

CHAPTER 3

THE LOANABLE FUNDS MODEL

The next model in our series is called the **Loanable Funds Model**. This is a model of interest rate determination. It allows us to explore the causes of rising and falling interest rates and to evaluate the wisdom of policy measures designed to influence credit and monetary growth rates and interest rates. In this chapter the model's structure will be explained and the use of the model illustrated through some examples.

The Relevance of the Loanable Funds Model

Here are some important questions we can ask about interest rates:

1. Why, generally, do interest rates rise and fall? What causal factors come into play, and how do they interact?
2. What effects do budget deficits have upon interest rates?
3. How does monetary policy, and in particular, expansionary open market operations, have upon interest rates?
4. How does the formation of inflationary expectations influence interest rates?
5. When evaluating policies designed to affect interest rates or other financial variables, do we need to distinguish between the long-run effects and the short-run effects of the policy?

Many of these questions will be addressed in this chapter.

The Structure of the Loanable Funds Model

Refer to **Figure 3.1**, which shows the general configuration of the Loanable Funds Model. As can be seen, the model is similar to the microeconomic model discussed in chapter 1 and the aggregate supply - aggregate demand model from chapter 2. It is a comparative-statics equilibrium model that employs a supply and demand curve to locate a market-clearing equilibrium price. The special price in this model is the cost of credit - the **interest rate**, represented by the variable **r**. There is, of course, a full spectrum of interest rates in the U.S. economy, ranging from short-term rates on money market assets such as U.S. Treasury Bills to long-term rates, such as the interest rates on 30-year home mortgages. Interest rates throughout this spectrum are never the same - generally on any given day there are as many interest rates as there are securities that represent them. The simple version of the Loanable Funds Model simplifies this complexity by assuming only one "interest rate," which can be thought of as a proxy average for the entire structure of interest rates. Not much

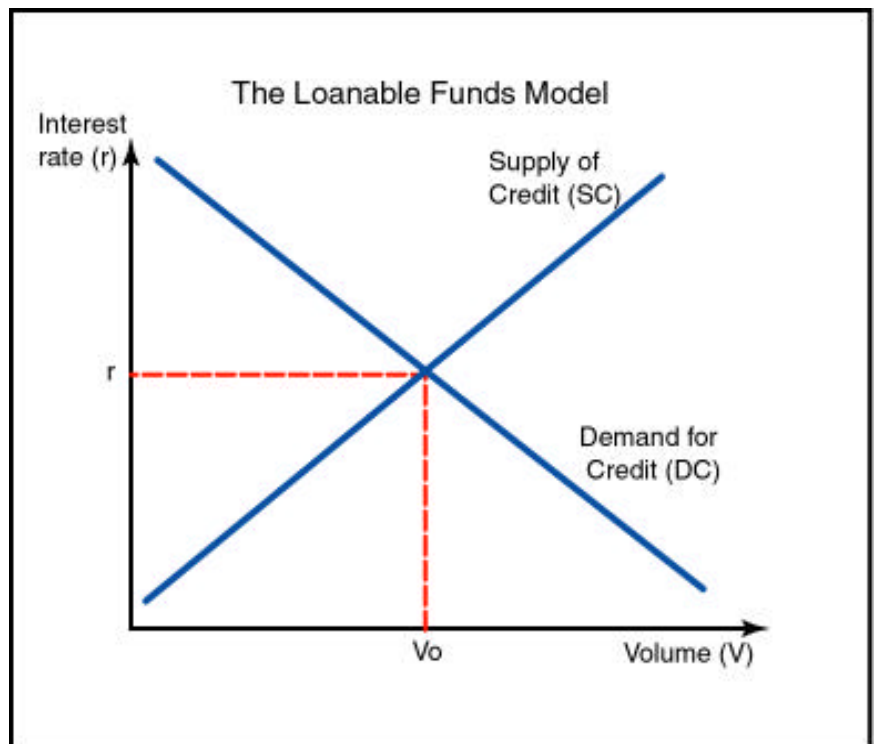


Figure 3.1

is lost in this simplification, at least for the introductory applications for which the model is used, because the entire structure of interest rates tend to rise and fall together.

