Chapter 19

The Theory of Money and Credit\(^1\)

Because the monetary and banking system, in the process of creating money, is making loans that would not otherwise be made, there is an intimate link between money and credit. The monetary system is able to exert a powerful influence on interest rates, and there is constant political pressure on the monetary authorities to use this power to reduce interest rates.

We have already investigated two of the three motives the monetary authorities might have to allow rapid monetary expansion and therefore inflation: The first of these motives was inflationary finance or seigniorage – if the government prints more money, it gets to spend it. The second of these motives was to stimulate the real economy – inflation, if unanticipated, will tend to reduce unemployment, and increase real output.

In this chapter, we will investigate the third motive, which is to use the link between money and credit to reduce interest rates, and will learn how this link operates.

The Loanable Funds Model

The primary function of the credit market is to enable people, and firms owned by those people, to trade command over present goods for command over future goods. When people “borrow money,” it is ordinarily in order to spend that money on real goods that they otherwise could not purchase. In exchange, they give up IOUs that will require them to reduce their command over goods when they come due in the future. In so doing, they are in effect exchanging future goods for present goods.

Likewise, when people “lend money,” they are giving up command over present goods that they would otherwise be entitled to, in exchange for IOUs that will increase their command over future goods when they mature, and thereby in effect are exchanging present goods for future goods.

The real interest rate \( r \) determines the price \((1+r)^m\) at which credit, or command over present goods, can be exchanged for future goods in \( m \) years. At high real interest rates, present goods are relatively costly in terms of future goods, and hence the demand for credit by households and firms who want to borrow will be relatively small. At low real interest rates, present goods are relatively cheap in terms of the number of future goods that must be given up to obtain them, and hence the demand for credit will be relatively large. Thus the non-monetary demand for credit by borrowers may be summarized as a decreasing function of real interest rates, that we will represent by \( D_{NM}(r) \).

At the same time, at high real interest rates, people will tend to want to lend more “money,” i.e. give up more command over present goods in exchange for future goods, than they

\(^1\) This chapter owes a considerable debt to the book of the same title by Ludwig von Mises.
will at lower real interest rates. The non-monetary supply of credit by savers or lenders is therefore an increasing function of real interest rates, $S_{NM}(r)$.

Figure 1 shows the non-monetary demand for and supply of credit. Economists like to put prices on the vertical axis and quantities on the horizontal axis, and the real interest rate $r$ determines the relevant intertemporal price, so we’ve put $r$ on the vertical axis, and the real quantity of credit demanded or supplied on the horizontal axis. The demand schedule $D_{NM}(r)$ slopes down, while the supply schedule $S_{NM}(r)$ slopes up.

Figure 1
The Loanable Funds Market: the non-monetary demand for and supply of credit.
In practice, there are considerable transactions costs involved in matching the borrowers who demand credit with the lenders or savers who supply credit. In Chapter xx below, we will look at the Financial Intermediation industry, which serves this function in the economy at a non-zero cost. For the purposes of the present chapter, however, we will simply ignore such costs, and pretend that borrowers and lenders can find one another costlessly.

Abstracting thus from transactions costs, the unique real interest rate \( r_0 \) at which the two schedules in Figure 1 intersect is the *non-monetary equilibrium real interest rate.* This is the real interest rate that would prevail in a hypothetical closed economy with no demand for money and no banking system, so that all the demand for credit arose from the desire to trade command over future goods for command over present goods, and all the supply of credit came from agents who were willing to trade command over present goods for command over future goods. The loan market model of Figure 1 is often called the *Loanable Funds Model* of (real) interest rate determination.

At any real interest rate below \( r_0 \), the households and firms in this economy would want to borrow more than they would want to lend, thus putting pressure on interest rates to rise toward \( r_0 \). At any real interest rate above \( r_0 \), people and firms would want to lend more than they would want to borrow, which would put pressure on interest rates to fall toward \( r_0 \) instead.

**The Demand for Money and the Total Demand for Credit Schedule**

Our second building block for analyzing the relationship between money and credit is the demand for real money balances \( m^D \). In general we would expect this demand to increase almost in proportion to the level of real income, and also to decline somewhat with the level of interest rates, but to keep it simple for the purposes of this chapter, we will just take real money demand as a constant.

