A Cyclical Interpretation of Money

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I. Introduction

As *Hicks* has suggested, the demand for money is a derived demand, hence the strength of money demand depends on the strength of demand for output, which is cyclical. The less unemployment and excess capacity prevailing, the broader is the demand for money and the stronger is the tendency to use money substitutes more actively and creatively. The asymmetry which characterizes the business cycle thus appears within components of the business cycle. This paper deals with a monetary asymmetry within the cycle.

By now it is well-recognized, or should be, that the money supply is not synonymous with the money stock. The equation of output makes that clear. M is the stock of money, while MV is the supply of money.[1] It is possible for M to increase while MV remains the same. Disinflation of prices reduces nominal interest rates, raises the proportion of idle money balances held against income, and thus reduces velocity. V accordingly compensates a change in M. Hence the money supply (goods demand) remains constant while the money stock increases. If substitutes for money exist, then the money supply may change while the money stock remains constant. A rise in interest on MMMFs will increase velocity.

If money, defined narrowly, may serve as a medium, so may liquidity, broadly defined, serve as a means of spending. While the empirical tests of the modern quantity "theory" of money are numerous and impressive, tests of the liquidity doctrine are curiously contradictory.[2] If we deem it unwise to deny the importance of testing hypotheses with data, it would also be

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[1] In the equation of output, MV = PO, from a money market interpretation, MV is supply while PO is demand; however, from a commodity market interpretation, MV is demand while PO is supply. Unfortunately, error is perpetuated when one writes: "Here M is the money supply (sic), V is velocity, P is the price level, and Q is real output." See *Tobin* (1983). For the significance of this interpretation, see *Allsbrook* (1986). MMMFs are checkable money market mutual funds.

[2] For a summary of liquidity tests, see *Milton Friedman* and *Anna J. Schwarz,* Monetary Statistics of the United States (New York: NBER, 1970), p. 128.

imprudent to reject the plausibility of a hypothesis for lack of data. The purpose of this paper is to suggest a hypothesis which captures the effects of a changing money supply, which is endogenous, over alternative phases of a stylized cycle. Recognition of a systematic variation in velocity over the cycle may explain why, in the short-run, a closer correlation between changes in the money stock and output or price indicators may not be observed.[3]

II. Model

The model which we employ is well-known. The *Keynes-Hicks* methodology developed in the SILL geometry is utilized to incorporate a hypothesis of cyclically endogenous monetary behavior. The only change necessary to amend this model to distinguish between money supply (flow) and money stock traces from the slope of the transactions demand for money function (L1). If the proportion of money held against income for spending on goods and services falls (rises), then the slope of the transactions demand for money function falls (rise). A change in the ratio of transactions balances to income will change velocity. Accordingly, the slope of the equilibrium money function, LL, will change. If the slope of L1 falls (rises), then the slope of LL falls (rises). This enacts a rotation of the LL curve.

If, however, the money stock is changed, the LL curve shifts to a higher or lower position parallel to its prior position. A rise in velocity thus becomes a clockwise rotation of LL, but a rise in the stock of money becomes a rightward (parallel) shift of LL. In Figure 1, L_0L_0 is the initial set of monetary equilibria. L_1L_1 reflects an increase in the money stock which may be con-

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[3] Consider the following consistency of U.S. postwar changes in nominal GNP, money stock, and velocity, expressed in percentages. See, e.g., *M. Friedman*, The Optimum Quantity of Money (Chicago: Aldine Publishing Co., 1969), esp. pp. 15, 206 - 209.

Years	Recovery (E) or Recession (C)	Private GNP (C + I)	Money Stock (M_1)	Income Velocity
1946 - 48	E	+ 40	− 1	+ 26
1948 - 49	C	− 4	− 1	− 3
1949 - 53	E	+ 32	+ 16	+ 24
1953 - 54	C	+ 3	+ 2	− 2
1954 - 57	E	+ 24	+ 5	+ 17
1957 - 58	C	− 3	0	− 2
1958 - 60	E	+ 17	+ 2	+ 13
1960 - 61	C	− 1	+ 1	− 1
1961 - 68	E	+ 75	+ 35	+ 30