To be consistent with the terminology of the finance markets, the quantity axis of the loanable funds model is labeled with the variable **volume**. Typically magnitudes of financial flows are labeled as volume, such as “the volume of bank credit,” or “the volume of municipal bonds,” where the unit of measure, sometimes implicit, is in some magnitude of dollars, such as “millions of dollars” or “billions of dollars.” A numeric equilibrium solution for the loanable funds model might yield the statement that “the market-clearing equilibrium was at a volume of \$135 billion.”¹

The demand and supply curves in this model have a special meaning. The demand curve represents the **demand for credit** by **borrowers** and the supply curve represents the **supply of credit** by **lenders**.

Borrowers (represented by the demand curve) include consumer borrowers (credit cards, auto loans, home mortgages, installment credit, etc.), businesses of all kinds (corporate borrowing, farm credit, trade credit, etc.) and government uses of credit for all purposes. Much of the borrowing that takes place in the United States economy is financed through the *sale* of interest-bearing financial assets² like corporate bonds. In other words, when a corporation borrows money by selling corporate bonds, this constitutes a *demand for credit*. Likewise, when a state government finances a dedicated capital outlay project, such as school construction, through the sale of municipal bonds, this also is an example of the demand for credit. Finally, when the U.S. Government runs a budget deficit and finances the deficit through the sale of U.S. Treasury Bills, Notes, or Bonds, this is counted as part of the demand for credit. In summary, the demand for credit consists of two components: (1) the direct demand for credit through loan applications (by consumers, for example) and, (2) the sale of all classes of interest-bearing financial assets as a means to raise money.

The second category, which includes all classes of bonds, notes, and bills, does *not* include the sale of equities (stocks) by corporations for the purpose of raising money. The sale of stock by a corporation is technically the sale of an ownership portion of the corporation. The buyer of the stock is not extending credit nor making a loan - the buyer of the stock is buying a piece of the company.

Lenders (represented by the supply curve in the loanable funds model) include direct lenders, such as banks, mortgage companies, credit card companies, and auto and equipment leasing companies (a lease used instead of debt, such as an auto lease, is considered credit - a lease associated with a rental is not), and the purchasers of the interest-bearing financial assets - the bonds, notes, and bills - discussed above in the description of the demand for credit. For an example of the latter, if a person buys a newly issued corporate bond, the corporation issuing the bond is *demanding credit* and the person buying the bond is *supplying credit*. When a credit card company allows a consumer to use the credit card, the consumer is *demanding credit* and the credit card company is *supplying credit*. As a final example, if the U.S. Government runs a budget deficit and partially finances it through the sale of U.S. Treasury Bonds, then the U.S. Government is *demanding credit* and the purchasers of the bonds are *supplying credit*.

There is one very important addition to the group of those who supply credit in the loanable funds model. In the U.S. economy, the nation’s monetary and credit system is regulated and strongly influenced by the central bank, the **Federal Reserve System**. Through a policy expedient called **open market operations**, the Federal Reserve System has the ability to directly affect the supply of credit in the United States, and by so doing, directly affect interest rates³. Therefore the supply of credit

¹In our simple applications of the model, we will typically be content to conclude that “the volume of credit rose” or “the volume of credit fell.”

²These are sometimes called *yield-bearing* financial assets.

³The mechanics of Federal Reserve policy and open market operations are too complex to describe here. Students will normally see an explanation of Federal Reserve policy in some other segment of a macroeconomics course. It must simply be accepted as a matter of faith here that the Federal Reserve System can, at will, increase the supply of credit in the U.S. economy.

will include the condition that the Federal Reserve System, as a policy measure, can increase the supply of credit.

In summary, the supply of credit consists of three components: (1) credit directly supplied by lenders to borrowers, such as auto loans provided by banks, (2) the purchases of interest-bearing financial assets, such as the purchase of corporate bonds by consumers, and (3) new credit made available because of open market operations (Federal Reserve policy).

Table 3.1 lists those factors that affect supply and demand in the loanable funds model. Generally, on the demand side all categories of borrowing are included, and on the supply side all variables that are likely to influence the activities of lenders are included.