We defined “credit” to be command over current real resources. In order to acquire and hold money balances, agents must either borrow these funds from other agents, or else forgo consumption out of their current incomes. *Either way, the demand for money represents an additional source of demand for credit, over and above the non-monetary demand considered by the Loanable Funds model.*

We define the Total Demand for Credit Schedule \( D_T(r) \) to be the non-monetary demand for credit from the Loanable Funds Model, plus the demand for real money balances:

\[
D_T(r) = D_{NM}(r) + m^D
\]

Figure 4 shows \( D_T(r) \) alongside \( D_{NM}(r) \). By itself, the demand for money simply shifts the demand for credit schedule to the right by \( m^D \).

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2 The non-monetary equilibrium real interest rate is what Knut Wicksell (1898) referred to as the *natural rate of interest.* Like the “natural” rate of unemployment discussed in Chapter ##, it turns out to be the unique real interest rate that is consistent with neither accelerating nor decelerating inflation. In fact, Milton Friedman (1968) borrowed from Wicksell’s term when he named the “natural” rate of unemployment.
The non-monetary demand for credit and the total demand for credit. In an economy with 100% reserve commodity money, the equilibrium real interest rate would rise from \( r_0 \) to \( r_1 \).

In a commodity money economy with no bank notes or bank deposits, the banking system would be unable to supply any credit to the economy that is not supplied to it by savers. In such an economy, \( r_1 \) as shown in Figure 2 would be the equilibrium real interest rate. In a commodity-money economy with no banking system, therefore, the equilibrium real interest rate would be higher than it would be in a comparable economy that somehow did without money.

Adding banks who offer bank notes or deposits that are 100% backed by the monetary commodity might make money more convenient to use, but would not alter the equilibrium real interest rate, since banks would still have no funds to lend to the non-bank economy beyond their own capital and intermediated savings. In a commodity-money economy with 100% reserve...
banking, the equilibrium real interest rate is therefore the same as with no banking sector, and consequently higher than in a comparable non-monetary economy.

**Credit Market Equilibrium with a Banking System**

However, in a fiat money economy with zero commodity-money reserves, the Banking System, conceived to consist of the Central Bank together with the commercial banks, can permanently supply real credit to the economy, to the extent that the public wants to hold real money balances. In the United States today, the Fed thus supplies credit to the Treasury and therefore indirectly to the taxpayers, roughly equal to currency in circulation plus required bank reserves. The commercial banks then provide additional credit to their borrowers, roughly equal to their deposits minus their required reserves. Together, these loans basically equal the entire M1 money stock.

In a fiat money economy with zero commodity reserves, the total supply of credit $S_T(r)$ is therefore the non-monetary supply plus $M/P$, the real value of the money supplied by the banking system:

$$S_T(r) = S_{NM}(r) + M/P$$

So the supply of money by the banking system simply shifts the supply of credit to the right by $M/P$.

Figure 3 shows the total supply of credit when the banking system provides a nominal money stock $M_0$ which just happens to have real value equal to $m^D$ at the initial price level $P_0$, so that $M_0/P_0 = m^D$. Since the demand and supply of credit have both shifted to the right by the same amount $m^D$, the credit market clears at $r_0$, the rate that would prevail in a hypothetical non-monetary economy. In a pure fiat money economy in which money supply and demand are in equilibrium, the equilibrium real interest rate is the same as it would be in a hypothetical non-monetary economy. ³

³ The same would be true in a commodity money economy with fractional commodity reserves, in the limit in which the commodity reserve ratio approached zero.
Credit market equilibrium in a monetary economy with a banking system that provides loans with real value $M_0/P_0$ just equal to $m^D$. 

But now suppose the banking system expands the money stock beyond $M_0$, say to a value $M'$ which at the initial price level $P_0$ exceeds the demand for real money balances: 

$$M'/P_0 > m^D$$ 

In order to induce borrowers to take up the required additional loans, the real interest rate must fall to a value $r'$ that is below $r_0$, as illustrated in Figure 4.
If banks expand their loans and therefore the money stock beyond \( m_0 \) to \( M'/P_0 \), the real interest rate must fall to \( r' < r_0 \), in order to induce potential borrowers to take up the additional loans.

This reduction of the real interest rate when there is an excess supply of money is known as the liquidity effect of the monetary expansion. Notice that it is the reduction in real interest rates required to induce borrowers to take out additional loans with the intention of spending the additional money.

A popular misconception is that the liquidity effect is the reduction of interest rates required to induce the public to hold the additional money. But Figure 3 shows that the liquidity effect is present even when money demand does not respond to interest rates at all.

