

M represents a particular asset demanded by an institution, R_m is the interest rate on that asset, R_n is the interest rate on a competing asset and K is a supply constraint (such as the amount of deposits at mutual savings banks). The differential $(R_m - R_n)$ between two interest rates rather than a separate listing of the rates was chosen to emphasize the importance of the consideration of the margin between asset prices. If the margin between R_m and R_n increases and portfolio managers select more of asset R_m, it may be inferred that the margin between the two rates is of some relevance to the fund managers. If an increase in the margin is not associated with increased holdings of asset M, then it would appear that some factor other than the two asset prices is of more relevance in the asset selection process.

It should be noted that this method of entering the two interest rates imposes certain restrictions on the interest rate coefficients. The restrictions are:

1) The coefficients will be opposite in sign and of equal magnitude

2) The levels of the rates will be of no significance.

Since most of the portfolios are dominated by a small number of interest-bearing assets, the restrictions are not severe.[1]

The K variables, that is, the constraints in the asset demand equations, also take on the role of dependent variables and the general form of these equations is:

$$\Delta K = a_o + a_1 K_{-1} + a_2 (R_K - R_L) + \ldots + a_n \Delta Y$$

$R_K - R_L$ represents the interest rate differential between deposits at two different financial institutions, e.g. mutual savings banks and commercial banks, and Y is an income variable. Interest rates are employed throughout the equations as are income and monetary variables.

---

[1] Frank de Leeuw followed the differential interest rate procedure in the Brookings Econometric Model, reasoning that "The justification for this restriction is that U.S. and private securities account for nearly all of the assets of nonbank finance institutions, and therefore the differential roughly measures the yield on one asset compared with the yield on alternative assets. The restriction implies that the proportion of savings invested in private securities will be the same if the two rates are, say, 6 and 4 per cent, as they will be if the rates are 5 and 3 per cent. . . . These restrictions would be much less plausible if there were many other assets in nonbank finance portfolios." Frank de Leeuw, "A Model of Financial Behavior," The Brookings Quarterly Econometric Model of the United States, ed. by J. Duesenberry, et. al. (Chicago: Rand McNally and Company, 1965), p. 522.

Data and Statistical Tests

Data drawn from the four tight money periods, as delineated in the first chapter, furnished 29 quarterly observations. A description of the sources of data, which are seasonally adjusted, is given in the appendix. Several equations of each type were estimated and the "best," as measured by the statistical tests and *a priori* expectations, was chosen for discussion in this chapter. The same set of "best" equations was also estimated for easy money (29 observations) and combined tight and easy money (58 observations) periods for purposes of comparison. The easy and combined equations (found in the appendix) give some indication of the direction and magnitude of the differences between tight and easy money periods.

The first-difference approach was employed to estimate the regression coefficients because, although the coefficients of determination (R^2's) are generally smaller than those which would be obtained from the use of "levels," fewer multicollinearity problems are developed.[1] This is an additional reason why interest rate differentials rather than levels were employed in the equations. The first-difference approach also permits the use of the stock-adjustment format which links current and desired levels of asset holdings. Two-stage least squares was the estimation technique adopted because a large number of the explanatory variables used

---

[1] If a high degree of collinearity exists between two or more explanatory variables, it is difficult to discern the actual influence exercised by each over the endogenous variable.

in certain equations are endogenous to the system as a whole.[1]

The general criteria for acceptance of an equation as being the best of its series was $R_2 > .25$ and $1 <$ Durbin-Watson Test (DW) > 3.[2] F values and standard errors of estimate (SEE) were also examined, although not as rigorously. The choice of individual variables within the equation was governed by a priori

---

[1] J. Johnston, (Econometric Models (New York: McGraw-Hill, Inc., 1963), pp. 253, 258)) says that in a model, "One may not know which endogenous variable to select as the dependent variable, and no matter which is chosen, the remaining endogenous variable(s) will be correlated with the disturbance term in that relation because of the simultaneous nature of the relations in the model." Where y_1 represents the matrix of endogenous variables on the left-hand side of the equation, Y_2 the endogenous explanatory variables on the right-hand side, and X_* the exogenous variables, Johnston says that "The basic idea in two-stage least squares is to replace Y_2 . . . by an estimated matrix $\hat{Y}_2$ based on the least-squares regressions of the variables in Y_2 on all the predetermined variables in the model and then to apply least squares again to y_1, $\hat{Y}_2$ and X_*. Since many of the variables exogenous to the system are merely lagged endogenous variables, Y_2 was regressed against a subset of the exogenous variables to obtain $\hat{Y}_2$. A procedure somewhat similar to de Leeuw's was followed. De Leeuw (op. cit., p. 487) points out that "An exhaustive list (of the predetermined variables of the Brookings model) would, of course, leave no degrees of freedom in the first-stage regressions and would therefore simply reproduce ordinary least-squares estimates. The list of predetermined variables was pared down by (a) excluding all lagged endogenous financial variables; (b) consolidating a number of exogenous variables--currency and unborrowed reserves and the various classes of reserve requirements--into the single open-market variables described and (c) choosing nonfinancial variables which intuitively seemed important in influencing financial behavior and leaving out exogenous financial variables which seemed relatively unimportant."

[2] The Durbin-Watson statistic tests for the presence of auto-correlation. A high degree of autocorrelation (or correlation of the disturbance terms in the regression) generally signifies the omission of important explanatory variables.

expectations in regard to the sign of the regression coefficient and the partial correlation coefficient (the latter not transcribed here), and T values > 1.[1] In some cases, if an unexpected sign of a variable persisted through several trial equations, the variable was retained; also, a variable with a T value < 1 was kept in a few instances when it met expectations as to the sign of the regression coefficient. Although the two-stage least squares technique may be an advantage over the one-stage method for reasons mentioned earlier, it complicates the interpretation of the statistical tests.[2]

Symbols

A large number of endogenous and exogenous variables are used in the following equations and the symbols for these variables are given below:

Endogenous Variables

SLG = Savings and loan holdings of Federal Government securities

RGB = Interest rate on long-term Treasury securities

RTB = Interest rate on three-month Treasury bills

---

[1]The T value is the regression coefficient divided by the standard error of the regression coefficient.

[2]See Stephen M. Goldfeld, (Commercial Bank Behavior and Economic Activity, (Amsterdam: North-Holland Publishing Company, 1966), pp. 137-138) who says, "even for linear models, little is known about the small sample properties of two-stage least squares. By introducing nonlinearities and lagged values of the dependent variables, we simply compound the problem. This means that the standard t-, F-, and Durbin-Watson tests are now doubly suspect.

"What evidence there is, suggests that two-stage least squares tends to yield somewhat conservative t-values, i.e., tends to understate the significance of a particular coefficient."

DSL = Deposits at savings and loan associations

MSB = Mutual savings banks' holdings of mortgages

MSD = Deposits at mutual savings banks

GLI = Treasury securities held by life insurance companies

MLI = Mortgages held by life insurance companies

CBL = Life insurance company holdings of corporate bonds

SBK = Short-term (less than one year) Treasury securities held by commercial banks

LBK = Long-term (one year or greater) Treasury securities held by commercial banks

CBK = Loans issued by commercial banks

BO = Borrowings of member banks

ER = Excess reserves of member banks

TD = Time and savings deposits at commercial banks

IF = Fixed investment

DH = Change in inventories

CND = Consumption of nondurables

CD = Consumption of durables

HMH = Household currency and demand deposit holdings

CC = Consumer credit

REC = Expenditures on residential construction

SLB = State and local borrowings

CURR = Currency in the hands of the public

DD = Demand deposits at commercial banks

M = Currency plus demand deposits

Y = Gross national product

YD = Disposable personal income

Exogenous Variables

RM = Interest rate on new mortgages

$(\frac{SLG}{SLM})_{-1}$ = One-quarter lagged ratio of Treasury securities to mortgages held by savings and loan associations

MRT = Total value of all mortgages outstanding

RSL = Interest rate on savings and loan shares

RTD = Interest rate on time and savings deposits

$(\frac{MGB}{MSB})_{-1}$ = One-quarter lagged ratio of Treasury securities to mortgages held by mutual savings banks

RMS = Interest rate on mutual savings bank deposits

$(\frac{GLI}{MLI})_{-1}$ = One quarter lagged ratio of Treasury securities to mortgages held by life insurance companies

GBL = Total long-term marketable Treasury securities outstanding

RCB = Interest rate on total corporate bonds

GBS = Total short-term marketable Treasury securities outstanding

X = A banking variable best summarized as the ratio of bank reserves to total deposits (see derivation, page 140)

RD = Federal Reserve discount rate (at New York bank)

RSI = Interest rate (weighted average) of combined savings and loan and mutual savings bank deposits

Z = The difference between gross national product (Y) and personal income (YD); a conglomerate variable whose chief components are depreciation, indirect business taxes and corporate profits.

CUI = Capacity utilization index

MUO = Manufacturers' unfilled orders

P = Implicit GNP price deflator

W = Total wealth (based on a variable constructed by Goldsmith)

FMA = Mortgage holdings of the Federal National Mortgage Association

DSLR = $\frac{\Delta GBS}{\Delta GBL}$, or ratio of the change in short-term to long-term Treasury securities

For convenience the twenty-three tight money equations are given in the following table. The equations are discussed individually and summarized at the end of the section.

Savings Institutions

Equation 1 Savings and Loan Holdings of Federal Government Securities

$$\Delta SLG = -.143 - .038\ SLG_{-1} + .114\ (RM-RGB) + .164\ \Delta DSL - .136\ (RGB-RTB)$$

[-2.15][1] [1.52] [3.08] [-2.53]

$R^2 = .368$ F = 3.49 SEE[2] = .153 DW = 2.39

The positive sign of the differential between mortgage rates and long-term Federal Government bonds (RM-RGB) indicates that the margin between the two rates is not an important factor in savings and loan demand for Federal Government bonds. Since mortgages and Treasury securities account for approximately 90 per cent of all savings and loan assets, changing prices apparently have a minor effect on the choice between these two assets in tight money

---

[1] T values are in brackets.

[2] SEE = Standard error of estimate.

TABLE III-1

Tight Money Equations

Equation		
Savings Institutions		
1. Treasury security holdings of savings and loan associations	$\Delta SLG = -.143 - .038\ SLG_{-1} + .114(RM-RGB) + .164\ \Delta DSL - .136(RGB-RTB)$	
	[-2.15] [1.52] [3.08] [-2.53]	
	$R^2 = .368$ F = 3.49 SEE = .153 DW = 2.39	
2. Savings and loan holdings of mortgages	$\Delta SLM = -4.43 - .010\ SLM_{-1} + .876\ \Delta DSL + 33.0\ (\frac{SLG}{SLM})_{-1} + .619\ \Delta MRT + .345\ \Delta REC$	
	[-1.37] [2.34] [1.47] [2.34] [1.51]	
	$R^2 = .531$ F = 5.21 SEE = .781 DW = 2.57	
3. Deposits at savings and loan associations	$\Delta DSL = -2.88 + .034\ DSL_{-1} + 2.08(RSL-RTD) + .037\ \Delta YD - .15\ \Delta HMH$	
	[2.76] [2.19] [.721] [-.827]	
	$R^2 = .400$ F = 4.01 SEE = .415 DW = 1.52	
4. Mutual savings banks' holdings of mortgages	$\Delta MSB = -.168 + .017\ MSB_{-1} - .212(RM-RGB) + .619\ (\frac{MGB}{MSB})_{-1} + .128\ \Delta MRT$	
	[2.76] [-1.05] [1.68] [1.90]	
	$R^2 = .625$ F = 9.99 SEE = .148 DW = 1.83	

TABLE III-1 - Continued

Equation

5. **Deposits at mutual savings banks**

$$\Delta MSD = -.830 + .022\ MSD_{-1} + .491(RMS-RTD) + .036\ \Delta YD$$

$$[1.48] \qquad [.968] \qquad [1.82]$$

$$R^2 = .432 \qquad F = 7.78 \qquad SEE = .214 \qquad DW = 1.04$$

Life Insurance Companies

6. **Treasury securities held by life insurance companies**

$$\Delta GLI = .507 - .210\ GLI_{-1} + .164(RM-RGB) + 2.62\ \left(\frac{GLI}{MLI}\right)_{-1} - .008\ \Delta GBL$$

$$[-2.62] \qquad [1.20] \qquad [2.38] \qquad [-1.95]$$

$$R^2 = .313 \qquad F = 2.73 \qquad SEE = .128 \qquad DW = 2.08$$

7. **Mortgages held by life insurance companies**

$$\Delta MLI = -.432 + .023\ MLI_{-1} - 1.34(RM-RGB)_{-2} + .81\ \left(\frac{GLI}{MLI}\right)_{-1} + .118\ \Delta MRT$$

$$[4.08] \qquad [-4.30] \qquad [1.54] \qquad [2.30]$$

$$- 1.70(RCB-RM)_{-2} + .057\ \Delta REC$$

$$[-3.92] \qquad [1.50]$$

$$R^2 = .760 \qquad F = 11.597 \qquad SEE = .127 \qquad DW = 2.18$$

TABLE III-1 - Continued

Equation

8. **Life insurance company holdings of corporate bonds**

$$\Delta CBL = 1.54 - .015\ CBL_{-1} + .678(RCB-RM)_{-2} + .859(RCB-RGB)_{-2} + .034\ \Delta IF$$

[-2.42] [2.65] [2.84] [.989]

$R^2 = .328$ F = 2.932 SEE = .195 DW = 2.72

Commercial Banks

9. **Short-term (less than one year) Treasury securities held by commercial banks**

$$\Delta SBK = -.136 - .059\ SBK_{-1} + 1.29(RGB-RTB) + .362\ \Delta GBS + 92.0\ \Delta X$$

[-1.14] [3.08] [7.03] [1.26]

$R^2 = .698$ F = 13.9 SEE = .137 DW = 1.63

10. **Long-term (one year or greater) Treasury securities held by commercial banks**

$$\Delta LBK = 5.81 - .174\ LBK_{-1} + .695(RGB-RTB) + .058\ \Delta GBL$$

[-2.37] [1.10] [.967]

$R^2 = .277$ F = 3.20 SEE = 1.96 DW = 1.48

11. **Loans issued by commercial banks**

$$\Delta CBK = .20 + .011\ CBK_{-1} + .599\ \Delta(CURR+DD) + .09\ \Delta Y + 2.0\ \Delta BO$$

[1.70] [1.65] [1.41] [1.24]

$R^2 = .465$ F = 5.21 SEE = 1.425 DW = 2.15

TABLE III-1 - Continued

Equation		
12. Borrowings of member banks	$\Delta BO = .143 - .285\ BO_{-1} - .155\ (RD-RTB) - .038\ \Delta(CURR+DD)$	
	[-2.02] [-1.70] [-.916]	
	$R^2 = .158$ F = 1.57 SEE = .181	DW = 1.85
13. Excess reserves of member banks	$\Delta ER = .041 - .042\ ER_{-1} - .029\ \Delta RTB + 2.54\ \Delta X - .002\ \Delta Y$	
	[-1.18] [-3.17] [2.54] [-2.26]	
	$R^2 = .698$ F = 13.9 SEE = .013	DW = 1.57
14. Time and savings deposits at commercial banks	$\Delta TD = 4.465 + 3.11\ (RTD-RSI) - .496\ \Delta RTB + 1.358\ \Delta DD$	
	[7.30] [-1.67] [7.44]	
	$R^2 = .846$ F = 45.69 SEE = .789	DW = 2.85
Real Sector		
15. Fixed investment	$\Delta IF = 3.24 - .058\ IF_{-1} - .071\ \Delta RCB + .304\ \Delta CBK - .175\ \Delta Z + .236\ \Delta CUI + .493\ \Delta(CD+CND)$	
	[-6.96] [-.126] [3.16] [-4.17] [4.15] [7.13]	
	$R^2 = .830$ F = 17.9 SEE = .484	DW = 1.65

TABLE III-1 - Continued

Equation	
16. Change in inventories	$DH = -20.6 - 1.6\,\Delta(CURR+DD) + .69\,\Delta MUO + .26\,P_{-1}$
	[-1.85] [2.99] [2.83]
	$R^2 = .487$ F = 7.91 SEE = 4.065 DW = 1.63
17. Consumption of nondurables	$\Delta CND = -2.21 + .023\,CND_{-1} + .071\,\Delta YD - 1.27\,\Delta HMH + .795\,\Delta(CURR+DD)$
	[2.55] [.803] [-2.58] [2.38]
	$R^2 = .529$ F = 6.75 SEE = .934 DW = 2.07
18. Consumption of durables	$\Delta CD = -.524 + .009\,CD_{-1} + .096\,\Delta W + 1.76\,\Delta RGB + .261\,\Delta(CURR+DD)$
	[.811] [3.46] [1.04] [1.56]
	$R^2 = .513$ F = 6.33 SEE = .626 DW = 1.82
Other Credit-Sensitive Markets	
19. Household currency and demand deposit holdings	$\Delta HMH = -1.37 + .021\,HMH_{-1} - 3.60\,\Delta RTD + .126\,\Delta(DSL+MSD+TD)$
	[1.09] [-1.44] [1.62]
	$R^2 = .557$ F = 10.5 SEE = .468 DW = 2.61

TABLE III-1 - Continued

Equation				
20. Consumer credit	$\Delta CC = .393 - .237\ \Delta DD + .176\ \Delta YD - .133\ \Delta HMH$			
	[-2.16] [6.62] [-.936]			
	$R^2 = .654$	$F = 15.8$	$SEE = .312$	$DW = 1.15$
21. Expenditures on residential construction	$\Delta REC = - .269 - 1.96\ \Delta FMA + .204\ \Delta(DSL+MSD)$			
	[-3.17] [1.10]			
	$R^2 = .291$	$F = 5.34$	$SEE = .615$	$DW = 1.47$
22. State and local borrowings	$\Delta SLB = 2.21 - .335\ \Delta(CURR+DD) - 10.8\ \Delta ER - .114\ \Delta YD$			
	[-1.03] [-2.38] [-1.12]			
	$R^2 = .287$	$F = 3.35$	$SEE = 1.48$	$DW = 2.58$
Term Structure of Interest Rates				
23. Long-term Treasury security rate less the three-month bill rate	$RGB-RTB = 4.72 - .06\ DSLR - 1.81\ RGB_{-1} + 2.18\ RGB_{-2} - .28\ P + .15\ P_{-1} + .15\ P_{-2}$			
	[-1.34] [-3.62] [3.81] [-1.52] [.659] [.726]			
	$+ .34\ M - .44\ M_{-1} + .05\ M_{-2}$			
	[2.12] [-1.86] [.391]			
	$R^2 = .805$	$F = 8.692$	$SEE = .352$	$DW = 1.69$

periods. In the comparable easy money equation (see Appendix B), the sign of the (RM-RGB) coefficient is reversed, but the T value is only .4. One interpretation of these results would be that in tight money periods, when savings and loan acquisition of Treasury securities is slowed (as discussed in Chapter 2), the differential between RGB and RM is even less important than at other times.

