Monetary and Fiscal Influences on Economic Activity—The Historical Evidence*

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In November 1968 this REVIEW *included an article which tested the relative importance of monetary and fiscal influences on economic activity for the postwar period 1953-68. The conclusions of that article were that monetary influences had a stronger, more predictable, and faster impact on economic activity than fiscal influences.*

The intent of this article is to consider the same issue in a longer, historic context (1919-69). Have monetary influences dominated economic activity in periods when financial and institutional factors were substantially different, as in the 1920's, and when the general trend of economic activity was largely depressed, as in the 1930's? The results presented in this article indicate that monetary influences have dominated fiscal influences on economic activity in all subperiods considered, with the single exception of the years covering World War II. This article also presents evidence that the movements in the money stock have been dominated by the behavior of the monetary authorities and not by the behavior of the public.

A SUBJECT of continuing interest in professional and recently in popular economic writing is the relative role of monetary and fiscal influences in determining economic activity.[1] This debate has been renewed by Leonall Andersen and Jerry Jordan (AJ) in an article published in this *Review*.[2] That article presented evidence which indicated that monetary influences had a larger, more predictable, and faster effect on economic activity than fiscal influences in the period from 1953 to 1968.

These results have stimulated considerable interest and discussion.[3] The ensuing debate has mainly confined itself, however, to the time period used in the original AJ article (1953-68). Since other economic experiences might suggest a different assessment of monetary and fiscal influences, it seems useful to expand the testing periods to include a longer period in United States economic history.

It is reasonable to assume that tests obtained from a wider range of experience would go a long way

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[1]This issue was first raised in a somewhat different context by Milton Friedman and David Meiselman in "The Relative Stability of Monetary Velocity and the Investment Multiplier in the U.S." *Stabilization Policies*, The Commission on Money and Credit, Prentice-Hall, 1963.

[2]Leonall C. Andersen and Jerry Jordan: "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization," this *Review*, November 1968.

[3]Richard G. Davis, "How Much Does Money Matter?", *Monthly Review*, Federal Reserve Bank of New York, June 1969; Edward M. Gramlich, "The Role of Money in Economic Activity: Complicated or Simple?," *Business Economics*, September 1969; "The Usefulness of Monetary and Fiscal Policy as Discretionary Stabilization Tools," (presented at the American Bankers Association, Conference of University Professors, Milwaukee, September 1969); Frank de Leeuw and John Kalchbrenner, "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization – Comment," this *Review*, April 1969; Paul S. Anderson, "Monetary Velocity in Empirical Analysis," *Controlling Monetary Aggregates*, prepared by the Federal Reserve Bank of Boston, September 1969; M. J. Artis and A. R. Nobay, "Two Aspects of the Monetary Debate," National Institute *Economic Review*, Vol. XLIX (August 1969), pp. 33-51; and Wilfred Lewis, Jr., "'Money is Everything' Economics – A Tempest in a Teapot," National Conference Board *Record*, Vol. VI, No. 4 (April, 1969), pp. 32-35.

toward answering some of the questions raised about the AJ article. If the dominance of monetary influences prevailed in earlier periods, then confidence in the reliability and stability of the original results and their continued applicability is enhanced. On the other hand, if the dominance of monetary influences is shown to be confined to only the most recent time period, then it could be asserted that special circumstances are at work in the present period which could not be relied upon to continue. The intent of this article is to test the relative impact of monetary and fiscal influences on economic activity in the United States on a quarterly basis from 1919 to 1969 and for selected subperiods.

This article is organized in the following way. First, a brief and highly simplified review is given of some of the theoretical and statistical issues which have been raised in connection with the type of tests used by AJ. This review will allow us to see what can and cannot be deduced from any results. Second, the test results for the 50-year period from 1919 to 1969, with 200 quarterly observations, will be presented, together with a historical review and comparison. Finally, the statistical reliability of the results will be considered.

Theoretical and Statistical Issues

There are two primary ways to study the relative importance of monetary and fiscal influences on economic activity. First, their effects can be inferred within the context of a fully specified and statistically estimated structural model of the economy, as in the FRB-MIT model.[4] The monetary and fiscal variables are introduced in the structural model at those points where their functional roles are indicated by economic theory. The measured impact on economic activity of the monetary and fiscal variables is dependent upon the explicit transmission mechanism which is postulated and built into the structural model. Second, monetary and fiscal influences can be measured by direct estimation of a single regression equation. In this case, some measure of economic activity is regressed directly against the monetary and fiscal variables without specification of a transmission mechanism.

[4]See Frank de Leeuw and Edward M. Gramlich, "The Channels of Monetary Policy," Federal Reserve *Bulletin*, June 1969. A structural model is one in which the major behavioral assumptions of a theory are explicitly included in the statistical estimates. It is fully specified if there are as many equations as there are endogenous variables.

The Large Structural Model Approach

There are advantages and disadvantages associated with each of these approaches. An important advantage of the large structural model is that it allows one to distinguish between direct and indirect monetary and fiscal influences, and to see how subsectors of the economy are affected. In formal terms a structural model is essentially a hypothesis of the model builders about the interrelations in the economy. The statistically estimated equations represent components of that hypothesis. If it turns out that the model builders' view of the economic mechanism is reasonably correct, then the "structural richness" of the large models permits a wider range of questions to be answered.

The major disadvantage of structural models is that the model builder may have omitted an important channel of transmission and, consequently, incorrectly estimated the magnitude of the monetary or fiscal influences. Indeed, even if the model builder has a good idea of the transmission channels, it may be technically impossible to estimate them because the channels have not or cannot be quantified. For example, assuming that the cost of borrowing is an important link in the monetary transmission mechanism, it is quite possible that this is not accurately measured by market interest rates. Both changes in credit rationing and compensating balance requirements, for which there are no available quantified measures, could affect the cost of borrowing yet not be reflected in changes in market interest rates.

The Single Equation Approach

An advantage of the single equation approach is that if the monetary and fiscal variables are correctly specified, and if they are not themselves determined by economic activity, they will capture the direct and indirect impact of monetary and fiscal influences on economic activity, irrespective of the transmission channels. The single equation approach avoids the problem of specifying and measuring specific links between monetary and fiscal influences and economic activity, and will generally be consistent with a wide range of theories (hypotheses) about the structural interrelations in the economy.

One major disadvantage of the single equation approach used here is that it can deal with only a single question, the relative impact of monetary and fiscal influences on economic activity. It does not distinguish between the direct and indirect impact of the monetary and fiscal influences on economic

activity or how subsectors of the economy are affected.[5] In addition, both the structural model approach and the single equation approach face the same problem of selecting measures of monetary and fiscal influences which are exogenous in a statistical sense.

In order to derive results which are comparable with AJ's work, the single equation approach (the so-called St. Louis equation) is used here. However, before presenting the test results, it would be useful to consider what can and cannot be implied by using this approach. First, as was previously noted, the single equation approach restricts us to considering just one question – the relative impact of monetary and fiscal influences on economic activity. We cannot say what the channels of the influence are.

Second, the single equation approach used here does not allow us to discriminate between economic theories. Take the generalized statement of the single equation which is used in this article:

$$\Delta Y = \alpha_0 + \alpha_1 \Delta M + \alpha_2 \Delta F$$

where ΔY = changes in economic activity,
ΔM = changes in monetary influences,
ΔF = changes in fiscal influences.

The parameters, α_1 and α_2, indicate the magnitude of the impact of monetary and fiscal influences, respectively, on economic activity, and α_0 is a proxy for the net trend of all other influences on economic activity. Assume for the moment that the statistical results of a test using this format substantially favor monetary influences (ΔM) over fiscal influences (ΔF) in determining economic activity (ΔY). These results do not provide clear-cut evidence to help answer the question of whether the Keynesian Income-Expenditure Theory or the Modern Quantity Theory is a better representation of the economic world. Both theories provide an operational rule for monetary influences, and thus the dominance of the monetary variable does not discriminate between them.[6] A test of competing economic theories can be conducted only if the alternative behavioral assumptions are made explicit.[7]

Third, the single equation approach does not necessarily tell us anything about monetary and fiscal policy decisions of the authorities. If the independent variables have been chosen properly, they will indicate monetary and fiscal influences on the economy. One can assert that such influences are simultaneously a measure of the policy intentions of the authorities only if additional external evidence is provided, which indicates that the policymakers have acted either consciously or otherwise to systematically control the monetary and fiscal variables used in the equation.[8]

The third point can be clarified with an example: Assuming there are two countries, A and B. Statistical tests indicate that the monetary variable dominates the fiscal variable in influencing economic activity in each country. However, it is also known that Country A does not have a central bank, while Country B does. Obviously, we can only talk about discretionary monetary *policy* in Country B, but we can talk about monetary *influence* in both countries. In Country A, the monetary variable is dominated by factors other than by the actions of a central bank – perhaps by the domestic gold supply. In Country B (with a central bank), the monetary variable could be dominated by the central bank; however, our statistical results do not provide any evidence with respect to that issue. Such evidence can be derived only by an explicit investigation of the behavior of the central bank in Country B. Thus, discretionary monetary policy and monetary influences are not necessarily measured by the same variable.[9]

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[5]One way to handle this disadvantage is to regress the monetary and fiscal variables against the components of GNP to see which broad sectors of the economy are affected. See Leonall C. Andersen, "Money and Economic Forecasting," *Business Economics*, September 1969, for the results of such a test.

[6]There are a number of empirically estimated Keynesian economic models which have a "weak" monetary sector. Evidence that monetary influences are important would tend to cast doubt on the usefulness of those models. However, this is more a criticism of the particular model and not the underlying Keynesian theory. Within the context of standard Keynesian theory, there are circumstances where strong monetary and weak fiscal influences could exist.

[7]A test of competing economic theories conceptually could be conducted either with a single reduced-form equation or with a more fully specified structural model. When Friedman and Meiselman, "The Relative Stability . . ." attempted such a test using the single equation reduced-form approach, a considerable controversy occurred within the economics profession. To the best of the author's knowledge, no one has attempted to compare competing theories by a test of alternative structural models.

