

Transmission Mechanisms of Monetary Policy

To determine what policies should be implemented to stabilize the economy, policy-makers must have an accurate assessment of the timing and effect of their policies on the economic activity. More specifically, how does the effect of monetary policy transmit from a monetary tool to the goal(s)? And what are the relative strength of these transmission channels?

To begin with, we are interested in the role of money in affecting the economic activity: Does money matter for the economic activity? Basically, there has been two approaches to study this issue: Reduced model and Structural model.

1 Reduced Model vs. Structural Model

1.1 Reduced Model

The early monetarists studied this issue by directly regressing output on money. This effectively examines the statistical relationship between these two variables.

For example, Friedman and Schwartz (1963) study the monetary history in US and conclude that money did cause output to fluctuate, albeit with a time lag averaged 16 months.

However, how money affects output is a black box. It does not explain the channels through which the effects of monetary policy is transmitted.

Moreover, the significance of correlation does not imply causality: we cannot be sure whether money affects output or the other way around. When we examine the causality $A \longrightarrow B$, we have to make sure that changes in A is *exogenous*. Otherwise, the significance of correlation between A and B may be due to

- (1) Reverse causality, i.e., $B \longrightarrow A$.

For example, the Real Business Cycle Theory observes that almost none of the correlation between money and output comes from monetary base, which can be better controlled by the central bank. The money-output correlation may stem from other components of

money supply that are affected by actions of banks, depositors, and borrowers, and more likely to be affected business cycles. Therefore, the true causality could be the other way around, $B \longrightarrow A$.

(2) The third variable C drives both series. It may be because C affects both A and B positively, and thus when you look at the correlation between A and B , you find a significant positive correlation between A and B . In other words, A may be irrelevant. Therefore, we have to make sure that the causality under investigation is theoretically founded, i.e., whether the relationship between A and B are theoretically relevant. This implies that a structural model is needed as a guide to the empirical estimation.

1.2 Structural Model

New Keynesian economists tend to use structural models to examine the effect of money on the economic activity in a model that characterizes the behaviors of agents in every sector. If the model is correct, then we will be able to evaluate each transmission channel separately. It also makes easier to predict how institutional changes (financial innovation, deregulation, etc.) might affect the link between money and output.

One problem is that the monetary transmission mechanism for an economy may be continuously changing. It may be difficult to identify all the transmission channels that are working.

2 Traditional Interest Rate Channels

The interest-rate channels are the key monetary transmission mechanism in the basic Keynesian IS-LM textbook model, which can be characterized by the following:

$$M \uparrow \Rightarrow r \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow,$$

where r is the real interest rate, representing the real cost of capital. I is business fixed investment and inventory investment (consumer durable expenditure and residential housing were added later on).

An important feature of the interest rate transmission mechanism is its emphasis on the *real* rather than the nominal interest rate that matters. Furthermore, it is often the

real *long-term* interest rate and not the short-term interest rate that is viewed as having the major impact on spending.

How do changes in the short-term nominal interest rate induced by a central bank result in a corresponding change in the real interest rate on both short and long-term bonds? In order to have this “liquidity effect,” there must be some frictions. The key here is sticky prices, so that expansionary monetary policy, which lowers the short-term nominal interest rate, also lowers the short-term real interest rate.

The expectations hypothesis of the term structure in Chapter 6, which states that the long-term interest rate is an average of expected future short-term interest rates, suggests that the lower real short-term interest rate leads to a fall in the real long-term interest rate. These lower real interest rates then lead to rises in aggregate demand.

The fact that it is the real interest rate that impacts on spending provides an important mechanism for how monetary policy can stimulate the economy, even if nominal interest rates hit a floor during an inflationary episode. With nominal interest rates close to zero ($i = 0$), an expansion in the money supply can work by raising the expected inflation, thereby lowering the real interest rate:

$$M \uparrow \Rightarrow \pi^e \uparrow \Rightarrow r = 0 - \pi^e \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow .$$

This monetary transmission channel is dubbed "*money channel*" or "*Cost of Capital channel*".

2.1 Empirical Evidence

Taylor (1995) surveys studies on interest rate channels and he finds that there is strong empirical evidence for substantial interest rate effects on consumer and investment spending. On the other hand, Bernanke and Gertler (1995), for example, find that empirical studies have failed to identify the significance of interest rate channel through the cost of capital. They search for other transmission mechanisms of monetary policy.

A key objection to the IS-LM paradigm by monetarists for analyzing monetary policy effects is that it focuses on only one asset price, the interest rate, which is the price of bond, rather than a spectrum of asset prices.

There are three key assets besides bonds that receive substantial attention in the literature on the transmission mechanism— foreign exchange, equities, and houses.