Changes in savings and loan shares (DSL) are positively (and significantly) associated with changes in both savings and loan Treasury security and mortgage holdings. The positive sign also appeared in the easy money equations of ΔSLG and ΔSLM. The sign of the negative RGB-RTB (rate on long-term less the rate on short-term Treasury securities) coefficient implies that savings and loan associations do not necessarily purchase long-term Treasury securities when their yield is high relative to the short-terms.[1]

Equation 2 Savings and Loan Holdings of Mortgages

$$\Delta SLM = -4.43 - .010\ SLM_{-1} + .876\ \Delta DSL + 33.0\ \left(\frac{SLG}{SLM}\right)_{-1} + .619\ \Delta MRT + .345\ \Delta REC$$

[1.37] [2.34] [1.47] [2.34] [1.51]

$R^2 = .531$ F = 5.21 SEE = .781 DW = 2.57

---

[1] About 80 per cent of savings and loan Treasury securities have a greater than one year maturity. (Savings and Loan Fact Book, 1967, p. 48).

The results of the second equation indicate that savings and loan acquisitions of mortgages are positively associated with deposits (DSL) and outstanding mortgages (MRT) as well as spending on residential construction (REC). The two latter variables were entered to determine if savings and loans "feel" constrained to continue financing some portion of the housing industry in tight money periods. The results are not inconsistent with this hypothesis. The relationships hold for combined easy and tight money periods, as shown in the appendix, but the sign of the ΔREC variable becomes negative in easy money periods (T value < 1) and the T value of ΔMRT drops almost to zero. The lagged ratio of savings and loan holdings of Federal Government securities to mortgages $(\frac{SLG}{SLM})_{-1}$ is employed in the equation to determine if the associations attempt to maintain some steady ratio between their two principal interest-bearing assets. The positive sign of the coefficient may be interpreted as indicating that an increase in last quarter's Treasury security holdings (compared to mortgage holding) evokes an increase in this quarter's mortgage holdings.

Equation 3 Deposits at Savings and Loan Associations

$$\Delta DSL = -2.88 + .034\ DSL_{-1} + 2.08\ (RSL-RTD) + .037\ \Delta YD - .15\ \Delta HMH$$

$$[2.76] \qquad [2.19] \qquad [.721] \qquad [-.827]$$

$R^2 = .400$ F = 4.01 SEE = .415 DW = 1.52

The differential between the rate on savings and loan shares (RSL) and commercial bank time deposits (RTD) is an important

factor (as stated by an executive of the Savings and Loan League)[1] influencing the ability of savings and loan associations to attract funds. A 1 per cent increase (e.g., from 1 per cent to 2 per cent) in the differential between the interest rate offered on savings and loan shares and time and savings deposits at commercial banks brings an increase of $2.08 billion in deposits at savings and loan associations in tight money periods. Savings and loan shares are associated positively with disposable income (YD) and negatively with household money holdings (HMH), although neither T value is impressive.

The same three types of dependent variables, holdings of Treasury securities, mortgages and deposit acquisitions, were examined for mutual savings banks as for savings and loan associations. No satisfactory tight money relationship was ever found for the mutual savings banks' holdings of Treasury securities, however. Of the explanatory variables used in the ΔMGB equation, including MGB_{-1}, RM-RGB, $(\frac{MGB}{MSB})_{-1}$, ΔMSD, RGB-RTB, and ΔGBL, none demonstrated a T value $\geq$ 1. Consequently, the equation has been omitted from the model. Part of the reason for the equation's poor showing may be that, as seen in Chapter Three, mutual savings bank holdings of Treasury securities have declined over the years with little marked change in either tight or easy money periods. If MGB had been specified in terms of levels rather than first differences, quite likely a significant negative relationship with deposits at mutual savings banks would have become apparent because of inherent trends.

---

[1] See page 40.

Equation 4 Mutual Savings Banks' Holdings of Mortgages

$$\Delta MSB = -.168 + .017\ MSB_{-1} - .212\ (RM-RGB) + .619\ \left(\frac{MGB}{MSB}\right)_{-1} + .128\ \Delta MRT$$

[2.76] [-1.05] [1.68] [1.90]

$R^2 = .625$ F = 9.99 SEE = .148 DW = 1.83

Equation 5 Deposits at Mutual Savings Banks

$$\Delta MSD = -.830 + .022\ MSD_{-1} + .491\ (RMS-RTD) + .036\ \Delta YD$$

[1.48] [.968] [1.82]

$R^2 = .432$ F = 7.78 SEE = .214 DW = 1.04

Mutual savings banks, like savings and loan associations, do not find the mortgage and Treasury security margin an important factor in aligning the interest-bearing portion of their portfolio (according to the negative sign of the RM-RGB variable in Equation 4). The signs of the remaining three explanatory variables are positive in the tight money equation but negative in the easy money equations found in the appendix. The T values of the variables in the easy money equation, however are lower than their counterparts in the tight money equation. The one-quarter lagged ratio of Treasury security holdings to mortgages in tight money Equations 2 and 4 says that an increase in the ratio of Treasury securities to mortgages last quarter increases the acquisition of mortgages by both savings and loans and mutual savings banks this quarter. Both institutions react positively to increases in the mortgage supply constraint, MRT. As with savings and loan shares, deposits

at mutual savings banks rise with an increase in the differential between the rate paid on mutual savings deposits (RMS) and the rate paid for deposits at commercial banks (RTD). The response is not as strong as with a 1 per cent increase in the similar differential at savings and loan associations ($.491 billion compared with $2.08 billion). Deposits at mutual savings banks appear to respond more strongly, however, than deposits at savings and loan associations to increases in disposable income (YD). The T value of the YD variable (1.82) is substantially higher than the corresponding T value for deposits at savings and loan associations and the regression coefficient is approximately of equal magnitude despite the fact that total deposits at savings and loans are much greater than at mutual savings banks.

From these results it could be postulated that savings and loan associations, who have generally paid the highest rates for deposits of the three major savings institutions, attract the large depositors, who shift sizable amounts of funds from commercial banks to savings and loans (and vice versa as implied by Equation 14) with incremental interest rate changes. Mutual savings bank depositors, on the other hand, are less influenced by interest rate differentials. Depositors at mutual savings banks respond proportionately more to changes in disposable income by saving more at their institutions than do savings and loan depositors. Since the savings banks were established as thrift institutions for small depositors, the results are in accord with expectations.

Life Insurance Companies

Equation 6 Treasury Securities Held by Life Insurance Companies

$$\Delta GLI = .507 - .210\ GLI_{-1} + .164\ (RM-RGB) + 2.62\ \left(\frac{GLI}{MLI}\right)_{-1} - .008\ \Delta GBL$$

[-2.62] [1.20] [2.38] [-1.95]

$R^2 = .313$ F = 2.73 SEE = .128 DW = 2.08

Equation 7 Mortgages Held by Life Insurance Companies

$$\Delta MLI = -.432 + .023\ MLI_{-1} - 1.34\ (RM-RGB)_{-2} + .81\ \left(\frac{GLI}{MLI}\right)_{-1} + .118\ \Delta MRT$$

[4.08] [-4.30] [1.54] [2.30]

$$-1.70\ (RCB-RM)_{-2} + .057\ \Delta REC$$

[-3.92] [1.50]

$R^2 = .760$ F = 11.6 SEE = .127 DW = 2.18

Equation 8 Life Insurance Company Holdings of Corporate Bonds

$$\Delta CBL = 1.54 - .015\ CBL_{-1} + .678\ (RCB-RM)_{-2} + .859\ (RCB-RGB)_{-2} + .034\ \Delta IF$$

[-2.42] [2.65] [2.84] [.989]

$R^2 = .328$ F = 2.93 SEE = .195 DW = 2.72

Equations 6, 7, and 8 depict life insurance asset activity in tight money periods. The signs of three explanatory variables were reversed in easy money periods, compared with eight sign changes for the five savings' institution equations. These results indicate

some higher degree of stability of fund flow for the life insurance companies, but because of the "roughness" of the comparison, the evidence can only be viewed as suggestive. The interest differential between mortgages and Treasury securities apparently has little relevance in the determination of Treasury security holdings; nor do life insurance companies feel constrained to support the Treasury's offerings of long-term obligations (GBL).

In Chapter Two it was seen that life insurance companies often commit funds ahead through a forward commitment process based on economic conditions prevailing well before the funds are actually invested. Quite likely, the funds would be commited in advance in the case of the high return assets--mortgages and coporate bonds--rather than Treasury securities. An attempt was made to incorporate the forward commitment process into the equations by lagging the interest rate differentials two quarters. The differentials in Equation 7 indicate that Federal Government bond rates apparently do not influence decisions to acquire mortgages but corporate bond rates do. Since some funds are committed to mortgages in the current quarter, mortgages outstanding (MRT) and spending on residential construction (REC) were entered in the equation and both associated positively with mortgage holding.

The demand for corporate bonds (CBL) is related positively with the differential between the bond rate and the mortgage rate (RCB-RM) as expected and (surprisingly) with the differential between corporate and Treasury bonds (RCB-RGB). The fixed investment variable (IF), entered in the equation as a proxy for business demand for funds, associates positively with life insurance corporate bond holdings.

Commercial Banks

Equation 9 Short-term (less than one year) Treasury Securities Held by Commercial Banks

$$\Delta SBK = - .136 - .059\ SBK_{-1} + 1.29\ (RGB-RTB) + .362\ \Delta GBS + 92.0\ \Delta X$$

[-1.14] [3.08] [7.03] [1.26]

$R^2 = .698$ F = 13.9 SEE = .137 DW = 1.63

Equation 10 Long-term (greater than one year) Treasury Securities Held by Commercial Banks

$$\Delta LBK = 5.81 - .174\ LBK_{-1} + .695\ (RGB-RTB) + .058\ \Delta GBL$$

[-2.37] [1.10] [.967]

$R^2 = .277$ F = 3.20 SEE = 1.96 DW = 1.48

Equation 11 Loans Made by Commercial Banks

$$\Delta CBK = .20 + .011\ CBK_{-1} + .599\ \Delta(CURR+DD) + .09\ \Delta Y + 2.0\ \Delta BO$$

[1.70] [1.65] [1.41] [1.24]

$R^2 = .465$ F = 5.21 SEE = 1.43 DW = 2.15

Most of the assets relating to the commercial bank investment and loan portfolio are examined in the above equations.[1]

---

[1]James Pierce lists three components of commercial bank portfolios:
1) highly liquid reserve assets (cash, short-term Treasury (securities) used for transaction purposes,
2) investment assets (relatively long-term securities--long-term Treasury securities and municipal bonds) held for income,
3) nonfinancial loans (all loans other than very short-term loans to brokers, dealers, etc.) held for income.
Pierce's three components (although not all subsets) are covered by Equations 9, 10, and 11 above. Pierce discusses the assets in terms of

The principal exception is bank holdings of state and local bonds. Since the purchase of these securities is, to a large extent, a function of the individual bank's tax position (which in turn, may be a function of widely divergent state tax laws as well as uniform Federal taxes), it was felt that an analysis of bank demand for municipals was beyond the scope of this study.

Equations 9 and 10 imply that the term structure of interest rates has little effect on commercial bank purchases of short- and long-term Treasury securities, their secondary reserves. In both instances, the sign of the regression coefficient is positive and the T value in the ΔSBK equation, unexpectedly, is nearly three times as great as in the ΔLBK equation. Of exceedingly high significance in the commercial bank demand for short-term Treasury securities is the change in the outstanding supply of short-term Treasury securities.[1] Apparently, commercial banks do feel some obligation to purchase a portion of both short- and long-term Treasury security

---

return, risk, and liquidity. These three asset characteristics range from low return, low risk, and high liquidity for component 1 to high return, high risk, and low liquidity for component 3. Using weekly data for the 1960-1964 period, he was able to reach few strong conclusions regarding the commercial bank portfolio (probably because of aggregation problems and a relatively short time horizon). With regard to his loan function, Pierce concluded, "the highly simplified and unrealistic demand for loans function does not capture the impact of loan demand on the composition of the portfolio." James L. Pierce, "An Empirical Model of Commercial Bank Portfolio Management," Studies of Portfolio Behavior, op. cit., p. 188.

[1] See Goldfeld, op. cit., p. 54, who uses the change in the outstanding supplies of long- and short-term Treasury securities to account for periods in which long-term maturities, because of the passage of time, become short-term.

(the long-term sign is also positive although the T value is slightly less than 1) offerings.[1] The short-term equation also indicates that an increase in the reserves to total deposits ratio (X) associates positively with an increase in short-term Treasury holdings. Both moves could be construed as changes in the direction of increased risk-avoidance. A negative sign would have implied offsetting risk-return adjustments.

The differential between the rate on commercial bank loans and Treasury securities was tried in the bank loan (CBK) equation, but was dropped from the function because of its insignificance. According to Equation 11, the money supply (CURR+DD), income (Y) and borrowings (BO) are all associated positively with bank loans. Because of the deposit creation process, (CURR+DD) would be expected to relate closely with bank loans (CBK), but the relation between bank borrowing and commercial bank loans is not so clear. One school of thought would hold that an increase in borrowing from the Federal Reserve in tight money periods is indicative of substantial pressure on reserves and curtailment of loans. Another view takes a more skeptical position with regard to the banks' supposed reluctance to borrow from the Federal Reserve. This second view maintains that member banks will borrow from the Federal Reserve, liquidate Treasury securities, or enter the Federal Funds market if the return on bank loans is sufficiently higher than the cost of obtaining loanable funds, whatever the source. The evidence (from Equation 11) supports this second view.

---

[1] See Goldsmith's comment on this possibility, p. 68.

Equation 12 Borrowings of Member Banks

$$\Delta BO = .143 - .285\ BO_{-1} - .155\ (RD-RTB) - .038\ \Delta(CURR+DD)$$

$$[-2.02] \qquad [-1.70] \qquad [-.916]$$

$R^2 = .158$ $F = 1.57$ $SEE = .181$ $DW = 1.85$

Equation 13 Time and Savings Deposits at Commercial Banks

$$\Delta ER = .041 - .042\ ER_{-1} - .029\ \Delta RTB + 2.54\ \Delta X - .002\ \Delta Y$$

$$[-1.18] \qquad [-3.17] \qquad [2.54] \qquad [-2.26]$$

$R^2 = .698$ $F = 13.9$ $SEE = .013$ $DW = 1.57$

Equation 14 Time and Savings Deposits at Commercial Banks

$$\Delta TD = 4.47 + 3.11\ (RTD-RSI) - .496\ \Delta RTB + 1.36\ \Delta DD$$

$$[7.30] \qquad [-1.67] \qquad [7.44]$$

$R^2 = .830$ $F = 17.9$ $SEE = .484$ $DW = 1.65$

Equation 12 demonstrates the least satisfactory coefficient of determination ($R^2 = .158$) of any of the equations in the model. Despite several attempts to improve the fit by injecting other explanatory variables into the relationship, the R^2 and F values could not be improved. The present equation was retained for two reasons. First, the three explanatory variables all display the expected signs. Second, the R^2 and F values are approximately doubled for the easy money periods and maintain relatively high values for the combined tight and easy equations as well.

Equation 12 indicates that member banks are reluctant to borrow from the Federal Reserve when the discount rate (RD) is high, in this instance, high in relation to the Treasury bill rate (RTB). Tightening credit conditions, as reflected by a diminished money supply (CURR+DD), are generally manifested in increased borrowings, regardless of the relevant asset prices. According to Equation 13, commercial bank portfolio managers will take advantage of high short-term Treasury bill rates (RTB) rather than hold excess reserves (ER), thereby exchanging a slightly lower degree of liquidity for a higher yield. The positive sign of the commercial bank and public behavioral parameter (X) shows that increases in the reserves/total deposits ratio results in an increase in excess reserves. This result could only have been altered by some offsetting movements in required reserves or deposits.

The differential between the rate paid by commercial banks for time deposits (RTD) and the rate paid by other savings institutions (RSI) for deposits is an important factor influencing commercial banks' ability to attract funds. Another rate, the Treasury bill rate (RTB), also influences this ability. An increase in the bill rate apparently causes large depositors to switch out of time deposits into short-term Treasury securities. An increase in demand deposits (DD), the larger component of the money supply (CURR+DD),evokes an increase in time deposits in tight money periods.

The Real Sector

Equation 15 Fixed Investment

$$\Delta IF = 3.24 - .058\ IF_{-1} - .071\ \Delta RCB + .304\ \Delta CBK - .175\ \Delta Z$$

$$[-6.96] \qquad [-.126] \qquad [3.16] \qquad [-4.17]$$

$$+ .236\ \Delta CUI + .493\ \Delta(CD+CND)$$

$$[4.15] \qquad [7.13]$$

$R^2 = .830$ $F = 17.9$ $SEE = .484$ $DW = 1.65$

Equation 16 Change in Inventories

$$DH = - 20.6 - 1.6\ \Delta(CURR+DD) + .69\ \Delta MUO + .26\ P_{-1}$$

$$[-1.85] \qquad [2.99] \qquad [2.83]$$

$R^2 = .487$ $F = 7.91$ $SEE = 4.07$ $DW = 1.63$

The fixed investment (IF) equation utilized six explanatory variables, one of which, the interest rate on corporate bonds, was not significant at the 5 per cent level (or almost any lower level). The negative interest rate sign, however, conforms with expectations and in the easy money equation, the T value and regression coefficient become considerably larger. It was anticipated that the Z variable, which contains, among other elements, business profits, would associate positively with the change in fixed investment but such was not the case. Two possible explanations are that the other elements within Z are overriding business profits or higher business

profits do not necessarily lead to increased investment.[1] In the easy money equation, the Z coefficient took on a T value of only .62 although the sign remained negative.

The sign of the capacity utilization variable (CUI) buttresses the thesis that higher capacity utilization is expected to induce investment. Increases in bank loans (CBK) also associate positively with accelerated investment activity. Most investment demand functions incorporate one or more of the above explanatory variables but few include a consumption factor (CD+CND). The consumption variable serves as a proxy for sales and has the advantage that in this model, consumption, being endogenously determined, fills what would otherwise be a void in the endogenous matrix of the following chapter with a reasonable value. The consumption variable displays the highest T value of those factors attempting to explain investment in either tight or easy money periods.

The change in inventory investment (DH) is associated positively with manufacturers' unfilled orders (MUO) and lagged prices (P_{-1}), and negatively with the money supply (CURR+DD).

---

[1]There are indications that increased business profits do not associate positively with increased investment in the same quarter. Eisner said of his profits variable, "The curiously negative coefficient for current profits defies immediate explanation. Perhaps higher current capital expenditures cause higher current depreciation charges and higher current interest payments, and also entail 'start-up' or other costs, all reducing current net profits." Robert Eisner, "A Permanent Income Theory for Investment: Some Empirical Explorations," The American Economic Review, LVII (June, 1967), p. 372.

Two other attempts were made to obtain the "correct" sign for profits. One employed corporate profits and inventory valuation adjustments taken from Federal Reserve Board data and the other used corporate profits after taxes as determined by the Department of Commerce. Both coefficient signs were negative with T values less than 1.

