EFFECT OF MONETARY POLICY ON EXPENDITURES
IN SPECIFIC SECTORS OF THE ECONOMY

A paper
by

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Introduction

I was asked to prepare a discussion paper on the effects of monetary policy on specific sector expenditures as evidenced by the economy's movements during the course of 1966. The problems which arise and caveats necessary when theory is applied to specific cases are only too evident to all. Since the particular analytical techniques will influence the results, we start with the reasoning behind some of the choices made in this paper.

Conflicting Theories

Analysis requires theories. A plethora exist in the monetary field. At least four major descriptions of the relationships between changes in monetary policy and specific expenditures compete for attention.

1. Monetary policy influences interest rates which affect spending. Interest rates may alter the desire to consume or save. They also determine the cost of borrowing which influences the profitability of investment. Higher rates may limit the ability to borrow.

2. Spending is a function of the wealth or the assets of individual units. Monetary policies have an impact on wealth. The measurement of policy movements, for this purpose, can be performed in many ways. Some consider movements of the money supply narrowly defined as a measure or proxy for such changes. Others use broader definitions including other commercial bank deposits, deposits in all financial institutions, all liquid assets, or all wealth.

3. Expenditures may be influenced through the creation or intermediation of credit. The availability or rationing of credit to spending units will affect their spending. Monetary authorities through their creation of reserves and their impact on relative interest rates influence the amount and type of credit creation, of lending, and of borrowing.

4. Shifts in monetary policy cause changes in attitudes and expectations. These in turn may influence the spending of particular units.

Interpreting Data

Even with a theory in hand, testing the theory against available data is complex. Demand theories in any sector stress many significant variables. Monetary variables are only a few among many which will be shifting simultaneously. Expenditure data reflect the results of all of these separate impacts. Analysis requires that their individual effects be traced.

The variables may influence the levels of expenditures, changes in the levels, or the rate of change. A search for policy effects must, therefore, consider the statistics on the average level of a sector's spending as well as its first and second differences.

Most theories point out that policy changes alter expenditures only with a lag. Effects may occur over periods running from one to twenty or more quarters into the future. Conversely, the movements of the dependent variable in any quarter reflect the influence of each of many past quarters' changes in the monetary variables. A period's data may reflect several opposing movements of the independent variables in the past each of which influences the later period but with differing weights.

Finally we recognize that the aggregative data for a sector may hide significant movements in specific parts. Thus monetary impacts on total business investment may differ greatly from their impacts on the investment of small businesses or on those in particular industries. The availability of credit may be extremely significant for small finance companies while comparatively unimportant for large chemical firms. In attempting to evaluate the influence of monetary policy on a sectoral basis through an examination of spending statistics for each of the sectors taken as a whole, this type of impact may be completely hidden.

Plan of Paper

Recognizing all of these difficulties, we propose to examine various types of data in the light of existing theory. Using the period 1961-64 and the first half of 1965 as base measures, we examine the quarterly data for 1965, 1966, and early 1967. We first consider the more direct measures of monetary policy. Then we go on to figures showing changes in the flow of funds during these periods, and finally to data on expenditure flows.

We examine the data in relation to existing theories and in particular to that found in the recent empirical literature. Our approach to theory is eclectic rather than monolithic. Experience of over 50 years of business fluctuations analysis indicates, at least to me, that the field was retarded and damaged by misguided attempts to impose single, all-inclusive explanations on the very complex relationships. The ability both to explain and predict expanded rapidly as eclectic theories took over from

those stressing single causes. It seems likely that this experience should hold for monetary theories also.

Based on this examination of the data, we select two specific sectors in which to examine the apparent relationships between monetary changes and final expenditures. Whether anyone is convinced of the existence of one rather than another relationship will remain a question of style and choice. Examinations of the data themselves, however, should lead to some better understanding of what occurred by giving each reader a better idea of the timing and magnitudes of movements during this period.

Measures of Monetary Change

Table 1 shows the rate of change in a group of monetary variables. The general relationships are familiar. In the base period, 1961-64, member bank reserves and the money supply expanded around 3.5 per cent slightly more than half as fast as the gross national product. As a result, during this period, the ratio of money supply to the GNP dropped from 27.6 at the start to 24.1 per cent at the end of the period.

Time and savings deposits expanded rapidly particularly at commercial banks and savings and loan associations. Liquid assets as a whole rose somewhat faster than the GNP so that their ratio rose slightly from 79.2 per cent at the end of 1960 to 81.5 per cent at the end of 1964.

The first 11 months of 1965 show far more diverse movements. The division into six- and five-month periods catches some of the randomness and erratic movements that dominate these specific measures in short periods. Total reserves show a rapid expansion followed by a much slower one. The

TABLE 1

Financial and Monetary Indicators
(End of period to end of period)