[8]Such information would come from studies of the "reaction function" of the policy-making authorities. There have been a number of such studies of the monetary authorities. For example: (1) William Dewald and Harry Johnson, "An Objective Analysis of the Objectives of American Monetary Policy, 1952-1961," *Banking and Monetary Studies*, ed. Deane Carson (Homewood, Illinois: Richard D. Irwin, 1963); (2) James W. Christian, "A Further Analysis of the Objectives of American Monetary Policy," *The Journal of Finance*, volume XXIII, June 1968; (3) Michael W. Keran, and Christopher T. Babb, "An Explanation of Federal Reserve Actions (1933-68)," this *Review*, July 1969; (4) John Wood, "A Model of Federal Reserve Behavior," *Staff Economic Study No. 17*, Board of Governors of the Federal Reserve System.

[9]This point is quite important and open to some misunderstanding. To link monetary policy with the indicator of monetary

Given this array of caveats with respect to the single equation approach, it is nevertheless highly useful in indicating monetary and fiscal influences on economic activity. The key reason has already been discussed. An economy is an extremely complex array of interrelated and interdependent markets tied together by the price mechanism. Millions of individual decision-making units participate in these markets. In this complex web of interrelationships, attempts at specific and detailed measurement of the channels through which monetary and fiscal influences operate on economic activity are quite hazardous.

Given the complexities of the economy and the existing uncertainty about the transmission mechanism, it is useful to measure the monetary and fiscal influences directly, without constraining them to operate within our imperfect notions about how they operate. Freedom from this type of specification error is perhaps the principal virtue of the single equation approach.

Problems of the Single Equation Approach

The key methodological and statistical problems with the single equation approach are related to selection of appropriate indicators of monetary and fiscal influences. First, a theoretical justification for using particular variables is required. Such justification naturally evolves from the various economic theories (hypotheses) which have been developed to explain the determination of aggregate economic activity. For example, bank credit or free reserves are unlikely indicators of monetary influence because there is no well-specified economic theory from which these variables are a derivable consequence. Even if statistical results indicate a close relation between bank credit and economic activity, it is difficult to interpret the results. On the other hand, the money stock is a good choice as an indicator of monetary influence because it plays an important role in both the Keynesian Income - Expenditure Theory and the Modern Quantity Theory of Money.

Second, there must be evidence that the actions of monetary and fiscal authorities determine the movements in the variables selected. It is not necessary that the policymakers have acted consciously to control the specific variables used; it is only necessary that policy actions systematically dominate movements in the indicated variable.

This leads naturally to the third and final condition. To be able to interpret the regression coefficients meaningfully in the single equation approach, the monetary and fiscal variables must be statistically exogenous. The economic meaning behind this condition is that the variables selected to represent monetary and fiscal influences should not be contemporaneously determined by the behavior of the public, as measured by changes in economic activity. If this exogeneity assumption is not satisfied, the direction of causality is uncertain, and a close statistical association with economic activity does not provide any evidence of the magnitude of the impact from monetary and fiscal influences. This is the so-called "reverse-causation argument" against the single equation approach.

The next section presents the results of various statistical tests of monetary and fiscal influences on economic activity. The last section will consider the reverse-causation argument and whether movements in the monetary variables are dominated by the monetary authorities or by the public. Because the theoretical justification for the monetary and fiscal variables used in this article has already been considered in the AJ·article, it will not be presented here.

Monetary and Fiscal Influences

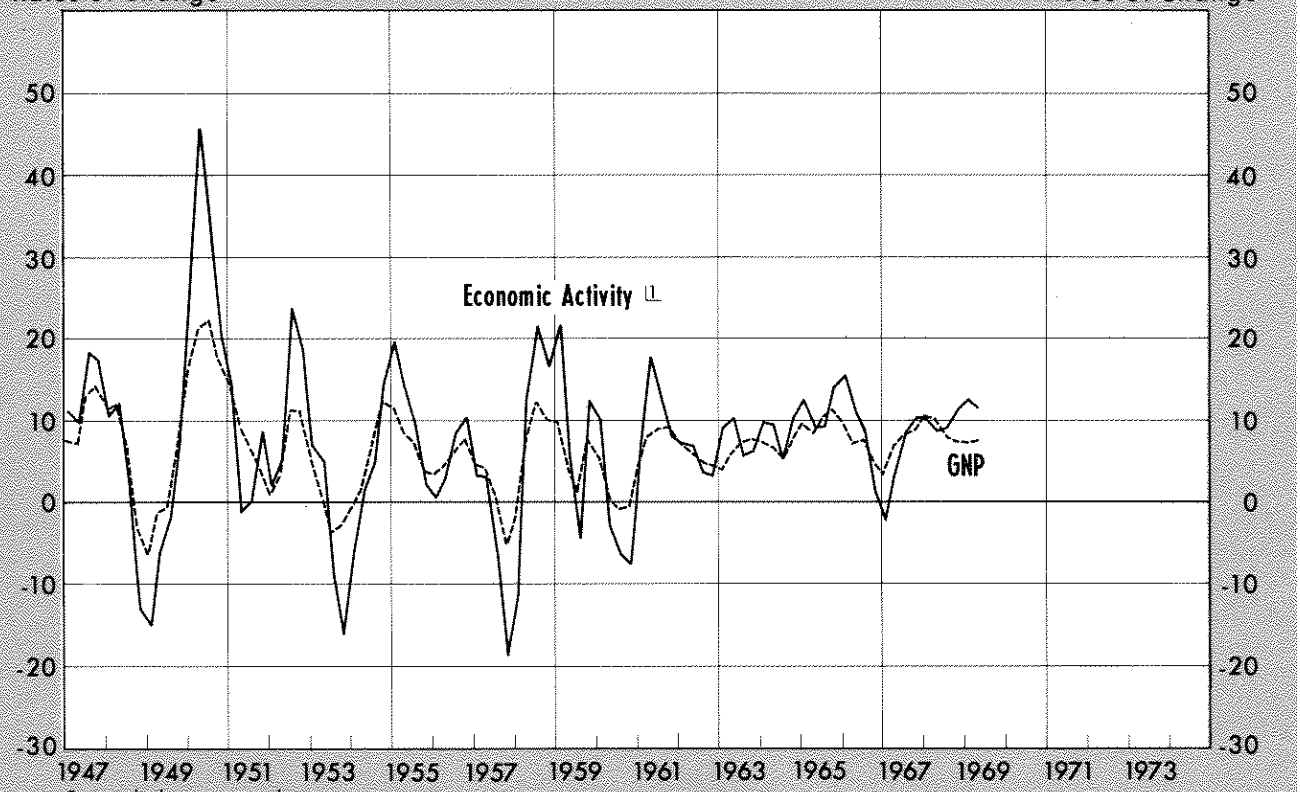
The test procedure used in this article is to regress quarter-to-quarter changes in a measure of economic activity against quarter-to-quarter changes in the indicators of monetary and fiscal influence. Because of the length of the test period (1919-69), data problems were encountered. For example, the most widely used measure of economic activity (nominal GNP), and the most widely used measure of fiscal policy (high-employment receipts and expenditures of the Federal Government), are not available on a quarterly basis before 1946. These deficiences in the data necessitated developing proxies for these measures.

A proxy for nominal GNP was constructed to measure economic activity. The proxy consists of the scaled product of the Industrial Production Index (IPI) and the Consumer Price Index (CPI), both of which are available on a monthly basis in continuous time series back to February 1919. Each is the broadest available measure of real output and prices, and

influence, it is not necessary that the authorities consciously control the value of the monetary variable. All that is required is that in controlling some monetary variable the authorities in the process also dominate movements in the variable used to indicate monetary influences. If the authorities have not deliberately attempted to control the variable which is the best indicator of monetary influence, then their policy actions could be criticized. However, this is not necessarily an argument against using that variable as an indicator of monetary influence.

Chart I

Nominal GNP and Economic Activity



Quarterly data at annual rates.

[1] Economic Activity is measured by the scaled product of the Consumer Price Index (CPI) and the Industrial Production Index (IPI) multiplied by Gross National Product (GNP) in the base years 1957-59: $\left[\frac{CPI \cdot IPI}{10,000}\right] \cdot \$457.4 \text{ billion} = \text{Economic Activity}$

Sources: GNP U.S. Department of Commerce,
Economic Activity Industrial Production Index, Board of Governors of the Federal Reserve System,
Consumer Price Index, U.S. Department of Labor

their scaled product is an index of economic activity. To convert this value index into a dollar measure, it was multiplied by the value of nominal GNP in the base years of the value index (1957-59).[10] By this method an index of quarterly economic activity, measured in billions of dollars, was constructed for the period II/1919 to II/1969.

This proxy for economic activity clearly has a number of defects. The service industries, levels of government and agriculture are excluded. In addition, industrial production traditionally grows at a faster trend rate than overall real output because it is more responsive to increases in productivity. Also, it shows larger swings over the business cycle than does nominal GNP. However, for the purpose of measuring the *changes* in economic activity from one quarter to the next, this proxy appears to be both useful and reasonably accurate.[11] Chart I shows the quarter-to-quarter rates of change in nominal GNP and in our proxy from 1947 to 1969.

[10]The formula used to compute this measure of economic activity (Y) is:

$$Y = \left[\frac{IPI \bullet CPI}{10,000}\right] \bullet (\$457.4 \text{ billion})$$

[11]The regressions between rates of change of nominal GNP ($\dot{GNP}$) and our proxy variable ($\dot{Y}$) appear as follows:

I/1947 — IV/1952

$$\dot{GNP} = \underset{(3.53)}{3.78} + \underset{(8.24)}{.45}\ \dot{Y} \qquad R^2 = .74 \quad D\text{-}W = 1.82$$

I/1953 — I/1969

$$\dot{GNP} = \underset{(11.44)}{3.42} + \underset{(15.80)}{.40}\ \dot{Y} \qquad R^2 = .80 \quad D\text{-}W = 1.55$$

As a measure of fiscal influence, changes in the national debt (ΔD) and actual Federal Government expenditures (ΔE) (purchases of goods and services plus transfer payments) were used. Data on tax receipts are available, but because of the strong influence which economic activity has on the value of tax receipts, it was not used.