The lagged price variable is entered to capture some of the effect of expectations. As prices rise, businessmen may wish to build-up inventories to escape paying anticipated higher prices. A decline in the money supply (which is generally associated closely with economic activity) results in an increase in inventories, possibly due to an unexpected overall decline in purchases. The first two explanatory variables (MUO and P_{-1}) imply that rational decisions regarding inventories are made by businessmen to achieve a planned stock. The third explanatory variable (CURR+DD) is entered to discern if inventories are, primarily, not planned but merely residuals which emerge after spending decisions are made.[1]

Equation 17 Consumption of Nondurables

$$\Delta CND = -2.21 + .023\ CND_{-1} + .071\ \Delta YD - 1.27\ \Delta HMH + .795\ \Delta(CURR+DD)$$

[2.55] [.803] [-2.58] [2.38]

$R^2 = .529$ F = 6.75 SEE = .934 DW = 2.07

Equation 18 Consumption of Durables

$$\Delta CD = -.524 + .009\ CD_{-1} + .096\ \Delta W + 1.76\ \Delta RGB + .261\ \Delta(CURR+DD)$$

[.812] [3.46] [1.04] [1.56]

$R^2 = .513$ F = 6.33 SEE = .626 DW = 1.82

---

[1]Michael Lovell points out inventory determinants and questions the chain of causality. "Although inventory movements may be largely explained by discrepancies between desired and actual stocks generated by changes in sales volume and the backlog of unfilled orders, this in no way establishes the precise way in which fluctuations in sales and inventories develop and whether they should be regarded as in some sense a fundamental cause, a crucial line in a causal chain, or a mere

The consumption function was separated into its two components, nondurable and durable consumption. As anticipated, consumption of nondurables responds positively to changes in disposable income and the money supply. A decrease in household cash holdings leads to an increase in nondurable consumption according to Equation 17. The signs of the explanatory variables are maintained in the comparable easy money equation.

No Friedman-type permanent income variable was entered into the consumption function, but changes in wealth did appear as a variable explaining durable consumption. The sign of the coefficient, as anticipated, is positive and the T value demonstrates a high degree of significance. The sign of the long-term interest rate, RGB, is positive in the tight money periods and negative in the easy money periods, although neither shows significance at the 5 per cent level. One explanation of the alternating signs would be that in the expansionary economy that often occurs despite the pressures of tight money, incomes are high and consumers do not mind paying the higher interest charges, particularly if rising prices are eroding the value of the dollar. In easy money periods, often characterized by recessions, consumers are cautious and would prefer to save rather than pay the interest charges that accompany

---

symptom of cyclical reversals. Michael C. Lovell, "The Contribution of Inventory Investment to Cyclical Reversals in Economic Activity," Inventory Fluctuations and Economic Stabilization, Prepared for the Subcommittee on Economic Stabilization, Automation, and Energy Resources, Joint Economic Committee (Washington, D.C.: U.S. Government Printing Office, 1962) p. 250.

credit purchases.[1] The money supply associates positively with durable consumption purchases, although its T value drops almost to zero in the easy money periods. The tight money equations indicate that a unit change in the money supply increases consumer nondurable purchases about three times as much as consumer durables, which is about the ratio of nondurable to durable consumption.

Other Credit-Sensitive Markets

Equation 19 Household Currency and Demand Deposit Holdings

$$\Delta HMH = -1.37 + .021\ HMH_{-1} - 3.60\ \Delta RTD + .126\ \Delta(DSL+MSD+TD)$$

[1.09] [-1.44] [1.62]

$R^2 = .557$ F = 10.5 SEE = .468 DW = 2.61

The household sector is represented explicitly by Equation 19 specifying household cash holdings. Increases in the interest rate paid on time deposits at commercial banks reduce householders' desire to maintain sizable cash balances. Attitudes toward cash holdings as opposed to savings at all institutions indicate some complementarity. As they increase their deposits at the three principal savings institutions, householders also augment their cash balances.

---

[1] Goldfeld says, "According to the classical notion, high interest rates increase incentives to save, thereby decreasing consumption. For a target saver, of course, the opposite would be true. Other possibilities include high interest rates leading to restricted consumer-credit conditions and, in this way, to reduced consumption. On the whole, the empirical evidence has not supported an interest effect on consumption." Goldfeld, op. cit., p. 128.

Equation 20 Consumer Credit

$$\Delta CC = .393 - .273\ \Delta DD + .176\ \Delta YD - .133\ \Delta HMH$$

$$[-2.16] \qquad [6.62] \qquad [-.936]$$

$R^2 = .654$ $F = 15.8$ $SEE = .312$ $DW = 1.15$

Equation 20 indicates that a decrease in demand deposits leads to an increase in consumer credit, while increases in disposable income evoke higher demands for consumer credit. Surprisingly, interest rate variables did not demonstrate either the expected sign (negative) nor a T value $\geq$ 1, and were therefore omitted from the above equation. As might be expected, policies which reduce householders' cash balances increase demands for consumer credit.

Equation 21 Expenditures on Residential Construction

$$\Delta REC = - .269 - 1.96\ \Delta FMA + .204\ \Delta(DSL+MSD)$$

$$[-3.17] \qquad [1.10]$$

$R^2 = .291$ $F = 5.34$ $SEE = .615$ $DW = 1.47$

Residential construction expenditures (REC) are associated positively with deposits at savings and loan associations and mutual savings banks and negatively with outlays by the Federal National Mortgage Association. Interest rates were tried in other formulations of the equation with little success. The FNMA tries to smooth out fluctuations in the mortgage market by buying

mortgages when the market is depressed (and conversely). With increased deposits at two financial institutions whose assets consist largely of mortgages, residential construction activity is strongly encouraged.

Equation 22 State and Local Borrowings

$$\Delta SLB = 2.21 - .335\ \Delta(CURR+DD) - 10.8\ \Delta ER - .114\ \Delta YD$$

$$[-1.03] \qquad [-2.38] \qquad [-1.12]$$

$R^2 = .287$ $F = 3.35$ $SEE = 1.48$ $DW = 2.58$

Commercial banks and wealthy private individuals constitute two prime sources of funds for state and local governments who borrow through the issuance of securities. As seen in the previous chapter, the attitude of banks toward municipals during periods of tight money is mixed. On the one hand, yields of most securities are rising during tight money periods, and municipals rise comparatively more than others, but on the other hand, municipals are less liquid than some other assets, and banks may value liquidity more highly than return under conditions of stress.[1] The equation above indicates that

---

[1] See William F. Staats who comments that "during periods of restrictive monetary policy, market yields on all types of debt--whether issued by corporations, the Government, state and local governments, or other debtors--move up. But yields on municipals tend to rise faster than yields on other types of issues largely because of the activities of banks and bond dealers, the two major institutional forces in the market." "The Municipal Bond Market and Tight Money," Federal Reserve Bank of Philadelphia Business Review, June, 1968, p. 3.

a decrease in the money supply leads to an increase in state and local government borrowing. It appears, also, that banks, who comprise about 40 per cent of the market for municipals, draw down their excess reserves to purchase the tax-exempt securities during tight money periods.[1]

It was anticipated that increases in disposable income would associate positively with state and local borrowing because the tax-exempt provisions should become more appealing when incomes are rising. The negative sign of the coefficient also held when changes in wealth were applied to another formulation of the state and local borrowings' equation. Other explanatory variables which were attempted and found unacceptable were the interest rate differential between municipal bonds and mortgages and state and local taxes paid. The easy money counterpart of Equation 22 demonstrated a reversal in sign of the ER and YD explanatory variables, indicating substantial cyclical variability.

---

[1] Staats, (ibid., p. 3) says that "when loan demand slackens, commercial banks having an adequate supply of reserves aggressively buy municipal bonds. But when loan demand builds up, banks simply quit adding to their municipal portfolio and in the face of tight money, may liquidate portions of their holdings."

Term Structure of Interest Rates

Equation 23 Rate on Long-Term Treasury Securities Less the Rate on Short-term Treasury Securities

$$RGB\text{-}RTB = 4.72 - .06\ DSLR - 1.81\ RGB_{-1} + 2.18\ RGB_{-2} - .28\ P + .15\ P_{-1}$$

$$[-1.34] \qquad [-3.62] \qquad [3.81] \qquad [-1.52] \qquad [.659]$$

$$+ .15\ P_{-2} + .34\ M - .44\ M_{-1} + .05\ M_{-2}$$

$$[.726] \qquad [2.12] \qquad [-1.86] \qquad [.391]$$

$R^2 = .805$ $F = 8.70$ $SEE = .352$ $DW = 1.69$

Lagged variables were incorporated into the term structure of interest rate equation to account for expectations.[1] An increase in the ratio of $\frac{\Delta GBS}{\Delta GBL}$ results, as expected, in a narrowing of the long-term, short-term differential. Increased offerings of short-term relative to long-term securities implies that a higher short-term rate must be paid to insure that the short-terms are taken off the market. The alternating signs (and high significance) of the RGB coefficients are surprising. It is necessary to go to period t_{-2} to find that an increase in the long-term rate results in an increase in the differential. It was felt that an increase in prices would bring about a diminished desire to hold long-term

---

[1] An earlier version of this equation was developed using a much longer (10 quarter) lag structure. The statistical tests indicated that observations past a 2-quarter lag were mostly irrelevant. Consequently, the present equation employs only a 2-quarter lag structure. The equation itself is based on a term structure formulation constructed by Frank de Leeuw for the Brookings Quarterly Econometric Model, op. cit., p. 477.

securities since inflation may lead to erosion of the value of a security the longer it is held. Thus price increases should associate positively with the term structure. The multiple regression indicates that this may be the case for t_{-1} and t_{-2} but not for the current quarter. A decrease in the money supply leads to a narrowing of the differential in the same quarter (possibly creating problems for some financial institutions). Since the short-term rate is more volatile than the long term, the narrowing in the differential probably occurs because of a rapid initial rise in the short-term rate. The lagged money supply variables display alternating signs and successively lower T values.

Summary of Results of Tight Money Equations

A number of asset prices were employed in the examination of the depository institutions' portfolios. Differential rates between mortgages and Treasury securities did not appear to have much bearing on the selection of these assets, leading one to conclude that these two broad asset areas are fairly well isolated from one another. A slowing of mortgage and Treasury security acquisitions in tight money periods was discussed in Chapter Two. If interest rate differentials between mortgages and Treasury securities were critical to the institutions' portfolio decisions, one type of asset might be expected to increase at the expense of the other as one asset yield rose relative to the other. The evidence suggests that such is not the case. Equations 9 and 10 indicate that commercial bank demand for short- and long-term Treasury securities is influenced more by the tacit "agreement" to support Treasury offerings than by yield differentials.

The asset yields which are probably most relevant to portfolio decisions are the varying yields within a broad asset category, for example yields on FHA and VA mortgages as opposed to conventional mortgages, or rates on consumer installment loans (of concern to commercial banks) as opposed to rates on farm loans. A very detailed study of these rates as well as maturities, down payment requirements, collateral, etc. would be necessary to completely validate conjectures surrounding the relevance of such rates.

There appears to be little doubt that rates on deposits (see Equations 3, 5, and 14) offered by competing financial intermediaries are of primary importance influencing their ability to attract funds from the general public. A 1 per cent change in the differential between competing deposits evokes a significant change in the flow of funds from one institution to another. Changes in income are also related (positively) to changes in deposits at the savings institutions.

Changes in the money supply are positively associated with changes in the consumption of nondurable and durable goods, but negatively associated with inventory accumulation. This strong relation between the money supply and real variables in the current quarter tends to buttress the Monetarist thesis that monetary influences are transmitted directly into the economy as well as indirectly through interest rates and/or changes in investment. In the four other credit-sensitive markets, there is some evidence that developments in these areas are influenced by activities within the financial institutions. For example, a decrease in deposits at savings and loan associations and mutual savings banks results in a

decline in expenditures on residential construction, and an increase in the rate paid on time and savings deposits at commercial banks is accompanied by a drop in household currency and demand deposit holdings.

Tests for Stability

Some differences within the various markets in tight and easy money periods were pointed out in Chapter Two and in the above discussion of the twenty-three tight money equations. The equations themselves may serve as the basis for the stability tests.[1] The Chow test, designed to test equality between sets of coefficients in two linear regressions, indicates instability (at the 5 per cent level) in thirteen of the twenty-three equations.[2] The real sector appears to be the most stable of the areas tested (see Table III-2). Of the four equations in the real sector, only investment demonstrated a lack of stability. Behavior is adjusted more strongly, in reaction to changing economic conditions, in the other areas. Half of the six commercial bank and two of the three life insurance company sets of regression coefficients displayed inequality.

---

[1] Stability, according to Meltzer means "that the parameter estimates for the . . . model, computed for different time periods, appeared to be drawn from the same underlying population." Allan H. Meltzer, "A Little More Evidence from the Time Series," Journal of Political Economy, LXXII (October, 1964), p. 506.

[2] See Gregory C. Chow, "Tests of Equality between Sets of Coefficients in Two Linear Regressions," Econometrica XXVIII (July, 1960), pp. 591-605, and Johnston, op. cit., pp. 136-138. The Chow test examines the hypothesis: $\beta_1 = \beta_2 = \beta$ where β_1 = the linear regression coefficients derived from one set of data, β_2 = the corresponding coefficients derived from additional, or other data, and β = the coefficients derived from the consolidated data.

TABLE III-2

The Chow Test

Variable	F	Durbin-Watson Statistic		
		Easy Money	Tight Money	Combined
ΔSLG	2.27	1.84 #	2.39 IN	2.04 #
ΔSLM	5.36**	1.56 IP	2.57 IN	1.93 #
ΔDSL	3.52*	1.04 P	1.52 IP	.79 P
ΔMSB	1.04	1.21 IP	1.83 #	2.20 #
ΔMSD	4.48**	2.37 IN	1.04 P	1.27 P
ΔGLI	5.36**	2.41 IN	2.08 #	1.73 IP
ΔMLI	3.79**	1.90 IP	2.18 IN	1.73 IP
ΔCBL	1.60	2.84 IN	2.72 IN	2.85 N
ΔSBK	1.21	1.94 #	1.63 IP	1.58 IP
ΔLBK	1.92	2.43 IN	1.48 IP	1.71 #
ΔCBK	2.85*	2.90 N	2.15 #	2.22 #

Variable	F	Durbin-Watson Statistic		
		Easy Money	Tight Money	Combined
ΔBO	1.20	1.78 #	1.85 #	1.47 IP
DH	1.35	2.21 #	1.63 #	1.38 P
ΔCND	1.47	2.92 N	2.07 #	2.39 IN
ΔCD	1.65	2.33 IN	1.82 #	2.14 #
ΔER	12.00**	2.21 #	1.57 IP	1.23 P
ΔTD	28.06**	1.66 #	2.85 N	1.71 #
ΔIF	4.03**	2.14 IN	1.65 IP	1.58 IP
ΔHMH	2.11	1.81 #	2.61 IN	2.27 #
ΔCC	7.79**	1.23 IP	1.15 P	.56 P
ΔREC	11.50**	1.01 P	1.47 IP	.75 P
ΔSLB	5.81**	1.41 IP	2.58 IN	2.19 #
RGB-RTB	4.02**	1.31 IP	1.69 IP	1.34 IP

[1] * = significance at the 5 per cent level

TABLE III-2 - Continued

[2] ** = significance at the 1 per cent level

[3] Significance means that the sets of regression coefficients are significantly different from each other at the stated levels, that is, the hypothesis that $\beta_1 = \beta_2 = \beta$ is rejected.

[4] The Chow test is computed as follows (See J. Johnston, Econometric Methods (New York: McGraw-Hill, 1963), p. 137). Q_1 = sum of squared residuals of the combined tight and easy money data. Q_2 = the total of the sum of the squared residuals of tight and easy money data run separately.

$Q_3 = Q_1 - Q_2$

$$F = \frac{Q_3 / k}{Q_2 / m + n - 2k}$$ where n = number of tight money observations, m = number of easy money observations, and k = the number of parameters estimated.

[5] The Durbin-Watson statistics are included because one of the assumptions of the Chow test is an absence of serial correlation. Therefore, Chow test results which are computed when the Durbin-Watson should be given more weight than otherwise.

[6]
IP = Indeterminate positive serial correlation
IN = Indeterminate negative serial correlation
P = Positive serial correlation
N = Negative serial correlation
\# = Absence of serial correlation

Although this sign of instability within the life insurance sector is surprising in view of the analysis of the previous chapter, the finding of fluctuations in savings institutions and other credit-sensitive markets' responses conforms with expectations. Three of five sets of savings institutions' coefficients and three of four other credit-sensitive market coefficients (all except the HMH function) are not equal by the Chow criterion.

Another, less sophisticated, index of stability substantially confirms the implications of the Chow test. By noting the sign of the comparable regression coefficients for tight and easy money periods, approximate indications of stability may be discerned. More than 25 per cent of the 92 explanatory variables employed in the 23 equations displayed contrary signs for tight and easy money. Of the five sectors, the stability status of the life insurance companies and commercial banks were somewhat altered by the sign of the coefficient "test."

Of the 14 explanatory variables in the 3 life insurance equations, 3 exhibited different signs for tight and easy money; 2 signs changed for the 17 explanatory variables in the 4 real equations. For the 21 commercial bank variables, 5 signs were reversed. The two remaining sectors, the savings institutions and other (postulated) credit-sensitive markets demonstrated the least stability, or the most susceptibility to changing credit conditions. The two savings institutions displayed 8 sign reversals of the 20 explanatory variables and the 4 credit-sensitive markets had 4 of 11 possible sign changes.

CHAPTER IV

THE COMPLETE TIGHT MONEY MODEL

The implications of the tight money relations presented in the previous chapter can be examined more fully through the utilization of impact multiplier (that is, reduced form) and simulation techniques. With the addition of several identities to the twenty-three structural equations, it is possible to determine, in the reduced form, the short-run (one quarter) impacts of changes in policy variables on the various markets in tight money periods.[1] Since gross national product, disposable income and the money supply enter the model by way of identities as endogenous variables, it is also possible to identify the effects of the policy variables on these important aggregates.

Variables endogenous to the system of equations as a whole are often employed as explanatory variables in specific equations. By structuring a matrix of endogenous variables

---

[1] Goldberger says, "the structural model is in an important sense only an implicit description of the economic process. For example, the current endogenous variables appearing on the right hand side of equation . . . are jointly dependent variables along with consumption, they themselves are accounted for in other structural equations. It follows that the level of current consumption may be found explicitly in terms of predetermined variables alone. Similarly for every other endogenous variable. This derived version of the model is known as the set of reduced forms." Arthur S. Goldberger, Impact Multipliers and Dynamic Properties of the Klein-Goldberger Model (Amsterdam: North-Holland Publishing Company, 1959), p. 14.

containing the interrelationships specified in the structural equations and the identities, one can invert the matrix to obtain feedback of the endogenous variables upon one another.[1] The rationale and techniques supporting the impact multiplier or reduced form analysis are fairly well known.[2]

The identities are listed below:

(1) $Y = CD + CND + IF + DH + G$

(2) $YD = Y - Z - T$

(3) $A = RGB - RTB$

---

[1] Goldberger, ibid., p. 15. "For many analytical purposes--as well as for simple prediction--the reduced forms are the more relevant version of the model. Each coefficient of the set of reduced forms indicates the magnitude of the direct and indirect influence of some predetermined variable upon some current endogenous variable. Specifically, in a linear model, a reduced form coefficient measures the change in the endogenous variable which occurs when a unit change occurs in the predetermined variable with all other predetermined variables held constant."