3 Other Asset Price Channels

3.1 Exchange Rate Channel

The monetary policy transmission operating through exchange rate effects on net exports has been a major concern for central banks in export-oriented economies.

$$\begin{aligned} M \uparrow &\Rightarrow r \downarrow \\ \Rightarrow &\text{ Domestic dollar interest-earning assets become less attractive} \\ \Rightarrow &\text{ Capital outflow} \Rightarrow \text{ Depreciation of domestic currency} \\ \Rightarrow &\text{ Net Export} \uparrow \Rightarrow Y \uparrow . \end{aligned}$$

3.2 Equity Price Channels

3.2.1 Tobin's q Theory on Investment

Tobin's q Theory provides a mechanism by means of which monetary policy affects the economy through its effects on the valuation of equities (Tobin (1969)). Tobin's q is defined as the market value of firms divided by the replacement cost of capital.

If $q > 1$, the market price of firms is high than the replacement cost of capital, and new plant and equipment capital is cheap relative to the market value of business firms. Corporations can then issue equities and sell them at a higher price relative to the cost of the plant and equipment they are investing. Therefore, investment spending will rise.

$$M \uparrow \Rightarrow P_s \uparrow \Rightarrow q \uparrow \Rightarrow I \uparrow \Rightarrow Y \uparrow .$$

How might monetary policy affect equity prices? When the money supply rises, the public finds it has more money than it wants and so tries to re-adjust their portfolio by increasing their spending on other assets, including equities (Monetarists' story); or the fall in interest rates stemming from expansionary monetary policy making bonds less

attractive relative to equities, thereby causing the price of equities to rise (Keynesian view).

3.2.2 Wealth Effects of Equities on Consumption Expenditures

According to Modigliani's (1971) life-cycle model, consumption spending is determined by the lifetime resources of consumers, which is made up of both human capital, real capital and financial wealth. A major component of financial wealth is common stocks. When stock prices rise, the value of financial wealth increases, thus increasing the lifetime resources of consumers, and consumption should rise.

$$M \uparrow \Rightarrow P_s \uparrow \Rightarrow \text{Wealth} \uparrow \Rightarrow C \uparrow \Rightarrow Y \uparrow,$$

where the consumption expenditures include spending on non-durables and services, and services from ownership of houses and consumer durables.

3.2.3 Housing and Land Price Channels on Residential Investment and Consumption

Both of the wealth and Tobin's q channels described above allow for a more general definition of equity, so that Tobin's q framework applies to the housing market, where *housing is equity* for house producers. An increase in house prices has the following effects:

(1) Higher house prices raises their prices relative to replacement cost, leads to a rise in Tobin's q for housing, thereby stimulating its production.

$$M \uparrow \Rightarrow P_H \uparrow \Rightarrow q_H \uparrow \Rightarrow \text{Residential investment} \uparrow \Rightarrow Y \uparrow.$$

(2) Higher housing and land prices also raise the wealth of households, thereby leading to a rise in consumption.

$$M \uparrow \Rightarrow P_H, P_L \uparrow \Rightarrow \text{Wealth} \uparrow \Rightarrow C \uparrow \Rightarrow Y \uparrow.$$

4 Credit Channels

This view of the monetary transmission mechanism emphasizes the role of asymmetric information in credit markets. There are two basic channels of monetary transmission

that arise as a result of information problems in credit markets: the bank lending channel and the balance-sheet channel.

4.1 Bank Lending Channel

Banks play a special role in the financial system because they are “information producers,” and are especially well suited to solve asymmetric information problems in credit markets.

As long as there are bank-dependent firms (certain borrowers have no access to the credit markets unless they borrow from banks), and there is no perfect substitutability of retail bank deposits with other sources of funds for banks, the bank lending channel of monetary transmission operates as follows:

$$M \downarrow \Rightarrow \text{Bank reserves} \downarrow \Rightarrow \text{Bank lending to bank dependent firms} \downarrow \Rightarrow I \downarrow, Y \downarrow.$$

An important implication of the credit view is that monetary policy will have a greater effect on expenditure by smaller firms that are more dependent on bank loans. Large firms are more likely to have direct access to the credit markets through stock and bond markets, without going through banks.

Whether the bank lending channel is significant have been debated in the literature. The reasons that the bank lending channel may be less and less important are:

(1) Deregulation has lead to less restriction on banks’ ability to raise funds other than deposits.

(2) There is a trend of decline in the traditional bank lending business world-wide, meaning that banks are playing a less important role in credit markets.

4.2 Balance-Sheet Channels

The balance-sheet channel also arises from the presence of asymmetric information problems in credit markets. The lower the net worth of business firms, the more severe the adverse selection (less collateral as buffer for losses)¹ and moral hazard (more incentive to engage in risky investment) problems are in lending to these firms.

¹Recall that since default is the primary concern for lenders, adverse selection causes a problem for the functioning of financial markets because when bad borrowers (borrowers with a higher risk of defaulting on their debts) get financed, they are more likely to default. Requiring collateral reduces the problem of

Monetary policy can affect firms' balance sheets in several ways.

