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Monetary, Credit and (Other) Transmission Processes: A Monetarist Perspective

Allan H. Meltzer

Early in the history of dynamic economics, Ragnar Frisch (1933) separated dynamic analysis of economic fluctuations into impulses and propagation processes. Impulses occur irregularly, but when they occur, a propagation process distributes their effect through the economic system. Recent writers replace impulse with "shock" and propagation with "transmission." The transmission process describes how the economy responds to an impulse. The focus of this symposium is on the transmission of monetary impulses. It should come as no surprise, however, that the same process transmits fiscal and other impulses.

A transmission process is specific to a class of hypotheses. Real business cycle hypotheses do not allow any monetary effects on real variables, so the transmission of monetary impulses is limited and uninteresting. For other classes of hypotheses—classical, Keynesian, monetarist, neo-Keynesian, neoclassical, eclectic—monetary impulses have at least temporary real effects. The source of these real effects differs according to the model.

For a monetarist or classical economist, long-run neutrality of nominal impulses is an implication of rational behavior. However, before impulses are fully absorbed, relative prices and real output respond to monetary impulses. The reason is that households and businesses fail to anticipate or perceive correctly all of the

1 The substitution of "shock" defined as unanticipated change for "impulse" seems in keeping with Frisch's definitions. Many events transmitted to the economy, surely including monetary and fiscal actions, are not entirely unanticipated even if their timing is uncertain. As Mishkin (1983), Gordon (1982) and others have shown, anticipated policy actions are also transmitted through the propagation or transmission mechanism. I retain the term impulse to include more than shocks.

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future implications of past and current actions. From a monetarist perspective, one principal reason for the misperceptions that give rise to relative price changes is that time is required to distinguish permanent and transitory impulses and real and nominal impulses. These delays in correctly perceiving the duration or type of change are part of the costs of acquiring information. Contracting in nominal terms is one response to these uncertainties (Meltzer, 1995).

Monetarists typically favor rules for monetary policy to reduce costs of acquiring information. Without a rule, market participants must use resources to anticipate how and when the monetary authority will respond to price, output, employment, exchange rate and other changes. Each new policy action is scrutinized to revise anticipations of the magnitude, timing and duration of effects on interest rates, exchange rates, other relative prices, output and the price level. A preannounced rule would reduce uncertainty by eliminating an important source of the misperceptions and faulty anticipations that contribute to fluctuations of relative prices and real wealth.

In this paper, I first concentrate on the monetarist view and how it differs from the standard model. To simplify, the paper considers only a closed economy. In an open economy, the exchange rate would be one of the relative prices in the monetarist transmission process. Substitution between domestic and foreign goods and assets would give rise to changes in international trade and capital movements as the economy absorbs the impulse and restores neutrality.

Introducing additional relative prices would further emphasize a main point of monetarist analysis: in practice there are many relative prices that do not change in fixed proportions or uniformly from cycle to cycle. Impulses differ, as do the particular inventories of assets held by wealth owners at any time, so the particular relative price changes induced by changes in the monetary impulse differ also.

Later sections provide some evidence on the role of relative prices in a recent cycle and compare the monetarist transmission process to some other approaches. In particular, Bernanke (1983) and others emphasize the role of the bank loan market as part of the transmission process. I compare the monetarist and lending models and present some evidence on the importance of the lending channel. A conclusion briefly discusses some policy implications.

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2 Economists have made progress in understanding macro processes without a complete model of aggregation or a microfoundation showing the source of the real effect of monetary impulses. Such foundations are desirable but unnecessary for discussion of the transmission process. I have discussed these issues in Brunner and Meltzer (1993) and more fully in Meltzer (1995). See also Blanchard (1990).

3 A monetary rule does not require constant money growth. The rule can be activist, use current information, require feedback, and so on.

4 This suggests why search for a "truly" exogenous measure of monetary shocks is unlikely to be fruitful. Often it is the impulse, not just the shock, that matters (as these terms are used in footnote 1). Markets often anticipate central bank changes, so "the" interest rate may move in advance of the policy action. There is a monetary impulse in this case, but the shock or announcement may appear to have no effect.
A Critique of the Standard Model

Nearly 60 years after Hicks (1937) introduced the IS-LM model to relate money and the interest rate to aggregate income or output, the model remains the workhorse model of most textbooks and much policy discussion. In this model, monetary policy is transmitted by changes in the interest rate. A reduction in the money stock raises the cost of borrowing. Higher borrowing costs reduce spending by producers on investment in inventories and capital goods, or consumers on durable goods, so aggregate spending falls in response to a monetary contraction and rises following a monetary expansion. Since spending, output and aggregate income are equal in a closed economy, output and spending change together.5

This simple version of IS-LM leaves open whether it is a model of real output with fixed prices or a model of nominal output that does not distinguish between real and nominal values. The Phillips curve resolves the issue by introducing some simple dynamics relating inflation to some measure of aggregate excess demand for output. With this addition, a positive monetary impulse initially raises the stock of real money balances and lowers the interest rate, representing the opportunity cost of holding money. At the lower interest rate, the equilibrium rate of investment is higher. Spending increases and, because the monetary impulse is not fully anticipated, the price level does not rise in the same proportion as the monetary impulse. The Phillips curve describes the distribution of the increased spending between prices (or inflation) and output; the larger the increase in prices, the smaller is the rise in real money balances and real output. As knowledge of the size of the monetary impulse becomes available, money wages and commodity prices increase, and the effects on real variables fade. Prices and money rise in the same proportion, and the economy returns to equilibrium at full employment.