[2] Johnston (op. cit., p. 240), for example, outlines the following system:

B = a G X G matrix of coefficients of current endogenous variables

Γ = a G X K matrix of coefficients of predetermined variables (The two matrices are given in Appendix D.)

y_t, x_t, u_t = column vectors of G, K, and G elements, respectively

The model in matrix form is written as

$$By_t + \Gamma x_t = u_t$$

If it is assumed the B matrix is nonsingular, the reduced form of the model may be written

$$y_t = \pi x_t + v_t$$

where π = a G X K matrix of reduced-form coefficients
t = a column vector of G reduced-form disturbances

Thus,

$$\pi = -B^{-1}\Gamma \qquad \text{and} \qquad v_t = B^{-1}u_t$$

Johnston further assumes that $E(u_t) = 0$ for all t.

$$(4) \quad B = RR + ER + CURR$$

$$(5) \quad DD = \frac{RR - k_2\ TD}{k_1}$$

$$(6) \quad M = CURR + DD$$

$$(7) \quad M = \left(\frac{1 + \frac{CURR}{DD}}{X + \frac{CURR}{DD}} \right) B$$

New symbols introduced are:

B = the source base (a modification of the Brunner-Meltzer "monetary base" concept) or high-powered money (a term used by Friedman-Schwartz)

RR = required reserves of member banks

T = personal taxes, that is, the difference between personal income and disposable personal income

G = government (Federal and state and local) purchases of goods and services

A = the term structure of interest rates

k_1 = required reserve ratio against demand deposits

k_2 = required reserve ratio against time and savings deposits

The first identity is the sum of the components of gross national product and the second defines disposable personal income in terms of gross national product, the conglomerate variable Z, and personal taxes. The injection of these two identities permits government spending and taxing to enter the model as exogenous variables whose impact on all the endogenous variables can be ascertained in the reduced form. The third identity, representing the term structure of interest rates, is included to facilitate the computation of the

impact of the exogeneous variables on the two interest rates comprising the term structure.

The four remaining identities, combined with the commercial bank behavioral equations of the previous chapter, form a monetary sector of the reduced form model. The monetary base (B) and the two required reserve ratios (k_1 and k_2) constitute two of the three primary stabilization tools of the Federal Reserve (the other, the discount rate, was entered as an exogenous variable in the bank borrowing equation of the previous chapter). The money supply, M, which is defined in the identities, enters the system as an endogenous variable determined jointly by the Federal Reserve, (through B), the public (through $\frac{CURR}{DD}$), and the commercial banks (through X).[1] The identity $B = RR + ER + CURR$ is derived from the "uses" of the base rather than the "sources" of the base.[2] Identity (5) relates deposits to their respective required reserve ratios. The equation could be rewritten $RR = k_1\ DD + k_2\ TD$. The identity is not precisely correct because demand deposits and

---

[1] As will be demonstrated, the control of X is governed by actions of the public as well as the banking system.

[2] The uses of the "source" base, as described by Andersen and Jordan, consist of member bank deposits at the Federal Reserve, currency held by banks and currency held by the public. In the above identity, RR + ER approximate the sum of member bank deposits and currency held by banks. An exact specification of the base, would require an additional, but relatively unimportant variable, vault cash of non-member banks, in order that the identity would read:

$$B = RR + ER + CURR + CNMB$$

when CNMB = currency (or vault cash) of non-member banks. Leonall C. Andersen and Jerry L. Jordan, "The Monetary Base--Explanation and Analytical Use," Federal Reserve Bank of St. Louis Review, L (August, 1968), p. 7.

time (and savings) deposits of nonmember banks are included in the DD and TD variables, respectively. Since member banks hold the vast majority of all deposits of the commercial banking system, it was felt that refinements of the identity, for the purposes at hand, were unnecessary. The sixth identity defines the money stock in the customary way, that is, currency in the hands of the public plus demand deposits. Brunner and Meltzer's work[1] provides the basis for the formulation of the final identity,

$$M = \left(\frac{1 + \frac{CURR}{DD}}{X + \frac{CURR}{DD}} \right) \quad B$$

---

[1]See Karl Brunner and Allan H. Meltzer, "Liquidity Traps for Money, Bank Credit, and Interest Rates," Journal of Political Economy, LXXVI (Jan./Feb., 1968), p. 32. In their system M = mB where m is the monetary multiplier, a variable which has demonstrated considerable stability over the years. In fact, much of the Brunner-Meltzer treatise rests on the assumption of a high degree of stability of m. The monetary multiplier is a function of many monetary variables.

$$m = \frac{1 + k}{[a\delta r^d + (1 - a)\,\gamma r^t + v + e]\,(1 + t + d) + k}$$

k = C^p/D^p, currency ratio

t = T^d/D^p, time deposit ratio

d = D^g/D^f, government deposit ratio

e = excess reserve ratio, or $\frac{\text{excess reserves}}{\text{total deposits}}$

v = non-member vault cash ratio

a = $\frac{1 + d}{1 + t + d}$

δ = ratio of net demand deposits at member banks to total demand deposits

γ = ratio of demand deposits at member banks to total time deposits

r^d = weighted average reserve requirements on demand deposits at member banks

r^t = weighted average reserve requirement on time deposits at member banks

D^p = demand deposits held by the public

The two non-linear identities, (5) and (7), must be linearized at the mean to become compatible with other entries in the reduced-form system. The derivation process is described in Appendix E .

Impact Multiplier Results

Table IV-1 presents a subset of the π (or reduced form) matrix containing exogenous variables, the majority of which are under the control of policy-makers, and the endogenous variables of the system. The numbers in the table represent one quarter impact multipliers. Of the nine exogenous variables listed in the table, six could be said to be policy control variables, one (RTD) is a quasi-control variable, and the other two (CUI and X) are not under the explicit control of any single agency, but give some additional information about the character of the system. Capacity utilization, for example, is not a fiscal or monetary tool, but changes which lead to different rates of capacity utilization have significant impacts on other variables.

C^p = currency held by the public

T^d = time deposits held by the public

D^g = government (Treasury) deposits at commercial banks

It can readily be seen that the actual value of the monetary multiplier depends on actions of the monetary authorities, the commercial banks, and the public.

The equation can be compressed to

$$m = \frac{1 + k}{\frac{\text{Required reserves + vault cash outside required reserves}}{\text{Total deposits of member + non-member banks}} + k}$$

In terms of the symbols employed elsewhere in this dissertation,

$$m = \frac{1 + \frac{CURR}{DD}}{X + \frac{CURR}{DD}}$$

TABLE IV-1

Tight Money Impact Multipliers

	RTD	RD	CUI	G	T	B	k_1	k_2	X
SLG	-.163	-.00063	.00157	.00664	-.00664	-.0821	.297	.227	.0845
SLM	-1.24	-.00387	.0097	.0411	-.0399	.041	.00681	.00522	-.0482
DSL	-1.29	-.00381	.00954	.0404	-.0393	.0402	.0139	.0106	-.0475
MSB	-.041	.0000	.0000	-.00001	.0000	.0752	-.250	-.191	-.0783
MSD	-.241	-.00379	.0095	.0402	-.0391	.0421	-.0903	-.0691	-.0458
GLI	.0318	.0000	.0000	.00001	.0000	-.0582	.193	.148	.0606
MLI	-.0178	-.00009	.00022	.00094	-.00091	.00096	-.00089	-.00068	-.00108
CBL	.0712	-.00341	.00855	.00223	-.00121	.0366	-.105	-.0804	-.0388
SBK	-.250	.0000	-.00001	-.00004	.0000	.458	-1.52	-1.16	91.5
LBK	-.135	.0000	-.00001	-.00002	.0000	.247	-.819	-.627	-.257
CBK	.355	-.320	.0249	.105	-.00944	.657	-2.05	-1.57	-.689
BO	.0217	-.155	.0000	.0000	.0000	-.0397	.132	.101	.0413
ER	-.0158	.00024	-.0006	-.00255	.00023	-.00267	.00572	.00438	2.54
TD	2.18	.00001	-.00004	-.00015	.00001	.115	-5.64	-4.32	.0824
IF	2.09	-.10041	.252	.0655	-.0355	1.08	-3.09	-2.36	-1.14
DH	.913	-.00001	.00003	.00015	-.00001	-1.67	5.54	4.24	1.74
CND	4.52	-.00641	.016	.068	-.0661	.883	-2.02	-1.55	-.954
CD	-.491	.00001	-.00002	-.00008	.00001	.897	-2.98	-2.28	-.933
HMH	-3.52	-.00096	.00239	.0101	-.00987	.0249	-.720	-.551	-.00137
CC	1.57	-.0187	.0468	.198	-.193	.186	.631	.483	-.241
REC	-.313	-.00155	.00388	.0164	-.0160	.0168	-.0156	-.0119	-.019
SLB	-.440	.00958	-.024	-.102	.123	-.456	1.39	1.06	-26.9
A=RGB-RTB	-.194	.0000	-.00001	-.00003	.0000	.355	-1.18	-.901	-.369
Y	7.03	-.107	.268	1.13	-.102	1.19	-2.54	-1.95	-1.29
YD	7.03	-.107	.267	1.13	-1.10	1.19	-2.54	-1.95	-1.29
RR	.0966	.00024	-.0006	-.00253	.00023	1.96	.688	.526	1.40
M=CURR+DD	-.571	.00001	-.00002	-.00009	.00001	1.04	-3.46	-2.65	-1.09

Starting with the fiscal multipliers which are listed in the table as G (Government expenditures) and T (Taxes), it appears that neither of the two have a very large impact on the endogenous variables of the system.[1] An increase in Government expenditures of $1 billion will lead to an increase in gross national product (in annual rates) of $1.13 billion, but only $.13 of that is in the non-governmental sectors. A $1 billion increase in G, matched by a $1 billion change in the same direction in T results in a $1.03 billion rise in gross national product. The change which occurs in disposable income (YD), as a consequence of the balanced budget move, is, as expected, much less. Since fiscal variables are distinctly in the minority in the structural equations and identities, the results could be simply a manifestation of the method by which the system was structured. With much additional research, more sophisticated fiscal measures could be entered in the reduced form. The G variable, for example, could be broken down to include Federal expenditures and state and local expenditures. The Federal expenditures could be separated into defense expenditures and nondefense expenditures to investigate the magnitudes of the resulting multipliers. The T variable could be divided into several components rather than total taxes, to include the personal income tax rate, corporate tax rates, social security taxes, and so forth. On the state and local level, changes in sales taxes could be admitted as well as changes in property tax rates.

---

[1] See Andersen and Jordan, "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization," Federal Reserve Bank of St. Louis Review, L (November, 1968), pp. 11-24. Andersen and Jordan find a similar lack of influence on the part of the fiscal variables of their system.

In regard to the monetary policy instruments, it can be seen that changes in the base have a larger impact on the economy than changes in the fiscal variables. A $1 billion decrease in the base would result in a $1.19 billion decrease in gross national product, but that impact would be spread throughout the system, rather than concentrated in one sector. Increases in the base result in a $.04 billion increase in savings and loan holdings of mortgages and a slightly larger increase in mutual savings banks holdings of mortgages. Base increases also are associated positively with increases in commercial bank holdings of short-term and long-term government securities and bank loans, but are negatively associated with borrowings and excess reserves.

The $1.19 billion figure for increases in GNP can be examined in terms of the real variables, that is IF, DH, CND, and CD. An increase in the base increases, in order of magnitude, fixed investment, durable consumption, and nondurable consumption. Increases in these areas are somewhat offset by a substantial ($1.67 billion) decline in inventory accumulation. Increases in the base also result in increases in household money holdings and the extension of consumer credit. Consequently, if the Federal Reserve wanted to reduce credit extensions during tight money periods, it could reduce the base rather than resort to special credit limitation tools.

Two of the other variables under the control of the Federal Reserve, the required reserve ratios on demand deposits (k_1) and time deposits (k_2), apparently exert a powerful influence on the endogenous variables of the system. For example, a one

percentage point increase in k_1 results in a decrease in GNP of $2.54 billion. An increase in DH is more than offset by declines in the consumption and fixed investment sectors. Reserve requirement ratios are generally considered to be crude, as opposed to fine tuning, tools in the Federal Reserve arsenal. The sweeping effects of a one percentage point increase in both k_1 and k_2 can be observed by noting that the money supply would fall by over $6 billion and gross national product would decline $4.5 billion. In the period covered by the data, changes in reserve requirements have been, with minor exceptions, downward.

The discount rate does not appear to be a very strong Federal Reserve stabilization policy instrument. The discount rate is often raised during tight money periods by the "Fed" more as a signal than as an actual impediment to continued expansion. To achieve a $.5 billion reduction in GNP, the discount rate would have to be raised nearly 5 percentage points (under the assumption that all other exogenous variables would be held constant, an unlikely event). If the Federal Reserve believed the economy were growing too rapidly, it might employ a combination of its tools to reduce nominal GNP by, say $5 billion. A one percentage point increase in the required reserve ratio against demand deposits (k_1) and a $2 billion sale of Treasury bonds would, based on the above model, accomplish the goal.[1]

---

[1]The primary sources of the monetary base are Federal Reserve holdings of Treasury securities and the gold stock. Together, they account for about 90 per cent of the base. See Leonall C. Andersen and Jerry L. Jordan, "The Monetary Base--Explanation and Analytical Use," op. cit., p. 7.

Such a large decline in GNP, however, would likely be undesirable. Moreover, the Federal Reserve is often constrained to "even keel," that is,purchase a large amount of new Treasury offerings to guarantee the securities being taken off the market at a "reasonable" interest rate, when prevailing economic conditions might call for a reduction in the pace of economic activity. In such a situation the monetary authorities could increase the demand deposit required reserve ratio one point and purchase $1 billion of Treasury bonds, giving a net decrease in GNP of about $1.3 billion.

The interest rate paid by commercial banks on time and savings deposits (RTD) represents a quasi-control variable exercised by the Federal Reserve, if it is assumed member and non-member banks pay interest on deposits near the ceiling set by Regulation Q. An increase in this rate causes a channeling of funds to commercial banks and away from savings and loan associations and mutual savings banks. The result is a decrease in mortgage loans extended by savings and loan associations and mutual savings banks and an increase in bank loans. There is also a surprisingly large increase in GNP which is generated primarily by an unaccountably large rise in nondurable consumption spending.

Federal Reserve actions could be offset, however, by actions of the public and commercial banks in varying X. A one percentage point decrease in X, that is, a decrease in reserves relative to total deposits, could offset a Federal Reserve sale of $1 billion of Treasury securities executed to moderate the pace of economic activity.

The capacity utilization index (CUI), which is not a policy control variable, could be increased directly by such factors as labor

employment gains, technology or higher profits and indirectly by stimulative fiscal and monetary policies. Whatever the source, a one percentage point increase in capacity utilization effects a $.268 billion increase in GNP. Most of the increase is reflected in a higher level of fixed investment. It would appear that policies directed at stimulating capacity utilization stimulate income through additional investment activity.

Approaching Table IV-1 from the endogenous variable point of view, it can be seen that increased liquidity, provided by increases in the monetary base, filter through the economy in the same quarter so as to increase spending in nearly all sectors. Savings institutions, buoyed by increased deposits, engage in additional mortgage activity, life insurance companies and commercial banks extend more credit, householders hold more cash, consumers spend more for durable and nondurable goods and services, businesses expand their investments, and residential construction activity increases. If a moderated pace of economic activity were desired, the Federal Reserve could bring both direct and indirect pressures to bear. In addition to directly slowing the economy and its sectors through sales of Treasury securities, the "Fed" may also narrow the differential between long- and short-term interest rates (A). Savings institutions, which experienced considerable difficulties in 1966 when the rate of growth of the money supply (and base) was slowed, face a two-fold problem: their deposit growth moderates and the change in yields paid on their assets (mortgages) and liabilities (deposits) works against them.

Simulation Results

The foregoing impact multiplier (or reduced form) analysis largely omits consideration of the effect of time lags on the system and consequently fails to incorporate the dynamic properties of the model. It is possible to "simulate" the time path of the response of endogenous variables to changes in exogenous variables when lagged endogenous variables are utilized in the system of equations.[1]

---

[1] Goldberger, op. cit., pp. 80-81 outlines the following procedure for constructing simulation vectors:

y = a single endogenous variable
z = a single predetermined variable

$\pi = - B^{-1} \Gamma$ (see p.136, footnote 2)

and

$y = - B^{-1} \Gamma z = \pi z$ shows the explicit dependence of the y's upon the z's.

also

$\dot{y} = \pi \dot{z}$ where $\dot{y} = y_t - y_{t-1}$

and $\dot{z} = z_t - z_{t-1}$

"The set of variables predetermined at time t, that is the $\dot{z}_t$, consists of a set of exogenous variables, which we now denote as $\dot{v}_t$, and a set of lagged endogenous variables, which we now denote as $\dot{y}_{t-1}$.

"If the predetermined vector $\dot{z}_t$ . . . is partitioned into an exogenous vector $\dot{v}_t$ and a lagged endogenous vector $\dot{y}_{t-1}$, and the coefficient matrix π_o is correspondingly partitioned, the reduced forms may be written

(5.0.2)[equation number] $\dot{y}_t = [\pi_1 \ \pi_2] \begin{matrix} \dot{v}_t \\ \dot{y}_{t-1} \end{matrix}$

or equivalently,

(5.0.3) $\dot{y}_t = \pi_1 \dot{v}_t + \pi_2 \dot{y}_{t-1}$

Although the distinction between lagged endogenous and actual exogenous variables (both may be classified as predetermined variables) is of little consequence in the formulation of the impact multipliers, it is of critical importance in the determination of the longer-run responses. In the dynamic system, the lagged endogenous variables are themselves determined by the actual exogenous variables as the time path is traced out.

Table IV-2 gives the results of two alternative simulations over a period of one year (four quarters). Stabilization authorities desire (it is assumed) to pull the economy out of a tight money period. A number of policy instruments are available to them, but (it is further assumed) only the alternatives of (1) increasing the monetary base $1 billion in four consecutive quarters or (2) increasing Government expenditures by a similar amount for four quarters are considered.[1]

"If the initial conditions are specified, i.e., if a set of values of the variables y_t are specified for some year, say, $t = -1$; and if the time path of the exogenous variables z_t is also specified, i.e., if a set of values of the variables z_t are specified for years $t = 0, 1, 2, 3 \ldots$; then the time path of the endogenous variables may be traced out for years $t = 0, 1, 2, 3 \ldots$, by repeated use of (5.0.3).

[1]The problems encountered in attempting to approximate "reality" with the impact multiplier approach are compounded with the longer-run simulation concept. For example, it is assumed (under the impact multiplier approach) that all exogenous variables remain unchanged for a quarter in order to discern the impact of one exogenous variable on the endogenous components of the system; when a simulation is traced out over several quarters, all exogenous variables, other than those which are permitted to vary, are held constant over that entire period, a very unrealistic, but necessary assumption.