Although the credit market is in equilibrium at the reduced real rate \( r' \), there is still an excess demand for present goods corresponding, by Walras' Law, to the excess supply of money. Prices will therefore tend to rise gradually until the price level catches up to the money supply. If the monetary expansion is not repeated, the real value of \( M' \) will gradually fall until it reaches \( m^D \). When the price level finally reaches \( P' = M'/m^D \), the excess supply of money will be gone, and the real interest rate will return to its non-monetary equilibrium value \( r_0 \).
The Dynamics of a One-Time Increase in the Money Stock

By using its control over the monetary base $B$ to regulate the nominal money stock $M$, the Fed, acting as Central Bank, can exert a strong, though transitory, influence on real and therefore nominal interest rates by allowing the banking system meet the demand for credit at reduced interest rates. Part of this demand for credit will be met by the Fed's own purchases of debt securities on the open market, and part of it will be met by commercial bank lending. Either way, the new money is temporarily meeting some of the non-monetary demand for credit at the pre-existing price level.

To see how this works, assume that prior to some time $t_0$ the nominal money stock has been constant at $M_0$, that the price level has been constant at $P_0 = M_0/m^D$ so that inflationary expectations are initially zero, and that the real and therefore nominal interest rate is $r_0$, with a real money stock $m_0 = m^D$, as illustrated in Figure 5. If at $t_0$ the Fed allows the nominal money stock to increase to $M' > M_0$, the real interest rate will immediately fall to $r' < r_0$, as shown in Panel 5. The resulting excess supply of money will cause the price level to rise, as shown in Panel 5c. As $P$ rises, the real value of $M'$ will fall, as shown in Panel 5b. Eventually $P$ will rise in proportion to the money stock, to

$$P' = M' P_0 / M_0$$

and real balances will fall back to $m_0$. As inflation erodes the value of the loans the banking system has supplied to the economy, $r$ will return to $r_0$, as shown in Panel 5d.

In Figure 5, it is assumed throughout for simplicity that inflationary expectations are initially zero, and are not appreciably affected by this one-time inflation, so that the nominal rate $R$ equals the real rate $r$ throughout, and that money demand is not appreciably affected by the decline in interest rates.

*With an inconvertible paper money, a one-time monetary expansion can therefore reduce the real interest rate below the non-monetary equilibrium level $r_0$, but only temporarily, and only by creating an inflationary excess supply of money. Eventually prices will rise and real interest rates will return to their former level.*
Figure 5

The liquidity effect of a one-time increase in the nominal money stock from $M_0$ to $M'$ at time $t_0$, as shown in Panel a. The price level increases, but only gradually, from $P_0$ to $P' = P_0 \frac{M'}{M_0}$ as shown in Panel c. The increase in bank lending quickly lowers real and nominal interest rates from $r_0$ to $r'$ (Panel d). But as the real value of the new bank loans is eroded by inflation, real and nominal interest rates gradually revert to $r_0$. 

The Dynamics of a One-Time Increase in the Rate of Monetary Growth

In Figure 5, the one-time inflation did not appreciably affect inflationary expectations, so that no distinction had to be made between the real and nominal interest rates. Now suppose instead that at time $t_0$ the Central Bank begins permanently allowing $M$ to increase at a constant rate of growth $\mu_0$, as shown in Panel a of Figure 6. (The symbol $\mu$ is the Greek letter mu, pronounced "mew".) The vertical axis of Panel a of Figure 6 is a logarithmic or ratio scale, so that a constant rate of growth appears as a straight line.

Panel b of Figure 6 shows the excess supply of money. At first, under the inertia of zero inflationary expectations, inflation stays near zero and the price level stays near $P_0$, as shown by the dotted line in Panel a. As the nominal money stock grows, its real value therefore initially grows, and an excess supply of money gradually builds up, as seen in Panel b. At the same time, the real value of bank loans increases, pushing real interest rates down as shown in Panel d. However, as the excess supply of money builds up, it starts to put upward pressure on prices, and inflation grows, as shown in Panels a and c. As the price level belatedly catches up with the money stock, the excess supply of money peaks out at time $t_1$ in Panel b, and then begins declining back toward zero. As the excess supply of money peaks out, the real interest rate $r$ will bottom out at the level indicated by $r'$ in Panel d.  