A few comments need to be made about the savings categories on the supply side. First, *consumer savings* represents voluntary savings from *disposable personal income*. Consumers may hold such savings either as deposits in financial institutions like banks or through the purchase of interest-bearing financial assets. *Business savings*, financed by profits, are typically invested in such financial assets as well.

The category labeled *mandatory savings* is meant to represent the *involuntary consumer savings* that are mandated by pensions and other mandatory retirement programs. This should be distinguished from voluntary consumer savings because the former is somewhat sensitive to interest rates whereas the latter is not.

As before, any change in the values of any of these variables will cause a shift in the appropriate curve and a movement to a new market-clearing equilibrium.

An example of this is seen in **Figure 3.2**, which shows the impact of a *decline* in consumer borrowing. Suppose consumers thought that current consumer debt levels were too high and they react by cutting back on their use of credit. This would be shown as a shift to the left of the demand for credit. This by itself would result in a decline in interest rates and a lower volume of credit, as shown. It should be remembered in this model as in any comparative statics model, the analysis of cause and effect that comes from consideration of a change in a single variable assumes no change in the other variables in the model - the relationship is considered in isolation. Therefore, in this example, we might conclude that a contraction of consumer demand for credit has the *tendency* of lowering interest rates, or considered *in isolation from other* factors, would lower interest rates.⁴

The Loanable Funds Model	
Factors that affect the supply and demand of credit	
<p>The Supply of Credit represents the activities of lenders; any party supplying directly or indirectly credit to the finance markets. This includes <i>purchasing financial assets</i> (U.S. Treasury securities, corporate bonds, etc.) in addition to bank loans.</p>	
<p>The Demand for Credit represents the activities of borrowers; this includes any party <i>selling a financial asset</i> to raise money, in addition to borrowing from financial institutions.</p>	
Demand	Supply
<i>Interest rates</i> (–)	<i>Interest rates</i> (+)
U.S. govt. budget deficits (+)	Consumer savings rates (+)
S&L govt. municipal borrowing (+)	Business savings rates (+)
Consumer borrowing (+)	Mandatory savings (+)
Business borrowing (+)	Federal Reserve credit creation (+)
Residential mortgages (+)	Foreign purchases of U.S. financial assets (+)
Business mortgages (+)	Inflationary expectations (+)
Foreign demand for U.S. funds (+)	
Inflationary expectations (–)	
<p>or anything that influences any of these categories, such as consumer confidence, rates of profit, demographic variables, wealth and income growth rates, foreign exchange rates, etc.</p>	

Table 3.1

⁴This is equivalent to saying mathematically that if $r = f(x_1, x_2, x_3)$, then we are considering the isolated effect of $\partial r / \partial x_1$ and conclude that to be >0 . This means that if x_1 falls, r will also fall if the other variables remain unchanged. If we can't say that about them, then we must be content to say that r will tend to fall.

The actual empirical or historical movement of interest rates will depend upon the net impact of all variables acting upon them, not just the demand for consumer credit. That is why we cannot make the predictive statement that “a decline in the consumer demand for credit will definitely cause interest rates to fall,” (what if something else, such as corporate borrowing, is rising to offset the decline in consumer borrowing?) but are able to make the qualified statement that “a decline in the consumer demand for credit has a tendency to lower interest rates and cause the volume of credit to fall,” so long as we realize that any number of things can offset that tendency.

Does this severe qualification render us unable to say anything practical or useful about the behavior of interest rates? The answer is no - understanding the impact of key variables is very important in policy analysis and it is the only reasonable basis for trying to figure out what mix of events caused interest rates to rise or fall over any historical period.

Likewise, simulation models based upon this kind of structure do allow the analyst to consider multiple variable impacts, and for such models to be accurate, the isolated effect of each single variable must first be known. The reader is merely being cautioned that there is no simple chain of cause and effect between any single variable and interest rates in an economy where a long list of factors are known to act upon rates simultaneously.