	1961-64 Annual Average	1965 1st.H.	1965 July-Nov.	Dec.65 Mar.66	1966 2nd Q.	1966 3rd Q.	1966 4th Q.	1967 1st Q.	1967 2nd Q.
	(Annual rates of change, seasonally adjusted, in per cent)								
Total member bank reserves	3.7	7.0	1.6	4.8	4.5	- 0.9	- 3.6	17.7	3.4
Member bank non-borrowed reserves	3.5	4.5	3.3	2.8	2.9	- 3.0	0.4	24.8	4.8
Private money supply	2.8	2.6	4.2	5.5	2.7	- 1.8	- 1.5	6.4	7.7
Time and savings deposits:									
Commercial banks	14.8	15.2	16.5	7.9	11.2	8.8	3.0	18.9	15.2
S&L's	13.2	7.4	10.6	6.3	- 0.3	2.9	4.2	10.2	8.6
Mutual sav. bks.	7.9	7.5	7.1	4.1	3.2	4.6	6.6	8.7	9.9
Total time & sav. dep.	12.8	10.9	12.8	6.6	6.0	6.0	4.0	14.2	12.0
Liquid assets[1]	7.4	7.4	9.5	8.8	3.4	2.7	5.4	9.0	3.8
GNP	6.7	8.4	8.6*	10.2**	6.1	6.6	7.1	2.2	4.7
	(In per cent)								
Liquid assets/GNP	80.2	80.7	80.3*	79.7	79.7	79.0	78.5	79.1	79.6
Money supply/GNP	25.6	23.3	23.0	22.7	22.5	22.2	21.9	21.9	22.1
	(In basis points)								
3-mo. bill rate	+ 40	- 01	+ 30	+ 40	+ 06	+ 76	- 53	- 80	- 01
3-5 yr. Treasury	+ 18	--	+ 39	+ 37	+ 32	+ 26	- 58	- 47	+ 89
20-yr. US bonds	+ 03	- 01	+ 19	+ 20	+ 21	+ 07	- 31	- 02	+ 52
Corp. Aaa (new issue)	- 03	+ 11	+ 20	+ 20	+ 23	+ 49	+ 04	- 30	+ 71
Municipal Aaa	- 03	+ 18	+ 20	+ 14	+ 07	+ 30	- 14	- 28	+ 39
Prime rate	--	--	+ 50	+ 50	+ 25	+ 25	--	- 50	--

[1] Includes money supply, time and savings deposits, savings and loan shares, U. S. Savings Bonds, and U. S. direct and agency issues maturing in less than one year and are data reported as of the last Wednesday of the month. Government bond holdings of banks, S&L's, and U. S. government agency and trust funds have been excluded.

* 3rd Quarter.
** 4th Quarter and 1st Quarter.

Source: Federal Reserve Board.

money supply data picture an opposite movement. Non-borrowed reserves fall between. The rate of expansion of commercial bank time deposits speeded up in this period as banks went more heavily into negotiable certificates of deposit. At the same time, funds in thrift institutions grew more slowly. The opposing movements averaged to a somewhat slower growth for total time and savings deposits compared to the base period. The ratio of the money supply to the GNP continued to fall while the ratio of liquid assets fell in contrast to its previous expansion.

December 1965 marked a well-publicized change in monetary policy. This was followed by a slower expansion rate for non-borrowed reserves. Through the middle of.1966 total reserves and the money supply expanded at close to their rates for the first 11 months of 1965, but they then declined absolutely in the last half of the year.

The impact on time and savings deposits was more immediate and drastic. Flows were affected by the change in reserves, by changes in Regulation Q, and by a sharply altered relationship between the rates offered for deposits and money market rates. Their total rate of growth fell by more than half in the first quarter of 1966. It then continued at reduced levels. The second and third quarters exhibited a dramatic shift in the relationship between commercial banks and savings and loans. Banks raised their rates paid on consumer-type deposits rapidly to offset the increases in market rates. S&L's in particular could not respond, so they lost funds to both the market and banks.

All of these movements are reflected in a much slower expansion of liquid assets and in a continuing fall in the ratios of liquid assets and of the money supply to the GNP.

The related changes in interest rates are only too familiar. Rates rose sharply after the December action. Most continued to move up in the second quarter and reached record levels by September. The initial movements were primarily expectational, but thereafter they mirrored changes in the creation of reserves and deposits as well.

The Flow of Funds

Table 2 indicates how shifts in the monetary variables were reflected in the availability of credit to the different sectors of the economy.

Businesses expanded their deficits or requirements for external funds fairly steadily until the first quarter of 1967. In this same period, the deficits of both levels of government fluctuated without any trend.

The next section of the table shows business borrowing expanded rapidly through the middle of 1966. The initial and most rapid increase took the form of bank loans. These reached record-breaking heights in the middle of 1966. The additions to loans slowed somewhat matching the similar movement in bank deposits, but they continued to be made in amounts far above the base period. The year 1966 also witnessed a record level of borrowing in the security markets. Here, too, the amount of flotations decreased in the last quarter.

TABLE 2

Deficits and Borrowing
(In billions of dollars, seasonally adjusted)

	Average Annual Change 1961-64	1965 1st H.	1965 3rd Q.	1965 4th Q.	1966 1st Q.	1966 2nd Q.	1966 3rd Q.	1966 4th Q.	1967 1st. Q.
Businesses:									
Internal funds	43.0	54.7	55.5	56.4	57.7	57.8	57.9	61.4	57.9
Capital outlays	45.1	60.0	62.5	65.4	68.6	73.7	73.7	77.3	70.5
Net deficit	- 2.1	- 5.3	- 7.0	- 9.0	-10.9	-15.5	-15.8	-15.9	-12.7
Federal	- 3.6	3.0	- 4.0	- 1.1	1.2	2.1	- 1.7	- 4.8	-10.2
State & local	- 1.8	- .9	- 1.0	- 1.1	- .2	.9	1.1	.5	- 1.8
Total	- 7.5	- 3.2	-12.0	-11.2	- 9.9	-12.5	-16.4	-20.2	-24.7
				Private Funds Raised					
Business:									
Bk. loans n.e.c.	3.9	12.2	9.9	14.8	10.5	16.5	7.6	9.2	6.8
Corp. securities	5.3	5.7	7.4	2.9	11.9	15.2	11.7	6.9	14.5
Mortgages	7.3	8.5	9.0	8.2	8.5	8.3	5.0	2.8	5.5
Other (inc. tax liabilities)	2.9	4.1	4.7	8.8	8.0	- 2.3	4.2	6.8	6.1
Total	19.4	30.5	31.0	34.7	38.9	37.7	28.5	25.6	32.9
Households:									
Consumer credit	5.6	9.8	9.3	8.9	9.2	7.0	6.9	4.6	4.8
Mortgages	14.6	16.3	17.0	17.8	16.2	15.3	14.6	12.7	11.3
Other	1.5	2.0	2.2	2.7	- .5	2.5	2.8	1.6	.7
Total	21.7	28.1	28.5	29.4	24.9	24.8	24.3	18.9	16.8
R.O.W.	3.1	3.4	1.0	2.7	2.3	2.4	.1	.9	- .8
Private Total	44.2	62.0	60.5	66.8	66.1	64.9	52.9	45.4	48.9
Government:									
State & local	6.0	7.8	7.2	8.4	5.8	7.8	6.3	6.6	10.2
US Govt. direct & sav. bonds	5.5	2.7	- 8.3	7.7	9.5	-14.4	8.0	2.3	8.2
Nonguaranteed & PC's	1.4	3.5	3.8	.5	5.4	17.2	- 1.0	---	2.3
Total	12.9	13.0	2.7	16.6	20.7	10.6	13.3	8.9	20.7
Total Funds Raised	57.1	75.0	63.2	83.4	86.8	75.5	66.2	54.3	69.6