Because ΔD is also influenced by changes in tax receipts, only the results using Government spending are reported. The use of Federal Government spending as our single measure of fiscal influence is not as serious a drawback as it might first appear. Andersen and Jordan (AJ) found that the strongest measure of fiscal influence was achieved by using Federal Government expenditures alone. The observed level of Government spending which is used from 1919 to 1945 is not significantly different from the high-employment level of Government spending which AJ used, and which is used here for the subperiods from 1946 to 1969.[12]

As measures of monetary influence, three variables were tested: total reserves of member banks, the monetary base, and the narrowly defined money stock (currency holdings of the nonbank public and private demand deposits). The separate use of monetary and fiscal variables in these regressions implies that one can think of monetary and fiscal influences as having separate impacts on economic activity. This may not be the case. One well-known fiscal influence on monetary actions can occur because of "even-keel" actions. "Even-keel" is the policy of the Federal Reserve to stabilize money market conditions during periods when the United States Treasury is floating a new issue of securities. Thus, an increase in Government spending financed by an increase in debt could induce an increase in the money stock because of Federal Reserve "even-keel" actions. This issue can be dealt with only by asserting that all factors which affect the money stock are monetary and all factors which affect Government spending are fiscal. This is not unreasonable, since the Federal Reserve could stop even-keel actions if it chose to do so.

The tests of monetary and fiscal influences were run using four measures of change: quarterly first differences, quarterly central differences, quarterly first rates of change, and quarterly central rates of change. Only the results with quarterly first differences of the money stock and Government expenditures are reported in this article. However, alternative measures of change and alternative measures of monetary and fiscal influences give substantially similar results.[13]

In each test the form of the equation was estimated with money alone, fiscal alone, and a combination of the two. Alternative time lags between t-1 and t-10 were tried using the Almon distributed-lag technique.[14] The form of the equation selected and the time lags to represent each time period were chosen on the basis of minimum standard error of estimate adjusted for degrees of freedom.[15]

The total period was divided into five subperiods: 1919-29, when economic conditions were generally prosperous; 1929-39, when economic conditions were generally depressed; 1939-46, when the United States was approaching or was in a total war situation; 1947-52, the early postwar adjustment period and finally, 1953-69, a period when economic conditions were again generally prosperous. These subperiods cover a sufficiently wide range of economic conditions to provide an indication of monetary and fiscal influences under a variety of economic circumstances.

A summary of the regression results is reported in Table I. For the total period 1919-69, the monetary variable is statistically significant and the fiscal variable is statistically insignificant at the 95 per cent confidence level. In the five subperiods, the monetary variable is significant in all but the subperiod covering the war years, 1939-46. The absence of a statistically significant monetary variable in this period is probably due more to the inadequacies of the data than to a lack of a relationship. Because of price

[12]The only difference between the observed levels of Government spending and the high-employment level of Government spending is an adjustment for unemployment compensation payments. These payments did not start until 1937 and did not amount to a significant figure until after World War II. See Chart III for sources of data for Government spending, money stock, and economic activity.

[13]The other results are available upon request.

[14]The Almon lag technique, by constraining the distribution of coefficients to fit a polynomial curve of n degree, is designed to avoid the bias in estimating distributed-lag coefficients which may arise from multicollinearity in the lag values of the independent variables. The theoretical justification for this procedure is that the Almon constrained estimate is superior to the unconstrained estimate because it will create a distribution of coefficients which more closely approximates the distribution derived from a sample of infinite size. In order to minimize the severity of the Almon constraint, the maximum degree of the polynomial was used in each case. The maximum degree is equal to the number of lags plus one of the independent variables up to five lags. Following the convention established by Shirley Almon, "The Distributed Lag Between Capital Appropriations and Expenditures," *Econometrica*, Vol. XXXIII, No. 1 (January 1965), if there are n lags, $t+1$ and $t-n-1$ are both constrained to zero. The regressions were also run without constraining the beginning and ending values to zero, and the results are virtually identical.

[15]For a discussion of this criteria for selecting lags, see Leonall Andersen, "An Evaluation of the Impact of Monetary and Fiscal Policy on Economic Activity," *Papers and Proceedings*, Business and Economic Statistics Section, American Statistical Association, August 1969.

Table I

INDICATORS OF MONETARY (ΔM) AND FISCAL (ΔE) INFLUENCES ON ECONOMIC ACTIVITY (ΔY)

$$\Delta Y = a_0 + a_1 \Delta M + a_2 \Delta E$$

(Quarterly First Differences — Billions of Dollars)

Time Periods	Lags*	a_0	$a_1 \Delta M$ (sum)	$a_2 \Delta E$ (sum)	R^2 D-W
II/1919 — I/69	t-6	1.92	2.89	—.07	.32
		(2.34)	(4.31)	(.28)	1.15
II/1919 — II/29	t-3	.36	5.62	**	.35
		(.51)	(3.16)		1.58
III/1929 — II/39	t-5	—.51	5.40	—7.97	.39
		(.54)	(3.41)	(1.95)	1.86
III/1939 — IV/46	t-5	6.32	—1.21	.35	.66
		(1.39)	(.59)	(.81)	1.60
I/1947 — IV/52	t-10	3.65	13.82	—3.37	.72
		(.84)	(3.51)	(4.12)	2.74
I/1953 — I/69	t-4	1.42	8.85	—.84	.47
		(.74)	(4.70)	(1.07)	1.71

Note: Regression coefficients are the top figures; their "t" statistics appear below each coefficient, enclosed by parentheses. R^2 is the percent of variations in the dependent variable which is explained by variations in the independent variable. D-W is the Durbin-Watson statistic.

*Lags are selected on the basis of minimum standard error, adjusted for degrees of freedom.

**Fiscal variable omitted for 1919-29 because it increased the standard error of the estimate.

controls, the measure of economic activity was substantially understated between 1939 and 1946. Therefore, it is not surprising that the variables measuring the influences of stabilization actions were not statistically significant in that period.

The fiscal influence was statistically significant in only one of the five subperiods, 1947-52. However, the sign of the coefficient is negative due to special factors which are explained below.

In general, the results with respect to both monetary and fiscal variables for the period 1919-69 and the subperiods conform closely to the results reported in the AJ article for the period 1953-68. The coefficient of determination (R^2), which measures the per cent of variations in ΔY due to variations in ΔM and ΔE, is lower than that reported by AJ. This result is not surprising considering that our proxy is probably inferior to nominal GNP as a measure of economic activity.

Because of the major importance of the monetary influence, it is useful to look at the estimated coefficients of the monetary variable during the various subperiods. In both of the prewar subperiods, 1919-29 and 1929-39, the estimated coefficients on the monetary variable are almost the same, around 5.50. This implies that for every $1 increase in the money stock there will be a $5.50 increase in economic activity after three to five quarters. These are remarkably stable coefficients. In the postwar subperiods, however, the coefficients are substantially larger, and they are also different with respect to each other. In the 1947-52 period the coefficient on the monetary variable is 13.82 with a ten-quarter lag in its impact. In the 1953-69 period the coefficient is 8.85 with a four-quarter lag. What does this variation in the value of the monetary coefficients imply?

The difference in the values of the coefficients between postwar subperiods is due to the different length of lags. These lags are selected on the basis of minimum standard error of estimate, adjusted for degrees of freedom. The results for the 1947-52 subperiod with a four-quarter, rather than a ten-quarter lag, had a monetary variable coefficient of 7.24. This value is quite close to the 8.85 value for the 1953-69 subperiod where the minimum standard error estimate was with a four-quarter lag.

The higher average value of the monetary coefficients in the postwar subperiods over the prewar subperiods is due to the weakness in the proxy selected to measure economic activity. The most complete measure of economic activity is nominal GNP. However, it is available on a quarterly basis only since 1946. As previously indicated, our proxy for economic activity tends on the average to grow more rapidly than nominal GNP because its "real" component is measured by industrial production. This factor did not bias the value of the coefficients in the prewar subperiods, because the Great Depression insured that our proxy did not grow significantly between 1919-29 and 1929-39. For the postwar subperiods, however, the substantial and continuous increases in economic activity probably have caused an upward bias in the size of the monetary variable coefficient presented in Table 1. For the 1953-69 period, AJ had a monetary variable coefficient with a four-quarter lag of 5.63, using nominal GNP. This value is almost identical to prewar subperiods when economic activity is measured with our proxy.

Thus, it is quite possible that if quarterly nominal GNP figures were available back to 1919, the estimated value of the monetary coefficients would have been close to 5.50 in all subperiods.

Testing Propositions

The propositions which AJ tested were whether monetary or fiscal influences were (1) stronger, (2) more predictable, and (3) faster in their impact on economic activity. They concluded that the evidence for the 1953-1968 period strongly favored the dominance of monetary over fiscal influences. These same propositions are tested in this article and provide additional evidence that monetary influences consistently have been stronger, more predictable, and faster in their effect on economic activity than have fiscal influences. The results are detailed below.

Which is Stronger? — To measure the relative strength of monetary and fiscal influences, we need to know which has the largest impact on economic activity. This question can be answered by making an appropriate comparison of the coefficients of the monetary and fiscal variables. If the variables on which these coefficients are estimated have the same dimension and magnitude of variation, then the comparison can be made directly. These conditions, however, are not satisfied with these data. Money is a stock variable measured as first differences, and Federal Government spending is a flow variable measured as first differences at annual rates. Also, the degree of variation in the two variables differs substantially. In general, the fiscal variable has fluctuated more than the monetary variable (see Chart III on pages 16 and 17).

To make the *estimated coefficients* of the monetary and fiscal variables comparable for an assessment of their relative impact on economic activity, they were transformed into *beta coefficients*. The "sum" beta coefficients are presented in Table II. For the whole period the monetary influence is large and statistically significant, while the fiscal influence is negative and statistically insignificant. This result also applies to each of the subperiods, except for World War II and the early postwar periods (1939-52). During the World War II years the monetary influence is statistically insignificant and negative, and the fiscal influence is insignificant and positive. For the early post-World War II years the fiscal influence is statistically significant and negative. This postwar regression result seems to be due to special factors which are outlined below.