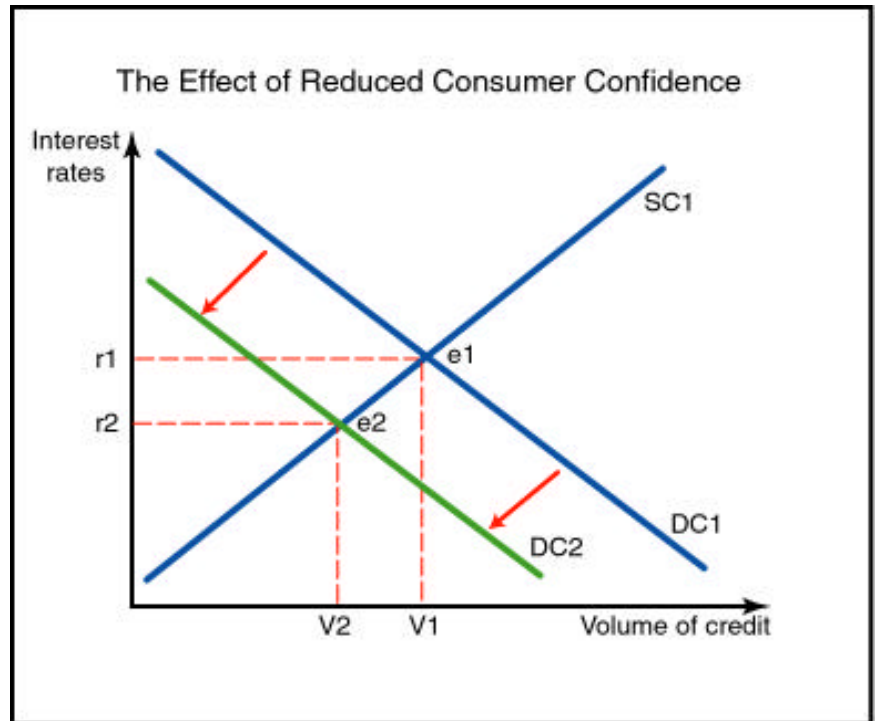


Figure 3.2

Applications of the Loanable Funds Model

One of the most controversial topics in macroeconomic policy in recent years revolves around the economic impact of budget deficits. When the issue was addressed using the Aggregate Supply - Aggregate Demand Model developed in chapter 2, we get the result shown here in **Figure 3.3**. We remember that taxation tends to move the aggregate demand curve to the left (because it lowers disposable income, reducing the ability of consumers to spend) and government spending tends to shift it to the right. Consequently a balanced budget is likely to have a neutral effect, whereas a budget deficit, which requires spending to exceed tax receipts, is likely to have a stimulating effect in the short run. Whether the stimulating effect is inflationary

