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Introduction

THREE MONETARY EFFECTS ON INTEREST RATES

One of the oldest tenets of Wall Street is that tight money increases interest rates and easy money reduces them. Indeed, the level of rates is often taken to indicate whether monetary conditions are tight or easy. In that respect the connection seems tautological, but the considerable statistical evidence supporting such a connection is not based on a tautology.

Actually, in traditional theory there are three different kinds of monetary effect on interest rates—a portfolio effect, a credit effect, and an inflation effect. All three could be at work together. Their relative importance, however, is crucial to the theory of monetary dynamics. This study is concerned mainly with the first two, but the third one also comes in for attention at certain points.

1. The *portfolio effect* occurs because money and other financial assets are substitutable forms of wealth holding. A change in the rate of growth of the money stock produces a discrepancy between actual and desired money balances. This leads to accommodating changes in the demand for other financial assets and in their prices. The resulting changes in interest rates tend to remove the discrepancy, because these changes affect the demand for money balances and work to bring the amount demanded into equality with the changed supply.

When the rate of growth of the money supply changes, the growth rates of actual and desired balances continue (for a time) to be unequal. For as long as it persists, the discrepancy continues to affect interest rates.

Continued growth in the money stock does not, however, lead to lower and lower interest rates. A decline in interest rates stimulates investment expenditures. This raises aggregate expenditures and income and thus increases the demand for money balances. The economy gradually adjusts to a rise in monetary growth through a corresponding increase in the growth rate of expenditures and nominal income. In this process the initial period of falling interest rates comes to an end and the rates move back toward their original levels. Eventually a new long-run equilibrium is attained which, compared with the initial position, has higher rates of growth of money and of nominal expenditures and income and the same *real* rate of interest.[1]

The portfolio effect focuses on the substitutions that people make between money and asset holdings when actual and desired balances are not equal. To measure that effect here, the empirical analysis relates the level of interest rates to the rate of change of the money stock. The dependence of interest rates on monetary growth should be clearly distinguished from a relationship between the demand for real money balances and interest rates. The latter "liquidity preference relation," as Keynes termed it, shares a common parentage with the portfolio effect. The substitutability between money and financial assets lies behind both.

The demand for money balances depends upon the level of interest rates and other scale variables such as wealth and income. This demand takes part in determining the equilibrium relationship between stocks of money and other assets. The portfolio effect, by contrast, involves a dynamic adjustment sequence; it describes the effect on interest rates over time as portfolios are brought into equilibrium. The value of the interest elasticity of demand for money balances in equilibrium is not crucial to that adjustment sequence, so long as the elasticity is not zero (implying no substitutability) or infinite (giving rise to a liquidity "trap"). The crucial parameter for the portfolio effect

[1] There are two well-known conditions for the real rate of interest to be the same in the long run: that the initial position be one of full employment (otherwise the monetary expansion produces an increase in real income which, by the usual assumption, permanently increases saving more than it permanently increases investment and so reduces interest rates), and that redistributions of wealth resulting from unanticipated increases in the price level have negligible effects on the demand and supply of real loanable funds.

is the rate of adjustment to changes in monetary growth. The empirical relationships implied by the portfolio effect are not the same as those implied by the demand function for money balances.

2. According to the *credit theory,* an expansion of bank credit has a permanent effect on interest rates, unlike the portfolio effect. In the credit theory, money created by banks goes first into financial markets and adds to the total supply of real loanable funds,[2] which affects the equilibrium amount of borrowing and lending in the economy. To be sure, once the new money is spent by borrowers, it becomes part of the circulating media, supporting a higher level of aggregate expenditures and prices; thus, after the first round of its issue, the new money will be used in the same way as the previously existing stock of money. So long as the flow of new money continues, however, interest rates supposedly remain lower. Moreover, the decline in rates is not dependent upon lags in prices or other variables. If all prices rise immediately and proportionately to the increase in the money stock, money expenditures depreciate in the same proportion, and the continuing expansion of credit still augments loanable funds in real terms and reduces interest rates. The expansion is not solely in nominal terms, therefore, but also shifts the allocation of real aggregate expenditures.

It seems appropriate to attribute the credit effect, among modern writers, to Knut Wicksell.[3] He introduced the concept of the "natural rate of interest." At this rate the demand for loanable funds equals the amount supplied by current saving out of income. The natural rate can differ from the rate prevailing in the market so long as there are additions to loanable funds from money creation (or from reductions in desired real money balances).