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4 Figure 6a is drawn as if real money demand did not respond to nominal interest rates. If in fact real money demand is a declining function of the nominal interest, "velocity boost" will push the price level somewhat higher than shown in Figure 6a, but still along a trajectory that grows at the same rate as the nominal money stock.
Figure 6
The liquidity effect of a one-time increase in the rate of money growth from 0 to $\mu_0$ per year, beginning at time $t_0$. 
However, as inflation \( \pi \) closes the gap between money demand and supply, \( r \) returns to its original level \( r_0 \). Meanwhile, anticipated inflation \( \pi^a \) gradually rises, creating a gap between nominal interest rates (R) and real interest rates (\( r \)). Eventually, after time \( t_2 \), inflation settles down to rate \( \mu_0 \), \( r \) settles down to \( r_0 \), and R will end up at \( r_0 + \mu_0 \). At first, when inflationary expectations are small, the nominal interest rate R will track the real rate r, and begin to decline, as shown in Panel d. However, as inflationary expectations (shown by \( \pi^a \) in Panel b) start to catch up with actual inflation (\( \pi \)), the nominal interest rate will begin to rise above the real interest rate.

Eventually, after some time \( t_3 \), the economy will settle down to an inflationary equilibrium in which inflation equal to \( \mu_0 \) is fully anticipated and is being driven by inflationary expectations themselves rather than an excess supply of money. The excess supply of money will have disappeared, and real interest rates will have returned to \( r_0 \) as shown in Panel d. The nominal rate, however, will have permanently risen, to \( r_0 + \mu_0 \).

A one-time, permanent increase in the monetary expansion rate therefore can also reduce real and nominal interest rates, but again only temporarily. Eventually the real rate will return to its original level, and nominal rates will be higher than ever.

**The Liquidity Effect of Monetary Policy**

The temporary reduction in real and nominal interest rates caused by an increase in either the money stock or the money growth rate is called the *liquidity effect* of monetary policy. It is a common misconception, even among economists, that this liquidity effect is "the fall in the nominal interest rate necessary to induce agents to hold additional real money balances."\(^5\) It may be seen from Figure 6 that in fact it *is the fall in real rates necessary to induce agents to borrow the additional money balances, with the intention, not of holding them, but of spending them, either on investment goods or on consumption goods.* At the reduced interest rates, agents ordinarily will wish to hold a little more money on average, but nowhere near as much as they want to borrow. Even if the money demand schedule is vertical as assumed for simplicity here, there will still be a finite short-run tradeoff between monetary expansion and interest rates.

If the Central Bank is determined to hold the real interest rate down to \( r' \) after inflation and inflationary expectations have set in, as at time \( t_2 \) in Figure 6, it can do so, but only temporarily, by raising the money growth rate to a new level \( \mu_1 \) (not illustrated), even higher than \( \mu_0 \). Since this new money growth rate will temporarily exceed the inflation rate, an excess supply of money will again set in, and the real rate will have to fall below \( r_0 \) to induce households and firms to borrow these funds. But as they attempt to spend them, inflation and nominal interest rates will eventually grow to \( \mu_1 \) and \( r_0 + \mu_1 \), respectively, and the real rate will return once again to \( r_0 \).

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\(^5\) This particular quotation happens to be by Mark A. Thoma, "The Effects of Money Growth on Inflation and Interest Rates across Spectral Frequency Banks," *Journal of Money, Credit, and Banking* 26 (May 1994), p. 218, but it typifies academic thinking on the issue.
Only a perpetually accelerating money growth rate and therefore inflation rate is capable of holding the real interest rate permanently down to a target level \( r' \) below the natural rate \( r_0 \). The result will be an accelerating inflation that grows without bound. Thus low interest rate policy is the third motive (in addition to inflationary finance and unemployment policy) that a government might have for allowing a hyperinflationary monetary expansion to take place. These motives are not mutually exclusive, so a government might have any two of them, or even all three, in mind, should it allow accelerating inflation to set in.

The Excess Supply of Money Schedule

For the purpose of analyzing the link between money and credit, we may reduce the two curves in the Loanable Funds model of Figure 1 to a single curve that gives the non-monetary net demand for credit, positive or negative, at each real interest rate:

\[
D_{NM}^{Net}(r) = D_{NM}(r) - S_{NM}(r)
\]

This net non-monetary demand for credit schedule is shown in Figure 7. The vertical axis again shows the real interest rate \( r \). The horizontal axis now shows the net demand for credit, i.e. real command over present goods, with positive values indicating net demand, and negative values indicating net supply. This schedule necessarily slopes down, and necessarily intersects the vertical axis at the same non-monetary equilibrium real interest rate \( r_0 \) at which the two schedules in Figure 1 intersect.