Source: Federal Reserve Board Flow of Funds.

Mortgage funds for income properties fell sharply in the last half of 1966. The availability of other funds shifted rapidly primarily as a result of changed tax liabilities as corporations had to pay more taxes on a current basis. In total, businesses increased their borrowings through the second quarter. Funds raised then decreased quite sharply but remained well above earlier periods.

Households showed a sizable expansion in funds raised in 1965. These sums reflected high and increasing sales of new automobiles. New housing starts were also high and a larger share of expenditures was being financed through mortgages.

Auto sales and the expansion of consumer credit were at record levels in the first quarter of 1966. Consumer credit then slowed its expansion sharply. Mortgage lending by private sources started down immediately in the first quarter of 1966. By the first quarter of 1967, household borrowing on mortgages was nearly 40 per cent below the 1965 high.

Changes in governmental credit flows were erratic reflecting primarily movements in tax collections, Treasury balances, and agency issues.

Given theories that explain monetary impacts in terms of creation and availability of credit and assets as well as the interest rates, what facts stand out in these two tables? We see: the steady fall in the ratio of money to the GNP throughout the period; the fall in the ratio of liquid assets to the GNP after the end of 1964; and the fall in the creation of non-borrowed reserves after the first half of 1965. Compared to the previous periods, total reserves and the money supply grew somewhat faster in the fiscal year 1966, but they then decreased absolutely starting in the

summer of 1966. Finally, apparently there were significant shifts in the

expansion rates of time and savings deposits in response to new instruments,

changes in Regulation Q, and market rates.

The credit demands of businesses and the sharp increase in loans

from banks as well as in the sale of securities are reflected in Table 2.

This expansion slowed gradually after the middle of 1966. The availability

or use of credit by households dropped sharply from the end of 1965.

The interest rate or price of money increased throughout the

period until the final quarter of 1966. The movements in rates were par-

ticularly sharp between December 1965 and October 1966.

Sector Expenditures

How do these changes in the monetary variables appear to have

carried over to the actual sector expenditures? Let us examine Table 3.

If we lacked knowledge of the monetary changes during this period, what

movements in spending would stand out as requiring explanation? In levels,

only the movement in housing expenditures is clear. These fell rapidly in

1966 to well below the amounts registered in both the 1961-64 and first-

half-of-1965 bases. Inventories were also lower in the second quarter of

1967, but this low figure followed extremely high peaks for most of their

prior observations.

Considering changes in. levels, we note that after the end of 1965

the rate of increase in spending on non-residential investment and on con-

sumers' durables slowed down and then stopped. State and local expendi-

tures seemed to increase at a steady or rising rate. The growth of other

TABLE 3

Selected Indicators
Annual Rates, Seasonally Adjusted

	Annual Average 1961-64	1965			1966				1967	
		1st H.	3rd Q.	4th Q	1st Q.	2nd Q.	3rd Q.	4th Q.	1st Q.	2nd Q.
					(In billions of dollars)					
GNP Total	575.8	669.1	690.0	708.4	725.9	736.7	748.8	762.1	766.3	775.3
Residential	25.5	27.1	26.9	26.8	27.0	25.8	23.7	20.9	21.4	22.7
Nonresidential	53.5	68.3	71.9	75.7	78.3	78.7	81.2	82.8	81.9	81.3
Change in bus. inv.	4.9	9.7	9.4	9.9	9.9	14.0	11.4	18.5	7.1	2.1
State and local	56.4	67.8	70.4	72.5	74.3	76.2	78.1	80.2	83.3	85.6
Consumer durables	51.7	64.7	66.1	68.6	71.6	68.2	70.9	70.6	69.4	72.1
Other consumption	314.9	359.5	370.2	379.2	386.7	393.4	399.3	403.2	410.8	416.8
					(In per cent)					
% of DPI after interest										
Consumer durables	13.3	14.4	14.1	14.4	14.8	13.9	14.2	13.9	13.4	13.7
Consumer nondurables & services	81.0	80.2	79.2	79.5	79.7	80.2	80.0	79.3	79.2	79.3
Personal saving	5.7	5.4	6.6	6.1	5.5	5.9	5.8	6.8	7.5	7.1
					(In millions of units)					
Sale of new autos	6.8	8.8	8.9	8.6	9.3	7.8	8.5	8.1	7.3	7.8
Private housing starts	1.49	1.51	1.45	1.58	1.52	1.37	1.09	.98	1.21	1.26
					(In billions of dollars)					
Increase in savings available for mortgages (Index)	100.0	107.4	106.2	100.0	94.0	63.8	58.4	54.3	124.0	n.a.
Change in outstanding mortgage commitments*	1.40	.52	- .32	.49	- .87	- 5.15	- 5.36	- 3.14	1.87	6.72
Net change in mortgage debt	20.9	20.6	21.0	21.6	23.1	17.5	12.5	9.1	12.7	15.
Contracts & orders for new plant & equipment	11.8	14.5	15.2	15.5	16.8	17.3	18.3	16.7	16.2	16.8
Newly approved capital appropriations	3.4	5.4	5.9	6.3	6.4	7.1	6.1	6.2	5.6	n.a.