TABLE IV-2

Simulation Results

	Monetary Base is Increased $1 Billion in Each Quarter				Government Expenditures are Increased $1 Billion in Each Quarter			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
SLG	-.0821	.9089	-.371	.859	.0066	.0065	.0065	.0063
SLM	.041	-.0652	.308	-.578	.0411	.0437	.0461	.0484
DSL	.0402	-.0075	.29	-.495	.0404	.0415	.0425	.0437
MSB	.0752	-.0808	.354	-.779	.0000	.0000	.0000	.0001
MSD	.0421	-.0056	.291	-.493	.0402	.0410	.0417	.0425
GLI	-.0582	.0718	-.276	.639	.0000	.0000	.0000	-.0001
MLI	.0010	-.0014	.482	-.529	.0009	.0010	.0010	.0011
CBL	.0366	.0004	-.206	.168	.0022	.0021	.0020	.0018
SBK	.458	-.528	2.16	-4.90	.0000	.0000	-.0002	.0004
LBK	.247	-.313	1.17	-2.77	.0000	.0000	-.0001	.0002
CBK	.657	.639	1.39	-.653	.105	.106	.107	.108
BO	-.0397	.0113	-.0032	.0008	.0000	.0000	.0000	.0000
ER	-.0027	.0005	-.0183	.0325	-.0026	-.0024	-.0023	-.0022
TD	.115	.116	.114	.117	-.0001	-.0001	-.0001	-.0001
IF	1.08	.0287	2.94	-4.93	.0655	.0624	.0591	.0569
DH	-1.67	-.0002	.0011	-.0029	.0001	.0000	.0000	.0000
CND	.883	.818	1.33	.0231	.0680	.0686	.0692	.0700
CD	.897	-1.03	3.89	-9.15	-.0001	.0001	-.0003	.0008
HMH	.0249	.0134	.0883	-.107	.0101	.0106	.0110	.0115
CC	.186	-.0536	1.41	-2.48	.198	.198	.197	.197
REC	.0168	-.0027	.118	-.201	.0165	.0168	.0172	.0176
SLB	-.456	-.335	-1.08	.902	-.102	-.103	-.103	-.104
A=RGB-RTB	.355	-.743	2.06	-5.38	.0000	.0001	-.0002	.0005
Y	1.19	-.18	8.17	-14.1	1.134	1.131	1.128	1.128
YD	1.19	-.18	8.17	-14.1	1.134	1.131	1.128	1.128
RR	1.96	1.96	1.94	1.99	-.0025	-.0024	-.0023	-.0022
M=CURR+DD	1.04	1.04	1.04	1.04	-.0001	-.0001	-.0001	-.0001

The simulation results show a much stronger, more pervasive effect on the endogenous variables for increases in the monetary base than increases in Government expenditures. Increases in the base demonstrate a fairly moderate influence over the system in the first two quarters, but that influence is strongly magnified in the latter half of the "simulation year." Changes in the base have their most significant effects in the real sector on durable consumption and fixed investment spending. Government expenditures demonstrated little influence over spending in other areas in the foregoing impact multiplier analysis and Table IV-2 shows that this lack of influence is also found in the four-quarter simulation. Minor oscillations may be observed in the Government expenditure simulation, but a significant explosive oscillation appears to develop in the time paths generated by changes in the monetary base.[1] These apparently unstable movements of the endogenous variables probably

---

[1]The time paths traced by the Klein-Goldberger model also displayed a high degree of sensitivity to changes in monetary variables. " . . . strong feedbacks did indeed appear when the preliminary calculations on (multi-period) multipliers, referred to above, were made. However, their character was so clearly unrealistic that the monetary relations were discarded from the system; after the second or third year [annual data were used], money market effects swamped all other effects and in an implausible way. . . . "Our interpretation of this pattern is not that the feedback of the monetary sector to the real sector has been uncovered by considering delayed effects, but rather that the monetary equations of the K-G [Klein-Goldberger] model are not adequate. A step that suggests itself is to undertake a reformulation of the model which would specify the money market relationships more realistically and accurately. Such a step, however, is a major task in itself." Goldberger, op. cit., pp. 84-85. The Klein-Goldberger solution to the problem was to hold certain endogenous monetary variables constant throughout the simulation. No such (artificial) technique was attempted in the tight money model.

reflect the employment of data derived from the tight money phase of the cycle. The finding of instability is not surprising in view of the Chow test results of Chapter Two (thirteen of the twenty-three equations demonstrated a lack of stability at the 5 per cent level of significance.)

Predictive Ability of the Model

The adequacy of the system of equations can be tested in an approximate fashion by examining the predictive ability of the model. The seven-quarter 1959-61 period of tight money was selected for testing purposes.[1] Partial forecasting (as well as the impact multiplier and simulation techniques utilized in this chapter) assists in determining the explanatory effectiveness of the model. Total (impact multiplier), and partial analysis provide complementary forecasting information. The former technique has the advantage of incorporating the simultaneity of the entire model whereas partial forecasting can only provide

---

[1]The third tight money period, III/1959-I/1961, was chosen for several reasons. First, its seven quarters represent an average period in that the four tight money periods provided 29 observations, making 7 an average in terms of duration. Second, it occurs near the data midpoint of 1953 and 1967. If structural shifts took place in those markets analyzed, the data mid-point should remain more free from structural shift errors than the extremities. Third, as pointed out in the first chapter, the sequence of events pertaining to interest rates, the money supply, etc. appeared in accord with expectations. Fourth, the other three tight money periods are less desirable for a combination of the above reasons. The 1953-1954 period was one in which the financial institutions were still holding large amounts of Treasury obligations, an important factor much less prevalent in subsequent periods. The 1955-1957 period was one of much longer duration than the others, and the 1966-1967 period was atypical in view of its severity.

information on the adequacy of individual equations.[1]

With the partial analysis method, actual values of predetermined and endogenous explanatory variables are substituted into the isolated equations without regard for simultaneity. Since the regressions are in terms of Δ's rather than levels, the estimated Δ is added to the actual level of the previous quarter. Addition of estimated Δ's to previously estimated levels would simply magnify previous errors, which in terms of a seven-quarter forecast, would likely be substantial.

An attempt was made at combining the simultaneity aspect of the total analysis technique with the structural features of partial analysis. The equations were again estimated one-by-one, but they were arranged in such an order that estimated, rather than actual, values of endogenous explanatory variables could be employed in some of the equations. Certain variables endogenous to the system, those found in the identities, took on, as before, actual values. For example, in the ΔCND equation in which $\Delta CND = f\ (CND_{-1}, \Delta YD, \Delta HMH, \Delta(CURR+DD)), \Delta YD$, and $\Delta(CURR+DD)$, defined in the identities, were given their actual values, but

---

[1]Goldberger (op. cit., p. 50) describes the primary deficiency of the partial method: "... since it does not utilize the full model simultaneously, it does not provide direct evidence on the effectiveness of the model as a whole. Structural errors may be compounded--or cancelled out--when the ramifications of the full body of relationships are allowed to manifest themselves." However, partial analysis, "is particularly suited for studying the stability--or lack of it--displayed by individual structural relationships." Of total, or impact multiplier analysis, Goldberger says, "... the only observations fed into the model for each sample year are the values of the predetermined variables. When this is done, the full model constitutes a system of simultaneous equations in all the current endogenous variables."

ΔHMH, was estimated from the equation $\Delta HMH = f(HMH_{-1}, P_{-1}, \Delta RTD, \Delta SMI)$.[1] Some measure of simultaneity was thus obtained by employing one estimated variable among the four explaining the change in non-durable consumption. The fixed investment equation, $\Delta IF = (IF_{-1}, \Delta CBK, \Delta Z, \Delta CUI, \Delta(CD+CND))$ utilizes three endogenous explanatory variables, ΔCBK, ΔCND, and ΔCD. ΔCBK and ΔCD were estimated in the above manner for inclusion in the ΔIF variable. The primary handicap of partial analysis was overcome to some extent in this manner.

Another important variant of the partial analysis technique was examined. The procedure, which utilizes average rates of change of the variables, is based on the assumption that there exists a significant degree of uniformity, with regard to sequence, direction and magnitude of changes in key variables, over tight money periods. This approach was suggested by the fact that most of the tight money indicators, as discussed in Chapter One, did exhibit certain similarities over the four periods. If the movements in explanatory variables are sufficiently similar during tight money periods, it should be possible to predict, generally, their impact on the endogenous variables of the system in future tight money periods. If this specific thesis were tested for the 1959-1961 tight money period, no actual values of the variables would be permitted to be entered in the equations after the first estimates, and the errors

---

[1]This form of the ΔHMH equation, not exhibited in the previous chapter, was picked since it utilizes only predetermined variables. The equation is given as:

$$\Delta HMH = -2.76 + .0457\ HMH_{-1} + .0004\ P_{-1} - 2.60\ \Delta RTD + .073\ \Delta SMI$$
$$[4.49] \qquad [.076] \qquad [1.19] \qquad [3.32]$$

SMI = The Standard and Poor's 500 Stock Market Index.

would be compounded (or canceled) throughout the seven quarters. In line with the other two approaches to partial analysis, however, the estimated Δ's were tied to the actual levels of the previous quarter and the above forecasting thesis was not examined directly. The average rates of change and the results of the third partial analysis give some indication as to how fruitful it might be to attempt forecasting an entire tight money period on the basis of averaging (or perhaps averaging with weights) variable movements of earlier tight money periods. The average rates of change and the technique employed in obtaining them are described in the appendix.

Table IV-3 presents the results of the three forecasting techniques compared with actual values of the variables for the 1959-1961 tight money period. Simultaneous forecasting, given the ad hoc constraint of treating variables employed in identities as predetermined, was possible in twelve of the twenty-three cases. Average rates of change for all predetermined variables (including those defined in the identities), other than lagged values of endogenous variables, were utilized for computation of the last column of the table. Some measure of simultaneity was gained for the average rates of change estimates by following the technique employed in the simultaneous forecasting procedures.

The simultaneous and average rate of change forecasts are only slightly inferior to those of the basic partial forecasting approach. The least predictable variable was changes in inventories, DH. Forecasts of the other twenty-two variables were reasonably

TABLE IV-3

Comparison of Predicted and Actual Values
of Tight Money Equations, III/1959-I/1961

Variable	SEE[1]	Quarter	Actual	Predicted		
				Partial Forecasting	Simultaneous Forecasting	Forecasting with Average Rates of Change
SLG - Savings and loan holdings of Federal Government securities						
	.153	III/'59	4.5	4.5	4.5	4.5
		IV /'59	4.6	4.7	4.7	4.6
		I /'60	4.6	4.7	4.7	4.7
		II /'60	4.6	4.6	4.6	4.7
		III/'60	4.5	4.7	4.6	4.6
		IV /'60	4.7	4.6	4.5	4.5
		I /'61	4.9	4.8	4.7	4.8
SLM - Savings and loan holdings of mortgages						
	.718	III/'59	51.3	49.0	45.2	49.2
		IV /'59	51.3	50.8	50.1	50.7
		I /'60	54.7	50.9	52.9	50.9
		II /'60	56.3	53.7	53.2	54.1
		III/'60	58.2	55.8	54.6	55.7
		IV /'60	60.1	57.9	58.5	57.6
		I /'61	62.1	59.8	61.2	59.5
DSL - Deposits at savings and loan associations						
	.415	III/'59	52.9	52.3		52.5
		IV /'59	54.6	54.4		54.3
		I /'60	56.2	56.4		56.2
		II /'60	57.8	58.0		57.8
		III/'60	59.9	59.4		59.4
		IV /'60	59.9	61.5		59.4
		I /'61	62.1	63.8		61.5
MSB - Mutual savings banks' holdings of mortgages						
	.148	III/'59	24.3	24.0		24.0
		IV /'59	24.8	24.9		24.1
		I /'60	25.3	24.8		24.8
		II /'60	25.7	25.3		25.3
		III/'60	26.1	25.7		25.7
		IV /'60	26.7	26.1		26.2
		I /'61	27.3	26.7		26.7

[1]SEE = the Standard error of estimate

TABLE IV-3 - Continued

Variable	SEE	Quarter	Actual	Predicted: Partial Forecasting	Predicted: Simultaneous Forecasting	Predicted: Forecasting with Average Rates of Change
MSD - Deposits at mutual savings banks						
	.214	III/'59	34.9	34.0		34.1
		IV /'59	35.0	34.0		34.2
		I /'60	35.2	35.0		34.4
		II /'60	35.5	35.8		35.3
		III/'60	36.0	36.1		36.1
		IV /'60	36.3	36.8		36.8
		I /'61	37.0	37.0		36.7
GLI - Treasury securities held by life insurance companies						
	.128	III/'59	7.1	6.9		6.8
		IV /'59	6.9	6.9		6.9
		I /'60	6.8	6.8		6.8
		II /'60	6.6	6.7		6.7
		III/'60	6.5	6.4		6.5
		IV /'60	6.4	6.4		6.4
		I /'60	6.5	6.3		6.3
MLI - Mortgages held by life insurance companies						
	.127	III/'59	38.6	38.3	38.3	38.3
		IV /'59	39.2	39.5	39.2	38.9
		I /'60	40.0	39.5	39.5	39.4
		II /'60	40.6	39.5	39.0	40.2
		III/'60	41.2	40.8	39.7	40.8
		IV /'60	41.8	41.3	41.0	41.4
		I /'60	42.4	42.1	41.6	41.6
CBL - Life insurance company holdings of corporate bonds						
	.195	III/'59	44.8	44.8	44.8	44.8
		IV /'59	45.2	45.5	45.5	45.4
		I /'60	45.6	45.8	45.7	45.9
		II /'60	46.1	46.0	46.1	46.2
		III/'60	46.4	46.6	46.6	46.6
		IV /'60	47.0	47.0	46.9	47.0
		I /'60	47.4	47.4	47.5	47.9

TABLE IV-3 - Continued

Variable	SEE	Quarter	Actual	Predicted: Partial Forecasting	Predicted: Simultaneous Forecasting	Predicted: Forecasting with Average Rates of Change
SBK - Short-term Treasury securities held by commercial banks						
	1.37	III/'59	9.3	9.7	9.8	11.7
		IV /'59	9.7	8.6	8.7	10.3
		I /'60	8.1	9.5	9.6	9.0
		II /'60	6.7	8.8	8.5	8.9
		III/'60	10.6	9.6	10.0	8.9
		IV /'60	12.6	10.4	10.0	11.4
		I /'61	16.2	16.1	10.0	12.9
LBK - Long-term Treasury securities held by commercial banks						
	1.96	III/'59	43.0	42.3	42.5	43.1
		IV /'59	41.1	41.2	41.2	41.3
		I /'60	39.5	40.4	40.3	39.8
		II /'60	41.7	39.6	39.5	38.9
		III/'60	40.1	41.8	42.0	41.2
		IV /'60	39.9	40.3	40.1	40.2
		I /'61	37.6	40.0	39.9	39.4
CBK - Commercial bank loans						
	1.43	III/'59	107.6	105.4	110.0	108.3
		IV /'59	110.1	108.7	108.8	110.1
		I /'60	112.5	111.6	111.6	112.5
		II /'60	114.6	113.1	113.2	114.7
		III/'60	115.9	116.2	116.4	116.1
		IV /'60	116.7	115.9	117.2	118.0
		I /'61	117.2	119.0	118.5	121.3
BO - Borrowings of member banks						
	.181	III/'59	.869	.852		.688
		IV /'59	.841	.891		.879
		I /'60	.665	.680		.693
		II /'60	.420	.467		.524
		III/'60	.223	.324		.261
		IV /'60	.082	.191		.129
		I /'61	.072	.070		.168

TABLE IV-3 - Continued

Variable	SEE	Quarter	Actual	Predicted: Partial Forecasting	Predicted: Simultaneous Forecasting	Predicted: Forecasting with Average Rates of Change
ER - Excess reserves of member banks						
	.014	III/'59	.410	.398		.394
		IV /'59	.444	.403		.406
		I /'60	.446	.504		.451
		II /'60	.490	.496		.459
		III/'60	.642	.494		.499
		IV /'60	.699	.670		.665
		I /'60	.692	.702		.667
TD - Time and savings deposits at commercial banks						
	.789	III/'59	67.3	68.1		67.4
		IV /'59	67.4	66.6		67.8
		I /'60	67.0	67.4		68.4
		II /'60	67.9	67.4		68.3
		III/'60	70.5	70.3		69.8
		IV /'60	72.9	71.7		72.7
		I /'61	72.9	75.4		72.7
IF - Fixed investment						
	.474	III/'59	71.8	74.5	73.4	73.9
		IV /'59	70.8	71.6	70.8	72.0
		I /'60	72.6	71.7	68.3	71.9
		II /'60	72.1	73.3	73.1	71.7
		III/'60	70.4	70.7	72.6	72.1
		IV /'60	70.0	69.2	69.3	71.4
		I /'61	67.7	69.8	71.1	71.3
DH - Changes in inventories						
	4.06	III/'59	.4	6.3		9.2
		IV /'59	6.3	8.7		3.7
		I /'60	9.9	4.9		5.2
		II /'60	3.9	5.6		5.3
		III/'60	3.1	4.4		2.6
		IV /'60	-2.4	5.4		2.5
		I /'60	-3.5	4.3		.3

TABLE IV-3 - Continued

Variable	SEE	Quarter	Actual	Predicted		
				Partial Forecasting	Simultaneous Forecasting	Forecasting with Average Rates of Change
CND - Consumption of nondurables						
	.934	III/'59	147.3	146.7	146.4	149.3
		IV /'59	149.1	147.5	146.2	147.1
		I /'60	149.4	151.5	145.9	151.2
		II /'60	152.0	150.9	146.4	148.9
		III/'60	151.3	152.6	148.2	153.7
		IV /'60	152.5	152.4	148.7	153.8
		I /'61	154.1	154.0	150.9	153.7
CD - Consumption of durables						
	.626	III/'59	45.8	45.7		46.6
		IV /'59	43.6	46.1		46.1
		I /'60	45.9	43.2		44.2
		II /'60	46.1	45.6		45.8
		III/'60	45.3	46.1		45.6
		IV /'60	43.8	45.3		46.1
		I /'61	41.9	43.9		43.9
HMH - Household currency and demand deposit holdings						
	.415	III/'59	66.5	66.5		66.6
		IV /'59	66.7	67.0		66.7
		I /'60	65.3	67.4		67.3
		II /'60	64.7	65.5		65.5
		III/'60	65.9	65.0		64.9
		IV /'60	65.9	66.4		66.4
		I /'61	66.5	66.0		67.0
CC - Consumer credit						
	.312	III/'59	49.0	47.5	47.5	48.1
		IV /'59	50.3	50.4	48.9	50.2
		I /'60	51.9	52.0	50.3	51.3
		II /'60	53.4	53.2	51.5	52.9
		III/'60	54.3	53.7	51.9	54.1
		IV /'60	54.7	54.6	52.2	54.9
		I /'61	55.0	55.3	52.9	55.4

TABLE IV-3 - Continued

Variable	SEE	Quarter	Actual	Predicted		
				Partial Forecasting	Simultaneous Forecasting	Forecasting with Average Rates of Change
REC - Expenditures on residential construction						
	.615	III/'59	24.1	23.9	23.6	24.0
		IV /'59	23.4	23.8	23.7	23.7
		I /'60	23.1	23.2	23.4	23.0
		II /'60	21.8	22.7	22.8	22.9
		III/'60	20.8	21.7	21.5	21.6
		IV /'60	20.8	21.0	21.1	20.8
		I /'61	21.0	21.5	21.3	20.7
SLB - State and local borrowings						
	1.48	III/'59	83.3	83.4	83.1	80.1
		IV /'59	84.7	85.1	85.5	85.9
		I /'60	86.5	86.7	86.1	85.2
		II /'60	88.3	88.3	88.0	88.7
		III/'60	90.6	88.4	89.9	90.3
		IV /'60	92.3	92.2	92.5	90.8
		I /'60	94.6	93.9	93.8	94.6
RGB-RTB - Term structure of interest rates						
	.352	III/'59	.22	.48		
		IV /'59	-.22	-.18		
		I /'60	.77	.84		
		II /'60	1.53	1.28		
		III/'60	1.34	1.67		
		IV /'60	1.63	1.35		
		I /'61	1.39	1.29		

satisfactory. By averaging the seven-quarter errors in terms of actual values, it was determined that fourteen of twenty-three partial, four of twelve simultaneous, and fourteen of twenty-two average rates of change prediction errors were less than 2 per cent of the actual values. The accuracy of the predictions can also be gauged in terms of the standard errors. A similar seven-quarter averaging revealed that about fifty per cent of all prediction errors (twelve of twenty-three partial, seven of twelve simultaneous and nine of twenty-two average rates of change) were less than one standard error.[1] In view of the multiple sources of error owing to the equations themselves, the simultaneity aspect, and the averaging of rates of change, the forecasts give surprisingly good results.