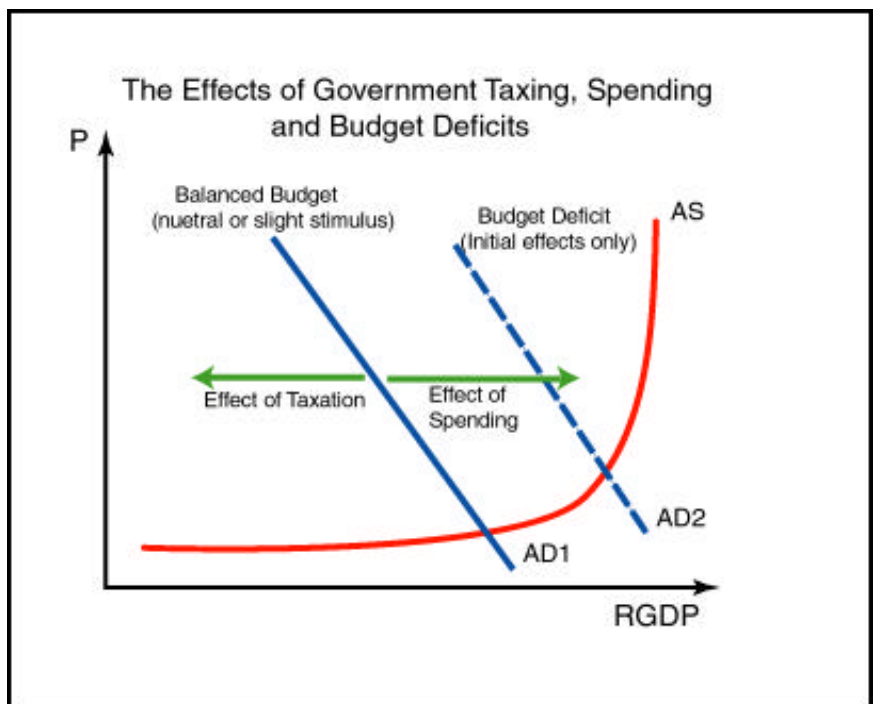


Figure 3.3

depends upon where the stimulation occurs along the aggregate supply curve. Clearly, if the economy is in a recession with the capacity utilization rate well below 80% and high unemployment, deficit spending will likely stimulate the economy into higher levels of real output. Such a short-run stimulation might be well justified in a dormant economy.

What about the long-run effects of persistent, chronic deficits, such as those seen in the U.S. economy in the 1980s? First, it is clear when looking at **Figure 3.3** that if a persistent deficit eventually pushed the aggregate demand curve into the inflationary region of the aggregate supply curve, then the very undesirable long-range effect of inflation is going to emerge. This is one reason why large chronic budget deficits year after year are inadvisable - they build a natural tendency toward inflation into the economy. Addressing this same issue with the loanable funds model points out yet another potential problem - large and chronic budget deficits also have a tendency to raise interest rates.

The effect of budget deficits upon interest rates

This effect can be seen in **Figure 3.4**. When the federal government runs a budget deficit, spending more than is received in revenues, the difference (the deficit) must be financed through the sale of U.S. Treasury Bonds, Notes, and Bills.⁵ As was shown above, this constitutes an increase in the *demand for credit*, and is shown in **Figure 3.4** as a shift to the right (from DC_1 to DC_2) in the demand curve. The obvious result is higher interest rates.

This effect of budget deficits upon interest rates introduces the possibility of an economic phenomenon called **crowding out**. Economy theory tells us that if interest rates are rising because of budget deficits, then the demand for funds in the private sector - corporate, consumer, and mortgage