* See Table 5 for definition.
Sources: Economic Indicators; text; Business Cycle Developments.

consumption expenditures fluctuated in a quite random manner. Their average growth rate was higher than in the base period, although the per cent of available income actually spent fell slightly.

Both the discussion in this period of what was happening as well as the demand theory of these expenditures can furnish rather complete explanations of the course of almost all of the major variations--probably with the exception of housing--found in this table without any necessary reference to monetary events. Inventory cycles, the acceleration principle, etc., give adequate reasons for most movements. Furthermore, while evidence of the impact of monetary variables on many streams was searched for during this period, few signs of a direct relationship were obvious although some special surveys and statistical descriptions of this period do point out probable relationships between the monetary changes and expenditures in specific sectors.

In a way this is surprising, but not too much so. We know that most econometric studies of the past covering State and local expenditures, inventories, outlays for consumer durables, and other consumption have attempted without success to relate changes in monetary variables to expenditures. While at times monetary variables have added some explanatory values, in more cases these variables appear to have lacked statistical significance. Future attempts based on the past two years added observations, better estimating procedures for leads and lags, and use of more comprehensive models may alter this situation.

In the remainder of this paper, we discuss only the relationship of monetary changes to expenditures in housing and other fixed investment. These are the areas where past and current studies give most hope for success. For the remaining sectors, the relationships are probably far more complex, so much so that many would hold that explicit proof of their existence must still be considered as lacking. We would expect, of course, that with a more complete disaggregation of these sectors other examples would be more evident. New techniques may also lead to the discovery of significant relationships not yet explored.

Expenditures on Residential Structures

The basic theories relating monetary shifts to expenditures tell us that we should, in this period, expect major reactions in the residential construction sphere. The data of Table 3 confirm our expectations. In 1966, the table shows an extremely sharp fall in both residential investment and in housing starts. While the relationship between these two measures is not exact, they are tied sufficiently for us to use variations in starts as a short-cut approach to explaining expenditures.[1]

The reasons for expecting monetary shifts to influence housing starts are clear. By its nature, monetary policy should, in the first instance, affect those units whose spending is highly dependent on either the cost or availability of credit. Among these groups, the degree of

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[1] It is expected that the level of housing starts shown in the table will be revised downward shortly. This should not affect the analysis of this paper.

impact will vary. The variations will depend on the per cent of purchases made with credit, the amount of credit required per unit of expenditure, the ability or willingness to absorb higher interest rates, the institutional character of the market, and the degree to which traditional lenders are influenced by policy changes.

Housing ranks high on all these counts. About 95 per cent of new single-family housing is sold with the benefit of long-term financing. In any given year, the gross amount of mortgage lending on residential structures may be 160 per cent or more of this sector's GNP expenditures. The net amount lent approximates 70 per cent. Most borrowers allot a high percentage of their annual income to cover the costs of financing a house. They have limited ability or willingness to absorb changes in the cost or availability of credit.

While residential financing is the largest of all capital market operations, its institutional structure is rather unique. Its importance to the separate types of lending institutions varies greatly. Thus in 1963-65, a fairly typical period, each institutional group placed a very different percentage of its net inflow of funds into net residential mortgage expansion. The averages for this period, for example, were 18 per cent for commercial banks, 98 per cent for mutual savings banks, 96 per cent for savings and loan associations, and 28 per cent in the case of life insurance companies.

For commercial banks and life insurance companies, in particular, these percentages have traditionally been subject to rather wide variations. Mortgage lending usually does not arise from customer or other long-term relationships. The willingness over time of institutions to make loans varies greatly in accordance with the current situation in the capital market as a whole. They vary the per cent of their funds put into mortgages widely.

These factors give a clear indication of why construction expenditures should be expected to feel a heavy impact as monetary policy shifts. Two paths seem to lead from an increase in interest rates to a curtailment of starts: (a) Higher interest rates raise the cost of borrowing on mortgages fairly rapidly. This directly lowers the profitability of builders. It also decreases the demand for units by final purchasers. (b) The availability of money to both builders and purchasers is also decreased. (1) Savers react to rate movements by shifting their deposits among financial institutions or increasing their direct market investments. (2) This shift among institutions will alter the availability of mortgage funds in accordance with the weight each type places on this sphere of lending for traditional or other reasons. (3) Many financial institutions will lower the relative share of funds to be placed in mortgages.

The decreased availability of mortgage funds and higher interest rates have no great impact on the needed number of housing units. They decrease construction and turnover. Initially most of the construction shortfall is absorbed in fewer vacancies. Eventually, however, it raises rents and leads to lower housing standards and a higher cost of living. In the meantime production in this sector is reduced.

Shifts Among Financial Institutions

Chart I and Table 4 reflect some of the alterations which occurred in both the amount and availability of funds among financial institutions. Sharp movements took place in both the share of savings going to financial institutions and in its distribution among institutions.

A simple explanation for these phenomena arises when one relates them to the yields paid depositors by financial institutions and by the money market. Chart I for example shows the growth of time deposits in commercial banks and thrift institutions as the spread of the amounts they paid their depositors varied from market rates.

We see from the chart that the experience of last year was foreshadowed in several previous periods. The year 1966 was dramatic but not unique.

While major fluctuations seem related to the market spread, they also are influenced by government regulations. The chart shows the increasing share of savings put in commercial bank time deposits. Part of this movement reflects banks' greater interest in competing for time deposits. Part, however, reflects the greater leeway available for such competition beginning with the 1957 increase in Regulation Q ceilings. This upward movement was aided by the additional upward adjustments in the ceilings between 1962 and 1965 and by the decision of banks to enter vigorously the market for negotiable certificates of deposit.