![Figure 7](image)

The non-monetary net demand for credit schedule.
In a monetary economy, the credit market is in equilibrium when the total demand for credit, \( D_T(r) = D_{NM}(r) + m^D \), equals the total supply of credit, \( S_T(r) = S_{NM}(r) + M/P \). In other words,
\[
D_{NM}(r) + m^D = S_{NM}(r) + M/P.
\]
But with a little rearranging, this implies that the excess supply of money just equals the net excess demand for credit shown in Figure 7. Since \( D_{NM}(r) \) depends negatively on the real interest rate \( r \), the excess supply of money must also depend negatively on \( r \). Using "XS" as an abbreviation for "excess", we will call this schedule \( m^{XS}(r) \):
\[
m^{XS}(r) = M/P - m^D
\]
\[
= D_{NM}(r) - S_{NM}(r)
\]
\[
= D_{net}^{NM}(r)
\]

This real excess supply of money schedule is depicted in Figure 8. It is no coincidence that it looks exactly like the non-monetary net demand for credit schedule in Figure 7.

Figure 8
The excess supply of money schedule
Low Interest Rate Policies

If the Central Bank attempts to maintain a constant real interest rate below \( r_0 \), say \( r' \), this policy will therefore require a constant real excess supply of money, equal to \( m^{XS}(r') \) in Figure 9. The result will be an accelerating inflation, driven both by the (constant) excess supply of money and by the inevitably rising inflationary expectations.

![Diagram](image)

**Figure 9**
A real interest rate target \( r' \) permanently below \( r_0 \) will require a permanent and positive excess supply of money \( m^{XS}(r') \), and therefore an inflation that eventually accelerates without bound.

However, if the Central Bank instead attempts to maintain a constant *nominal* interest rate \( R' \) below \( r_0 \) plus initial inflationary expectations, the result will be an inflation that accelerates *even more rapidly*: As inflationary expectations rise, the real rate implied by the fixed nominal rate will *decline*, from \( r' \) to \( r'' \) and below, as in Figure 10. As it does, the excess supply of money required by the net non-monetary demand for credit schedule will increase rapidly, from \( x' \) to \( x'' \) and beyond, as loan demand grows in real terms. Once inflationary expectations exceed the fixed nominal rate \( R' \), the implied real rate will go negative. Loan demand will then become enormous, since it will become profitable to borrow money from the banks just to hoard goods for later resale. A *fixed and artificially low nominal interest rate target will therefore degenerate into hyperinflation even more rapidly than will a fixed and artificially low real interest rate target.*
Figure 10
A nominal interest rate target $R'$ below $r_0$ plus initial inflationary expectations will imply a real interest rate target that falls without bound, as from $r'$ to $r''$ and beyond, and an excess demand for money that grows without bound, as from $m^{XS}(r')$ to $m^{XS}(r'')$ and beyond. The result will be an inflation that accelerates even more rapidly than with a low and fixed real interest rate target.

Credit Crunches

Unfortunately, the only way to find out what the equilibrium real interest rate $r_0$ is at any moment is to follow a neutral, non-inflationary monetary policy, and see what interest rate the market comes up with. If the Central Bank is setting interest rates itself, it loses this signal. It will therefore inevitably be setting rates either too high or too low. If it ignores what is happening to the money stock, it will not know which is the case until it sees clear signs that inflation is either rising or falling.

Typically, the temptation for the Central Bank is to err on the side of easy money, i.e. the low side, since low real rates are fiscally attractive and politically popular, and since inflationary pressure temporarily reduces the unemployment rate and increases measured real output. If it does set rates too low, inflation will eventually accelerate. As the Central Bank becomes concerned about the growing inflation rate, a credit crunch that pushes nominal interest rates, and even real interest rates, much higher than they would otherwise have been, will be necessary.
to bring inflation back down. Recent examples in the United States of such "credit crunches" that followed periods of easy money are 1958, 1966, 1969, 1973-4, and, most spectacularly, 1980-82.