To a monetarist economist, this view of the transmission process is overly restrictive and mechanical. A monetary impulse that alters the nominal and real stocks of money does more than change a single short-term interest rate or borrowing cost. Monetary impulses change actual and anticipated prices on a variety of domestic and foreign assets. Intermediation, the term structure of interest rates, borrowing and lending, and exchange rates respond. Many of these transmission processes have long been recognized. Adjustment of relative prices during cycles, or following a change in money, has been standard fare since the beginning of systematic thinking about economics.6 The use of a single short-term interest rate, even

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5 This is not a parody. A recent statement is Walsh (1994), although Walsh distinguishes between real and nominal magnitudes. Sometimes a real wealth or real balance effect supplemented the cost of borrowing. Until prices adjust, a change in nominal money is also a change in real balances and thus in real wealth. Since consumption depends on real wealth, spending responds until neutrality is restored. The empirical importance of the real balance effect is generally dismissed as too small to be relevant.

6 For example, Fisher (1920) emphasized changes in the relative velocities of currency and bank deposits as the public altered its desired asset portfolio and banks and other financial institutions responded. Haberler (1937) is the classic source for discussing the principal alternative transmission processes used in the pre-Keynesian era to explain how monetary impulses produce cumulative expansions, an upper turning point, a contraction, a lower turning point and renewed expansion.
If stripped of its borrowing cost interpretation, is a poor metaphor for the classical response of relative prices following a monetary impulse and the further adjustments that restore neutrality.

The IS-LM model omits important features of the transmission process. First, the model neglects the adjustment of asset stocks as new investment in capital accumulates. Second, it leaves open whether the single rate of interest is a short-term rate, considered relevant for the demand for money, or a long-term rate relevant for investment and capital accumulation. Third, there is no role for financial intermediaries; money is either the monetary base or directly proportional to the monetary base. Fourth, the model leaves open whether money substitutes for bonds only or for a full range of assets including both bonds and real capital. On the latter interpretation, bonds and real capital are perfect substitutes in portfolios (or only differ by a constant risk premium). Fifth, many of the changes in short-term interest rates are transitory disturbances that do not affect spending decisions. IS-LM does not distinguish these transitory movements from permanent or persistent changes in nominal and real returns.

**Monetarist Building Blocks**

Why does an unanticipated change in the nominal stock of money affect relative prices and real variables? The nonmonetarist answer to this central question is that there is a "liquidity effect" (Christiano and Eichenbaum, 1992). A change in money changes liquidity; the short-term interest rate is a measure of this liquidity effect.

To a monetarist, this answer is at best partial and incomplete. A monetary impulse changes the stock of money relative to the stocks of other domestic and foreign assets, and changes the marginal utility (or marginal product) of money relative to the marginal utility (product) of these other assets and the marginal utility of consumption. Money holders attempt to restore equilibrium by equating the ratios of the marginal utilities to the relative prices of all assets and current production and consumption. This involves changes in many relative prices, in spending and in asset portfolios.

In a theoretical Walrasian economy, where prices are called out by a crier and all transactions are cleared simultaneously, the process of adjusting marginal utilities, relative prices and real output occurs instantly. Simultaneous clearing of markets removes the source of the productivity of money. Money is not only useless but costly to hold.

The social and private productivity of money arises when there is uncertainty about relative prices and the persistence of monetary and other impulses. One type

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7 Restricting the substitution only to bonds renders the model inapplicable to countries without organized financial markets. See Brunner (1989).
of uncertainty that is highlighted in monetarist analyses is uncertainty about whether observed changes are permanent or transitory. Money receives a real return, for its service as a medium of exchange, by reducing costs of bearing uncertainty. The use of money lowers costs of acquiring information and transacting (Brunner and Meltzer, 1971; King and Plosser, 1986). Heightened uncertainty about future output and asset values increases costs of acquiring information and raises the return to holding money.\(^8\) Inflation raises the costs of holding money.

Suppose there is an unanticipated injection or withdrawal of base money. In the absence of an auctioneer or full information, the change imposes information costs. Is the change permanent or transitory? Is it made to offset a change in the demand for money? These and other questions do not have immediate, complete answers. Those who see the monetary impulse as the start of inflation (or disinflation) respond differently than those who anticipate a one-time change in the price level, and both of the former responses differ from the responses of those who perceive the change as transitory or are unaware that any change has occurred. Therefore, some will switch from money to equities, goods or real assets; others will shift to short-term bills or bank deposits; and still others will shift the opposite way. Many will do nothing either because they do not monitor momentary changes, or because they believe the change is transitory, or because they are uncertain and await more information before paying costs of adjustment.

Relative prices reflect the balance of opinion that follows the new impulse. As more information accrues, the initial change in the monetary base and short-term interest rates will be seen more clearly as a transitory event, the implementation of existing policy or a shift toward faster or slower money growth. Production, consumption and inventories adjust to the revised configuration of relative prices.

The transmission is not confined to a small corner of the money market. The adjustment of relative prices, anticipations, aggregate demand and output affect the labor market. Tax collections and government spending change, so there are effects on the budget position and the financing of the budget. The next section organizes these responses and interactions in a monetarist model.

**A Monetarist Model**

To capture some of the interplay of relative prices, a monetarist model has at least three assets:\(^9\) 1) money or base money is a nominally denominated asset that

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\(^8\) Contrast this explanation of the use of money with the uses emphasized in recent literature where money is: 1) held to reduce "shoe-leather costs"; 2) imposed as a costly but unavoidable device for making cash-in-advance payments; 3) used as an intertemporal store to transfer wealth between generations; or 4) held to satisfy arbitrary institutional restrictions.