The year 1965 witnessed a considerably slower growth rate for S&L's traditionally the major source of mortgage funds. This downward movement accelerated in the course of 1966. Market rates were moving up,
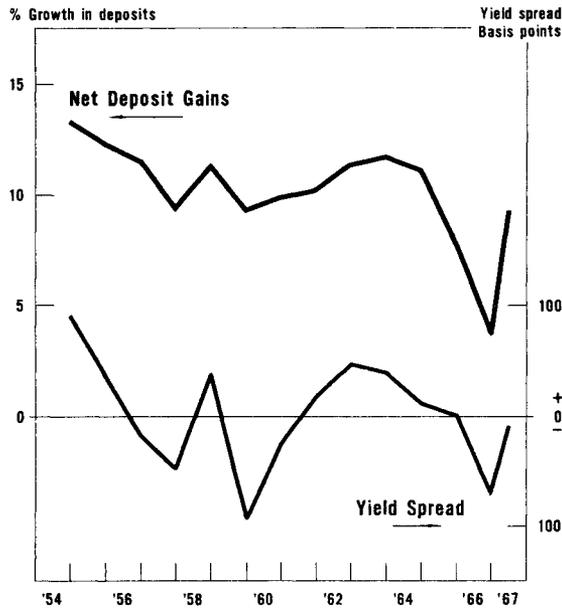
SHIFTS IN SAVINGS

TIME DEPOSITS
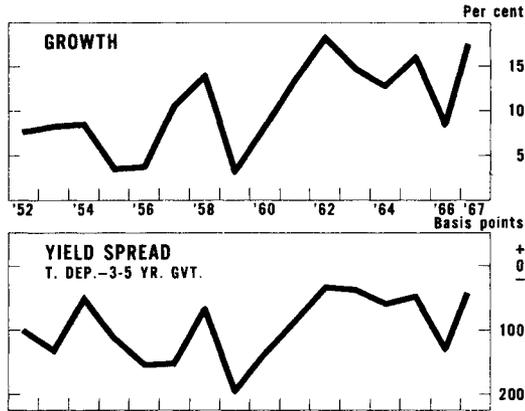
ANNUAL RATE OF CHANGE IN NET DEPOSITS AT MUTUAL SAVINGS BANKS AND SAVINGS AND LOAN ASSOCIATIONS RELATED TO YIELD SPREAD *

*AVERAGE INTEREST DIVIDEND RATES PAID LESS AVERAGE YIELD ON 3-5 YEAR INTERMEDIATE TREASURY BONDS.
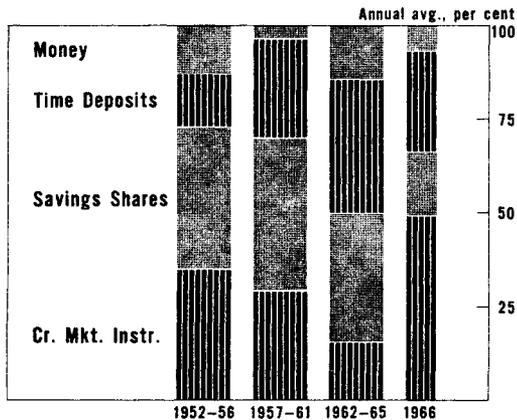
DISTRIBUTION OF PUBLIC FIN. ASSET PURCHASES

TABLE 4

Savings Flows During Selected Months
(In millions of dollars)

	Commercial banks*	S&L's	Mutual Sav. Banks	Life Ins. Companies**
	(Not seasonally adjusted)			
1966				
January	831	- 77	227	824
April	1,261	- 773	- 341	658
July	1,751	-1,508	195	977
October	481	- 56	131	943
1967				
January	764	184	433	1,268
April	1,929	497	189	705
June	2,046	1,831	625	n.a.
	(Seasonally adjusted)			
1966				
January	1,632	470	226	824
April	1,125	227	27	658
July	2,151	- 170	201	977
October	904	168	293	943
1967				
January	1,648	748	485	1,268
April	1,776	1,544	580	705
June	2,178	753	468	n.a.

* Into consumer-type time and savings deposits.
** Net increase in assets.

Source: Federal Reserve Board.

but rates paid by the thrift institutions lagged. They were squeezed
because on one hand their earnings depended mainly on long-term, lower-
yield assets bought in the past. On the other, S&L's found it difficult to
move the marginal rate offered without altering the average for all share
accounts. The optimum speed of adjustment of these rates, therefore,
depended on the average rather than the marginal elasticity of demand for
their accounts. What this elasticity was caused considerable debate par-
ticularly among those concerned by the fact that reserves had not caught
up to the previous growth in liabilities.

This problem was less acute for commercial banks both because the
average maturity of their assets was far shorter and because they differen-
tiated their deposits offering separate rates in each market. As a result,
they were able to compete far more effectively.

Table 4 shows the type of movements that occurred among institu-
tions in 1966. It also shows the clear impact on the flow of funds into
these institutions of the reduction in Q ceilings in September 1966 and
the later movement in market rates.

Changes in Housing Finance

These shifts in the flow of funds into and among the institutions
had an immediate impact on the mortgage market. For example, Table 3 shows
a weighted index of savings available for mortgage lending. This is simply
a weighted aggregate of the net deposit flows into financial institutions
with weights based on the percentage of each type's flow placed in mortgages
in the first half of the 1960's. We note that funds available began to

fall in the third quarter of 1965. By the fourth quarter of 1966, the index had fallen nearly 50 per cent.

The impact of this change in flows was augmented by a not unusual shift by each type of institution away from the mortgage market. By the first half of 1967 for example the net investment in residential mortgages as a share of new inflow of funds had fallen to 6 per cent for commercial banks, 50 per cent for mutual savings banks, 43 per cent for savings and loans, and 16 per cent for life insurance companies. These shifts reflected these institutions' views as to relative returns, desire for liquidity, the availability of mortgages, and differing lags among these forces.