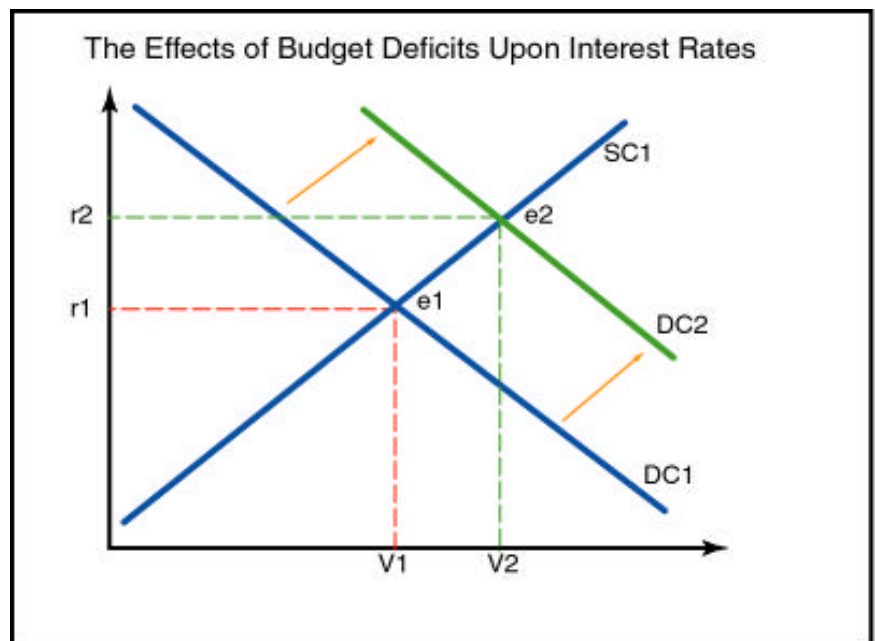


Figure 3.4

borrowing - might *fall* because of these higher interest rates. For example, the demand for residential mortgages might be very sensitive to increases in mortgage rates. An increase in the payment of a 30-year fixed rate \$150,000 home mortgage that rises from 7% to 9% equals slightly less than \$200 per month. One would expect the demand for home loans to fall in an environment of rising interest rates. If private borrowing falls because of rising interest rates caused by government borrowing, then the deficit is said to be *crowding out* private borrowing. This could further mean, of course, that *aggregate demand* would fall because of reduced levels of private credit-financed spending, somewhat offsetting the stimulating effects of the deficit. Because this theory employs many complicated chains of cause and effect, it is a suitable candidate for exploration with a computer simulation model. We will therefore return to the controversy in the chapter on simulation models. For the moment, we will merely concede that budget deficits tend to push interest rates up, and this in turn might discourage many categories of private

⁵Why and how this is done is not explained in this chapter. For a complete explanation of this procedure, see Evans, Gary R. *Red Ink - The Budget, Deficit, and Debt of the U.S. Government*, Academic Press, 1997, Chapter 1.

borrowing.

Again, it should be remembered that this result must be expressed as a *tendency* - we conclude that large budget deficits have the *tendency* to raise interest rates. We know that there can be other offsetting factors at work.

The effect of open market operations upon interest rates

Figure 3.5 provides a good example of such an offsetting tendency. Earlier in this chapter it was explained that the Federal Reserve System has the ability to increase the amount of credit available to the economy through a policy expedient called open market operations. This is shown as a shift to the right in the supply curve (from SC_1 to SC_2), which has the effect of lowering interest rates and increasing the volume of credit. This, in fact, is the desired effect of an expansionary open market operation, which is a policy measure designed to stimulate an economy.

The two combined: budget deficits and expansionary open market operations together

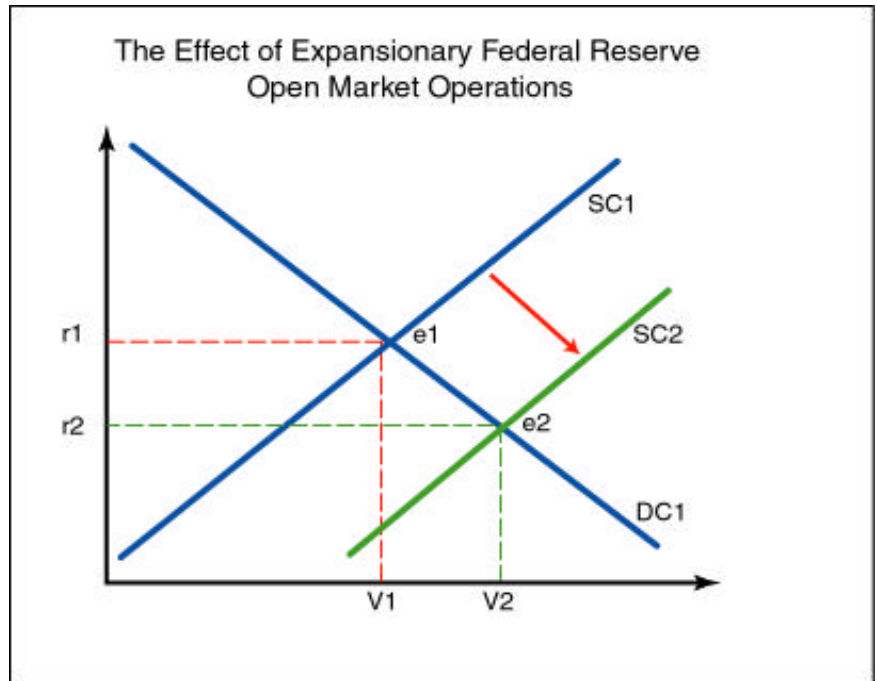


Figure 3.5

It is clear from inspection that the two cases shown in **Figure 3.4** and **Figure 3.5** tend to offset each other. Deficits tend to raise interest rates and expansionary open market operations tend to lower them. The effect of the two combined is shown in **Figure 3.6**.