\(^9\) As there is no representative monetarist model, my discussion follows Brunner and Meltzer (1965, 1968, 1976). Models for foreign assets including bonds and real capital are excluded by the closed economy assumption. Intermediation is introduced below.
provides real services as a medium of exchange; 2) bonds or securities are nominally
denominated assets that yield a nominal return, the rate of interest, \( i \); and 3) the
stock of real capital, or claims to real capital, yields a real return—a unit of real
capital has a price \( P \). Prices of many different assets—houses, consumer durables,
producer's capital and claims to capital—are included in \( P \). Households choose an
optimal mix of the three types of assets. All assets are substitutes in portfolio, but
they are not perfect substitutes.\(^{10}\)

With three asset types, and the definition of wealth, the model must determine
two relative prices to achieve portfolio balance for the economy. Figure 1 shows the
position of portfolio balance or asset market equilibrium at the intersection of the
\( MM \) and \( CM \) lines. \( MM \) is an equilibrium relation for the (base) money market,
and \( CM \) is an equilibrium relation for the securities or bond market. The positions
of the \( MM \) and \( CM \) curves are defined for given asset stocks and for given output,
commodity prices and anticipations. Changes in these given values shift the positions
of \( MM \) and \( CM \) by changing asset stocks or the determinants of asset demands.
The equilibrium values of the interest rate and asset price level, shown at the intersec-
tion of \( CM \) and \( MM \) in Figure 1, are conditional on the existing stocks of
assets and the demand to hold them.

The slope of \( MM \) shows the different combinations of interest rate \( (i) \) and asset
price level \( (P) \) at which existing money balances are willingly held. The slope is
positive. As the interest rate rises, wealth owners reduce desired money balances; a
rise in \( P \) restores equilibrium by lowering desired holdings of existing real capital
and increasing desired holdings of money (and bonds). The slope of \( CM \), the equi-
librium relation for the securities market, is negative. A higher interest rate in-
creases desired bond holdings. A fall in \( P \) restores equilibrium by inducing asset
owners to shift into real capital.

**Transmission of Monetary Impulses: Asset Markets**

The transmission process begins in the asset market. Costs of information and
transactions are lower for many assets than the costs of changing production or
adjusting consumption or investment in durables. Particularly when there is uncer-
tainty about whether impulses are permanent or transitory, asset markets respond
more quickly.

An open market operation by the central bank is a simultaneous, opposite
change in the stocks of base money and securities. An open market purchase in-
creases the base and reduces the stock of debt held by banks or the public. An open
market sale reduces the base and increases the public's debt holdings.

\(^{10}\) Debt and real capital may be perfect substitutes in portfolios at full, long-run equilibrium. Transmission
concerns the process by which relative prices and the price level adjust to new impulses. Unless adjust-
ment is instantaneous, issues about Ricardian equivalence do not arise. Further, debt and real capital
are not perfect substitutes in production, so distinguishing between debt and real capital is useful for
this reason also. Cukierman and Meltzer (1989) show that with some bequest-constrained individuals,
debt is valued, and changes in debt change market interest rates in a model that is otherwise Ricardian.
See also Woodford (1995).
Figure 1
Asset Market Equilibrium

The broken lines in Figure 1 show the effect of an open market purchase of securities. More base money must be willingly held, so $MM$ shifts to the right, as shown by $MM_1$. Wealth owners use the additional money to purchase existing bonds and real capital, thereby lowering the interest rate and raising the asset price level. Since the demand for money depends negatively on the interest rate and positively on the asset price level, the decline in the interest rate and the rise in the asset price level continue until the additional money is willingly held. The open market purchase also reduces publicly held securities, so less debt must be willingly held. $CM$ shifts to the left, as shown by $CM_1$. A lower interest rate is required to absorb the smaller stock of securities into wealth owners' portfolios.

The new equilibrium at the intersection of $MM_1$ and $CM_1$, $(i_1, P_1)$, is the new position of portfolio balance. Both the increase in money and the reduction in securities lower the interest rate, so the direction of change in the interest rate is unambiguous. The two effects on the asset price level have opposite signs; if the two effects were equal, asset prices would not respond to an open market operation. Empirical studies suggest that open market purchases raise the asset price level and open market sales lower $P$, as required for the monetarist hypothesis (Brunner and Meltzer, 1968).\textsuperscript{11}

\textsuperscript{11} To obtain this empirical result, the interest elasticity of the excess demand function for securities (credit) must be larger than the interest elasticity of the excess demand for money. This is a condition of equilibrium. In Figure 1, $MM$ is steeper than $CM$. See Brunner and Meltzer (1976, 1993).
Some Implications

The asset market model has several distinct implications. First, changing the base and changing the stock of securities have different effects on the interest rate and asset price level. This implies that the choice of budgetary finance—the mix of money and bonds issued to finance a budget deficit—affects asset prices and interest rates. These different effects are transmitted to the output market (as discussed below), so short-run output market responses also depend on the mix of deficit finance.

Second, a quintessential implication of standard IS-LM analysis is that, by controlling the interest rate, a central bank can offset random changes in the demand for money. Interest rate targeting, therefore, avoids portfolio and output market response by letting the monetary base respond to the change in the demand for money.

This implication is false in monetarist analysis. Suppose there is a random increase in the demand for money. If the central bank fixes the interest rate at $i_f$, the stock of money increases in response to the increased demand for money. In Figure 1, $MM_2$ shows that, following an increase in the demand for money, equilibrium is maintained at $i_f$ if and only if the monetary stock increases in step with demand. However, at $MM_2$ the equilibrium asset price level rises to $P_2$. The rise in the asset price relative to the prices of new production induces increased spending on new production, so spending and output increase. Control of the interest rate does not avoid portfolio or output market responses and may amplify these responses.

Moreover, in monetarist analysis, changes on the securities market also affect the interest rate. A central bank that sets an interest rate target would increase the money stock following any disturbance that changes $i_f$. For example, unanticipated increases in the stock of securities, or a random reduction in the demand for securities, shift the $CM$ curve to the right (along $MM_f$ from $CM_f$ to $CM$). As before, an interest rate targeting policy responds to the rise in interest rates by increasing the money stock from $MM_f$ to $MM_2$. To restore equilibrium on the money market at the higher money stock and unchanged interest rate, asset prices must rise to $P_2$. Again, relative prices of assets and output change with effects on spending, output and the price level.