In 1963-65, the financial institutions invested an average $45 billion a year in residential mortgages. The net mortgage investments averaged $19 billion a year or nearly 50 per cent of their net fund inflow. In the first half of 1967, the annual rate of gross investments had fallen by more than 45 per cent to $24 billion a year. Net mortgage investments were at the rate of $11 billion or only 20 per cent of the net inflow into financial institutions. While the use of seasonally unadjusted data somewhat overstates the case, mortgages' share of funds decreased by nearly 60 per cent from their 1963-65 share.

The timing of these shifts and their impact on starts show up clearly in Table 3. The decrease in available savings was followed within a quarter by a decrease in outstanding mortgage commitments. The lag to decreased housing starts visually appears to be between one and two quarters. The net change in mortgage debt lags the decrease in funds also.

Results of Econometric Models

The impact of monetary changes on housing expenditures can be checked by use of an econometric model. The model has the advantage of giving a specific weight to the monetary impacts while holding all other variables constant. It retains, however, all the well-known disadvantages inherent in its problems of statistical techniques and measurements.

Table 5 shows current versions of the Maisel model first published in the American Economic Review in June 1963. The present form includes two monetary variables one measuring interest rates and one availability of financing. In equations 1-3, the availability variable is based on offerings net of purchases of mortgages by private holders to FNMA. This moves inversely to credit availability. In equations 4 and 5, credit availability is measured by the savings available for mortgages discussed in the previous section. Other variables are vacancies, disposable income per household, relative rents to costs, and the inventory under construction.

What do the models suggest as to monetary impacts? Both the interest rate and availability variables are three-quarter moving averages with a further one-quarter lag. On the average, a change in monetary conditions affects the rate of starts six months later. At the means, the average interest elasticity is -.48 and the average credit availability elasticity is -.07. This means that a 100-basis-point increase in mortgage interest rates is related to a fall in housing starts of 120,000 at annual rates. A decrease of $1 billion in savings available for mortgages is equivalent to a decrease of 33,000 in starts.

TABLE 5

Housing Starts Regression Equations

1. $St_0 = -848.7 - .1548 \sum\limits_{-1}^{-3} FHA - .1011 \sum\limits_{-1}^{-3} FNMA - .0781 \sum\limits_{-1}^{-3} V$
   $(.0758) \quad\quad (.0222) \quad\quad (.0208)$

   $+ 1.0198 \sum\limits_{-1}^{-3} R/C + .0683 \; DIH_{-1}$
   $(.2171) \quad\quad (.0109)$

   $\bar{R}^2 = .74 \quad SEE = 22.27 \quad D.W. = .992$

2. $St_0 = -441.20 - .1472 \sum\limits_{-1}^{-3} Int. - .0687 \sum\limits_{-1}^{-3} FNMA - .0579 \sum\limits_{-1}^{-3} V$
   $(.1035) \quad\quad (.0198) \quad\quad (.0228)$

   $+ .6212 \sum\limits_{-1}^{-3} R/C + .0468 \sum\limits_{-1}^{-3} DIH_{-1} + .5371 \; St_{-1} - .2999 \; St_{-3}$
   $(.2287) \quad\quad (.0144) \quad\quad (.1067) \quad\quad (.1071)$

   $\bar{R}^2 = .83 \quad SEE = 18.10 \quad D.W. = 2.041$

3. $\triangle St_0 = 2.00 - .5148 \triangle FHA_{-1} - .0956 \triangle \sum\limits_{-1}^{-3} FNMA - .1807 \triangle V_{-1}$
   $(.2270) \quad\quad (.0356) \quad\quad (.0753)$

   $+ 1.0097 \triangle \sum\limits_{-1}^{-3} R/C - .3277 \triangle (St_{-1} - St_{-3})$
   $(.4544) \quad\quad (.1344)$

   $\bar{R}^2 = .40 \quad SEE = 19.62 \quad D.W. = 2.046$

4. $St_0 = -769.62 - .4404 \sum\limits_{-1}^{-3} Int + .0180 \sum\limits_{-1}^{-3} Fin - .1147 \; V_{-2}$
   $(.0992) \quad\quad (.0063) \quad\quad (.0224)$

   $+ 1.2243 \sum\limits_{-1}^{-3} R/C + .0524 \; DIH_{-1}$
   $(.2099) \quad\quad (.0182)$

   $\bar{R}^2 = .75 \quad SEE = 21.80 \quad D.W. = 1.198$

5. $St_0 = -614.16 - .3625 \sum\limits_{-1}^{-3} Int + .0074 \sum\limits_{-1}^{-3} Fin - .0987 \; V_{-2}$
   $(.1222) \quad\quad (.0061) \quad\quad (.0250)$

   $+ .9479 \sum\limits_{-1}^{-3} R/C + .0570 \; DIH_{-1} + .4500 \; St_{-1} - .3310 \; St_{-3}$
   $(.2352) \quad\quad (.0199) \quad\quad (.1307) \quad\quad (.1042)$

   $\bar{R}^2 = .81 \quad SEE = 19.12 \quad D.W. = 1.882$

See following page for definitions.

Definitions for Maisel Model
Period for fitting: 2nd Quarter of 1953-1st Quarter 1967

DIH--Disposable personal income, seasonally adjusted, in 1958 dollars per household.

FHA--Yields on FHA-insured Section 203, new-home mortgages sold in the secondary market, as reported by the Federal Housing Administration.

FIN--Sum of seasonally adjusted net inflows to financial institutions available for mortgages on residential properties, derived as follows: 16.3 per cent of Commercial Bank time and savings deposits, including negotiable certificates of deposit; 98.1 per cent of Mutual Savings Bank savings deposits; 86.9 per cent of Savings and Loan Association share accounts and advances from the Federal Home Loan Banks; and 26.3 per cent of Life Insurance Company increases in reserves.