sidered exogenous. L_2L_2 reflects an increase in the money supply (increase in velocity) which may considered endogenous.[4] It is the latter approach which is the basis for adopting a cyclical definition of money to the SILL model. We shall proceed through two alternate phases of the business cycle, disinflation and inflation (or accelerating inflation), to replicate a cyclical interpretation of money during a business cycle.
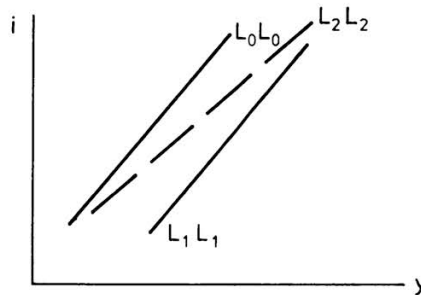

Figure 1

III. Cyclical Behavior

We shall not entreat full employment equilibrium since, by assumption, all markets are in equilibrium. Moreover, this condition may be a mere moment between alternating phases of a business cycle. Therefore, we shall invoke only those phases on either side of equilibrium, namely, disinflation and accelerating inflation. Nor shall we consider here the specific case of inflationary recession, since this condition may be associated with an imperfectly full employment equilibrium which could be deemed an "upper turning point."

1. Disinflation

During disinflation, the opportunity cost of holding pure real money balances, such as non-interest bearing demand deposits, falls, hence velocity decreases, and the narrowest measure of the nominal money stock increases relative to broader measures of the money stock. Overall, this means that

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[4] Suppose that someone "supplies" sufficient money to a bondholder to induce the holder to part with one's bond. The money supply has risen as transactions velocity has risen. Substitute, now, a new commodity or service for the bond, and the money supply has risen as income velocity has risen. Hence, transactions velocity may exceed income velocity, but income velocity cannot exceed transactions velocity. In our analysis, we address only income velocity consistent with the SILL dimensions.

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M1 initially falls more slowly than M2 which falls more slowly than M3. In part, this is due to the exogenous policy shift which reduces the growth of the monetary base (reserves) which impacts most immediately on M1. To replace the growth deficit of M1, assets must be converted from M2, where yields are higher, or from M3 where yields are highest. The greater source of M1 replacement is, accordingly, M2. Later, and endogenously, M1 rises more rapidly than M2 which rises more rapidly than M3. With disinflation, technically, it is the rate of depreciation of money and bonds which declines. In initial stages of disinflation, exogenous decreases in the rate of growth of the monetary base cause all components of liquidity (M1, M2, M3 and L) to subside. The effect on the rate of inflation, which is negative, reduces both the inflation premium affixed to real rates of interest and the rate of nominal income growth. The decline in nominal interest will increase the transactions demand for money (L1) via a substitution effect. This is a source of the decline in velocity. The arrest in the rate of growth of nominal income will also arrest the rate of growth in M_1 via an income effect. This too is a source of the decline in velocity. Accordingly, the willingness to hold passively more of these pure balances increases. As bonds also appreciate with the decline in interest, the higher bond prices (relative to the price of "other things") diminishes incentives to demand bonds by both the conservative saver (high futurity spender) and the speculator (low futurity spender). These effects are depicted in Figure 2.
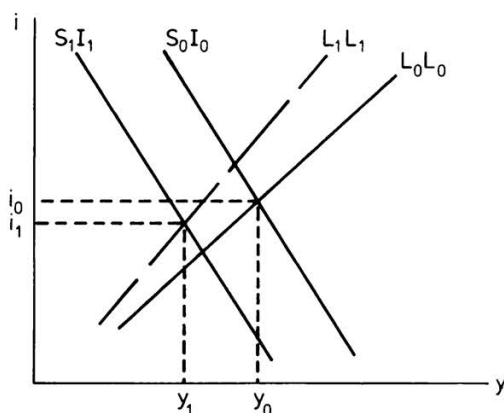

Figure 2

In Figure 2, the onset of recession is a real shift in SI from S_0I_0 to S_1I_1 which could reflect a decline in fiscal activism (a decline in goverment spending or a rise in tax collections). To the extent that the multiplier reduces real income from y_0 to y_1, a recession extends. To the extent also that

prices disinflate, the fall in real income is abated. Consider, then, the movement from y_0 to y_1 as the net effect of increased unemployment and *dis*inflation. The joint effect of falling income and falling inflation would raise the proportion of real balances held against income.[5] From this, the decline in velocity raises L_0L_0 to L_1L_1 which exacerbates the fall in income (from y_0 to y_1) but inhibits the fall in interest. Were it not for the rotation of LL, the decline in interest would be greater and the fall in income would be lesser.