Third, in Keynesian theory, a liquidity trap eliminates the effect of monetary impulses on the real economy. Once the interest reaches a minimum value, monetary policy becomes impotent; changes in the stock of money are absorbed by money holders at an unchanged interest rate. But this implication is false in monetarist analysis. Market interest rates are only one of the relative prices affected by monetary impulses. An increase in the monetary base would not lower the interest rate, but asset prices would increase. Relative price changes and their effects on spending would not be eliminated by a liquidity trap for interest rates.

Transmission of Monetary Impulses: Output Markets

Changes in relative prices on the asset markets spill over to the output markets. There are two effects on the output markets. Both depend on costs of informa-
tion—particularly the difficulty and importance of distinguishing between permanent and transitory changes. One process distributes monetary impulses between prices and output. Some version of the Phillips curve, relating the supply of output to unanticipated inflation and a measure of capacity, is now common to monetarist as to most other analyses. The other process is on the spending side. Here monetarist analysis offers a richer explanation of relative price changes and their implications for the adjustment of aggregate demand and its interaction with the Phillips curve or aggregate supply.

The previous section showed that an open market purchase reduces the interest rate, raises the asset price level and restores portfolio balance. (This is the position shown as $i_X$, $P_X$ in Figure 1.) Asset markets are in equilibrium following the open market purchase, but output markets are not. Since the price of existing assets is above the (unchanged) cost of new production, the relative price of new production has fallen. It is now cheaper to purchase new production. With the marginal product of capital unchanged, a lower market interest rate also reduces the cost of new production, particularly long-lived durables and capital goods.

Figure 2 shows aggregate demand, $d$, and aggregate supply, $s$. The price level of output, $p$, is on the vertical axis, and output, $y$, is shown on the horizontal axis; $y^*$ represents the full employment level of output.

Asset market adjustment, following the open market purchase, disturbs the output market equilibrium. Aggregate demand rises to $d_u$, and the price level and output increase. Since demands for assets depend on prices, output and anticipations, the output market response changes the demands for money, bonds and real capital. At higher prices and output, more money is demanded for transactions. Also, those who interpret the change in prices and output as persistent may choose to sell bonds and purchase claims to real capital (equities and other real assets). These asset market responses change the positions of the $CM$ and $MM$ lines in Figure 1, and thus change the asset price level and rate of interest (proximately) determined on the asset market. Aggregate demand again responds to new relative prices of assets and output.

The interaction of the asset and output markets continues and is supplemented by two other channels of transmission. First, changes on the output market affect the current government budget deficit. Tax collections rise with output and the price level, and some types of government spending fall, reducing the budget deficit (or increasing the surplus). With a smaller deficit, the amounts of base money and debt issued to finance the deficit decline. These changes again shift the $CM$ and $MM$ curves in Figure 1, changing asset prices and the interest rate (Brunner and Meltzer, 1976).

12 Monetarist analysis distinguishes between one-time price level changes and maintained rates of inflation, however. These are recognized analytically by separating the anticipated price level from the anticipated rate of inflation.
Second, anticipations respond to the initial impulse, although the size of the initial response may be limited. Information is incomplete, and costs of information are often high. As information accumulates about the size and persistence of open market purchases, wages and other costs of production more fully reflect the higher anticipated price level or rate of inflation. The supply of output (s) shifts to the left in Figure 2; output is lower at every price level.

Higher anticipated inflation also affects the asset market equilibrium. Increases in anticipated inflation reduce the demand for nominally denominated bonds. In Figure 1, CM shifts to the right as wealth owners sell bonds and purchase land, durables and other real assets. The interest rate and the asset price level rise, inducing further adjustment of aggregate demand.

The interaction among asset markets, output markets, the budget position and anticipations is a complex process with both common features or regularities and differences from one period or country to another. Differences in the size of impulses and the responses produce temporary changes in the rates of change of interest rates, asset prices and output. Such temporary accelerations and decelerations are a common feature of business cycles.

A main implication of the analysis is that interaction among money, credit, output markets, anticipations and the budget position cannot be summarized by the Phillips curve and the slopes of the spending and money (or asset market) relations. The positions of the CM, MM, d and s curves shift with changes in anticipations and relative prices and through the interaction of asset and output markets. Both the slopes and the shifts are relevant for the transmission process. Eventually, the system reaches a new general equilibrium with all asset markets and the output market at a consistent equilibrium. The speed at which the process converges de-
Pends on factors such as the proportion of the deficit financed by base money (Brunner and Meltzer, 1976, pp. 82–84) and the relative variances of permanent and transitory shocks in prior history.

Three conditions imply that the system converges to an equilibrium. First, there are unexploited opportunities if output does not sell at replacement cost; this assures that the asset and output price levels converge to equality. Second, in a stationary economy, the budget is balanced and there are neither open market operations nor deficit finance; this assures that monetary and fiscal impulses cease. (In a growing economy, debt, money, capital and output grow at the same rate.) Third, anticipated and actual values (or rates of change) become equal; this assures that there are no unanticipated changes.

Recent Evidence on the Monetarist Process

In monetarist analysis, the interest rate is one of many relative prices in the transmission process. The spread between short- and long-term interest rates (Har douvelis, 1988) or the spread between commercial paper and Treasury bills (Fried man and Kuttner, 1993) are measures of cyclical changes in relative prices that are entirely consistent with monetarist analysis. These spreads, however, do not summarize adequately relative price changes during cycles. Moreover, monetarist analysis applies both to countries with and without developed financial markets. Monetary impulses have transitional effects on output and lasting effects on prices even where commercial paper, long-term bonds and even Treasury bills do not exist.