![Figure 11](image)

A typical Credit Crunch. At time $t_3$, money growth falls from $\mu_0$ to 0. At first, real and nominal rates rise, but by $t_5$, the real rate is back to $r_0$, and the nominal rate ends up below its original level.
Figure 11 illustrates the course of a typical credit crunch. Here, the nominal money stock and price level have both been expanding at positive rate $\mu_0$ prior to time $t_2$ (which might follow the $t_2$ of Figure 6), as shown in Panel a. Inflation and inflationary expectations both are equal to $\mu_0$ prior to $t_3$, as shown in 11c. The real rate is at its equilibrium value $r_0$, while the nominal rate $R$ will equal $r_0 + \mu_0$, as shown in 11d.

If now at $t_3$ the Central Bank reduces money growth (in excess of real growth of output, which we have assumed away) to 0, inflation may be expected to continue for a while due to the inertia of inflationary expectations at rate $\mu_0$. Eventually this inflation will reduce the real value of the now constant nominal money stock, leading to an excess demand for money, or negative excess supply, as shown in Panel b. This excess demand for money will drive real interest rates up to a level like $r^*$ in Figure 10 and Panel 11d. Since inflationary expectations will not yet have fallen appreciably, the nominal rate $R$ will also rise, to a level like $R^*$ in 11d.

As the excess demand for money builds up, it will begin to slow inflation, as shown in Figure 11c. This will slow the growth of the excess demand for money, and eventually cause the real rate to eventually peak out, as at $t_5$. Falling inflationary expectations will further reduce the inflation rate, and will begin to close the gap between $R$ and $r$.

Eventually the economy will settle down to a zero inflation rate, as shown after time $t_5$. The real rate will have returned to $r_0$, and the nominal rate will have fallen to the same value, as shown in Figure 11d.

**Money Growth vs. Interest Rates as a Monetary Instrument**

The Fed, like any other Central Bank, can use its powers either to control the monetary base (and therefore the money stock) or interest rates, but not both. If it targets the money stock to grow at a given rate, it must accept whatever interest rates the market comes up with. If it targets the nominal interest rate to a given level, it must accept whatever money stock is necessary to meet loan demand at that interest rate.

If the Fed targets a constant money growth rate, the inflation rate will not be absolutely constant, but at least will fluctuate stably about a rate that is approximately the chosen money growth rate minus the long-run real growth rate of output. Any deviations from this inflation rate will tend to be transitory. The inflation rate will correct itself eventually without any sophisticated actions by the Fed.

If the Fed instead uses a flexible nominal interest rate target to try to stabilize prices, it will have to juggle the target and therefore the real interest rate dexterously up and down to keep either upward or downward pressure on inflation. Inattentively leaving its nominal interest rate target fixed at a wrong value can be destabilizing.

The two alternatives open to the Fed can be compared to the problem of balancing an egg on the palm of your hand on its side versus balancing it on its end. If the egg is laid on its side, it may not stand perfectly still, but at least it will be near a stable equilibrium and will come to rest on its side by itself. But if the egg is set on end (no fair cupping your hand!), it is almost
impossible to balance it perfectly. The only way to keep it from falling over is to move your hand from side to side to keep its point of contact with your palm roughly under its center of gravity. If you miscalculate, you may end up having to run across the room just in order to keep your hand under the egg.

Because the non-monetary supply of credit and demand for credit fluctuate from day to day, the equilibrium real interest rate \( r_0 \) is in fact continually changing in value up and down. If the Central Bank simply sets the nominal money stock equal to a constant value (adjusted for forecasted growth in the economy, which we are assuming away in the present chapter to keep things simple), interest rates will therefore fluctuate from day to day depending on loan market conditions.

If only equilibrium real interest rates are changing and not inflationary expectations, nominal interest rates will change, but only by a few percentage points around a mean of perhaps 2 to 4% with zero expected inflation. These small changes in nominal interest rates will cause some change in the demand for money, and therefore eventually in the price level with a fixed nominal money stock. However, the price level could move in either direction. Movements will not tend to be sustained and may even tend to reverse themselves, so there will be no reason for significant inflationary or deflationary expectations to set in. The large changes in nominal interest rates and money demand caused by spiraling inflationary expectations will therefore not occur. The changes in interest rates that do occur will primarily be those whose origins are in the loanable funds market.