Table II

BETA COEFFICIENTS

	ΔM (sum)	ΔE (sum)
II/1919 — I/69	.331*	—.026
II/1919 — II/29	.515*	—
III/1929 — II/39	.593*	—.803
III/1939 — IV/46	—.153	.219
I/1947 — IV/52	1.768*	—2.347*
I/1953 — I/69	.726*	—.159

Note: "Beta coefficients" are equal to the estimated coefficient times the standard deviation of the independent variable over the standard deviation of the dependent variable. See Arthur S. Goldberger, *Economic Theory* (John Wiley & Sons, 1964) pp. 197-98.

*Significant at the 95% level of confidence.

Table III

t VALUES

	ΔM (sum)	ΔE (sum)
II/1919 — I/69	4.31	— .28
II/1919 — II/29	3.16	-0-
III/1929 — II/39	3.41	—1.95
III/1939 — IV/46	— .59	.81
I/1947 — IV/52	3.51	—4.12
I/1953 — I/1969	4.70	—1.07

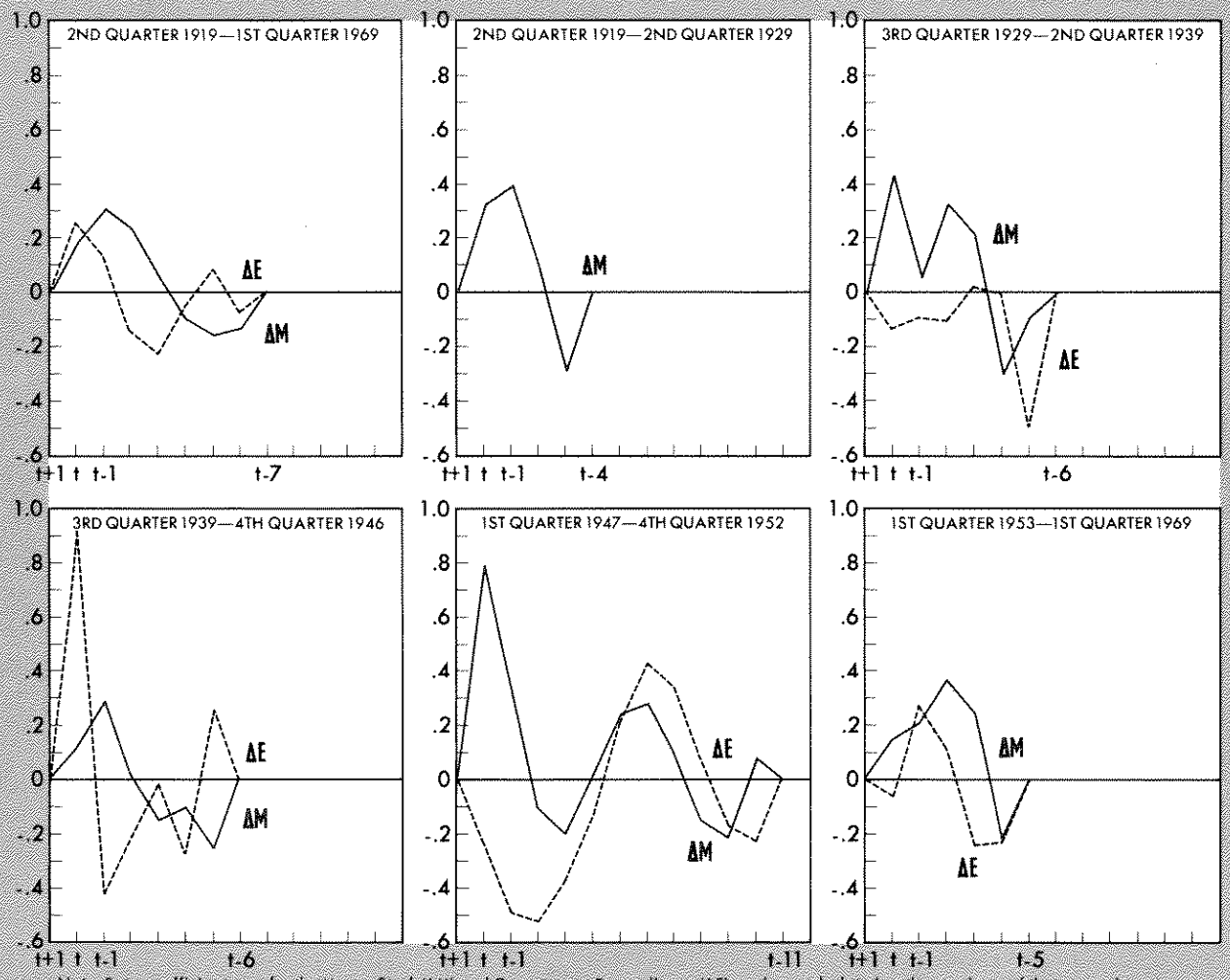
Note: A *t* value is a statistical indicator of the confidence one may have that the "true relationship" between the independent and dependent variable has the same sign as the statistically estimated coefficient of that relationship.

Which is More Predictable? — The monetary or fiscal variable with the more statistically significant coefficient is also more reliable in that its relationship to economic activity is more predictable. Statistical significance is measured by the *t* values of the coefficients of the monetary and fiscal variables when measured against the same dependent variable, which in this case was ΔY. A *t* value is a statistical indicator of the confidence one may have that the "true relationship" between the independent and dependent variable has the same sign as the statistically estimated coefficient of that relationship. The larger a *t* value, the more confidence we have that the monetary and fiscal variables are related to economic activity. The *t* values of the sum coefficients are presented in Table III. For the whole period, the *t* value of the monetary variable is substantially larger than the *t* value of the fiscal variable. The same statement also holds with respect to the *t* values of the monetary and fiscal variables in the subperiods, with the exception of the war and early postwar periods (1939-52). Thus, in general, the monetary variable has a more predictable effect on economic activity than the fiscal variable.

Chart II

Beta Coefficients of Monetary and Fiscal Influences

First Differences



Note: Beta coefficients are for the Money Stock (ΔM) and Government Expenditures (ΔE), and are calculated as the products of the regression coefficients for the respective variables times the ratio of the standard deviation of the independent variables to the standard deviation of Economic Activity (ΔY).

Lags were selected on the basis of the minimum standard error of estimate.

These charts are derived from the statistical results which are summarized in Table I.

Which Works Faster? – The relative promptness of monetary or fiscal influences can be measured by observing which variable has a shorter time lag in influencing economic activity. This can be seen in the quarterly patterns of the regression coefficients after they have been transformed into beta coefficients. The latter are plotted in Chart II and are derived from the same set of statistical results summarized in Table I. The fiscal variable has about the same impact as the monetary variable in the contemporaneous quarter during the total period 1919-1969. However, in the succeeding quarters the fiscal influence declines and becomes negative, while the monetary influence continues to be positive through the third lagged quarter. The quarterly pattern of the monetary influence in the subperiods is quite similar to that of the total period. The pattern of the fiscal influence varies irregularly over subperiods. However, in all subperiods except the war period 1939-46, the monetary variable has a consistently faster influence on economic activity than the fiscal variable.

Historical Review

The statistical results reported above are estimated on the basis of the average response of economic activity to monetary and fiscal influences within each of the periods selected. A different way of looking at monetary and fiscal influences on economic activity is to investigate specific historic episodes. Chart III on pages 16 and 17 is designed to assist in that investigation. In the lower tier of the chart the monetary and fiscal variables are plotted as rates of change on a common axis. In the upper tier of the chart economic activity is also plotted in its rate-of-change form.[16]

The most interesting comparisons are to be found where the monetary and fiscal influences are operating in opposite directions. In those periods the movement in economic activity will indicate which influence is dominant. The monetary and fiscal variables move in opposite directions in the periods 1919-21, 1931-32, 1939, 1948-50, and 1966-67. In each of these years economic activity, after a short lag, moved in the same direction as the monetary variable and in the opposite direction to the fiscal variable. As a matter of fact, all cyclical movements in the money stock were followed by proportional cyclical movements in economic activity. Of the *twelve* cyclical movements in economic activity from 1919 to 1969, *eleven* are preceded by corresponding movements in the money stock.[17] The single exception is the deceleration in economic activity in 1951, which is discussed below.

1919-1929 — Although this period was one of general economic prosperity, there were three cyclical declines in this ten-year period. The first and most severe occurred in late 1920 and early 1921. During the remainder of the 1920's two shorter and milder declines occurred; in late 1923 to early 1924, and in 1927.

Each of these cyclical movements in economic activity is matched by a corresponding movement in the money stock. Money switched from a 15 per cent rate of increase in the fourth quarter of 1919 to a 16 per cent rate of decline in the first quarter of 1921. This was the sharpest five-quarter deceleration in the money stock recorded during our fifty-year period. The money stock had pronounced, though milder, decelerations in 1923 and late 1926.

Federal Government spending showed substantial fluctuation in the earlier part of the period and very little movement in the middle and latter part of the period. This experience reflected the demobilization after World War I and the conservative spending policies of the Harding and Coolidge administrations.

The statistical results reported in Table I, page 11, omit the fiscal variable entirely for this subperiod, because its inclusion raises the standard error of the estimate (adjusted for degrees of freedom) and thus contributes nothing to the explanation of movements in economic activity. This is not true of any other subperiod in this study.

1929-1939 — The first part of this period is undoubtedly the most depressed in the entire economic history of the United States. It was not the sharpness of the decline that was so disastrous. There were more rapid declines in both 1920 and 1937. Its duration was disastrous. Economic activity declined at an annual rate of 20 percent or more for ten of the eleven quarters between late 1929 and late 1932. Sustained recovery did not start until the middle of 1933, when 25 per cent of the labor force was unemployed and the price level was 24 per cent below its 1929 level. This recovery lasted, with one significant interruption in 1937, through the end of the period.