As interest premiums fall, bond prices rise, but the rise in prices is curbed by the willingness of two categories of bondholders to part with higher priced bonds. Some bondholders may be impoverished by disinflation or recession, and they liquidate bonds for M1. Other bondholders cannot be convinced that bond prices will remain higher (or go still higher yet), and they liquidate for capital gains, which they may convert from M1 to M2 or M3. The joint effect of both groups' behavior is to inhibit the fall in interest.

The economic significance of this outcome is clear. Velocity falls with declines in income, and interest rates, and inflation. During recession or disinflation, therefore, velocity, and its reciprocal which is the demand for real money balances, are procyclical by nature. As interest rates decline, there is a tendency for relatively more short than long bonds to be held or acquired. The spread between yields on short and long bonds, albeit positive, tends to widen as demand for short bonds rises more rapidly than demand for long bonds. Hence short rates fall more than long rates (which may even rise initially), and the net effect may be a more protracted and less rapid decline in weighted average yields on all bonds, both short and long. This conforms to the outcome in Figure 2. Ultimately, however, the fall in short rates relative to long rates will increase the demand for long bonds and reduce their yields. This should signal the near end of a recession or disinflation phase. This outcome, furthermore, signals that output and employment must endure the cost of a rise in holdings of real balances. Nevertheless, this endogenous change in the supply of money will exert a smaller procyclical effect on income than would an exogenous change in the stock of money. A decline in the money stock dictated by monetary policy would shift L_0L_0 leftward in parallel. Then, interest would fall even less, and income would fall still more.

A comparison of the similarity of monetary and fiscal transmission mechanisms may now be made. Just as the expenditures multiplier is the behavioral link between real income and real consumption, so now is veloc-

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[5] While the decline in income does not per se alter the fraction of money held against income, the decline in interest rates does increase the desired fraction of money held against income.

ity the behavioral link between real income and real balances. And the asymmetry observed by *Duesenberry, Friedman* and others in the consumption function is not unique to the commodity (SI) market.[6] Asymmetry characteristics may also exist in the money and bond (LL) markets.

2. Accelerating Inflation

During accelerating inflation, as bonds and money depreciate in real value, the alternative cost of holding real money balances rises as nominal interest rates increase, hence velocity increases, and the narrowest measure of the nominal money stock declines relative to broader measures of the money stock. Initially, and exogenously, M1 grows more rapidly than M2 which grows more rapidly than M3. Later, and endogenously, M3 grows more rapidly than M2 which grows more rapidly than M1. As velocity increases, the money supply increases, and short-term bonds become short-term near-perfect substitutes for money. In initial stages of rising inflation, exogenous increases in the rate of growth of the monetary base cause all components of liquidity ($\dot{M}1 > \dot{M}2 > \dot{M}3 > \dot{L}$) to increase at different rates. In advanced stages of inflation, however, the effects of inflation will cause the relative growth rates of liquidity to be inverted such that $\dot{M}1 < \dot{M}2 < \dot{M}3 < \dot{L}$.[7] The flight from cash into bonds and even into real assets (with L characteristics) is symptomatic of a rising implicit "natural" rate of interest on commodities which may or may not be productive. In any event, the Wicksellian rate of interest en natura becomes more positive during inflation, and commodities of both reproductive and merely durable nature become increasingly preferable to bonds and lower interest-bearing money assets. This outcome is depicted in Figure 3.

Consider an inflation that occurs at a nominal money stock of L_0L_0. According to standard monetarist doctrine, L_0L_0 could be the result of expansionist monetary policy which exceeds the capacity of the economy of really absorb additional nominal money, and commodity prices begin rising more rapidly. As inflation mounts, the self-corrective effects of inflation reduce the real money stock by shifting L_0L_0 parallel leftward to L_3L_3. Nominal interest rates rise to i_3 from i_0 and real income falls from y_0 to y_3 via a

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[6] See *Allsbrook* (1973).