By inspection it is clear that the final effect upon interest rates will depend upon which of the two influences is most dominant, the budget deficit or Federal Reserve Policy (the graph is drawn in such a way as to show a relatively neutral effect - it could have been drawn to show slightly higher rates or slightly lower rates). This combined effect illustrates a point made earlier - either of these two effects considered in isolation influences the final direction of rates, but the actual direction of interest rates will be determined by the net effect of all influences combined. This means that the following two counterintuitive results are logically possible when looking at actual data: (1) historical interest rates can be *falling* during a period of rising budget deficits (because aggressive expansionary open market operations are

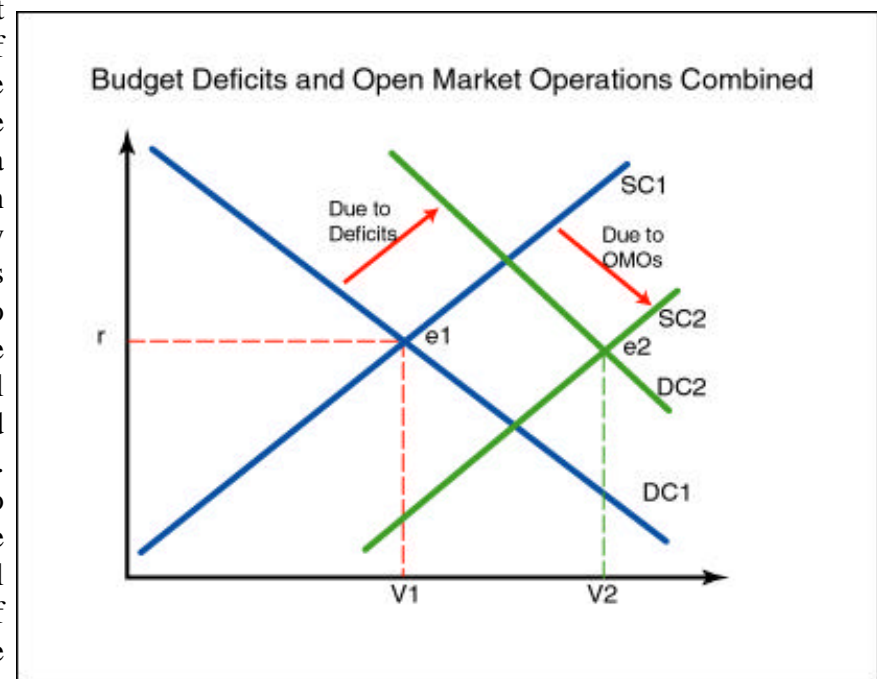


Figure 3.6

being used to offset the impact of the deficits) and (2) historical interest rates can be *rising* during a period of expansionary open market operations (because of budget deficits and for other reasons to be introduced next).

This less-than-exact result (in terms of the predictability of interest rates) should not be discouraging. The effects of two different types of economic policy (fiscal policy and monetary policy) are clearly demonstrated by the model and that the two can offset each other with a complex result is simply the truth of the matter.

Far more important, we still gather important information from the model even in this complex case. Although the final impact upon interest rates remains ambiguous, the impact upon the volume of credit is not (refer back to **Figure 3.6** to confirm this) Clearly, in a scenario where both large budget deficits and accommodating expansionary monetary policy are both present, credit formation and related variables, such as the growth rate of the money supply, will be very high. This has important implications. Such a policy combination is very stimulating to the economy, might increase aggregate demand considerably, and has the potential to move the economy into the inflationary region of aggregate supply.

The impact of inflationary expectatins upon interest rates

Nothing impacts the behavior of interest rates more strongly than the formation of inflationary expectations. With the appearance of inflation or the formation of inflationary expectations (usually one comes with the other, except that latter typically leads the former) interest rates will rise. Moreover, the effect of this variable will typically override all others, including offsetting variables such as expansionary open market operations. This effect is shown in **Figure 3.7**.

The impact of inflationary expectations is strong because it affects both the supply curve and the demand curve. It shifts the former to the left and up (from SC_1 to SC_2) and the latter to the right and up (from DC_1 to DC_2).