Monetary influences during this period have been characterized by a number of observers as being especially ineffective. The results presented in this article indicate that quite the opposite was the case. Monetary influences played an important role in the declines in economic activity in 1929-33 and 1937-38, and in the recovery in the intervening years.

Although the initial decline in the third quarter of 1929 apparently was not due to tight money influence (the money stock did not decline until the fourth quarter of 1929), the fact that the economic decline lasted for more than three years is associated with a decline in the money stock.[18] The initial five quarters of decline in the money stock were relatively mild. After reaching an annual 9 per cent rate of decline in the first quarter of 1930, it slowed to a 3 per cent rate of decline in the fourth quarter of 1930. Then, for the next four quarters, the money stock decelerated substantially and reached an annual rate of decline of 18 per cent in the fourth

[16]Rates of change are used to allow comparisons over long time periods on a similar basis.

[17]Milton Friedman and Anna Schwartz made a similar observation in "Money and Business Cycles," *Review of Economics and Statistics*, February 1963.

[18]Milton Friedman and Anna Schwartz, *A Monetary History of the United States*, (Princeton, New Jersey: Princeton University Press, 1963), chapter 7, go into considerable detail describing how Federal Reserve actions dominated movements in the money stock during this period.

quarter of 1931. For the next six quarters the declines became progressively smaller. Finally, at the end of 1933 the money stock registered the first quarterly increase since the third quarter of 1929. The money stock had shown continual quarterly declines for almost four years.

Economic activity moved parallel with the money stock pattern in 1929-33. Although the first year decline was substantial, it was less than the four-quarter decline in 1920-21, and only moderately greater than the four-quarter decline in 1923-24. In the first half of 1931 the rate of decline actually slowed, responding to the less restrictive monetary influences. However, in the next year the decline in economic activity increased sharply. In the year ending June 1932, it declined by 37 per cent. In late 1932, economic activity finally stopped declining, and in early 1933 it started to increase. This increase generally continued until the middle of 1937, when it was temporarily reversed by the tight money influence which developed in late 1936.

During this period fiscal influences, as measured by changes in Federal Government expenditures, were quite erratic. They were highly expansionary in the years 1931, 1933 to early 1934, 1936, and 1938. On the other hand, they were restrictive in the years 1932, 1935, and 1937. This pattern sometimes conformed with and sometimes opposed monetary influences. But in every case economic activity moved consistently with the direction and magnitude of monetary influences.

1939-1946 – Data for the war years are presented to make the series complete. However, with comprehensive price controls tending to create a discrepancy between the equilibrium and observed growth rate in economic activity, there is little to be learned about monetary and fiscal influences from this period. Our results indicate that the monetary variable was not statistically significant during this period. The fiscal variable had a strong positive influence in the quarter in which the Government spending took place, but tended to "washout" after five quarters, leaving only a small positive net influence.

1947-1952 – There were three cyclical expansions in this period: early 1947-48, late 1949 and 1950, and in 1952. There were cyclical contractions in the intervening years. The movements in the money stock did a good job of "tracking" the movements of economic activity during this period, with the single exception of the deceleration in economic activity which occurred in 1951. This is the only deceleration in economic activity in the fifty-year period which was not anticipated by movements in the money stock.

A quite plausible explanation for this phenomena is provided by Friedman and Schwartz.[19] In March 1951 the United States Treasury Department and the Federal Reserve reached an "Accord," which permitted the latter to abandon its war-induced policy of pegging the price of Government bonds. Even though the Federal Reserve did not take advantage of this increased flexibility in policy actions immediately, the public act of abandoning support of the Government bond market greatly reduced the apparent liquidity of the public. The public was no longer assured that conversions between Government bonds and money could take place at a fixed and known price. This caused a substantial, one-time increase in the liquidity demand for money balances relative to income, and a decrease in the velocity of money in a period when velocity had typically been rising.

This experience suggests not only that permanent changes in the demand for money independent of changes in income can weaken the observed relation between money and income, but that such changes in money demand are relatively rare. Such changes generally have been associated with some specific historic event which changes the previous institutional relations with respect to the liquidity of nonmoney assets.

The other unique factor about this subperiod is that the fiscal variable is statistically significant and negative. Weidenbaum has provided a plausible explanation for this.[20] He has shown that Government spending influences economic activity not when the bills are paid and the goods are delivered to the Government, but when the orders are placed with industry, which must then hire employees and open plants to produce the products.

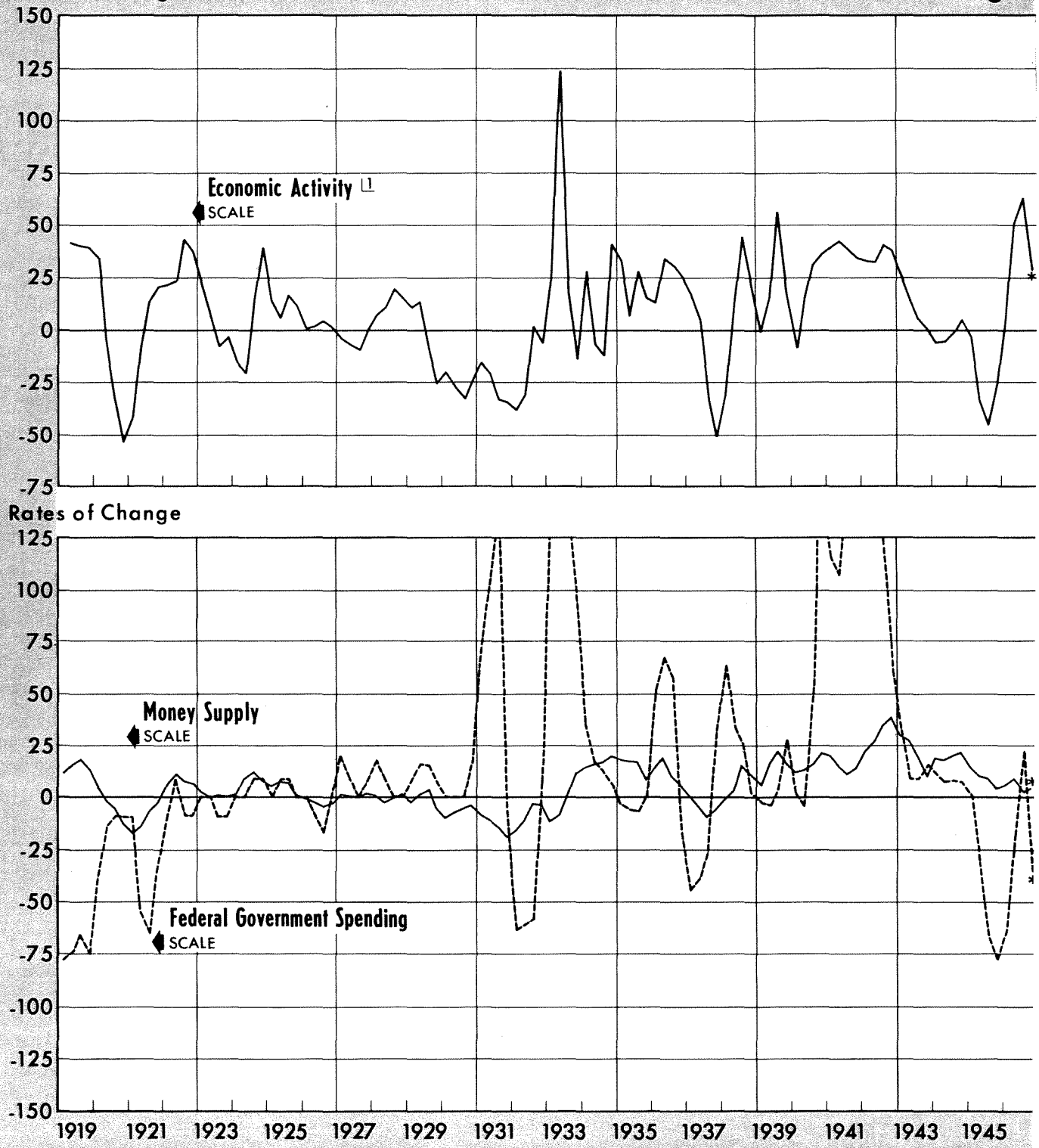
This discrepancy does not lead to serious bias in measuring Government spending except when there is a sharp acceleration or deceleration in this variable. This was clearly the case in the Korean War, when Government spending went from an annual rate of decline of 38 per cent in the second quarter of 1950 to an annual rate of increase of 83 per cent in the first quarter of 1951 and then fell to an annual rate of increase of 13 per cent in 1952. This "whiplash"

[19]Friedman and Schwartz, pp. 598 and 612.

[20]Murray L. Weidenbaum, "The Federal Government Expending Process," *Federal Expenditure Policy for Economic Growth and Stability,* (Washington, D.C.: Joint Economic Committee of Congress, U.S. Government Printing Office, November 1957), pp. 493-506.