One effect of a sustained increase in money growth is on the prices of durable assets. Land is the most durable asset, so monetarist analysis implies that land prices rise in anticipation of inflation. The public can purchase land most readily by buying houses, so prices of new and existing houses anticipate future inflation and disinflation.

Figure 3 compares rates of price change for new one-family houses and the U.S. GDP deflator. Peaks in the rate of change of housing prices precede each peak in the deflator by about two years. This is similar to the average lead of monetary impulses typically found in the literature. Housing is a nontransportable good, so the rates of change of housing prices may differ by city and region. Rates of change in four regions of the United States—northeast, midwest, south and west—show considerable differences for particular years such as 1985 or 1992. For the period 1971–1993, however, average rates of change

13 Evidence on the term structure is mixed, particularly for Germany. See Schmidt (1993) and Bomhoff (1994, pp. 136–37).
14 A similar conclusion is found using prices of existing houses. The rate of change of new-housing prices leads the rate of inflation by one to three years. Using annual data for the United States over the 1971–1993 time period, the peak bivariate correlation (0.68) is at a 2-year lead of the rate of change of housing prices over inflation.
are similar. The aggregate data appear to capture much of the information in the relative price of housing.¹⁵

In countries experiencing relatively deep or prolonged recessions in the early 1990s—Japan, Sweden, Britain, Australia, Germany and the United States—asset prices first rose then declined relative to output prices. Often asset prices declined absolutely as well. The importance of the relative price of assets for the transmission process is highlighted by the Governor of the Bank of Japan (Mieno, 1994, p. 4):

"Most of the economic fluctuations the Japanese economy has confronted during the last five years are closely related to the excessive economic boom and the substantial rise in asset prices in the second half of the 1980s, followed by a reversal of this trend." Kaku (1994) shows that a six-city average of Japanese housing prices doubled relative to GDP between 1985 and 1989. In the next three years, housing prices fell by 40 percent relative to GDP. Even larger changes are shown by equity prices on the Tokyo stock exchange relative to GDP.

A monetarist explanation of the Japanese experience in the 1980s and 1990s starts with the 1985 decision to intervene in the foreign exchange market to foster additional depreciation of the dollar and, in early 1987, to fix the dollar-yen

¹⁵ The mean rate of change for the four regions is 7.36 percent, and the variance computed from the annual rates of change for each region is 0.18 percent. The variance of the rate of housing price across 28 cities (SMSAs) ranges from 0.11 percent to 0.68 percent in 1983 to 1993. The mean for the 11 years is 0.31 percent.
exchange rate within a narrow band. Between 1971 and 1986, the yen had appreciated by more than 50 percent against the dollar, so an agreement to fix the nominal exchange rate in the face of a continuing U.S. current account deficit implied that the Bank of Japan would be forced to buy dollars and increase money growth. Money growth (M1) rose from 3.5 percent for 1982–85 to 8.1 percent in 1985–88. The increase in money growth raised anticipated inflation, encouraging purchases of land, housing and claims to land and real capital. The rise in these asset prices stimulated production, particularly production of housing and new capital goods. As equity prices rose, the cost of capital fell. Japan experienced an investment boom with a modest increase in actual inflation.

The effort to fix exchange rates ended with the October 1987 stock-market crash. Between 1987 and 1990, money growth (M1) declined from 9 percent to 3.2 percent; anticipations of inflation now reversed (perhaps with a lag), bringing down asset prices and producing stagnation and recession during the adjustment.

Similar processes operated independently in other countries. Figure 4 shows the rate of change of housing prices (deflated by the consumer price index) for Sweden and the United Kingdom. Both countries experienced a swing of more than 20 percent in the rate of change of this relative price within a few years. Both experienced a boom in the late '80s followed by a substantial decline in housing prices. In both countries, particularly Sweden, the banking system suffered large

![Figure 4: Rate of Change of the Relative Price of Housing: Sweden and U.K., 1987–93](image)

losses when interest rates rose and the relative price of housing fell. And relative price changes were not limited to housing. Jonung and Stymne (1995) report that the annual average change in prices of Stockholm office buildings was 18.2 percent between 1985 and 1990 and minus 26.5 percent in the next three years.

Bomhoff (1994, pp. 113–14) uses the same monetarist model to explain quarterly fluctuations in real growth in the United States, Japan and Germany for the period 1972 to 1991. Growth depends positively on lagged values of the rate of change of real-money balances and the relative price of housing and negatively on the lagged relative oil price. The relative housing price is generally significant.16

These findings support the monetarist transmission process: monetary (and other) impulses are transmitted through relative price changes and changes in real-money balances. The particular pattern of relative price changes varies from cycle to cycle and from country to country. An export-led expansion changes relative prices in a different way than a housing boom set off by expectations of inflation or an expansion triggered by war or defense spending, or, for some countries, a surge in the price of some commodity, such as coffee. On one occasion, the relative price impulse may be a change in the term structure of interest rates, the relative house price, the price of used cars relative to the price of new cars, or used machinery relative to new machinery, or all of these. Given the uncertainty about the persistence of impulses, there is no reason why a single relative price should summarize all information about the future, and the evidence suggests that no single relative price (or small number of prices) conveys such information consistently. The answer is not to build a large econometric model, however. We are unlikely to build a large model with stable parameter values.

Whatever the origins of the initial impulse, the magnitude and persistence of an economy’s response depends on the policy that follows an initial impulse. For example, in countries that followed expansive monetary policies following the oil shocks of the 1970s, the one-time price level increase was transformed into persistent inflation. When policy was stabilizing, the one-time price and output adjustment passed through the economy without imposing the costs of persistent inflation and disinflation.

Intermediation, Borrowing and Lending

A financial system that makes loans, purchases debt and issues several types of deposits also permits households to increase utility by owning and issuing the types of claims and debts that meet individual objectives. Intermediation is the process by which banks and other financial institutions tailor the maturity, terms and types of financial claims to meet the demands of households and businesses.