(1) Equity price

$$\begin{aligned} M \uparrow &\Rightarrow P_s \uparrow \Rightarrow \text{Net worth of firms} \uparrow \Rightarrow \text{AS \& MH problems} \downarrow \\ &\Rightarrow \text{Borrowing capacity of firms} \uparrow \Rightarrow I \uparrow, Y \uparrow. \end{aligned}$$

(2) Cash flow

$$\begin{aligned} M \uparrow &\Rightarrow i \downarrow \Rightarrow \text{Cash flow of firms} \uparrow \text{ (interest obligation on S-R debts} \downarrow \text{)} \\ &\Rightarrow \text{AS \& MH problems} \downarrow \Rightarrow \text{Borrowing capacity of firms} \uparrow \Rightarrow I \uparrow, Y \uparrow. \end{aligned}$$

(3) Credit rationing

$$\begin{aligned} M \uparrow &\Rightarrow i \downarrow \Rightarrow \text{Adverse selection} \downarrow \Rightarrow \text{Credit rationing} \downarrow \\ &\Rightarrow \text{Borrowing capacity of firms} \uparrow \Rightarrow I \uparrow, Y \uparrow. \end{aligned}$$

(4) General price level (debt-deflation)

$$\begin{aligned} M \downarrow &\text{ (maybe due to bank panic)} \Rightarrow \text{Unanticipated decline in price level} \\ &\Rightarrow \text{Debt in real terms} \uparrow \Rightarrow \text{Net worth of firms in real terms} \downarrow \\ &\Rightarrow \text{Borrowing capacity of firms} \downarrow \Rightarrow I \downarrow, Y \downarrow. \end{aligned}$$

4.3 Household Bank Lending and Balance-Sheet Effects

Although most of the literature on the credit channel focuses on spending by business firms, the credit channel should apply equally as well to consumer spending, particularly on consumer durables and housing.

(1) Bank lending channel

$$\begin{aligned} M \downarrow &\Rightarrow \text{Consumers who do not have access to other sources of credit are more credit constrained} \\ &\Rightarrow \text{Bank lending to bank dependent households} \downarrow \\ &\Rightarrow C \downarrow, Y \downarrow. \end{aligned}$$

adverse selection by limiting the loss of lenders in case of default. Net worth of borrowers (assets net of liabilities) serves as a similar role as collateral.

(2) Balance sheet channel

$$M \downarrow \Rightarrow \begin{cases} P_s \downarrow \Rightarrow \text{Wealth} \downarrow \\ i \uparrow \Rightarrow \text{households' balance sheet deteriorates} \\ \text{Unanticipated price level} \downarrow \Rightarrow \text{Debt in real terms} \uparrow \\ \Rightarrow \text{Households' borrowing capacity} \downarrow \\ \Rightarrow C \downarrow, Y \downarrow. \end{cases}$$

4.4 Why Are Credit Channels Likely To Be Important?

There are three reasons to believe that credit channels are an important part of the monetary transmission mechanism.

(1) A large body of cross-section evidence supports the view that credit market imperfections that are crucial to credit channels do indeed affect firms' employment and spending decisions.

(2) Evidence shows that small firms, which are more likely to be credit constrained, are hurt more by tight monetary policy than are large firms.

(3) The asymmetric information view of credit market imperfections at the core of the credit channel analysis is a theoretical construct, and the framework has proved to be highly useful in explaining many other important phenomena.

4.5 Implications for Monetary Policy

What are the lessons we draw from the above assessment of the channels of monetary policy transmission?

(1) A fall or a rise in short-term nominal interest rates may have nothing to do with monetary policy easing or tightening. Because movements in nominal interest rates do not always correspond to movements in *real interest rates* and yet it is typically the real and not the nominal interest rate that is important in the channel of monetary policy transmission.

For example, during the contraction phase of the Great Depression in the US, short-term interest rates fell to near zero and yet real interest rates were extremely high. Short-

term interest rates that are near zero, therefore, do not indicate that monetary policy is easy if the economy is undergoing deflation.

(2) Other asset prices (stock prices, foreign exchange rates, housing and land prices) besides those on short-term debt instruments (S-R interest rate) contain important information about the stance of monetary policy because they are important channels of the monetary policy transmission mechanism.

(3) Monetary policy can be effective even if short-term interest rates are already near zero. This is in contrast to the argument "liquidity trap," which says that when the interest rate is very low, expansionary monetary policy can no longer lower the interest rate to stimulate the economy.

This increased liquidity injected by expansionary monetary policy can help revive the economy by raising the general price level expectations and by inflating other asset prices, which then stimulate aggregate demand through the channels outlined here.

(4) Central banks have putting greater emphasis on price stability as the primary long-run goal for monetary policy. The discussion here of the monetary transmission mechanism provides an additional reason why price stability is so important: the price stability goal implies that a negative inflation rate is at least as undesirable as too high an inflation rate, because price deflations can be an important factor leading to a prolonged financial crisis, as occurred during the Great Depression.