Chart III

Changes in Money Supply and in Relation to Changes



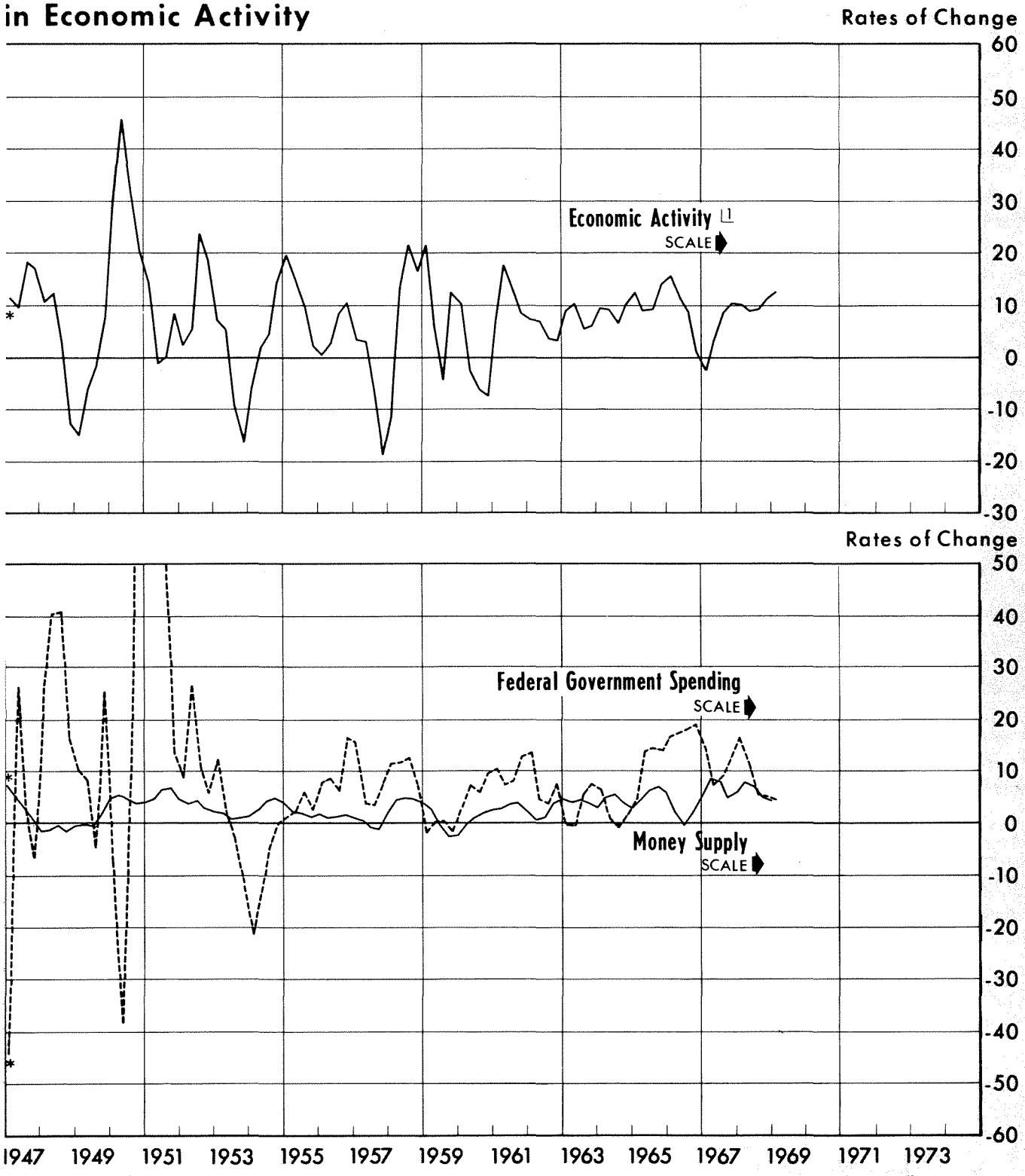
Quarterly data at annual rates.

*The magnitude of fluctuations in the three series plotted decreased considerably after World War II. The rate of change scale for the postwar years (1947-74) consequently has been enlarged to facilitate comparisons among the three series.

[1] Economic Activity is measured by the scaled product of the Consumer Price Index (CPI) and the Industrial Production Index (IPI) multiplied by Gross National Product (GNP) in the base years 1957-59: $\left[\left(\frac{CPI \cdot IPI}{10{,}000}\right) \cdot \$457.4 \text{ billion} = \text{Economic Activity}\right]$.

Government Expenditures in Economic Activity

Chart III



Sources: Money Supply: 1919-46, Milton Friedman & Anna J. Schwartz,"A Monetary History of the United States; 1947-1969,"Board of Governors of the Federal Reserve System; Federal Government Spending: 1917-28, estimated from U.S. Historical Statistics, Bureau of Census; 1929-1945, estimated from National Income & Products Supplement, U.S. Department of Commerce; 1946-69, Federal Reserve Bank of St. Louis; Economic Activity: Industrial Production Index, Board of Governors of the Federal Reserve System; Consumer Price Index, U.S. Department of Labor.

movement in Government spending follows by about two or three quarters an equally sharp movement in economic activity. As a result, ΔY and ΔE moved in opposite directions in this period. This is the cause of the statistically significant negative coefficient of ΔE with respect to ΔY.

If we had chosen a somewhat longer time period in which to measure the impact of monetary and fiscal influences, the strong negative offset estimated with respect to ΔE would have lost its statistical significance. We would have had results for the early post-World War II subperiod which were comparable to the results of the other subperiods.[21]

1953-1969 — This is the period which was covered in the original AJ study. While their measure of economic activity, nominal GNP, differs from the proxy used here and described in footnote 10, their results and ours are similar in most respects, as can be seen in the comparison of summary results in Table IV.

In each case the monetary and fiscal measures are the same (the money stock and government spending). Only the measure of economic activity differs. The first equation is based on our proxy of economic activity and is drawn from Table I. The second equation is based on nominal GNP.[22] In each case the monetary variable has a positive coefficient which is statistically significant and the fiscal variable has a coefficient which is statisticially insignificant and close to zero in value. Both equations are sufficiently well specified to pass the Durbin-Watson (D-W) test for autocorrelation, and the lag structures are the same when selected on the basis of minimum standard error of estimate. The value of the monetary coefficient is greater with the proxy measure of economic activity (ΔY) than with nominal GNP (ΔGNP), which is due to the greater average value and amplitude of the proxy. The coefficient of determination (R^2) is larger with ΔGNP than with ΔY. This is as would be expected if, as seems reasonable, nominal GNP is superior to our proxy as an indicator of economic activity.

Table IV

MONETARY AND FISCAL INFLUENCES ON ECONOMIC ACTIVITY, MEASURED AS A PROXY (ΔY) AND AS NOMINAL GNP (ΔGNP) (I/1953 — I/1969)

Dependent Variable	Lags*	Constant Term	Monetary Influence	Fiscal Influence	R^2 D-W
		a_0	a_1 ΔM	a_2 ΔE	
ΔY	t-4	1.42	8.85	−.84	.47
		(.72)	(4.70)	(1.07)	1.71
ΔGNP	t-4	2.59	5.63	.08	.65
		(3.19)	(6.94)	(.24)	1.78

Note: Regression coefficients are the top figures; their "t" values appear below each coefficient, enclosed by parentheses. R^2 is the per cent of variations in the dependent variable which is explained by variations in the independent variable. D-W is the Durbin-Watson statistic.

There were four cyclical declines in this period, each of which was led by a decline in the money stock. Government spending registered three cyclical declines, two of which corresponded to periods of decline in the money stock and one (in 1967) which did not. As noted in our investigation of earlier periods, economic activity declined following a decline in Government spending only when accompanied by a decline in the money stock.

Determining the Values of the Monetary and Fiscal Variables

An assessment of the reliability of the relations presented above will depend upon whether the estimated coefficients for the monetary and fiscal variables are exogenous. This problem arises in all statistical work, and no fully satisfactory solution has been found to test for exogeneity in either single equation or in large structural models.[23] However, in the single equation test of monetary and fiscal influences on economic activity employed here, one potential source of bias is found in the so-called "reverse-causation" argument. This asserts that the observed correlation between M and Y is not because changes in M cause changes in Y, but because changes

[21]This is shown by the following regression:

I/1947 — IV/1956
(Quarterly First Differences)

$$\Delta Y = \underset{(.48)}{1.11} + \underset{(3.31)}{7.82} \sum_{i=o}^{3} \Delta M_{t-i} - \underset{(1.76)}{1.13} \sum_{i=o}^{3} \Delta E_{t-i} \qquad R^2 = .27,\ \text{D-W} = .98$$

where Σ stands for sum of monetary or fiscal influence from period t to period t-3. Lags were selected on the basis of minimum standard error of estimate adjusted for degrees of freedom.

[22]The results with respect to nominal GNP differ slightly from the original Andersen-Jordan results because of the different lag structure. The lag structure in their original article (contemporaneous and three-lag values) was selected on the basis of minimum standard error of the coefficient attached to the monetary variable. The present lag structure (contemporaneous and four-lag values) was selected on the basis of minimum standard error of the entire equation adjusted for degrees of freedom. In this case, the different criteria did not change the results in any significant way.

[23]In statistical theory, a variable is exogenous if it is uncorrelated with the "true" error term of the equation. Unfortunately, only the measured error term in any equation is observable, so this test cannot be made.

in Y cause changes in M. If this possibility cannot be rejected, then a more elaborate statistical test is needed to compare monetary and fiscal influence on economic activity.[24]

The fiscal variable used here (total Federal Government spending, including transfer payments) is generally accepted as being determined by the fiscal authorities and not by the behavior of the public in the marketplace. For the purposes of our test we will assume that the fiscal variable is statistically independent or exogenous. With respect to the monetary variable (the narrowly defined money stock), there is considerable controversy as to whether its value is determined by the monetary authorities or by the public. For this reason we will concentrate our empirical investigation on the money variable. It will be shown that the reverse-causation argument is not supported by the evidence. In addition, the available evidence indicates that the actions of the monetary authorities dominate the movements in the money stock.

Does Economic Activity Affect Money?

In order to evaluate the significance of the reverse-causation argument, we need some indicator of the public's potential influence on the money stock. The indicator chosen is our proxy variable for economic activity (Y). This proxy has two advantages: first, it is the broadest available measure of aggregate economic activity and, as such, most actions of private decision-making units in the economy are reflected in it. Second, it allows us to consider directly the important statistical question of whether movements in Y lead to movements in M.

In order for economic activity to affect the money stock, it must operate through some transmission mechanism.[25] The Brunner-Meltzer money stock identity provides a useful structure within which to consider the several ways that economic activity could affect the money stock.[26] In this context the money stock (M) is defined as the product of the money multiplier (m) and monetary base (B):

$$M = mB$$

The sources of the monetary base consist of various kinds of credit extended by the monetary authorities to the rest of the economy. The use of the monetary base is divided between currency holdings of the nonbank public and reserves of commercial banks.