16 Bomhoff (1994, p. 136) also included the slope of the yield curve for the United States and Germany. The decline in housing prices remains significant for Germany, but not for the United States.
Intermediation fits well in the monetarist model but requires an expansion of available assets. There are now banks, so the monetary base consists of bank reserves and currency, not currency alone. Banks hold reserves and issue interest- and non-interest-bearing deposits. Additional intermediaries can be added by letting each deposit or intermediary liability set an interest rate that reflects the safety, terms, risk, applicable reserve requirements and other costs of regulation and the services offered by the intermediary. Banks and other intermediaries buy government debt and issue loans. There are, therefore, additional interest rates, or relative prices, that change as part of the transmission process.\(^7\)

The transmission of monetary (and other) impulses is not qualitatively different in the expanded framework. The $CM$ and $MM$ curves may have different slopes, but they still trace out the effects of changes in the monetary base, the stock of government debt and open market operations. The $MM$ curve is now an equilibrium relation for money—currency and checking deposits—not just base money, and the $CM$ curve is an equilibrium relation for the credit market that now includes bank loans, government securities and other debt on the consolidated banks’ balance sheet. With intermediation, however, money and bank credit do not rise and fall together. Differences in interest rates and costs of different types of deposits provide a margin that banks use to increase credit relative to money or conversely. By raising the interest paid on time deposits, subject to relatively low (or zero) reserve requirements, banks encourage wealth owners to substitute time for demand deposits. The stock of credit increases, and the stock of money declines.

Market observers and some economists are at times misled by the complexity of the system of intermediaries into making two unfounded criticisms of monetarists. First, they claim that intermediaries can escape from monetary policy actions. They observe that, even if the monetary base remains constant, banks and other intermediaries can expand loans by borrowing in the Euro-currency markets, selling certificates of deposit or selling parts of their portfolios of loans and outstanding securities to others. In the monetarist hypothesis, these changes in intermediation do not evade monetary impulses. They are parts of the transmission process by which markets change interest rates on a variety of claims and debts and adjust asset prices in response to a monetary impulse.

Second, a frequently repeated claim is that there are several different monetary aggregates that, at times, change by different magnitudes. Monetarist analysis shows that each of the different money stocks is the product of the monetary base and a money multiplier. The money multipliers differ, but each is a rational expression of the same elements in different combinations and with different weights. Each multiplier is consistent with the others, up to a small, random term, so all of the

\(^7\) The analysis of intermediation can be expanded by separating the credit market into separate markets for loans and securities. See Brunner and Meltzer (1966), where there are separate markets for money, bonds, loans and real capital with three relative prices—the rate on government securities, the bank loan rate and the asset price level.
money stocks change consistently and predictably (Brunner and Meltzer, 1968; Rasche and Johannes, 1987).

**The Lending View**

Credit and intermediation have long been analyzed as part of the transmission process. The monetarist transmission process includes a credit market in which banks acquire earning assets. Benjamin Friedman (1983), Friedman and Kuttner (1993) and Tobin (1969 and elsewhere) have done extensive work on the effects of changes in credit or financial markets on portfolio allocation. Bernanke (1983) renewed interest in intermediation by directing attention to cyclical changes in bank lending. Although most literature refers to his analysis and the work that followed as the "credit view," a more appropriate name is the loan market, or "bank lending view."

As explained by Bernanke and Gertler in their contribution to this symposium, and in Bernanke (1993), the lending view stresses that borrowers who do not have good alternatives to banks as sources of credit reduce aggregate spending when the central bank reduces the monetary base (or bank reserves). The reduction in loans is a supplement to the monetary response. Bank loans (or credit) decline with deposits or money, as in the monetarist transmission process. In addition, borrowers with restricted alternatives respond disproportionately to a monetary impulse. Much of the discussion emphasizes the negative effects of monetary restriction, but there are symmetric positive effects during periods of monetary expansion. A large literature has investigated the channels by which these supplementary lending effects are transmitted.

The monetarist and lending views agree that activity in lending or credit markets is an important part of the transmission process that is neglected in alternative frameworks. The two differ in important respects, however. The lending view emphasizes shifts in the distribution of loans between large and small borrowers. The principal assets and liabilities are money, bank loans and a composite consisting of securities and real capital. The monetarist transmission process focuses on relative prices and distinguishes money, loans and securities, and real capital. Bank loans can be separated from securities, as in Brunner and Meltzer (1966), if warranted empirically.

**Critique of the Lending View**

The lending view, as usually stated, consists of two propositions. First, spending by some group of borrowers depends on bank loans. Second, monetary policy shifts the banks' supply of loans relative to other types of credit.

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18 Friedman's earlier work—for example, Friedman (1980)—focused on the role of asset stocks and intermediaries. His more recent work with Kuttner concerns lending flows and the spread between various short-term interest rates.


20 My discussion in this section draws heavily on Neumann (1995) and Brunner and Meltzer (1993, pp. 90–96).
The first proposition is not in doubt if *depends* means simply that bank loans are the principal source of external finance for many firms. Banks specialize in acquiring costly information about small and medium-sized firms. There are alternative lenders, however, including finance companies, trade credit, credit card debt, venture capitalists, families and others. The real issue is how easily borrowers can find substitute lenders and whether a significant aggregate effect will result if they fail to do so.

The second proposition is more doubtful. The principal problem for the lending view is to show that autonomous shifts in banks' offers to lend contribute significantly to cyclical changes in bank loans. The alternative view is that changes in requests to borrow, induced by monetary (and other) impulses, best explain cyclical changes in lending. The critics note that banks can borrow Euro-dollars, issue certificates of deposits, sell securities and, in other ways, finance lending if it is profitable. Why do they prefer to reduce loans more than proportionally to their loss of reserves? Why do other intermediaries fail to satisfy the excess demand?