The predictability of the endogenous variables for the 1959-1961 tight money period appears to be distributed rather evenly through the sectors. The life insurance equations provide the most accurate predictions. Of its three partial forecasting predictions, all errors are within 2 per cent of the actual value of the variables, and two of the three are less than one standard error. Three sectors--commercial banking, other credit-sensitive markets, and savings institutions--demonstrated about the same degree of predictability with respect to the partial forecasting technique. Two of the six banking prediction errors are less than

---

[1] Goldfeld also utilized the partial analysis forecasting technique to test his structural equations and (by way of comparison) found that over two-thirds of his absolute prediction errors were less than one standard error and 24 of his 42 prediction errors were 2 per cent or less of the actual values. Goldfeld, op. cit., p. 172.

2 per cent of the variable's actual value, but four of the six are less than one standard error. The predictions for the four credit-sensitive markets, by the actual value and standard error criteria, are three of four and two of four, respectively. Prediction results for the savings institutions reveal four of five errors to be within 2 per cent of the actual values and two of five to be less than one standard error. The poorest results, in terms of predictability for the 1959-1961 tight money period, were demonstrated by the real sector. Two of the four prediction errors are less than 2 per cent of the variables' actual value and one was within one standard error. The five-sector predictions of the average rates of change technique produced results similar to those outlined above.

Summary of the Tight Money Model

The structural equations of the previous chapter were augmented by several identities in order to gauge the impact of various stabilization policy tools on the selected markets in tight money periods. The impact multiplier (or reduced form) analysis provided substantial information concerning the character of the system of equations. First, monetary policy instruments--the monetary base and reserve requirement ratios--demonstrate a significant impact on virtually all the markets in the model. In a tight money period, changes in the monetary base (for example) affect (1) the flow of funds to savings institutions (as do changes in Regulation Q); (2) the extension of credit by all the financial intermediaries; and (3) all components of the real sector.

Second, the intensity (and probably the duration) of the tight money "stress" appears to be directly related to the degree of pressure applied through the monetary control variables. Third, the fiscal policy instruments, Government expenditures and taxes, exercise only minor influence over the system (as structured). These conclusions are supported by the results of the four-quarter simulation of the model. The simulation results also support the (Chow test) evidence of a high degree of instability in the system. The three predictive tests of the equations showed that most of the relations formulated in the previous chapter are reasonably adequate in terms of predictive ability. Although this additional information reveals little about the overall character of the model, it is a significant aid in the evaluation of the merits of individual equations.

CHAPTER V

CONCLUSIONS

The results of this study indicate that:

1) Financial intermediaries (non-bank as well as bank) are affected by changing stabilization policies. Susceptibility to policy influences became particularly evident in the well-publicized 1966 "Credit Crunch", but evidence of substantial policy impacts on the intermediaries is apparent in earlier tight money periods.

2) A somewhat consistent reaction pattern of the intermediaries may be discerned in tight money periods. In general, holdings of high-risk, low liquidity assets (such as mortgages) decline and holdings of low-risk, high-liquidity assets rise.

3) The effects of the curtailment of mortgages and other loans appear to be transmitted to other areas of the economy such as residential construction, consumer credit, and the real sector.

4) Basic differences in behavior exist between tight and easy money periods.

5) Changes in monetary policy variables display a stronger, more pervasive influence over all sectors than changes in Government spending or tax policies.

The evidence presented in this study suggests an interpretation of tight money activities placing strong emphasis on the influence of monetary variables. A substantial reduction in the growth rate of monetary aggregates (such as the money supply or the monetary base) has preceded or coincided with tight money periods (defined as periods of decline in net sources of credit). Moreover, the effects of the monetary base in the tight money model of Chapter Four and the explanatory effectiveness of the money supply in certain equations of the previous chapter indicate considerable support for a thesis stressing the importance of monetary variables. Changes in the monetary aggregates may influence spending directly through altering cash balances or indirectly through changing asset yields. The influence of changing asset yields was (in particular) examined in this study.

The following summary of activities in tight money periods is suggested by the foregoing chapters: A slowing in the growth rate of monetary aggregates causes interest rates to rise (in the short-run). Financial institutions become disintermediated as asset yields in the open market rise above rates the institutions are permitted to pay for deposits. Open market rates, rates paid by competing depository institutions, and rates on life insurance policy loans are all relevant variables in determining the direction and magnitude of the flow of funds. The decelerated growth of deposits causes shifts within the asset portfolios of the financial institutions. The most evident portfolio change which occurs is a shift toward high liquidity - low return assets and away from low liquidity - high return assets. There is also a general decline in holdings of intermediate return-liquidity assets (long-term Treasury securities).

Interest rate differentials between mortgages and Treasury securities apparently are not a critical factor in the portfolio adjustment. Other considerations account for the tight money shifts in financial institutions' portfolios. At the beginning of the tight money periods when interest rates are high and/or rising, the institutions should be motivated to make more high-return mortgage (and other) loans than at any other time but this is not the case. With the decline in deposit inflow, the institutions apparently (1) do not have as many funds to lend as at other times, and (2) are cognizant of the possibility of a large-scale withdrawal of deposits. Institutions prepare for this possibility by increasing holdings of high-liquidity assets; savings and loan and mutual savings bank cash holdings rise as do commercial bank holdings of Treasury bills and excess reserves. Holdings of long-term Treasury securities by all four intermediaries examined either decline or their growth decelerates in tight money periods. The reduction of these intermediate-return holdings may reflect a desire to continue acquiring as many high-return assets as possible and/or a desire to increase cash holdings to meet the possibility of mass deposit withdrawals.

Since cash holdings of the intermediaries rise in tight money periods while the overall money supply falls, cash holdings must decline in some other sector. One important area in which cash holdings decline is the household sector. The reduction in household cash balances generally coincides with a reduction in consumer spending, particularly in the latter half of the tight money periods. This development implies

that whereas supply conditions - such as the availability of credit - may be the dominant factor in slowing the growth of credit in the first portion of tight money periods (when demand and expectations are high), slackening demand for credit is probably the more important factor in the latter half of the periods. A combination of these factors would account for the rise in financial institutions' holdings of low-return, high-liquidity assets and the fall in their holdings of high-return, low-liquidity assets in tight money periods.

Some measure of credit rationing probably occurs in tight money periods. Bank loans to commercial and industrial customers rise (as a proportion of all bank loans), possibly indicating that the flow of credit to "good" customers is curtailed less than to others in tight money periods. Mutual savings banks increase their holdings of conventional mortgages in tight money periods in relation to lower-return FHA and VA mortgages. A detailed investigation into differential interest rates (within broad asset categories), changes in debt maturities, down payment requirements, types of collateral, etc. would be required to determine all the relevant portfolio shifts as well as the causes of those shifts.

REFERENCES

Andersen, Leonall C. "Three Approaches to Money Stock Determination," Federal Reserve Bank of St. Louis Review, XLIX (October, 1967), 6-13.

Andersen, Leonall C., and Jordan, Jerry L. "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization," Federal Reserve Bank of St. Louis Review, L (November, 1968), 11-24.

_____. "The Monetary Base - Explanation and Analytical Use," Federal Reserve Bank of St. Louis Review, L (August, 1968), 7-11.

Brunner, Karl. "The Report of the Commission on Money and Credit," Journal of Political Economy, LXIX (December, 1961), 605-620.

_____. "The Role of Money and Monetary Policy," Federal Reserve Bank of St. Louis Review, L (July, 1968), 9-24.

Brunner, Karl, and Meltzer, Allan H. An Alternative Approach to the Monetary Mechanism. Prepared for the Subcommittee on Domestic Finance, Committee on Banking and Currency. Washington, D.C.: U.S. Government Printing Office, 1964.

_____. "Liquidity Traps for Money, Bank Credit, and Interest Rates," Journal of Political Economy, LXXVI (Jan./Feb., 1968), 1-37.

Charnes, A., and Thore, Sten. "Planning for Liquidity in Financial Institutions: The Chance-Constrained Method," Journal of Finance, XXI (December, 1966), 649-74.

Chow, Gregory C. "Tests of Equality between Sets of Coefficients in Two Linear Regressions," Econometrica, XXVIII (July, 1960), 591-605.

Conference on Savings and Residential Financing. The United States Savings and Loan League, 1966 Proceedings.

de Leeuw, Frank. "A Model of Financial Behavior," The Brookings Quarterly Econometric Model of the United States. ed. by J. Duesenberry, et. al. Chicago: Rand McNally and Co., 1965, 465-530.

Eisner, Robert. "A Permanent Income Theory for Investment: Some Empirical Explorations," American Economic Review, LVII (June, 1967), 363-90.

Friedman, Milton. "The Role of Monetary Policy," American Economic Review, LVIII (March, 1968) 1-17.

Friedman, Milton, and Meiselman, David. "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States, 1897-1958," Stabilization Policies. Commission on Money and Credit. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963.

Friedman, Milton, and Schwartz, Anna Jacobson. A Monetary History of the United States, 1867-1960. National Bureau of Economic Research. Princeton: Princeton University Press, 1963.

_____. "Money and Business Cycles," The Review of Economics and Statistics. XLV (Supplement: February, 1963), 32-78.

Goldberger, Arthur S. Impact Multipliers and Dynamic Properties of the Klein-Goldberger Model. Amsterdam: North-Holland Publishing Company, 1959.

Goldfeld, Stephen M. Commercial Bank Behavior and Economic Activity. Amsterdam: North-Holland Publishing Company, 1966.

Goldsmith, Raymond W. Financial Institutions. New York: Random House, 1968.

Gurley, John G., and Shaw, Edward S. "Financial Intermediaries and the Saving-Investment Process," The Journal of Finance, XI (May, 1956), 257-76.

Hart, Orson H. A statement before the Joint Economic Committee, Standards for Guiding Monetary Action. Washington, D.C.: U.S. Government Printing Office, 1968.

Hendershott, Patric H. "Monetary Policy, 1952-62." Paper presented at the Meetings of the Econometric Society on December 29, 1964.

Hester, Donald D., and Tobin, James (ed.). Studies of Portfolio Behavior. New York: John Wiley & Sons, Inc., 1967.

Hicks, J.R. "Liquidity," Economic Journal, LXXII (December, 1962), 787-802.

Hinshaw, Elton. "The Recognition Pattern of the Federal Open Market Committee". Paper presented at the Southern Economic Association Meeting of November, 1967.

Johnston, J. Econometric Methods. New York: McGraw-Hill, Inc., 1963.

Kane, Edward J., and Malkiel, Burton G. "Bank Portfolio Allocation, Deposit Variability and the Availability Doctrine," Quarterly Journal of Economics, LXXIX (February, 1965), 113-34.

Kareken, John H. "Lenders' Preferences, Credit Rationing, and the Effectiveness of Monetary Policy," Review of Economics and Statistics, XXXIX (August, 1957), 292-311.

Kareken, John, and Solow, Robert M. "Lags in Monetary Policy," Stabilization Policies. Commission on Money and Credit. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963, 14-96.

Lovell, Michael C. "The Contribution of Inventory Investment to Cyclical Reversals in Economic Activity," Prepared for the Subcommittee on Economic Stabilization, Automation, and Energy Resources, Joint Economic Committee, Inventory Fluctuations and Economic Stabilization. Washington: U.S. Government Printing Office, 1962, 245-57.

Meltzer, Allan H. "A Little More Evidence from the Time Series," Journal of Political Economy, LXXII (October, 1964), 504-8.

_____. "Mercantile Credit, Monetary Policy, and Size of Firms," Review of Economics and Statistics, XLII (November, 1960), 429-37.

Minsky, Hyman. "Private Sector Asset Management and the Effectiveness of Monetary Policy." Paper presented at the American Finance Association Meetings on December 28, 1968.

Mutual Savings Banking, Commission on Money and Credit. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962.

Pigou, A. C. "The Value of Money," originally published in The Quarterly Journal of Economics, XXXII (1917) and reprinted in Readings in Monetary Theory. Philadelphia: The Blakiston Co., 1951.

Smith, Warren L. "On the Effectiveness of Monetary Policy," The American Economic Review, XLVI (September, 1956), 588-606.

Staats, William F. "The Municipal Bond Market and Tight Money," Federal Reserve Bank of Philadelphia Business Review, June, 1968, 3-10.

Tobin, James A. "Commercial Banks as Creators of Money," Banking and Monetary Studies, ed. by Deane Carson; Homewood, Ill.: R. D. Irwin, 1963.

_____. "Liquidity Preferences as Behavior Towards Risk," Review of Economic Studies, XXV (February, 1958), 65-86.

_____. "Money, Capital and Other Stores of Value," American Economic Review, LI (May, 1961), 26-37.

Vernon, Jack R. "Savings and Loan Association Response to Monetary Policies, 1953-1961: A Case Study in Availability," Southern Economic Journal, XXXI (January, 1965), 229-37.

SOURCES OF DATA

Assets and Liabilities of Financial Institutions

The Federal Reserve Bulletins were the source of all data in this section. The data are for the last month of the quarter, are in billions of dollars, and are seasonally adjusted.

SLG	=	Savings and loan holdings of Federal Government securities
SLM	=	Savings and loan holdings of mortgages
DSL	=	Deposits at savings and loan associations
MGB	=	Mutual saving banks' holdings of Treasury securities
MSB	=	Mutual savings banks' holdings of mortgages
MSD	=	Deposits at mutual savings banks
GLI	=	Treasury securities held by life insurance companies
MLI	=	Mortgages held by life insurance companies
CBL	=	Life insurance company holdings of corporate bonds
SBK	=	Short-term (less than one year) Treasury securities held by commercial banks
LBK	=	Long-term (one year or greater) Treasury securities held by commercial banks
CBK	=	Commercial bank loans
BO	=	Borrowings of member banks
ER	=	Excess reserves of member banks

TD = Time and savings deposits at commercial banks

DD = Demand deposits at commercial banks

Monetary Data

Variables in this section were based on Federal Reserve Bulletin data and were compiled by the Federal Reserve Bank of St. Louis.

B = The monetary base, computed (on the uses side) as the sum of member bank reserves and currency held by the public and nonmember banks, adjusted for reserve requirement changes and shifts in deposits

k_1 = Reserve requirement ratio on demand deposits at member banks; a weighted average for the last month of the quarter

k_2 = Reserve requirement ratio against time and savings deposits; a weighted average for the last month of the quarter

RR = Required reserves of member banks

X = Ratio of total reserves to demand deposits (see detailed breakdown, p. 140

M = Money supply; that is, demand deposits plus currency in the hands of the public

Interest Rates

With the exception of RSL, RTD, RMS and RSI, interest rates were taken from Federal Reserve Bulletins. The source of RSL, RTD and RSI was the 34th Federal Home Loan Bank Board Annual Report. RMS and RSI were derived from the Savings and Loan Business monograph by Leon T. Kendall and the 1967 Mutual Savings Bank National Fact Book. The rates are expressed in percentages.

RGB = Interest rate on long-term Treasury securities

RTB = Interest rate of three-month Treasury bills

RM = Interest rate on FHA-insured mortgages

RSL = Interest rate on savings and loan shares. The data for the first two quarters of 1967 were trend-estimated.

RTD = Interest rate on time and savings deposits. The data for the first two quarters of 1967 were trend-estimated.

RMS = Interest rate on mutual savings bank deposits. Observations prior to 1961 consisted of linear interpolations of annual data. Post-1960 observations were gauged by comparisons with savings and loan figures and Mutual Savings Bank National Fact Book estimates.

RD = Federal Reserve discount rate (at New York bank)

RCB = Interest rate of total corporate bonds

RCP = Interest rate on commercial paper

Real Sector

All data, which are seasonally adjusted totals in annual rates, were drawn from Federal Reserve Bulletins. The implicit GNP price deflator, P, is in terms of per cent and was taken from Department of Commerce estimates.

Y = Gross national product

CD = Consumption of durables

CND = Consumption of nondurables

IF = Fixed investment

DH = Changes in inventories

YD = Disposable personal income

G = Government (Federal and state and local) purchases of goods and services

T = Personal taxes; that is, the difference between personal income and disposable personal income

Z = The difference between gross national product and personal income, or gross national product less capital consumption allowances less indirect business taxes less business transfer payments less corporate profits and inventory valuation adjustments less contributions for social insurance plus government transfer payments plus net interest paid by government and consumer plus dividends plus business transfer payments plus subsidies less current surplus of government enterprises.

P = Implicit GNP price deflator

Other Credit-Sensitive Markets Data

REC = Expenditures on residential construction. The data were drawn from Business Statistics, 1967, a Department of Commerce publication, and are seasonally adjusted totals in annual rates.

CC = Consumer credit. The source of data was Federal Reserve Bulletins.

HMH = Household currency and demand deposit holdings. Federal Reserve Flow of Funds Accounts were the source of these data.

SLB = State and local borrowings. Federal Reserve Flow of Funds Accounts were the source of these data.

Miscellaneous Data

All data are in billions of dollars, with the exception of the capacity utilization index (CUI) which is in per cent. MRT, GBL, GBS and FMA observations were drawn from Federal Reserve Bulletins. Other sources are noted in the data descriptions below.

MRT = Total value of all mortgages outstanding

GBL = Total long-term marketable Treasury securities outstanding

GBS = Total short-term marketable Treasury securities outstanding

W = Total private wealth. A series constructed by Keith Carlson of the St. Louis Federal Reserve Bank. Private wealth is computed by summing physical capital, the high-powered money stock, and private holdings of U.S. Government debt. Physical capital consists of the level of capital stock (as obtained from a Goldsmith series) plus net investment.

FMA = Mortgage holdings of the Federal National Mortgage Association. Source: Federal Reserve Bulletins.