The money multiplier, which is defined as

$$m = \frac{1 + k}{r\,(1 + \tau + g) + k},$$

is largely determined by the behavior of the public, including commercial banks; k represents the ratio of private currency holdings to private demand deposits; τ represents the ratio of private time deposits to private demand deposits; g represents the ratio of Government deposits in commercial banks to private demand deposits; and r represents the ratio of total bank reserves and total bank deposits.[27]

Economic Activity and the Monetary Base — The influence of economic activity on the money stock could operate either through the monetary base (B) or the money multiplier (m). To test whether economic activity has influenced the monetary base, regressions were run for the total period (1919-69), and for each of the five subperiods reported above. The results are presented in Table V. For the entire 50-year period changes in the monetary base have a statistically significant relation with changes in economic activity. However, economic activity explains at most only 4 percent of the variance of the changes in the monetary base; that is, the R^2 was .04. For every $1 *billion* increase in economic activity, there is associated only an $8 *million* increase in the base in the same quarter.

Equally weak relations between ΔY and ΔB were found in the subperiods. Only the first (1919-29) and the last (1953-69) subperiods had statistically significant coefficients, while the R^2 varied between .01 and .15.

These results imply that the public, operating through economic activity, has only a small effect on the monetary base, and that this effect has varied

[24]At the least, one would need an equation to explain the monetary and fiscal variables by factors which themselves were independent of income.

[25]The approach used here to test for the influence of the public on the money stock was suggested by the work of Leonall C. Andersen, "Additional Empirical Evidence on the Reverse-Causation Argument," this *Review*, August 1969.

[26]For a systematic exposition of this approach, see Albert Burger, "An Analysis and Development of the Brunner-Meltzer Nonlinear Money Supply Hypothesis," Working Paper No. 7, Federal Reserve Bank of St. Louis, May 1969.

[27]For a detailed discussion of the determinants of the multiplier and its influence on the money stock, see Philip Cagan, *Determinants and Effects of Changes in the U.S. Money Stock, 1875-1960*, (New York: National Bureau of Economic Research, 1965); and Jerry L. Jordan, "Elements of Money Stock Determination", this *Review*, October 1969.

substantially over time in both degree and significance. Allowing for the influence of lagged values of ΔY on ΔB does not change the results presented in Table V, except for 1947-52 when the R^2 increases to .24 and the coefficient becomes statistically significant.

Monetary Authorities and the Monetary Base – Another potential source of control of the monetary base is through the actions of the monetary authorities. There have been a number of studies which have related policy targets of the monetary authorities, such as income stabilization, to various indicators of monetary actions, such as the money stock (Dewald and Johnson), total member bank reserves (Dewald), free reserves (Wood), and the monetary base (Keran and Babb). All these studies conclude that the monetary authorities have dominated movements in the money stock or some closely allied variable. The last named study will be briefly reviewed here because it deals explicitly with control of the monetary base by the authorities.

Keran and Babb found that a large proportion of the movements in the monetary base can be explained by the desire of the monetary authorities to achieve three objectives: a stabilization objective with respect to income, employment, and prices, reflected in the Federal Reserve Open Market Committee policy statements as proxied by the level of free reserves (FR); an even-keel objective with respect to Government debt financing, measured by changes in the national debt (ΔD); and a financial objective with respect to stability of the financial system, measured by deviations of Corporate Aaa bond yields from "normal" yield levels ($r-r_n$).[28] In addition, economically "random" events, such as changes in the price of gold in 1934 and changes in presidential administrations, have also influenced the actions of the monetary authorities with respect to changes in the monetary base (ΔB). These events are represented by "dummy variables" in Table VI.

Table VI

THE INFLUENCE OF STABILIZATION (FR), EVEN-KEEL (ΔD) AND FINANCIAL ($r-r_n$) OBJECTIVES OF THE MONETARY AUTHORITIES ON THE MONETARY BASE (ΔB)

$\Delta B_t = c_1 FR + c_2 \Delta D + c_3 (r-r_n)$

(Quarterly First Differences — Billions of Dollars)

Time Periods	Stabilization Objective c_1 FR	Even-Keel Objective $c_2 \Delta D$	Financial Objective $c_3 (r-r_n)$	Dummy Variable*	R^2	D-W
II/1929 — IV/1939	.33 (6.76)	—.219 (2.86)	.401 (3.65)	.553 (1.95)	.59	1.75
I/1940 — IV/1952	.01 (.37)	.070 (6.32)	.469 (.81)	—	.46	1.90
I/1953 — IV/1968	.19 (2.28)	.018 (1.73)	.123 (2.69)	.415 (5.58)	.69	1.84

Note: Regression coefficients are the top figures; their "t" values appear below each coefficient, enclosed by parentheses. R^2 is the percent of variations in the dependent variable which is explained by variations in the independent variable. D-W is the Durbin-Watson statistic.

*In 1929-39 the Dummy Variable is designed to account for the impact on the monetary base of the rise in the price of gold in February 1934. It assumes the value of 1 for the first and second quarters of 1934 and zero for all other quarters. In 1953-68 the Dummy Variable accounts for the change in presidential administration. It assumes a value of zero from I/1953 to II/1962 and a value of one from III/1962 to IV/1968.

Table V

THE INFLUENCE OF ECONOMIC ACTIVITY (ΔY) ON THE MONETARY BASE (ΔB)

$\Delta B_t = b_0 + b_1 \Delta Y_t$

(Quarterly First Differences — Billions of Dollars)

Time Periods	b_0	$b_1 \Delta Y$	R^2	D-W
II/1919 — I/1969	.31 (8.17)	.008 (2.98)	.04	.58
III/1919 — II/1929	—.012 (.68)	.009 (2.42)	.12	.64
III/1929 — II/1939	.20 (3.39)	.004 (.41)	.02	.85
III/1939 — IV/1946	.99 (7.30)	—.012 (1.14)	.01	1.09
I/1947 — IV/1952	.12 (1.45)	.012 (1.76)	.08	.87
I/1953 — I/1969	.34 (6.24)	.012 (3.45)	.15	.87

Note: Regression coefficients are the top figures: their t values appear below each coefficient, enclosed by parentheses. R^2 is the percent of variations in the dependent variable which is explained by variations in the independent variable. D-W is the Durbin-Watson statistic.

Two of the three subperiods considered by Keran and Babb were approximately the same as subperiods in the present study (I/1953 to IV/1968) and I/1940 to IV/1952). Another subperiod in that study was re-estimated to match the 1929-39 subperiod in this study. The results are presented in Table VI. In each case, fifty percent or more of the variations in ΔB are explained by the actions of the monetary authorities. In contrast, where the actions of the public were assumed to operate, the best results explained fifteen percent or less of the variance in ΔB (see

[28]They have also shown that in the 1953-68 period, Federal Reserve open market operations (adjusted for changes in reserve requirements) were also explained by the same three objectives plus an additional money market objective, which in effect offset the noncontrolled sources of the monetary base.

Table V). The acceptable Durbin-Watson statistics in Table VI suggest that no important explanatory variables have been omitted from the monetary authorities' explanation of ΔB. On the other hand, low Durbin-Watson statistics in Table V imply that important explanatory variables have been omitted from an economic activity explanation of ΔB.

The values of the coefficients in Table VI for the prewar (1929-39) and postwar (1953-68) subperiods were similar with respect to the income stabilization objective (FR) and the financial stabilization objective ($r\text{-}r_n$),[29] supporting the hypothesis that the monetary authorities have acted in a largely consistent manner in controlling the monetary base (ΔB). During the war and early postwar period (1940-52), the Federal Reserve followed a single-minded policy of supporting the Government bond market. The results in Table VI reflect this, with only the even-keel variable statistically significant in that subperiod.

The results presented here indicate that it is the behavior of the monetary authorities (Table VI) rather than economic activity (Table V) which have dominated movements in the monetary base (ΔB). There is no evidence that the reverse-causation argument holds with respect to ΔB.

[29]For an explanation of all variables used in Table VI and of the difference in the even-keel sign between (1929-39) and (1953-68), see Keran and Babb, pp. 9-15.

Economic Activity and the Money Multiplier — Another channel through which economic activity could influence the money stock would be through its influence on the money multiplier. As indicated above, most of the ratios which are involved in determining the multiplier depend upon the behavior of the public, including commercial banks.

Table VII presents the results relating changes in the money stock (ΔM) to changes in the monetary base (ΔB) and economic activity (ΔY). Assuming that the monetary authorities determine movements in the base, and that the public operating through economic activity influences the money multiplier, our results indicate that for the total period (1919-69) both the monetary authorities (ΔB) and economic activity (ΔY) explain 67 per cent of the variance in ΔM. However, the beta coefficients, which indicate the "typical" influence of each independent variable on the dependent variable, show that the monetary authorities operating through the base (ΔB) have an impact on the money stock (ΔM) which is 3½ times as large as the public influence operating through economic activity (ΔY). The results for the subperiods are substantially the same as for the total period. The coefficient for the monetary base is statistically significant in all subperiods, while that for economic activity is statistically significant in only the first two subperiods (from 1919 to 1939). There was one subperiod (1929-39) where the beta coefficients indicated that economic activity was more important than the monetary base in determining movements

Table VII

RELATIVE INFLUENCE OF ECONOMIC ACTIVITY (ΔY) AND THE MONETARY BASE (ΔB) ON THE MONEY STOCK (ΔM)

$$\Delta M_t = d_0 + d_1 \Delta Y_t + d_2 \Delta B_t$$

(Quarterly First Differences — Billions of Dollars)

Time Periods	d_0	$d_1\Delta Y_t$	$d_2\Delta B_t$	R^2	D-W	Beta Coefficients ΔY	Beta Coefficients ΔB
II/1919 — I/1969	.094 (1.44)	.023 (4.61)	1.89 (17.78)	.67	1.32	.198	.755
II/1919 — II/1929	.075 (1.72)	.025 (2.49)	2.41 (5.57)	.61	1.43	.288	.640
III/1929 — II/1939	.064 (.63)	.063 (4.45)	.71 (2.86)	.42	1.21	.546	.351
III/1939 — IV/1946	.82 (2.52)	.022 (1.45)	1.69 (6.35)	.57	1.73	.181	.791
I/1947 — IV/1952	.37 (2.27)	.019 (1.41)	1.46 (3.63)	.46	.97	.230	.598
I/1953 — I/1969	.032 (.24)	.014 (1.92)	1.94 (8.00)	.59	1.56	.166	.696

Note: Regression coefficients are the top figures; their "t" values appear below each coefficient, enclosed by parentheses. R^2 is the percent of variations in the dependent variable which is explained by variations in the independent variable. D-W is the Durbin-Watson statistic.