To explain why loans decline relative to reserves, the lending view suggests that recessions reduce banks' net worth and have disproportionate effects on small borrowers. A fall in aggregate bank net worth can occur if regulatory changes require banks to hold more capital or if a substantial number of defaults arise on outstanding loans, as in the 1930s depression or following the collapse of real estate prices in the early 1990s. The aggregate effect of such changes in wealth is generally small since most losses are balanced by gains to other private agents.

The attention to net worth reflects the restricted range of substitution permitted by the lending view. By combining bonds and real capital in a single, composite asset, the lending view buries asset price changes within the composite. This eliminates relative prices of assets and output from the transmission process. Instead, relative price adjustment is limited to changes in the bank loan rate relative to an open market interest rate.

Bernanke and Blinder (1988) elaborate the special role of banks for small borrowers. They argue that relatively small firms depend on banks to supply capital, so these firms expand when bank lending increases and reduce output when bank lending falls. Emphasis is on borrowing costs, or differences in borrowing costs by size of borrower, including terms and conditions as part of cost.

Two testable implications result. First, the lending view eliminates relative prices of assets and output as part of the process by which monetary impulses affect the output market. The significant responses to relative housing prices

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21 Care is not always exercised when introducing exogenous shocks to lending. A permanent shock to the public's desire to borrow, independent of a shock to the demand for money, requires an opposite shock to the demand for real capital or government securities to maintain the balance-sheet constraint. Other shocks, such as asset reserve requirements or capital requirements, induce changes in banks' holding of both loans and securities. The lending view literature does not explain why these changes have their main effect on aggregate spending and output instead of the relative positions of different types of intermediaries. Competition between intermediaries is neglected.
and the term structure of interest rates, reported by Bomhoff (1994), Hardouvelis (1988) and others, support this feature of the monetarist hypothesis. Second, since the lending view combines debt and real capital in a composite asset, it implies that an increase in this sum raises the interest rate on government securities. The monetarist hypothesis implies that the composition of the change matters; increases in government debt and real capital have opposite effects on market interest rates.22

Evidence on the Lending Channel

The existence of a lending channel is not in dispute, nor is the existence of so-called imperfections, or less-than-perfect substitution. The issue is its quantitative importance. The lending view requires that cyclical changes in the degree of imperfection have independent effects on aggregate output. Evidence on changes in lending come from two time periods, the Great Depression of the 1930s and the so-called “credit crunch” of the early 1990s, so I consider both. Neither period provides much support.

The Great Depression

According to Bernanke (1983), disruption of the lending channel during the Great Depression supplemented the effects of a decline in the money stock by reducing the quality of financial services. The monetarist hypothesis recognizes that bank failures or commercial and industrial failures may have disrupted financial relations or encouraged banks to screen loans more carefully during the depression. However, the lending view implies that, in addition, changes in lending act as independent impulses particularly for small and medium-sized firms. Tests for Canada cast doubt on the importance of this additional channel (Haubrich, 1990).

Other evidence comes from comparing the amount of bank lending to borrowing on other credit markets. In the 1920s, there were active markets in the United States for banker’s acceptances and commercial paper that served both as supplements and substitutes for bank credit, particularly for large firms. If the lending channel is a separate transmission mechanism affecting small firms differently, 22

A puzzling feature of the Bernanke and Blinder (1988) model is the response of spending to the loan rate. This response is negative; a fall in the lending rate increases aggregate demand. Bernanke (1983) introduced the lending channel to explain the severity of the 1930s depression. Nominal interest rates on the credit market fell during the depression, so this part of the lending channel worked to expand aggregate demand or at least slow its fall. For the lending channel to make an important independent contribution to the depression, the effect of falling net worth would have to be more potent than the effect of falling nominal loan rates. The earlier discussion suggests that this change is much smaller than the induced decline in asset prices that lowered desired borrowing. The problem may be that the authors fail to distinguish between real and nominal rates. They assume that inflation is given, a serious oversight in a period of deflation. In the monetarist transmission process, falling asset prices relative to output prices and rising real rates of interest contributed to the decline in aggregate demand.
bank loans should have fallen during the Great Depression more rapidly than open market commercial paper and banker's acceptances.

Monthly data are available on these credit instruments. They lend no support to the bank lending hypothesis. Both bank and open market lending first rise and then fall during the Great Depression. The initial relative decline in bank loans, following the August 1929 peak, occurred before the first wave of bank failures, so it does not support the nonmonetary transmission process. The critical period is from November to December 1930, when the first wave of bank failures occurred, to February 1932, when the Reconstruction Finance Corporation was established and the Federal Reserve began large-scale open market purchases. In this period, open market lending declined at twice the rate of bank lending.

A further reason to doubt the importance of bank lending as an independent channel propagating the Great Depression is that the decline in bank lending can be readily explained as a response to the decline in nominal GNP. Figure 5 shows the actual decline in bank lending and nominal GNP and the decline in bank lending predicted from a regression relating bank lending to nominal GNP. The figure suggests that the decline in bank lending mirrors the decline in GNP and the deep depression. There is no need for any separate explanation of the decline.

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23 Monthly data for bank loans in 101 reporting cities and for commercial paper and banker's acceptances outstanding are from Board of Governors (1943).
in bank lending. The same regression equations estimated for the recessions of 1923–24 and 1926–27 also show little support for the lending channel.\footnote{The regression uses log of nominal GNP to explain log of bank loans. Quarterly data for 101 cities are averages of the monthly data in n. 23. For the two earlier recessions in the 1920s, the elasticity of bank loans with respect to nominal GNP is 1.83 with standard error 0.28 and an R² of 0.76. (Quarterly data for second-quarter 1923 to first-quarter 1925 are combined with data for fourth-quarter 1926 to second-quarter 1928). The Great Depression (third quarter 1929 to first quarter 1933) is estimated separately; the elasticity falls to 0.86 with a standard error of 0.04 and an R² of 0.96. The elasticity for the depression period is significantly smaller than for the earlier period.}

**Postwar Experience**

Postwar evidence on an independent impulse through the lending channel is, at best, mixed. The presence of binding Regulation Q constraints on interest rates in the 1960s and 1970s influences the data for these years. Once banks reached the ceiling, they could not use interest rates to bid for deposits, so they were forced to curtail acquisition of securities and loans.