[7] We have not addressed certain institutional issues such as trade credits, the size of the public debt and the proportion of that debt held by commercial banks, or the differing rates of growth between commercial banks and non-bank financial intermediaries. Although each factor could contribute to explaining how velocity could change, most of these institutions themselves are subject to change and so are not generally considered as constants.
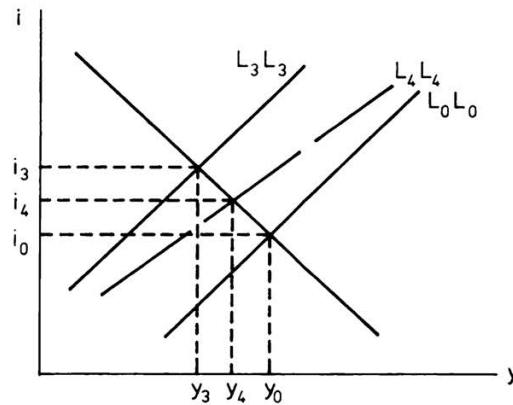
Figure 3

Keynes effect. As agents observe the onset of inflation, they adopt endogenously defensive behavior to avoid the cost of holding spoiling assets whose real prices are declining.

Given such a posture against inflation, the economizing of cash and bond holdings takes the form of reducing the inventory level of transactions (L1) balances and, to a lesser extent, of L2 and L3 balances, and of increasing purchases of inflation-sensitive debt instruments such as short-term bonds, whose yields responded earliest in falling. Consequently, the demand for short-term bonds rises at the expense of long-term bonds. This will ultimately raise long term rates and reduce short term rates. The pattern of change in the bond market, analogous to a steepening of the short end of the yield curve, and a rising but flattening long end of the yield curve, occurs.[8]

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[8] These discussions turn on the term structure of interest rates or the "yield curve." To begin with, a "normal" yield curve on Federal debt without positive or negative inflationary expectations (in equilibrium) is expected to be positively sloped, according to the *Hicks-Kessel* liquidity-premium model. The question then becomes, what happens to the yield curve when positive or negative inflationary expectations are introduced. Consider the effect of accelerating inflation (AI) on U.S. Treasury bills only. The yield segment rises and steepens. Therefore, during disinflation, this yield segment would fall and flatten. However, for the yield curve as a whole, including Treasury notes and bonds, the yield curve otherwise rises and flattens during inflation, while the yield curve otherwise falls and steepens during disinflation. The reasons for this are numerous. During recession or disinflation (DI), as interest falls, bills are progressively liquidated from the shortest (90 days) to the shorter (182 and 365 days) maturities. The impact on price (hence yield) is least at the shortest end of the spectrum, while the impact on price is only slightly greater for the shorter end of the spectrum. Hence, a relatively flat yield curve for bills only exists. But, as disinflation raises cash needs and liquidation of increasingly longer maturities occur, the effect is to progressively reduce the rate of decline in proportionally longer bonds. That is,

The net result of long-term yields appearing to rise more rapidly than short-term yields translates into the monetary equilibrium of L_4L_4 in Figure 3. A weighted index of altered nominal interest yields produces i_4 and y_4. Our interpretation of y_4 would include the marginal real income earned by representatives in bond and commodity markets whose commissions rise sharply during a rise in velocity during inflation. Under those conditions, MV rises relative to M, and thus the money supply increases relative to the money stock.

Empirically, it is true that a perfect *Fisher* effect of full inflation premiums or full disinflation discounts being spliced to real interest rates simply does not exist. Our analysis of the systematic variation in velocity during alternative business cycle phases may point to one explanation.