Table VIII

RELATIVE INFLUENCE OF ECONOMIC ACTIVITY (ΔY) AND THE MONETARY BASE (ΔB) ON THE MONEY MULTIPLIER (Δm)

$$\Delta m_t = e_0 + e_1 \Delta Y_t + e_2 \Delta B_t$$

(Quarterly First Differences — Billions of Dollars)

Time Periods	e_0	$e_1\Delta Y_t$	$e_2\Delta B_t$	R^2	D-W	Beta Coefficients ΔY	Beta Coefficients ΔB
II/1919 — I/1969	.001 (.14)	.001 (4.03)	—.03 (4.20)	.12	.96	.194	—.288
II/1919 — II/1929	.011 (1.62)	.004 (2.53)	—.16 (2.37)	.16	1.45	.438	—.403
III/1929 — II/1939	—.004 (.31)	.007 (4.04)	—.16 (5.16)	.50	.98	.441	—.575
III/1939 — IV/1946	.038 (3.05)	.001 (1.32)	—.034 (3.34)	.32	1.27	.274	—.528
I/1947 — IV/1952	.008 (2.24)	.0001 (1.45)	—.028 (2.98)	.24	.95	.062	—.308
I/1953 — I/1969	.0001 (.15)	.0001 (2.18)	—.011 (2.66)	.09	1.56	.100	—.332

Note: Regression coefficients are the top figures; their "t" values appear below each coefficient, enclosed by parentheses. R^2 is the percent of variations in the dependent variable which is explained by variations in the independent variable. D-W is the Durbin-Watson statistic.

in the money stock. The strength of the economic activity variable in that period reflects the substantial decline in the multiplier. The multiplier declined during the early part of that period (1929-33) due to a change in the currency-deposit ratio (k), which reflected the run on banks by households as they attempted to convert their bank deposits into currency.

These results are not changed when lagged values of ΔY and ΔB are added to explain ΔM. With four lags the statistical significance of the coefficient for ΔY disappears in 1919-29, while in 1953-69 the coefficient for ΔY becomes negative. This latter result is inconsistent with the usual reverse-causation argument, which asserts a positive relationship.

The results presented in Table VII imply that economic activity has had some influence on changes in the money stock, presumably through its influence on the money multiplier, especially in the important 1929-39 period. However, the observed influence of economic activity on the money stock would overstate its true influence if offset by the actions of the monetary authorities operating through the monetary base. For example, if part of the actions of the monetary authorities had been designed to offset the influence of economic activity on the money multiplier, then the observed association of economic activity and the money stock would be, at least, statistically ambiguous.

Table VIII indicates this is the case. It shows the relative impact of the public operating through economic activity (ΔY), and the monetary authorities operating through the monetary base (ΔB), on the money multiplier (Δm). In the total period and in all subperiods the influence of economic activity (ΔY) is positive and the influence of the monetary base (ΔB) is negative. The beta coefficients indicate that in all subperiods (including 1929-39), the monetary authorities offset or more than offset the influence of the public on the money multiplier. Thus, the significance of the association of economic activity and the money stock reported in Table VIII is weakened, because those movements in the money multiplier induced by economic activity have been offset by changes in the monetary base.

The conclusions which can be drawn from these statistical tests are (1) that the monetary base is the dominant factor in determining movements in the money stock, both directly (Table VII) and indirectly (Table VIII), by offsetting other influences on the money stock; and (2) that the monetary authorities are the dominant factor in determining movements in the monetary base (Table VI). Thus, for the purposes of the single equation regressions used in this article, there are no statistical reasons for not treating the money stock as substantially controlled by the monetary authorities in all subperiods (including 1929-39).

Summary

The intent of this article is to measure the impact of monetary and fiscal influences on economic activity over as long a period of American history as available data permit (1919-69), and for selected

subperiods. This was done to see if different financial institutions, Government involvement in the economy and general economic conditions which existed during this long period have substantially affected the relative impacts that monetary and fiscal influences have had on economic activity.

For the whole period and for each of the subperiods (except the war years 1939-46), the relative impacts of monetary and fiscal influences have been remarkably stable. Changes in the money stock (the indicator of monetary influence) have consistently had a larger, more predictable, and faster impact on changes in economic activity than have changes in Federal Government spending (the indicator of fiscal influence). This basic relationship is observed in the economically depressed period of 1929-39 and in the prosperous periods 1919-29 and 1953-69.[30]

A historical investigation of the past fifty years reveals that in every case where the monetary variable and the fiscal variable moved in opposite directions, economic activity moved in the direction of the monetary variable and opposite in direction to the fiscal variable. Every cyclical movement in the money stock since 1919 has been followed by a proportional cyclical movement in economic activity.

Both the statistical results and the historical investigation provide strong support for the case that monetary influences have a significant impact on economic activity over the business cycle. An important implication of these results is that monetary policy should be given a central role in any economic stabilization program.

[30]The author was surprised at the consistency of the monetary influence during the various subperiods. Before conducting the research reported in this article, he considered that monetary influences on economic activity were strongly significant only during periods of generally strong business conditions like the 1920's and 1960's, while fiscal influences were dominant in periods of generally weak business conditions like the 1930's. In the March 1967 issue of this *Review* (page 14), he said: "during the 1930's business expectations of the future were so badly impaired by the depression experience that even large change in financial variables like money, . . . would not be sufficient to induce new investment and consumption." In the November 1967 issue (page 8) he made the same statement in a slightly different context: "If the forces which create strong private demand should disappear, i.e., loss of optimistic expectations by firms and households, the rate at which money is made available to the economy may not result in a predictable change in income."

The results reported in this article do not support the above quotations. Monetary influences have dominated fiscal influences on economic activity in both periods of secular boom and periods of secular recession.

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The Appendix to this article, which begins on the next page, considers the fiscal influence in more detail.

APPENDIX

Most of the readers of this article will not be surprised with our results, which indicate that monetary influences have had a major impact on economic activity. Most economists believe that money matters. However, they may be surprised at the consistently weak or nonexistent fiscal influence which our results imply. This Appendix will explore one possible explanation for these surprising results.

Table IX shows the impact of fiscal influences (measured by changes in Federal Government spending) on economic activity without taking monetary influences into consideration. Notice in Table IX that the sign and statistical significance of the fiscal influences differ substantially from the results presented in Table I, where monetary influences are explicitly accounted for. In Table IX, the fiscal influences are positive and statistically significant for the entire period and for each of the subperiods. The single exception is the period 1947-52, where special factors explained in the text tended to bias the fiscal measure. On the other hand, the fiscal influences measured in Table I were statistically insignificant and negative for the entire period and for each of the sub-periods, again with the single exception of the period 1947-52.

Table IX

IMPACT OF FISCAL INFLUENCES (ΔE) ON ECONOMIC ACTIVITY (ΔY)

$$\Delta Y = f_0 + f_1 \Delta E$$

(First Differences — Billions of Dollars)

	Lags*	f_0	$f_1 \Delta E$ (sum)	R^2/D-W
II/1919 — I/1969	t-6	3.83 (5.16)	.81 (3.01)	.13 .96
II/1919 — II/1929	t-7	1.73 (2.44)	3.27 (2.78)	.41 1.58
III/1929 — II/1939	t-10	—3.45 (2.25)	18.28 (2.18)	.14 1.49
III/1939 — IV/1946	t-4	4.29 (2.91)	.53 (2.11)	.61 1.43
I/1947 — IV/1952	t-4	9.38 (3.91)	—1.49 (1.76)	.09 .81
I/1953 — II/1969	t-3	6.08 (2.95)	1.71 (2.15)	.08 1.13

Note: Regression coefficients are the top figures; their "t" values appear below each coefficient, enclosed by parentheses. R^2 is the percent of variations in the dependent variable which is explained by variations in the independent variable. D-W is the Durbin-Watson statistic.

*Selected on the basis of minimum standard error of estimate, adjusted for degrees of freedom.

A comparison of the results in Table I and Table IX indicates that fiscal influences on economic activity may be strongly dependent upon how Government spending is financed. Federal Government expenditures can be paid for either by tax receipts from the public, by issuing bonds to the public, or by expansion of the money supply.

The results in Table IX, where the fiscal influences are positive and statistically significant, do not differentiate between the alternative methods of financing Government spending. Table I, however, by explicitly including changes in the money stock, implies that Government spending financed by money creation is accounted for by the monetary variable. Only that portion of Government spending which is financed by taxation and selling bonds to the public is measured by the fiscal variable.[1] These results indicate that the strength of the fiscal influences on economic activity is dependent upon the method of financing Government spending. If spending is financed by increases in the money stock, it has a measurable effect on economic activity. If it is financed by taxes or selling bonds to the public, there is no measurable fiscal influence on economic activity.

Most writers on public finance and fiscal policy[2] have generally asserted that the impact of Government spending on the economy is influenced by how the spending is financed. The most expansionary method is through increasing the money supply, and the least expansionary method is through increases in taxes. The results presented in this Appendix are consistent with those assertions.

[1]The role of commercial banks is ambiguous in this analysis. If banks buy Government bonds and *induce* the Federal Reserve to increase total reserves, it is treated as an increase in the money supply by the monetary authorities. However, if the commercial banks buy Government bonds, independent of any increase in reserves, it is treated the same as a purchase of bonds by the general public.

[2]Richard Musgrave, *The Theory of Public Finance,* (New York: McGraw-Hill, 1959); Alvin Hansen, *Monetary Theory and Fiscal Policy,* (McGraw-Hill Company, 1949); and O. H. Brownlee and E. D. Allen, *The Economics of Public Finance,* Second Edition, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1956).