Wicksell was interested in explaining how increases in investment demand produce inflation through an induced expansion of the money

[2] The concept of "loanable funds" here is all-inclusive and is meant to be the flow of funds or credit (I use the terms interchangeably) appropriate to the determination of the general level of interest rates in the economy. The sale of one nonmonetary asset to purchase another—portfolio swaps—is excluded. Only *net* purchases of financial claims by each person or business are included; such purchases can be financed by income receipts, net reductions in money balances, or the creation of new money.

[3] *Interest and Prices,* London, Macmillan, 1936 (originally published 1898), and *Lectures on Political Economy,* Vol. II, London, Macmillan, 1935 (originally published 1906).

supply. A greater demand for capital induces banks to expand loans if reserves are sufficient; by this behavior banks accommodate the money supply to the demand for bank loans.[4] Although autonomous changes in the money stock (such as those produced by gold flows) did not receive his main attention, his line of reasoning can be extended to include the proposition, set forth above, that creating money through an expansion of credit (given the demand schedule for capital) reduces interest rates.

3. In an analysis of interest rates it is important to distinguish between nominal and real rates of interest. Changes in the rate of monetary growth produce corresponding changes over the long run in the rate of price increase, and nominal rates of interest tend to compensate for anticipated changes in the real value of fixed-dollar assets. Increases in the commodity price level, for example, depreciate the real value of bonds, and the dollar coupon rate of new bond issues tends to rise to keep the anticipated real rate of return on the bond the same as it would have been had the actual and the expected price level remained constant.

The difference between nominal and real rates of interest was stressed by Irving Fisher as part of his theory of fluctuations in investment.[5] The distinction is relevant here because the portfolio and credit effects pertain to the real rate of interest, not to nominal market rates. An increase in the monetary growth rate, if it persists, will increase the rate of change of prices and, eventually, anticipations of that rate. By Fisher's theory, an increase in the anticipated rate of price change will raise nominal interest rates commensurately. In such a situation the

[4] Wicksell expected most changes in the money supply to be accompanied by such shifts in loan demand. If bank loan rates adjust only partially to the shift in loan demand, these rates and the money stock will tend to move in the same direction. This was given as an explanation of the "Gibson Paradox," a positive association observed between interest rates and the commodity price level. See the discussion in my *Determinants and Effects of Changes in the Stock of Money, 1875–1960*, New York, National Bureau of Economic Research, 1965, Chap. 6.

[5] Irving Fisher, "Appreciation and Interest," *Publications of the American Economic Association*, 1896; *The Theory of Interest*, New York, Macmillan, 1930; and "Our Unstable Dollar and the So-Called Business Cycle," *Journal of the American Statistical Association*, June 1925, pp. 170–202.

portfolio and credit effects will reduce real, but not necessarily nominal, interest rates.[6]

These three monetary effects on interest rates represent different adjustments of the economy to a change in monetary growth. The *portfolio effect* concerns adjustments by the public when changes in the money supply create a discrepancy between actual and desired balances. It does not matter how the new money enters the economy. The discrepancy leads to substitutions between money and other assets with repercussions on interest rates. The *credit effect* draws attention to the first round of money creation. This effect is based on the behavior of banks and the initial impact of their credit expansion on financial markets. Not only does money matter here, but how it enters, whether via lending or via direct purchases of goods and services, also matters. The *Fisher theory* asserts that an increase in monetary growth will raise nominal interest rates, once the monetary expansion leads to price increases and anticipations of inflation.

This study deals with the theoretical basis and empirical importance of these theories, and how best to describe the channels of monetary effects on interest rates. In many monetary theories and studies great importance is attached to the credit effect of money but without an explicit examination of the empirical significance of this effect.

OUTLINE OF THE STUDY

The credit effect can be viewed as a theory about the disposition of the revenue from money creation. In this theory the money created through credit expansion adds in the first instance to the supply of loanable funds. That is to say, new money adds to the demand for financial

[6] Another effect of anticipated price changes is on the demand for money balances. The public will hold smaller real balances when it expects prices to rise, and in consequence may accumulate more capital goods over time at the expense of real balances as a form of holding wealth.