IV. Conclusions

Given the inability or unwillingness of policy authorities to stabilize the economy at full employment via rules for fiscal and monetary variables, it is appropriate that a wider consideration of economic behavior be included in normative and discretionary economic policies. A hypothesis of endogenous responses of economic free agents to indicators of inflation or disinflation is useful in anticipating the reliability of these agents' behavior in cycles. Given specific variability in velocity and thus the money supply, there must be a compensatory variability in policy governing the money stock. That is, exogenous policy must correctly anticipate endogenous behavior. If policy adheres to a rigid target growth of only the narrowest definition of money when agents are redefining the medium they treat as money, the efficacy of monetary policy is compromised, and the prospect of efficient countercyclical stabilization is diminished. Just as questions have arisen over the varia-

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longer term bond yields fall less than yields on shorter-term notes. This is consistent with the asymmetric duration spans between overall cyclical expansions and contractions. Accordingly, the yield curves may be depicted as between the yields (i) and the terms maturity (TtM) as:
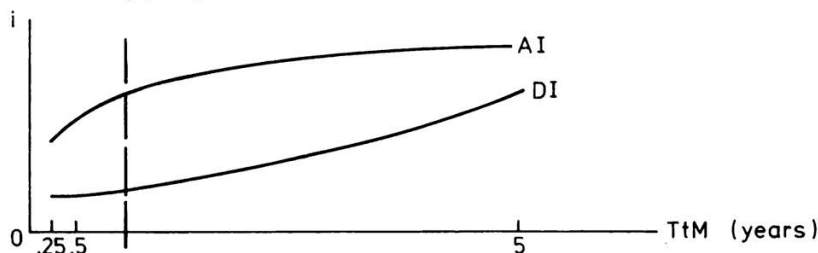
bility of the expenditures multiplier and its procyclical enhancement or abatement of exogenous change, so should procyclical aspects of velocity be included in the arsenal of knowledge to inform an optimum cyclical monetary policy.

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Zusammenfassung

Eine zyklische Interpretation des Geldes

In diesem Artikel wird eine Analyse der zyklischen Bewegungen der Geldumlaufgeschwindigkeit über einen stilisierten Konjunkturzyklus entwickelt. Historisch gesehen verändert sich die Umlaufgeschwindigkeit in vorhersagbarer, zyklischer Weise. Deshalb wird das IS-LM-Paradigma dazu herangezogen zu zeigen, warum diese Änderungen zu erwarten waren. Ein entscheidender Ansatzpunkt betrifft die Unterscheidung zwischen Geldbestand und Geldstrom. Während ersterer exogen, ist letzterer endogen und schließt Veränderungen der Umlaufgeschwindigkeit ein. Die beiden auf diese Weise begründeten Zyklusphasen sind rückläufige und akzelerierende Inflation. Die für diese Konjunkturphasen erwarteten Wirkungen auf Zinsstrukturkurven werden aufgezeigt. Damit wird der Versuch unternommen, die Finanzierungsseite der Volkswirtschaft (LM) eben jener Flexibilität zu unterwerfen, die für die Ausgabenseite der Volkswirtschaft (IS) durch die alternativen Konsum-Spar-Hypothesen gegeben ist.

Summary

A Cyclical Interpretation of Money

This article develops a cyclical analysis of velocity as it varies over a stylized business cycle. Velocity varies historically in a predictable cyclical fashion, so the IS-LM

paradigm is employed to illustrate why these changes are expected. A critical distinction lies in the difference between the stock of money and the flow of money. The former is exogenous, while the latter is endogenous and includes changes in velocity. The two phases of the cycle rationalized in this manner are disinflation and accelerating inflation. The expected effects on yield curves during these phases are drawn. Thus an attempt is made to subject the financial side of the economy (LM) to the same flexibility that the expenditure side of the economy (I5) has been subjected by the alternative consumption/saving hypotheses.

Résumé

Une interprétation cyclique de la monnaie

Cet article développe une analyse cyclique de la vitesse et montre comment elle varie au cours d'un cycle conjoncturel conventionnel. La vitesse varie historiquement d'une façon cyclique prévisible; le paradigme IS–LM est ainsi utilisé pour illustrer les raisons pour lesquelles ces changements sont attendus. Il est difficile de distinguer entre le stock monétaire et le flux monétaire. Le premier est exogène, le second, endogène, et inclut des variations de vitesse. Le cycle, rationnalisé de cette façon, connait deux phases: celle de désinflation, d'une part, et celle de l'inflation accélérée, d'autre part. Les effets attendus des courbes de résultats au cours de ces phases sont tracés. Il est donc essayé d'accorder au côté financier de l'économie (LM) la même flexibility that the expenditure side of the economy (IS) has been subjected by the alternative consumption/saving hypotheses.