FNMA-Dollar volume of offerings of mortgages by private holders to FNMA for purchase for its secondary market portfolio less dollar volume of sales from FNMA for that portfolio. Functionally comparable data prior to 1955 estimated.

Int--Contract rate on conventional first mortgages on new homes; FHLBB series for period beginning 1963 and FHA estimates for earlier period.

R/C--Ratio of rent component of BLS Consumer Price Index to residential cost component of GNP implicit price index.

St---Seasonally adjusted quarterly rate of private housing starts, including farm starts, as reported by the Census Bureau.

V----Number of housing units available and fit for use, derived by comparing available inventory, including new completions, with number of households at beginning of each quarter.

$\sum\limits_{-1}^{-3}$ --A three-quarter moving average of periods minus one, minus two, and minus three.

How significant are monetary changes in the total? We have various measures of significance. In calculating these we combine both monetary variables because of their high inter-correlation. On the average using simple relationships (not correcting for the interaction of money and other independent variables), the monetary variables are related to 42 per cent of the shifts in starts. Taking into account the other variables, the addition of the monetary variables accounts for about one-third of the movements not previously explained. Similarly removing the monetary variables decreases the relationships shown in Table 5 by about 20 per cent.

What do these models show for the year 1966? Let us take as a measure of change, the decrease in starts at annual rates between the last halves of 1965 and 1966. Because of the random variances in the data, fairly lengthy measurement periods are required. Over this year, the number of housing starts dropped by 476,000. The average of the models estimated a movement in this period of only 352,000. They failed to account for 26 per cent of the drop in this extremely dynamic period.

Of the decrease estimated by the model, the two monetary variables accounted for 75 per cent. The remainder was accounted for by an increased number of vacancies and a decrease in relative rents, offset somewhat by an increase in disposable income. The estimated impact of the monetary variables was 56 per cent of the actual reported change--the difference, of course, being the amount unexplained by the model.

While I don't want to over-estimate the importance of the econometric results, it is clear that they do tend to confirm our previous analysis of the major factors at work in this market.

Business Fixed Investment

Examining the tables with respect to business fixed investment what factors stand out? We note a steady decrease in corporate liquidity and a rise in interest rates from the middle of 1965. The amount of borrowing continued to increase till the end of the first half of 1966--with the sums borrowed from banks and the security markets far above previous rates. In the second half of 1966, borrowing fell quite sharply. Business appropriations for capital followed a similar path. Actual orders placed continued to rise through the third quarter, while GNP expenditures on business fixed investment went up through the fourth quarter of 1966.

When the measures began to fall, the amount of decrease followed an order similar to that of the turning points. The cut in business borrowing was sharpest and that in GNP expenditures the least. All stayed at high levels in comparison with those of 1961-64.

The theory of capital investment has been well specified in many places.[2] It starts with an assumption that there is a basic demand for capital based on its expected profitability. This in turn depends on the amount of output sold, the selling price for the output, and factor costs. The cost of using the capital depends on the interest rate, tax rates, and depreciation. Thus monetary policy is assumed to influence the demand for capital through the cost of using it. These various factors interrelate in a rather complex non-linear form because some variables have a multiplicative effect while interest costs enter through a discounting process.

[2] D. W. Jorgenson, "Anticipations and Investment Behavior," The Brookings Quarterly Econometric Model of the United States, J. S. Duesenberry, et al. (Rand-McNally, Chicago, 1965.)

The shifting desires of a firm to own capital are not, however, immediately reflected in investment expenditures. The demand has to go through a planning and design period. Appropriations will be made. Financing will be arranged. Contracts will be let. Finally expenditures begin and are spread over a fairly lengthy period depending on particular production processes. The change in demand resulting from a movement in any of the independent variables will influence the level of production in each of many future periods.

During the planning, appropriating, and contracting process, monetary changes may enter in an additional way. Many believe that the ability of firms to finance desired capital investments constrains their actual purchases. Thus, credit has an impact not only on profitability, but also on the ability of businesses to purchase profitable items.

Several surveys conducted by Donaldson, Lufkin, and Jenrette in 1966 among firms with assets of over $1 million seem to confirm the general theory.[3] In the vicinity of 20 per cent of these firms report cutting back somewhat on their capital investment because of changes in the monetary situation. In the first half of the year, most of these firms were primarily influenced by changes in interest rates. By the end of the year, however, a sizable minority indicated they had reduced spending because of the unavailability of credit. The great majority of those who cut back said that both the rate and availability of credit influenced their decisions. Larger

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[3] Donaldson, Lufkin & Jenrette, Incorporated, Timely Review of 1966 Credit Shortage Effects on Business Financing and Spending Decisions. July 1967. (New York.)

firms seemed to find credit easier to obtain and were less influenced by its availability than by its cost.

Results of Econometric Models

Several econometric models have been developed in recent years which follow the general outline of the theory discussed above. Important characteristics of three of these models are shown in Table 6. A major variance from the theory is that in their present form these models have not measured the impact of availability of credit during the planning and appropriation process. They are designed so they could do so, but they have not yet found this factor statistically significant. This may be either because of the high correlation among monetary variables or because prior to this year availability never became a really significant problem.

The first column of Table 6 shows the interest elasticity of these models. The Bischoff model is evaluated at the investment level of the fourth quarter of 1965. The simple mean of the three elasticities (which have been averaged from sub-parts) is -.22. The following columns show the type of impact which these models estimate from the monetary variable. The magnitude of response in any period depends on the final elasticity, the amount of monetary change, and the time intervening between the change and the period under consideration.