In the 1990–91 recession, interest in academic research on the lending channel was heightened by the sluggish recovery. Both the Council of Economic Advisers and the Federal Reserve cited strict bank examination and supervision as a principal cause of sluggish loan growth.

However, the academic evidence for the importance of a bank lending channel is relatively weak. Some leading proponents of the lending view, like Bernanke and Lown (1991), failed to find evidence of the lending channel for this period. Hubbard (1995, p. 26) concludes that evidence for the lending view is unclear. Thornton (1994) found a small, positive relationship between Federal Reserve actions and bank lending via the lending channel prior to the 1980s, when Regulation Q ceilings were effective, but he found no effect for more recent years. Driscoll (1994) estimated the response of output to the lending channel in cross-sections of states. He found evidence of a monetary channel relating monetary policy impulses to bank loans, but no evidence that bank loans affect output through the lending channel. Friedman and Kuttner (1993) find support for an independent lending effect mainly in the commercial paper market, not in bank lending. Ramey's (1993) study suggests that the aggregate effect is small. Kashyap and Stein (1995) find little difference in cyclical lending behavior of large and small banks. Only a handful of the very largest banks differed from the group's mean behavior. Kaku (1994, p. 9) concludes that the decline in lending by Japanese banks in the 1970s is mainly a response to reduced demand.

The lending view is closely related to earlier work on credit rationing. Although credit rationing is not a necessary condition for the lending view, a finding of significant credit rationing would support the lending view. It is often suggested that banks are slow to change lending rates when open market rates change. They may change nonpecuniary terms of the loan contract instead, in effect rationing credit by nonprice methods.
The most comprehensive study to date does not find much evidence of credit rationing. Berger and Udell (1990) studied more than one million individual loan contracts. They found that about half of the sluggish adjustment of bank lending rates resulted from prior commitments that set the lending rate. They conclude (p. 21) that "credit rationing, if it exists, may be relatively small and economically insignificant."

Policy Implications and Conclusions

Perhaps the best-known feature of monetarism is the recommendation that policy be conducted by following rules (Friedman, 1948, 1959; Meltzer, 1987; McCallum, 1988; Brunner and Meltzer, 1993). Rules may be adaptive, not fixed, and can adjust in a predictable way to permanent changes in real growth or intermediation.

Support for rules is related to five monetarist propositions: 1) neither the central bank nor private forecasters can predict output, employment, inflation or other variables with sufficient accuracy to damp fluctuations on average; 2) lags are not constant; neither government nor private forecasters can distinguish between permanent and transitory disturbances to levels and growth rates until sometime after they occur; 3) the response of particular relative prices to monetary and other impulses in any cycle may differ from previous cycles depending on initial conditions, the nature of shocks and the policy rule that is followed; 4) the private sector dampens fluctuations and returns to stability if undisturbed by unanticipated policy impulses; and 5) rules that are easily monitored reduce costs of information.

The required level of information for a successful discretionary policy—one that minimizes the uncertainty that the public must bear—is simply not available. The very nature of the economic process precludes finding precise estimates of an ever-invariant structure. Even if such information became available, discretionary policy actions can change structural responses. Moreover, the public would run the risk that policymakers would exploit information about structure for their own benefit, as emphasized by public-choice theorists.

Friedman (1953) shows the difficulty of stabilizing an economy by use of discretionary policy. Meltzer (1987) and Brunner and Meltzer (1993) report forecast errors for GDP growth and inflation in the principal developed economies based on work by many forecasters and all current methods of forecasting. A rule of thumb, based on these data, is that the best private or government forecaster, on average, cannot distinguish between a boom and a recession one quarter or one year ahead. A recent study of forecasting by the Netherlands central bank reaches a similar conclusion. The authors of that study find that disturbances in the monetary sector account, on average, for 25 percent of the uncertainty with respect to key variables (Mourik and Boeschoten, 1994, p. 149). A rule would remove most of these disturbances.

Knowledge of the transmission process does not remove uncertainty about the nature of shocks, their persistence, or their precise effects on the domestic economy.
or on the balance of trade and the exchange rate. Nor does it reduce forecast errors
enough to support discretionary interventions. But knowledge of the transmission
process helps to interpret observations during the nervous interlude between the
time policy action is undertaken and its effects on output and inflation become
visible. During this interlude, pressure on the central bank to abandon its rule, or
change its policy, is often intense. Theory—knowledge of the transmission
process—is required to interpret incoming data on real variables and relative
prices, including interest rates and exchange rates.

Many economists accept the main features of the monetarist hypothesis as a
theory of the transmission process, but would claim that it is not distinctly mon-
etarist. As Karl Brunner and I (1976, p. 97) wrote in a similar discussion 20 years
ago: “Often, labels remain, sustained by the intellectual laziness that postpones
careful examination of implications and propositions, long after hypotheses have
changed and distinctions have blurred.”

Since that was written, unfortunately, distinctions have not blurred very much.
New work on the monetary transmission process has sometimes denied that mon-
etary impulses have short-term real effects (real business cycle theorists); remained
in the IS-LM framework (many Keynesians); introduced the lending channel; or
emphasized open economy or expectations variables. With some change in em-
phasis, the last two processes have long been part of monetarist theories. But none
of these changes give sufficient weight to the basic insight of monetarism; monetary
impulses set off a transmission process that changes many relative prices and real
variables until neutrality is (eventually) restored.

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