The resulting increase in the capital-labor ratio of the economy can reduce the marginal productivity of capital and make the real rate of interest permanently lower than it would otherwise be. Such a shift in the relative stocks of real money balances and capital goods plays a role in monetary models of economic growth. It is ignored in this study.

assets, and in particular to the demand for those assets purchased through the expansion of credit. This raises two questions which are critically examined in Chapter 2. Does money creation in fact provide a revenue to the issuers—that is, to banks primarily—and, if so, do they save it? That they are supposed to save at least part of it is implied by the proposition that credit expansion adds to the supply of real loanable funds and thus reduces interest rates.

In Chapter 2, also, the services provided by banks in competing for deposits and the costs of these services are considered. These are often ignored in discussions pertaining to the costs of providing, and the returns to holding, deposit balances.

Chapters 3 through 5 are empirical analyses of short-run monetary effects on interest rates and include a test of the relative importance of the credit and portfolio effects. (Since the Fisher effect appears to have a long lag in periods of mild inflation, at least before 1966, the latest year covered here, it is ignored in this short-run analysis.) Both the credit and portfolio theories imply an inverse effect of the rate of change of the money stock on the level of interest rates. The evidence presented in Chapter 3 demonstrates this kind of inverse association.[7] The direction of influence can only be interpreted as running from monetary growth to interest rates, in support of the portfolio and credit theories. The evidence for the periods covered is not consistent with the reverse effect of interest rates on the money supply.

In Chapter 4 the credit theory is tested by extending the statistical analysis of Chapter 3. The test is based on a two-way division of monetary growth. Those sources of monetary growth due to credit expansion are one component and all other sources of growth are a residual component. The credit theory implies that the first source has much stronger effects on interest rates than the residual sources do and in effect ignores those other sources. Examples of other sources are federal expenditures financed by issuing new currency or reducing Treasury deposits at Federal Reserve banks, and foreign trade imbalances covered by transfers of gold or foreign exchange reserves. In

[7] Money is defined here as currency outside banks plus demand and time deposits of commercial banks, thus including all monetary liabilities of commercial banks.

testing the credit theory, the banking system should be consolidated with the Federal Reserve and the Treasury, although governmental agencies and commercial banks can be treated as different sources. The separation of the sources of monetary growth into those due to credit expansion and those due to residual components permits us to test whether their effects on interest rates differ.

In Chapter 5 the sources are examined in further detail: Bank credit is divided into loans and investments, to see whether they have differential effects on particular interest rates.

The statistical analysis indicates that, no matter how money is created, it affects interest rates inversely in the short run. The implication is that the first-round effect of money creation through credit expansion is weak, and that most of the effect on interest rates comes in subsequent rounds through the public's portfolio adjustments to the increase in monetary growth.

In Chapter 6 a simple mathematical model based on the portfolio effect described above is developed to account for this process. A change in monetary growth is assumed to produce a discrepancy between actual and desired money balances. The model describes how the subsequent adjustments temporarily affect interest rates.

The theory of the portfolio effect developed here implies a sequence of monetary effects on interest rates. To describe the sequence it is assumed that monetary growth increases and remains at a higher constant rate. Interest rates first decline and then gradually rise toward their initial position. Later, when the Fisher effect begins to take hold, nominal interest rates rise further. They go above the initial position, eventually by the amount of the increase in the rate of anticipated inflation. Apart from the Fisher effect, the movement to a new equilibrium need not be smooth but may, instead, involve overshooting and damped fluctuations around the long-run level.

Chapter 7 presents some estimates of this sequence. The inverse movement in interest rates, in response to a change in monetary growth, appears to reach its full effect in one to two quarters or so. After that, the movement changes direction. Interest rates pass their original position in three to five quarters. This evidence supports the portfolio theory. Monetary growth first affects interest rates inversely,

but, because the portfolio effect is temporary and the credit effect weak, interest rates turn around, and eventually the Fisher effect carries them past their original level.

The results of this study are pertinent to various issues in monetary theory and policy which deal with the channels of monetary effects. One example is the alleged increase in aggregate expenditures which occurs when banks sell government securities in order to expand loans, a question widely discussed in the early 1950's. Another example is the "bills only" controversy of the early 1960's, in which the question was whether Federal Reserve open-market operations should be conducted in Treasury bills or bonds. The present results indicate that monetary effects do not depend greatly upon the means by which such operations are carried out. Whatever initial effects are produced in certain sectors of the money market are a small part of the total effect. That is not to say that all sectors of the economy respond the same way to monetary policy. But the response is not closely related to differences in the initial direction of issuing new money. The final chapter elaborates these implications of the results.