The table shows the impact of an assumed change in investment in manufacturing plant and equipment two years after interest rates rise by 100 basis points. Clearly, while the models have the same general relationships, there are major differences in their measured response. Again

TABLE 6

Responses of Gross Investment to Changes in the Rate of Interest

	End of Period Elasticity $E_{I \cdot R}$	End of Period Response of Gross Investment $\frac{\partial I}{\partial R}$	Effects of a 100 Basis Point Decrease in R in Period T+8			I	R
			Decrease in period t+8 as a percentage of invest-ment in '65 4th Q.	Cumulative decrease of investment as defined in Col.I to period t+8 '65 dollars	Average quarterly decrease as a per-centage of investment '65 4th Q.		
Jorgenson	-.17	-.385 billions/ quarter in 1965 dollars	15.2%	10.5 billions	9.6%	Total plant and equipment	U.S. Govt. long-term bond rates
Griliches-Wallace	-.37	-.271 billions/ quarter in 1965 dollars	10.8%	4.4 billions	9.2%	Manu-facturing plant and equipment	Moody's industrial bond yield
Bischoff	-.12	-.618 billions/ quarter in 1965 dollars	3.2%	2.1 billions	1.6%	Producers durable equipment	Moody's industrial bond yield
						Nonresi-dential construction	Moody's industrial bond yield

References:

Jorgenson, D. "Anticipations and Investment Behavior," The Brookings Quarterly Econometric Model of the United States, Eds. J.S.Duesenberry, G.Fromm, L.R.Klein, and E.Kuh. Chicago: Rand McNally and Company, 1965, pp. 35-92.

Griliches, I. and Wallace, N. "The Determinants of Investment Revisited," International Economic Review, VI, (September 1965), pp. 247-59.

Bischoff, C. "Elasticities of Substitution, Capital Malleability, and Distributed Lag Investment Functions," unpublished working paper for FRB-MIT model, 1966.

_____ "A Model Explaining Non-Residential Construction," unpublished working paper for FRB-MIT model, 1967.

averaging these dissimilar results, we note that if interest rates rose by 100 basis points or nearly 25 per cent over their 1965 base then at the end of two years or eight quarters, the average level of investment (ceteris paribus) would be about 9.7 per cent less than it otherwise would have been. In the two-year period, the value of investment would have experienced a total cumulative decline of about $9.9 billion. This would have been a decrease of about 6.7 per cent of the investment in this two-year period.

The range of results produced by the three models is rather large and possibly misleading. In terms of total impact, the models are quite similar. Dissimilar results arise from considerable differences in lag patterns of response. In the Jorgenson and Griliches-Wallace models, the peak-period response of investment to a change in interest rates occurs within two years of the change. The Bischoff model in contrast produces responses that do not peak until eleven quarters after the change.

Since we are interested in 1966, we ask what approximately do these models show with respect to the impact of the monetary changes of this period? In this period the changes would be less since the total impacts are spread far into the future because of the lengthy ordering, production, and replacement process. Again we average the models in the table making some rather heroic assumptions about comparability in the process.

Non-residential investment expenditures in the last half of 1965 were at an annual rate of not quite $74 billion. The interest rate on long-term government bonds and on corporates ranged in 1963, 1965, and first half of 1965, the relevant periods influencing expenditures in the last half of

1965, at around 4.10 per cent and 4.35 per cent respectively. These rates rose at intervals in 1965 and 1966 reaching peaks up about 70 basis points for government bonds and 115 basis points for corporate bonds by the fall of 1966.

The ultimate effect of the increase in interest rates in 1966, if maintained far into the future, would according to the model decrease annual investment by from 3 to 5 per cent or from 2-1/4 to 3-3/4 billions of 1965 dollars. However, because of the lags in the investment process very little of this impact was felt during 1966. In fact, the estimated decrease from interest changes over the prior year would by the fourth quarter of 1966 have been only in the vicinity of $.9 billion at an annual rate or 1.2 per cent of the fourth quarter of 1965 base.

Obviously, these models do not show a very significant impact on monetary policy in 1966. Although they do seem to confirm the importance of long lags in this sector. However, I would guess that because the monetary shift was far larger and more dramatic than in the periods used for estimating their coefficients, these models, just as in the housing model, under-estimated monetary effects. We know from the Donaldson, Lufkin, and Jenrette study[4] that far more companies reported that availability of funds was influencing their expenditures in the second half of the year than in the first half. This lack of financing also appears to account for some of the cuts in appropriations and orders.

4/ Ibid.

Conclusions

We have noted sizable impacts in both housing and other investment of monetary policy although with considerable lags. The influences appear to work through both the price of credit and its availability. The shifts in the flow of funds among different financial institutions and the differing lags and ability to pay in the sub-sections of the capital market seem to have reinforced the direct influence of policies on reserves and short-term interest rates.

It should be clear that this analysis leaves out several other possible channels of impact. Omitted are the expectational effects, as well as those of the multiplier and the accelerator.

We note, for example, the increased rate of borrowing after the 1965 increase in the discount rate. We see the high rate of car sales and of consumer borrowing in the first quarter of 1966. The rate of inventory investment in 1966 was extremely high. We have no available method of determining whether the expectational forces caused these expenditures to be higher or lower than they otherwise would have been.

The multiplier effect appears clear. The percentage of available disposable income spent in 1966 was slightly below the last half of 1965, but slightly above the average rate for that year. Variations in spending appear to be fairly normal similar to those of many years in the past. This means that the measured impacts in housing construction and investment were carried through and had equivalent influences on consumption.

Similarly we would expect that normal acceleration for both fixed and inventory investment also occurred. The various econometric models give specific magnitudes for these forces. The Donaldson, Lufkin, and Jenrette survey[5] reported that firms altered their inventories and investments somewhat as their final demand varied. This was particularly true of suppliers to the residential construction industry.

While the results of this analysis of these different sectors are interesting and significant, they do, of course, leave many unanswered questions. They appear to indicate, as we would guess, that the specific impacts were influenced by the amount of co-variance with events and other related variables. We do not know how much of the measured results depended upon the state of demand, the prior lack of liquidity, or the time it takes to learn and to adjust to a new environment. These are the types of additional answers we need if we want to estimate the probability that monetary shifts will have greater or lesser impacts in the future.

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[5] Ibid.