The supply curve shifts as shown because lenders are not willing to make loans at *negative real interest rates*, which are interest rates below the inflation rate. For example, no bond buyer is going to be content to earn 5% interest annually on a

bond if the inflation rate is 10%. Such an investor is going to insist upon an interest rate higher than 10%, and as inflation rates rise over time the acceptable level (to lenders) of interest rates are adjusted accordingly. To understand the logic of the shift, look at points **a** and **b** on the two supply curves, both associated with volume V_0 . There we are asking the hypothetical question, “At what interest rate will the volume of credit V_0 be offered to the market.” The answer would be something like, “When inflation is low that volume of credit will be offered at the relatively low rate **a**; with high inflation that volume of credit will only be offered at the much higher rate **b**.” Since this would be true for any volume of credit represented, the shift in the curve as shown is justified.

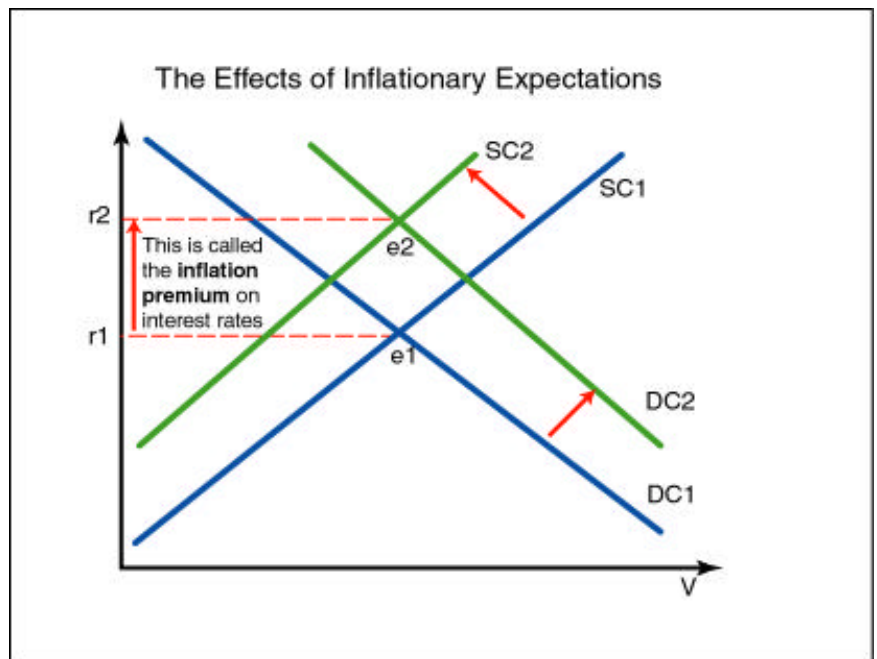


Figure 3.7

The demand curve shifts for a different reason. Here it is understood that for certain types of credit-financed

spending, the threat of inflation will cause many purchasers to *expedite* their spending intentions - in effect to try to buy before the price increase. Such an effect would be most common in an area like housing. With an inflationary threat, consumers rush to buy houses before they inflate out of reach, willing to pay much higher mortgage rates to do so. Additionally, consumers are simply willing to pay much higher interest rates in an inflationary environment, if for no other reason than it is understood that they are expected to do so.

By inspection, the impact of inflationary expectations is unambiguous. Interest rates rise in response.

The final spread between interest rates is referred to as the *inflation premium* on interest rates, and reflects the extent to which inflation drives interest rates higher.

These examples offer an introductory exposure to the loanable funds model. The model can generally be applied for at least introductory analysis anywhere the issue of interest rate determination arises.

©Gary R. Evans, 1999. This version of this chapter may be used for educational purposes without permission of the author. Instructors are encouraged to use this material in class assignments either by allowing students to download the material from a web site or by photocopying the material. Both options are free subject only to the limitations stated here. The material may be photocopied for reproduction under the following three conditions: (1) this copyright statement must remain attached to all copies; (2) students and other users may be charged only for the direct cost of reproduction; (3) this material is used for non-profit educational purposes only. The material may not be sold for a profit without explicit written consent of Gary R. Evans.

As a courtesy but not as an obligation, the author would like to be informed by email at evans@hmc.edu of any use of this chapter in a classroom context, and would appreciate comments suggestions for improving the content.