If the entire money demand schedule were to shift sideways, say leftwards as it is believed to have done in 1973-74, while the nominal money stock is held constant, the equilibrium real interest rate (which is determined entirely by \( D_{NM}(r) \)) will remain unchanged. However, the original price level \( P_0 \) will no longer equate the real value of the money stock to real money demand and a proportionate rise in prices will be required by the Quantity Theory of Money. Again, this will not be a sustained inflation, and it could as easily have been a deflation (if money demand had shifted rightwards) as an inflation, so there will be no cause for sustained inflationary (or deflationary) expectations to arise from such a one-time shift in money demand.

In Chapter 21 below, we will use the tools developed in this chapter to investigate how the Central bank could use an interest rate instrument to stabilize the inflation rate at a target level.
Appendix I

Endogenous or "Rational" Expectations

The text of this chapter is based on the assumption that individuals base their inflationary expectations empirically, i.e. on the basis of experience, and primarily on the basis of their own recent experience with the price level itself, so that Central Bank actions will not decisively affect inflationary expectations until they show up in increased or decreased inflation.

Many economists maintain, however, that inflationary expectations are instead formed endogenously, i.e. according to the predictions of economic theory and assuming that all pertinent information (such as the money demand schedule, the non-monetary demand for credit schedule, and the intentions of the Central Bank) is known to everyone. This extreme assumption is ordinarily called "rational" expectations.

Under endogenous or "rational" expectations, agents will be able to calculate \( r_0 \) from their knowledge of \( D_{NM}^{Net}(r) \). If they know the Central Bank is planning to target a nominal interest rate \( R' \) less than this value, they will immediately realize that this can only be an equilibrium situation if prices fall at a rate equal to \( r_0 - R' \). They will therefore expect prices to fall, regardless of the past behavior of prices, and will begin marking prices down accordingly even without a monetary disequilibrium. As prices do fall, borrowers will reduce their nominal lending in order to hold their real borrowing constant at \( D_{NM}^{Net}(r_0) \), and hence the nominal money stock will fall by just enough to hold the real money stock constant at \( m^D(R') \). The result will be a fully anticipated deflationary equilibrium, quite the opposite of the implications of empirical expectations, which would predict an accelerating inflation if initial inflationary expectations were zero.

Despite the intellectual appeal of "rational" expectations, the Greenspan Fed seems to operate under the assumption that lowering interest rates will tend to lead to higher inflation, rather than lower inflation.

Appendix II

The Real Bills Fallacy

In early 19th century Britain, after the monetary suspension of the Napoleonic Wars, a vigorous debate ensued as to whether the Bank of England's circulating bank notes should be made convertible into gold or left inconvertible.

Two schools of thought emerged, the Currency School and the Banking School. The Currency School argued that convertibility was necessary for price stability, and that the Bank's further issue of notes should be backed 100% with gold reserves.

The Banking School espoused the Real Bills Doctrine, according to which convertibility is irrelevant to the value of money, provided it is backed by bank assets of sufficiently high quality. In particular, it was argued that so long as bank notes and deposits were backed by "real
bills," i.e. marketable and well-collateralized short-term commercial loans similar to modern commercial paper or acceptances, their expansion would not be inflationary, because increases in the money stock would be matched, one for one, by commercial loans that represented legitimate business demand for money, and not inflationary consumption loans.

This argument has come to be known as the Real Bills Fallacy. The basic "fallacy" to it is that the demand for credit is not equivalent to the demand for money. The nature of this problem can be seen in Figure 6. If banks increase their liabilities to $M/P_0$ by meeting the demand for loans at $r'$, there will be a small increase in the demand for money, to $m^D(r')$. However, the total demand for credit, $D_T(r')$, is much greater, since in addition to the money demand schedule, the total demand for credit includes the nonmonetary ne: demand for credit, $D_{NM}^{Net}(r)$. Businesses who borrow money from the banks do not plan to just sit on the money for the life of the loan. Rather than money itself, what borrowers primarily want is access to the goods that can be purchased with money. Even if the goods purchased are used in production rather than for immediate consumption, the additional demand will put upward pressure on production costs, and ultimately on output prices in general.

Banks that base their lending on "real bills" will be relatively safe banks, so there is considerable merit to the proposal that banks restrict their loans to such assets. However, what limits banks' inflationary potential is not the quality of their assets, but rather is either a requirement that their notes and deposits be convertible into a real good (or stable foreign currency), or else a quantitative restriction on their collective monetary liabilities.

References


Peter Howitt, "Interest Rate Control and Nonconvergence to Rational Expectations," Journal of Political Economy 100, 1992, 776-800.