CUI = Manufacturing Capacity Utilization Index. Data were obtained from Federal Reserve Bulletins.

APPENDIX A

Net Savings at Savings and Loan Associations (millions of dollars)[1]

Year	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1952	234	222	313	257
1953	297	282	342	189
1954	356	339	396	375
1955	396	398	392	438
1956	405	421	419	415
1957	373	417	376	416
1958	491	483	511	529
1959	518	578	585	513
1960	564	603	671	674
1961	683	737	720	766
1962	725	726	807	851
1963	1074	931	833	838
1964	834	929	957	812
1965	681	702	731	729
1966	476	174	93	465
1967	873	1099	980	612

[1]Data are seasonally adjusted quarterly averages.

APPENDIX B

EASY MONEY EQUATIONS

Savings Institutions

$$\Delta SLG = .667 - .068\ SLG_{-1} - .123\ (RM-RGB) + .075\ \Delta DSL - .129\ (RGB-RTB)$$

$$[-1.97]^{1} \qquad [-.397] \qquad [1.48] \qquad [-.974]$$

$$R^2 = .206 \qquad F = 1.56 \qquad SEE^{2} = .149 \qquad DW = 1.84$$

$$\Delta SLM = -.415 + .007\ SLM_{-1} + .773\ \Delta DSL + 9.19\ \left(\frac{SLG}{SLM}\right)_{-1} + .002\ \Delta MRT - .275\ \Delta REC$$

$$[.755] \qquad [3.67] \qquad [.347] \qquad [.051] \qquad [-.906]$$

$$R^2 = .707 \qquad F = 11.08 \qquad SEE = .390 \qquad DW = 1.56$$

$$\Delta DSL = -1.18 + .032\ DSL_{-1} + 1.4\ (RSL-RTD) - .035\ \Delta YD - .243\ \Delta HMH$$

$$[2.55] \qquad [1.53] \qquad [-.43] \qquad [-1.16]$$

$$R^2 = .386 \qquad F = 3.77 \qquad SEE = .435 \qquad DW = 1.04$$

$$\Delta MSB = 2.82 - .009\ MSB_{-1} - .88\ (RM-RGB) - .742\ \left(\frac{MGB}{MSB}\right)_{-1} - .028\ \Delta MRT$$

$$[-.423] \qquad [-1.86] \qquad [-.668] \qquad [-.978]$$

$$R^2 = .329 \qquad F = 2.95 \qquad SEE = .278 \qquad DW = 1.21$$

[1] T values are in brackets.

[2] SEE = Standard error of estimate

$$\Delta MSD = .75 + .033\ MSD_{-1} + .325\ (RMS-RTD) - .012\ \Delta YD$$

[3.02] [.978] [-1.11]

$R^2 = .638$ F = 14.66 SEE = .131 DW = 2.37

Life Insurance Companies

$$\Delta GLI = .363 - .186\ GLI_{-1} + .228\ (RM-RGB) + 2.52\ \left(\frac{GLI}{MLI}\right)_{-1} + .004\ \Delta GBL$$

[-1.11] [1.80] [1.07] [.620]

$R^2 = .169$ F = 1.22 SEE = .116 DW = 2.41

$$\Delta MLI = -2.70 + .062\ MLI_{-1} - .364\ (RM-RGB)_{-2} + 5.99\ \left(\frac{GLI}{MLI}\right)_{-1} + .011\ \Delta MRT - .369\ (RCB-RM)_{-2} - .034\ \Delta REC$$

[4.11] [-1.0] [3.64] [.86] [-.65] [-.832]

$R^2 = .834$ F = 18.4 SEE = .152 DW = 1.90

$$\Delta CBL = .434 + .004\ CBL_{-1} + .359\ (RCB-RM)_{-2} + .487\ (RCB-RGB)_{-2} + .04\ \Delta IF$$

[.265] [.687] [1.12] [1.3]

$R^2 = .157$ F = 1.11 SEE = .224 DW = 2.84

Commercial Banks

$$\Delta SBK = .823 - .126\ SBK_{-1} + 258.8\ \Delta X + .411\ \Delta GBS + .801\ (RGB-RTB)$$

[-1.11] [1.23] [4.10] [1.10]

$R^2 = .467$ F = 5.25 SEE = 1.84 DW = 1.94

$$\Delta LBK = 2.1 - .099\ LBK_{-1} + .226\ \Delta GBL + 1.72\ (RGB-RTB)$$

[-1.10] [2.43] [2.53]

$R^2 = .392$ F = 5.38 SEE = 1.83 DW = 2.43

$$\Delta CBK = -1.35 + .048\ CBK_{-1} - .457\ \Delta(CURR+DD) - .097\ \Delta Y + 7.91\ \Delta BO$$

[4.34] [-.776] [-.821] [2.05]

$R^2 = .510$ F = 6.25 SEE = 1.67 DW = 2.90

$$\Delta BO = .14 - .24\ BO_{-1} - .241\ (RD-RTB) + .016\ \Delta(CURR+DD)$$

[-1.61] [-2.76] [.385]

$R^2 = .299$ F = 3.55 SEE = .299 DW = 1.78

$$\Delta ER = .035 - .081\ ER_{-1} - .078\ \Delta RTB + 3.53\ \Delta X + .0001\ \Delta Y$$

$$[-3.48] \qquad [-8.64] \qquad [3.47] \qquad [.121]$$

$$R^2 = .852 \qquad F = 34.7 \qquad SEE = .010 \qquad DW = 2.21$$

$$\Delta TD = 7.4 + 4.81\ (RTD-RSI) - .564\ \Delta RTB - .431\ \Delta DD$$

$$[7.88] \qquad [-1.70] \qquad [-1.53]$$

$$R^2 = .718 \qquad F = 21.2 \qquad SEE = .849 \qquad DW = 1.66$$

Real Sector

$$\Delta IF = 1.87 - .041\ IF_{-1} + .315\ \Delta CBK - .009\ \Delta Z - .67\ \Delta RCB + .094\ \Delta CUI + .493\ \Delta(CD+CND)$$

$$[-4.93] \qquad [5.86] \qquad [-.618] \qquad [-.971] \qquad [2.0] \qquad [9.64]$$

$$R^2 = .920 \qquad F = 42.1 \qquad SEE = .297 \qquad DW = 2.14$$

$$DH = -24.1 - 2.14\ \Delta(CURR+DD) + 1.57\ \Delta MUO + .293\ P_{-1}$$

$$[-2.33] \qquad [4.52] \qquad [3.55]$$

$$R^2 = .609 \qquad F = 12.98 \qquad SEE = 2.55 \qquad DW = 2.21$$

$$\Delta CND = -4.59 + .031\ CND_{-1} + .113\ \Delta YD - .80\ \Delta HMH + 1.33\ \Delta(CURR+DD)$$

$$[2.18] \qquad [1.04] \qquad [-1.29] \qquad [2.26]$$

$$R^2 = .450 \qquad F = 4.90 \qquad SEE = 1.27 \qquad DW = 2.92$$

$$\Delta CD = .878 - .013\ CD_{-1} + .15\ \Delta W - 1.77\ \Delta RGB + .042\ \Delta(CURR+DD)$$

$$[-.510] \qquad [2.29] \qquad [-.517] \qquad [.079]$$

$$R^2 = .197 \qquad F = 1.47 \qquad SEE = .863 \qquad DW = 2.33$$

Other Credit-Sensitive Markets

$$\Delta HMH = -2.59 + .049\ HMH_{-1} - .381\ \Delta RTD - .02\ \Delta(DSL+MSD+TD)$$

$$[2.96] \qquad [-.20] \qquad [-.309]$$

$$R^2 = .349 \qquad F = 4.47 \qquad SEE = .451 \qquad DW = 1.81$$

$$\Delta CC = - .296 - .102\ \Delta DD + .299\ \Delta YD - .088\ \Delta HMH$$

$$[-.839] \qquad [10.1] \qquad [-.713]$$

$$R^2 = .867 \qquad F = 54.5 \qquad SEE = .250 \qquad DW = 1.23$$

$$\Delta REC = 1.41 - .796\ \Delta FMA - .348\ \Delta(DSL+MSD)$$

$$[-2.24] \qquad [-2.63]$$

$$R^2 = .249 \qquad F = 4.31 \qquad SEE = .439 \qquad DW = 1.01$$

$$\Delta SLB = 2.03 - .024\ \Delta(CURR+DD) + 3.11\ \Delta ER + .043\ \Delta YD$$

$$[-.143] \qquad [1.72] \qquad [1.16]$$

$$R^2 = .145 \qquad F = 1.41 \qquad SEE = .50 \qquad DW = 1.41$$

Term Structure of Interest Rates

$$RGB-RTB = 7.0 + .0005\ DSLR - .489\ RGB_{-1} + .335\ RGB_{-2} - .073\ P + .411\ P_{-1} - .284\ P_{-2} + .089\ M - .333\ M_{-1} + .169\ M_{-2}$$

$$[.032] \quad [-1.23] \quad [.734] \quad [-.262] \quad [1.10] \quad [-1.29] \quad [.838] \quad [-1.97] \quad [1.68]$$

$$R^2 = .896 \qquad F = 18.2 \qquad SEE = .224 \qquad DW = 1.31$$

APPENDIX C

COMBINED TIGHT AND EASY MONEY EQUATIONS

Savings Institutions

$$\Delta SLG = .0001 - .028\ SLG_{-1} + .041\ (RM-RGB) + .133\ \Delta DSL - .081\ (RGB-RTB)$$

$$[-1.89]^{1} \qquad [.60] \qquad [3.79] \qquad [-2.01]$$

$$R^2 = .224 \qquad F = 3.83 \qquad SEE^{2} = .157 \qquad DW = 2.04$$

$$\Delta SLM = -2.49 + .004\ SLM_{-1} + 1.04\ \Delta DSL + 24.6\ \left(\frac{SLG}{SLM}\right)_{-1} + .043\ \Delta MRT + .220\ \Delta REC$$

$$[.799] \qquad [4.32] \qquad [1.38] \qquad [.764] \qquad [1.41]$$

$$R^2 = .544 \qquad F = 12.4 \qquad SEE = .680 \qquad DW = 1.93$$

$$\Delta DSL = -2.61 + .036\ DSL_{-1} + 1.97\ (RSL-RTD) + .026\ \Delta YD - .148\ \Delta HMH$$

$$[4.10] \qquad [2.95] \qquad [.597] \qquad [-1.05]$$

$$R^2 = .454 \qquad F = 11.03 \qquad SEE = .458 \qquad DW = .792$$

$$\Delta MSB = 1.46 + .008\ MSB_{-1} - .539\ (RM-RGB) - .107\ \left(\frac{MGB}{MSB}\right)_{-1} - .009\ \Delta MRT$$

$$[1.03] \qquad [-2.79] \qquad [-.296] \qquad [-.476]$$

$$R^2 = .455 \qquad F = 11.05 \qquad SEE = .220 \qquad DW = 2.20$$

[1] T values are in brackets.

[2] SEE = Standard error of estimate.

$$\Delta MSD = - .386 + .021\ MSD_{-1} + .178\ (RMS-RTD) + .017\ \Delta YD$$

[2.18] [.589] [1.55]

$R^2 = .531$ F = 20.4 SEE = .186 DW = 1.27

Life Insurance Companies

$$\Delta GLI = .288 - .121\ GLI_{-1} + .118\ (RM-RGB) + 1.29\ \left(\frac{GLI}{MLI}\right)_{-1} - .002\ \Delta GBL$$

[-1.64] [1.36] [1.28] [-.535]

$R^2 = .109$ F = 1.62 SEE = .135 DW = 1.73

$$\Delta MLI = - .195 + .026\ MLI_{-1} - 1.20\ (RM-RGB)_2 + .843\ \left(\frac{GLI}{MLI}\right)_{-1} + .017\ \Delta MRT - 1.53\ (RCB-RM)_{-2} + .021\ \Delta REC$$

[5.04] [-6.60] [1.67] [1.41] [-5.10] [.833]

$R^2 = .723$ F = 22.2 SEE = .159 DW = 1.73

$$\Delta CBL = 1.30 - .008\ CBL_{-1} + .529\ (RCB-RM)_{-2} + .418\ (RCB-RGB)_{-2} + .028\ \Delta IF$$

[-1.61] [2.39] [1.94] [1.53]

$R^2 = .147$ F = 2.28 SEE = .212 DW = 2.85

Commercial Banks

$$\Delta SBK = .182 - .082\ SBK_{-1} + .384\ \Delta GBS + 94.4\ \Delta X + .874\ (RGB-RTB)$$

$$[-1.65] \qquad [7.28] \qquad [1.19] \qquad [2.19]$$

$$R^2 = .531 \qquad F = 15.0 \qquad SEE = 1.52 \qquad DW = 1.58$$

$$\Delta LBK = 3.59 - .125\ LBK_{-1} + .101\ \Delta GBL + 1.27\ (RGB-RTB)$$

$$[-2.22] \qquad [2.00] \qquad [2.86]$$

$$R^2 = .279 \qquad F = 6.95 \qquad SEE = 1.92 \qquad DW = 1.71$$

$$\Delta CBK = -.467 + .023\ CBK_{-1} + .325\ \Delta(CURR+DD) + .046\ \Delta Y + 3.03\ \Delta BO$$

$$[3.75] \qquad [1.09] \qquad [.825] \qquad [1.84]$$

$$R^2 = .482 \qquad F = 12.4 \qquad SEE = 1.64 \qquad DW = 2.22$$

$$\Delta BO = .162 - .299\ BO_{-1} - .194\ (RD-RTB) - .006\ \Delta(CURR+DD)$$

$$[-3.72] \qquad [-3.20] \qquad [-.232]$$

$$R^2 = .283 \qquad F = 7.11 \qquad SEE = .159 \qquad DW = 1.47$$

$$\Delta ER = .052 - .071\ ER_{-1} - .046\ \Delta RTB + 2.68\ \Delta X - .0022\ \Delta Y$$

$$[-2.87] \qquad [-5.90] \qquad [3.33] \qquad [-2.98]$$

$R^2 = .681$ $\qquad$ $F = 28.2$ $\qquad$ $SEE = .015$ $\qquad$ $DW = 1.23$

$$\Delta TD = 5.22 + 3.68\ (RTD-RSI) - .577\ \Delta RTB + .791\ \Delta DD$$

$$[8.72] \qquad [-2.15] \qquad [4.57]$$

$R^2 = .714$ $\qquad$ $F = 45.0$ $\qquad$ $SEE = 1.00$ $\qquad$ $DW = 1.71$

Real Sector

$$\Delta IF = 2.62 - .051\ IF_{-1} + .340\ \Delta CBK - .045\ \Delta Z - .414\ \Delta RCB + .099\ \Delta CUI + .476\ \Delta(CD+CND)$$

$$[-7.99] \qquad [5.86] \qquad [-2.32] \qquad [-.948] \qquad [3.09] \qquad [9.86]$$

$R^2 = .839$ $\qquad$ $F = 44.4$ $\qquad$ $SEE = .459$ $\qquad$ $DW = 1.58$

$$DH = -21.1 - 1.45\ \Delta(CURR+DD) + .821\ \Delta MUO + .263\ P_{-1}$$

$$[-2.61] \qquad [4.74] \qquad [4.27]$$

$R^2 = .509$ $\qquad$ $F = 18.6$ $\qquad$ $SEE = 3.39$ $\qquad$ $DW = 1.38$

$$\Delta CND = -2.42 + .022\ CND_{-1} + .126\ \Delta YD - .939\ \Delta HMH + .721\ \Delta(CURR+DD)$$

[2.89] [1.91] [-2.47] [2.66]

$R^2 = .463$ F = 11.4 SEE = 1.12 DW = 2.39

$$\Delta CD = -.273 + .0045\ CD_{-1} + .117\ \Delta W + .656\ \Delta RGB + .285\ \Delta(CURR+DD)$$

[.448] [4.24] [.456] [1.80]

$R^2 = .373$ F = 7.89 SEE = .764 DW = 2.14

Other Credit-Sensitive Markets

$$\Delta HMH = -1.84 + .029\ HMH_{-1} - 2.19\ \Delta RTD + .102\ \Delta(DSL+MSD+TD)$$

[2.51] [-1.50] [2.56]

$R^2 = .480$ F = 16.6 SEE = .469 DW = 2.27

$$\Delta CC = .209 - .233\ \Delta DD + .227\ \Delta YD - .075\ \Delta HMH$$

[-2.84] [10.2] [-.694]

$R^2 = .715$ F = 45.2 SEE = .328 DW = .564

$$\Delta REC = .049 - 1.20\ \Delta FMA + .074\ \Delta(DSL+MSD)$$

$$[-3.23] \qquad [.670]$$

$$R^2 = .201 \qquad F = 6.92 \qquad SEE = .619 \qquad DW = .745$$

$$\Delta SLB = 1.97 - .043\ \Delta(CURR+DD) - 6.79\ \Delta ER - .019\ \Delta YD$$

$$[-.206] \qquad [-2.46] \qquad [-.309]$$

$$R^2 = .101 \qquad F = 2.03 \qquad SEE = 1.23 \qquad DW = 2.19$$

Term Structure of Interest Rates

$$RGB-RTB = 3.87 - .022\ DSLR - 1.60\ RGB_{-1} + 1.45\ RGB_{-2} - .213\ P + .142\ P_{-1} + .144\ P_{-2} + .275\ M - .423\ M_{-1} + .080\ M_{-2}$$

$$[-1.21] \quad [-4.42] \quad [3.34] \quad [-1.36] \quad [.663] \quad [.919] \quad [2.65] \quad [-2.59] \quad [.880]$$

$$R^2 = .719 \qquad F = 13.7 \qquad SEE = .362 \qquad DW = 1.34$$

APPENDIX D

B Matrix[1]

	SLG	SLM	DSL	MSB	MSD	GLI	MLI	CBL	SBK	LBK	CBK	BO	ER	CURR	TD
SLG	1.0		-.164												
SLM		1.0	-.876												
DSL			1.0												
MSB				1.0											
MSD					1.0										
GLI						1.0									
MLI							1.0								
CBL								1.0							
SBK									1.0						
LBK										1.0					
CBK											1.0	-2.0		-.60	
BO												1.0		.038	
ER													1.0		
CURR														1.0	
TD															1.0
IF											-.304				
DH														1.60	
CND														-.795	
CD														-.261	
HMH			-.126		-.126										-.126
CC															
REC			-.204		-.204										
SLB													10.8	.335	
A															
Y															
YD															
RR													-1.0	-1.0	
DD															.316
RGB															
M														1.93	

[1]See p. 136.

B Matrix - Continued

	IF	DH	CND	CD	HMH	CC	REC	SLB	A	Y	YD	RR	DD	RGB	M
SLG														.25	
SLM							-.345								
DSL					.15						-.037				
MSB														-.212	
MSD											-.0355				
GLI														.164	
MLI							-.057								
CBL	-.034														
SBK														-1.29	
LBK														-.695	
CBK										-.093			-.60		
BO													.038		
ER										.00225					
CURR													1.0		-1.0
TD													-1.36		
IF	1.0		-.493	-.493											
DH		1.0											1.6		
CND			1.0		1.27						-.0714		-.795		
CD				1.0									-.261	-.176	
HMH					1.0										
CC					.133	1.0					-.176		.237		
REC							1.0								
SLB								1.0			.114		.335		
A									1.0						-.34
Y	-1.0	-1.0	-1.0	-1.0						1.0					
YD										-1.0	1.0				
RR												1.0			
DD												-.062	1.0		
RGB									-1.0					1.0	
M													-.518		1.0

Γ Matrix

	SLG_{-1}	RM	DSL_{-1}	$\frac{SLG}{SLM_{-1}}$	SLM_{-1}	MRT	MRT_{-1}	RSL	RTD	YD_{-1}	$\frac{MGB}{MSB_{-1}}$	MSB_{-1}	RTB_{-1}	MSD_{-1}	RMS
SLG	.962	.114	-.164												
SLM			-.876	33.0	.99	.619	-.619								
DSL			1.03					2.08	-2.08	-.037					
MSB		-.212				.128	-.128				.619	1.02			
MSD									-.491	-.0355				1.02	.491
GLI		.164													
MLI						.118	-.118								
CBL															
SBK															
LBK															
CBK															
BO															
ER													.0288		
CURR															
TD									3.11				.496		
IF															
DH															
CND										-.0714					
CD															
HMH			-.126						-3.6					-.126	
CC										-.176					
REC			-.204											-.204	
SLB										.114					
A															
Y															
YD															
RR															
DD															
RGB															
M															

Γ Matrix - Continued

	GLI_{-1}	$\frac{GLI}{MLI}_{-1}$	GBL	GBL_{-1}	MLI_{-1}	CBL_{-1}	RCB	GBS	GBS_{-1}	X_{-1}	SBK_{-1}	RTB	TD_{-1}	LBK_{-1}
SLG												-.136		
SLM														
DSL														
MSB														
MSD														
GLI	.99	2.62	-.008	.008										
MLI		.81			1.02									
CBL						.985								
SBK								.362	-.362	-92.0	.941	-1.29		
LBK			.058	-.058								-.695		.826
CBK														
BO												.155		
ER										-2.54		-.0288		
CURR														
TD												-.496	1.0	
IF							-.071							
DH														
CND														
CD														
HMH													-.126	
CC														
REC														
SLB														
A														
Y														
YD														
RR														
DD														
RGB												1.0		
M														

Γ Matrix - Continued

	ER_{-1}	CBK_{-1}	RD	BO_{-1}	DD_{-1}	Y_{-1}	P_{-1}	RSI	IF_{-1}	Z	Z_{-1}	RCB_{-1}	CUI	CUI_{-1}
SLG														
SLM														
DSL														
MSB														
MSD														
GLI														
MLI														
CBL									-.034					
SBK														
LBK														
CBK		1.01		-2.0	-.60	-.093								
BO			-.155	-.285	.038									
ER	.958					.00225								
CURR														
TD					-1.36			-3.11						
IF		-.304							.942	-.175	.175	.071	.236	-.236
DH					1.6		2.6							
CND					-.795									
CD					-.261									
HMH														
CC					.237									
REC														
SLB	10.8				.335									
A					-.44									
Y														
YD										-1.0				
RR														
DD														
RGB														
M														

Γ Matrix - Continued

	CND_{-1}	HMH_{-1}	$CURR_{-1}$	CD_{-1}	W	W_{-1}	RGB_{-1}	RTD_{-1}	CC_{-1}	FMA	FMA_{-1}	REC_{-1}	SLB_{-1}	G
SLG														
SLM												-.345		
DSL		.15												
MSB														
MSD														
GLI														
MLI												-.057		
CBL														
SBK														
LBK														
CBK			-.60											
BO			.038											
ER														
CURR														
TD														
IF	-.493			-.493										
DH			1.6											
CND	1.02	1.27	-.795											
CD			-.261	1.01	.0956	-.0956	-1.76							
HMH		1.02						3.6						
CC		.133							1.0					
REC										-1.96	1.96	1.0		
SLB			.335										1.0	
A			-.44				-1.8							
Y														1.0
YD														
RR														
DD														
RGB														
M														

Γ Matrix - Continued

	T	B	k_1	k_2	DSLR	PRC	X	RM_{-2}	RGB_{-2}	RCB_{-2}	PRC_{-1}	PRC_{-2}	$CURR_{-2}$	DD_{-2}
SLG														
SLM														
DSL														
MSB														
MSD														
GLI														
MLI								.36	1.34	-1.7				
CBL								-.678	-.859	1.537				
SBK							92.0							
LBK														
CBK														
BO														
ER							2.54							
CURR														
TD														
IF														
DH														
CND														
CD														
HMH														
CC														
REC														
SLB														
A					-.06	-.28			2.18		.15	.15	.05	.05
Y														
YD	-1.0													
RR		1.0												
DD			-5.97	-4.57										
RGB														
M		2.85					-3.33							

Γ Matrix - Continued

	Constants	MUO	MUO_{-1}
SLG	-.143		
SLM	-4.43		
DSL	-2.88		
MSB	-.168		
MSD	-.83		
GLI	.507		
MLI	-.432		
CBL	1.54		
SBK	-.136		
LBK	5.81		
CBK	.20		
BO	.143		
ER	.041		
CURR			
TD	4.465		
IF	3.24		
DH	-20.6	.69	-.69
JND	-2.21		
CD	-.524		
HMH	-1.37		
CC	.393		
REC	-.269		
SLB	2.21		
A	4.72		
Y			
YD			
RR			
DD			
RGB			
M			

APPENDIX E

Derivation of the Non-Linear Identities

The two non-linear identities, $DD \equiv \frac{RR - k_2\ TD}{k_1}$ and $M \equiv \left(\frac{1 + \frac{CURR}{DD}}{X + \frac{CURR}{DD}}\right) B$ were linearized by setting the variables at their mean values over the four tight money periods. The linearization procedure follows that outlined by Goldberger.[1]

The first equation, $DD \equiv \frac{RR - k_2\ TD}{k_1}$ may be written:

$$f \equiv \left[\frac{RR - k_2\ TD}{k_1}\right] - DD = 0$$

Forming the total differential and equating it to zero yields:

$$\dot{f} = \left[\frac{RR - \dot{k}_2\ TD}{k_1}\right] - \dot{DD} = 0$$

In order to obtain the linearized values (for use in the B and Γ matrices) the non-linear portion of the identity, that is $\left[\frac{RR - \dot{k}_2\ TD}{k_1}\right]$, the following partial derivatives are obtained:

$$\frac{\partial f}{\partial RR} = \frac{1}{\bar{k}_1}$$

$$\frac{\partial f}{\partial k_2} = \frac{-TD}{\bar{k}_1}$$

---

[1] Goldberger, op. cit., pp. 20-21.

$$\frac{\partial f}{\partial TD} = - \frac{\bar{k}_2}{\bar{k}_1}$$

$$\frac{\partial f}{\partial k_1} = - \frac{(\overline{RR} - \bar{k}_2 \, \overline{TD})}{(\bar{k}_1)^2}$$

The second identity is linearized in the same manner,

$$M \equiv \left(\frac{1 + \frac{CURR}{DD}}{X + \frac{CURR}{DD}} \right) B$$

$$f \equiv \left(\frac{1 + \frac{CURR}{DD}}{X + \frac{CURR}{DD}} \right) B - M = 0$$

$$\dot{f} = \left[\left(\frac{1 + \frac{\dot{CURR}}{DD}}{X + \frac{CURR}{DD}} \right) B \right] - \dot{M} = 0$$

$$\frac{\partial f}{\partial B} = \left(\frac{1 + \frac{\overline{CURR}}{\overline{DD}}}{\bar{X} + \frac{\overline{CURR}}{\overline{DD}}} \right)$$

$$\frac{\partial f}{\partial X} = - \left(\frac{1 + \frac{\overline{CURR}}{\overline{DD}}}{\left(\bar{X} + \frac{\overline{CURR}}{\overline{DD}} \right)^2} \right) \cdot \bar{B}$$

$$\frac{\partial f}{\partial CURR} = \left\{ \left[\frac{\frac{1}{\overline{DD}}}{\bar{X} + \frac{\overline{CURR}}{\overline{DD}}} \right] - \left[\frac{1 + \frac{\overline{CURR}}{\overline{DD}}}{\left(\bar{X} + \frac{\overline{CURR}}{\overline{DD}} \right)^2} \cdot \frac{1}{\overline{DD}} \right] \right\} \bar{B}$$

$$\frac{\partial f}{\partial DD} = \left\{ \left[\frac{-\frac{\overline{CURR}}{(\overline{DD})^2}}{\overline{X} + \frac{\overline{CURR}}{\overline{DD}}} \right] - \left[\frac{1 + \frac{\overline{CURR}}{\overline{DD}}}{\overline{X} + \frac{\overline{CURR}^2}{\overline{DD}}} \cdot \left(- \frac{\overline{CURR}}{\overline{DD}^2} \right) \right] \right\} \overline{B}$$

APPENDIX F

Rates of Change Analysis of the Tight Money Explanatory Variables

The four tight money periods provided, in chronological order, 7, 10, 7, and 5 observations. In order to achieve a standardized, seven-quarter period, it was necessary to shorten the second and lengthen the fourth periods by some arbitrary procedure. The 1955-1957 ten-quarter data was compressed into seven-quarters by awarding all but the first and seventh quarters four instead of three monthly observations, while the two quarters of the extremities were comprised of five months each. The 1966-1967 five-quarter data was stretched to seven quarters by giving the first quarter three monthly observations, and the remaining six quarters two months apiece. The objective of this very rough data manipulation was to arrive at approximate average rates of change of the explanatory variables for a standardized seven-quarter tight money period.

The accompanying table presents the annual rates of change for the four periods and their averages for 14 explanatory variables including interest rates and monetary and fiscal variables.[1] The table is of interest for the information it provides on patterns of economic activity in tight money as well as for its partial analysis data value. In some instances, it does appear that a sequential pattern develops in tight money periods. The volatile

---

[1] Rates of change were averaged for the first three tight money periods for use in the 1959-1961 estimates. The 1966 "crunch" period was omitted because of its unusual severity and its time differential from the earlier tight money periods. Predictions of future tight money periods would, however, incorporate these observations.

short-term interest rates (RTB and RCP) rise rapidly in the first two quarters before leveling off and declining in the last half of the average seven-quarter tight money period. The long-term rates (RGB and RM) move similarly, but with markedly less volatility. One Federal Reserve tool, the discount rate, also rises during the early phase and declines in the latter half of the average period. Growth of the monetary base (B) and the money supply (CURR+DD) slackens in the first part of the period (probably due to a tightening of the monetary brakes by the Federal Reserve) and increases later.

Short- and long-term Treasury securities exhibit ambiguous characteristics. The quantity of outstanding short-terms rises in the early stages of the average tight money period as the interest rate required to sell them rises and then falls, paralleling the decline in RTB. With the exception of the first quarter (dominated by the large positive value of the first tight money period), the long-term Treasury securities follow a similar pattern. Outstanding mortgages (MRT) show a slightly moderated rate of growth in the second half of the period compared with the first. Both utilization of capacity (CUI) and disposable income (YD) demonstrate relative declines in the latter half of the average tight money period. Capacity utilization declines absolutely for all but one of the seven quarters. Government spending (G) and tax receipts (T), the latter especially, do not increase as rapidly during the second half of the period as the first. The variables show surprising consonance in pointing to

a first half in which the pace of economic activity is high in the face of restrictive monetary policies, and low in the second half, possibly as a lagged consequence of the earlier restrictive measures. Government spending (whose average rates of change movements are not as clear-cut as some others) increases the least when economic activity has slowed. That is, if Government spending influences significantly such variables as YD or CUI, it does so with little or no lag.

Annual Rates of Change
of Selected Explanatory Variables
for Structured Seven-Quarter Tight Money Periods

	I	II	III	IV	V	VI	VII
RTB - Interest rate of three-month Treasury bills							
I /'53 - III/'54	-14.5	21.4	-48.2	-36.2	-82.8	-85.1	520.2
III/'55 - IV /'57	251.3	-15.5	54.3	66.2	0	31.0	-21.9
III/'59 - I /'61	150.9	52.6	-70.5	-69.5	3.3	-32.2	27.3
II /'66 - II /'67	-6.8	104.5	19.1	-26.4	-45.0	-49.3	-53.5
Average	95.2	40.8	-11.3	-16.5	-31.1	-33.9	118.0
RCP - Interest rate on commercial paper							
I /'53 - III/'54	9.0	87.5	-2.9	-53.8	-37.6	-63.9	-50.5
III/'55 - IV /'57	130.0	19.1	46.8	15.7	3.4	20.3	-3.1
III/'59 - I /'61	113.9	23.5	-28.4	-48.2	-37.4	-17.6	-22.6
II /'66 - II /'67	25.2	31.9	17.9	8.4	-41.3	-40.1	-39.1
Average	69.5	40.5	8.4	-19.5	-28.2	-25.3	-28.8
RGB - Interest rate on long-term Treasury securities							
I /'53 - III/'54	20.3	37.7	-14.5	-26.3	-32.5	3.2	-4.6
III/'55 - IV /'57	8.8	1.0	10.6	34.1	-7.0	35.9	-19.4
III/'59 - I /'61	17.7	.9	-16.7	-8.6	-16.0	6.4	-9.9
II /'66 - II /'67	0	15.2	1.3	-12.0	-15.7	9.7	41.0
Average	11.7	13.7	-4.8	-3.2	-17.8	13.8	1.8
RM - Interest rate on FHA-insured mortgages							
I /'53 - III/'54	9.3	11.9	23.1	-3.2	-13.2	-10.6	-3.4
III/'55 - IV /'57	4.2	-1.9	10.6	10.2	22.5	3.4	9.1
III/'59 - I /'61	17.9	20.2	-.6	-1.9	-5.1	-4.5	-13.8
II /'66 - II /'67	33.5	10.7	10.5	9.3	-23.1	-7.2	10.8
Average	16.2	10.2	10.9	3.6	-4.7	-4.7	.7

	I	II	III	IV	V	VI	VII
RD - Federal Reserve discount rate (at New York bank)							
I /'53 - III/'54	70.6	0	0	0	-41.4	-46.0	0
III/'55 - IV /'57	100.8	21.9	39.0	24.3	0	0	0
III/'59 - I /'61	37.5	24.1	0	-31.4	-53.2	-1.3	0
II /'66 - II /'67	0	0	0	0	0	-42.8	-13.8
Average	52.2	11.5	9.8	-1.8	-23.6	-22.5	-3.4
B - Monetary base							
I /'53 - III/'54	-1.4	1.2	6.0	-2.3	-.7	2.0	1.6
III/'55 - IV /'57	1.8	2.1	-.2	2.6	-.1	1.2	-.2
III/'59 - I /'61	1.0	.1	-1.0	.1	2.0	3.6	2.0
II /'66 - II /'67	4.7	2.7	1.0	3.4	8.8	6.4	3.7
Average	1.5	1.5	1.4	1.0	2.5	3.3	1.8
CURR + DD - Currency plus demand deposits							
I /'53 - III/'54	1.9	-13.6	18.0	.6	1.2	1.9	3.4
III/'55 - IV /'57	.9	1.8	.7	1.1	.9	.2	-1.9
III/'59 - I /'61	0	-3.6	-3.1	-2.2	2.9	-.3	2.9
II /'66 - II /'67	3.4	-1.4	-.4	1.1	3.9	4.3	12.0
Average	1.6	-4.1	3.8	.2	2.2	1.5	4.1
GBS - Total short-term marketable Treasury securities outstanding							
I /'53 - III/'54	61.0	54.9	5.5	4.8	-7.8	-26.7	-8.1
III/'55 - III/'57	33.2	8.5	11.5	15.9	20.8	17.5	-5.8
III/'59 - I /'61	-3.2	7.2	-10.2	-14.5	28.9	-24.6	47.4
II /'66 - II /'67	-8.2	3.3	17.4	30.4	23.8	-12.7	-39.6
Average	20.7	18.5	6.0	9.2	16.4	-11.6	-1.5
GBL - Total long-term marketable Treasury securities outstanding							
I /'53 - III/'54	229.9	-20.2	19.0	-18.4	11.1	23.4	18.9
III/'55 - IV /'57	-5.3	-5.2	-15.0	-7.7	-3.2	-15.3	7.3
III/'59 - I /'61	13.7	.7	8.1	7.6	-28.3	13.5	-14.4
II /'66 - II /'67	-12.4	1.0	-9.6	-20.0	16.4	13.1	10.6
Average	56.5	-5.9	.6	-9.6	-1.0	8.7	5.6

	I	II	III	IV	V	VI	VII
MRT - Total value of all mortgages outstanding							
I /'53 - III/'54	12.4	11.1	9.9	10.1	10.3	11.3	13.0
III/'55 - IV /'57	13.1	13.7	11.1	10.1	9.5	7.9	8.3
III/'59 - I /'61	11.2	10.0	8.6	7.8	8.1	8.1	9.0
II /'66 - II /'67	6.0	5.1	5.2	5.0	5.8	5.1	4.3
Average	10.7	10.0	8.7	8.2	8.4	8.1	8.6
CUI - Manufacturing Capacity Utilization Index							
I /'53 - III/'54	3.4	.8	-6.8	-25.4	-17.7	-4.7	-2.4
III/'55 - IV /'57	3.2	-6.4	-6.6	-1.4	-1.0	-6.8	-16.4
III/'59 - I /'61	-18.4	-4.4	23.4	-9.2	-9.4	-16.4	-10.0
II /'66 - II /'67	1.3	-4.5	-.7	3.4	-14.9	-12.3	-10.6
Average	-2.6	-3.6	2.3	-8.2	-10.8	-10.0	-9.8
YD - Disposable personal income							
I /'53 - III/'54	5.6	6.9	.6	.5	1.9	-.9	4.1
III/'55 - IV /'57	8.3	5.0	6.0	7.2	5.1	7.6	2.3
III/'59 - I /'61	0	5.1	5.4	4.4	2.0	-.4	3.6
II /'66 - II /'67	4.7	7.5	7.5	7.8	8.4	7.0	5.6
Average	4.6	6.1	4.9	5.0	4.4	3.3	3.9
G - Government purchases of goods and services							
I /'53 - III/'54	15.5	9.8	-7.5	4.2	-18.7	-19.6	-5.1
III/'55 - IV /'57	6.1	2.3	12.0	6.5	20.0	6.3	3.6
III/'59 - I /'61	2.2	.4	-2.6	7.3	9.9	6.5	15.9
II /'66 - II /'67	11.1	25.1	20.3	16.1	26.2	14.6	4.8
Average	8.7	9.4	5.5	8.5	9.4	2.0	4.8
T - Personal taxes							
I /'53 - III/'54	11.3	1.1	-6.5	-25.9	-15.5	0	4.5
III/'55 - IV /'57	11.6	4.8	6.5	7.7	12.9	-.6	-8.1
III/'59 - I /'61	-5.6	1.8	35.9	.4	-7.6	-2.5	-2.9
II /'66 - II /'67	14.1	11.8	10.1	8.5	1.4	-.7	-2.7
Average	7.8	4.9	11.5	-2.3	-2.2	-1.0	-2.3