The Economics of Money Banking

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Chapter one

Nonmonetary or Barter Systems

Chapter1

Nonmonetary or Barter Systems

The overriding goal of this chapter is to understand

- **what is meaning of barter**
- **what is defect of a barter exchange system**
- **what are the implications emerge when a system of monetary exchange has been established in place a barter system.**

Chapter one

Nonmonetary or Barter Systems

The invention and use of money permit a widening of the area of production, trade, exchange, and economic activity. In the absence of money, where goods exchange directly for goods, production, of course, will still occur. But the production and exchange system that would exist in such a case and the manner in which superior economic arrangement can be realized by the use of money, call for brief examination.

Defect of a Barter Exchange System

Let us imagine a pure exchange economy. We suppose, for example, that production has taken place and the possessors of commodities come to a market place in the village square to exchange their surplus produce for other commodities they desire. We might imagine that there are in all 100 commodities offered in the exchange system. In the trading that ensues, we may observe at least four prominent defects or deficiencies of the procedure. these can be identified as 1 the difficulty of establishing the necessary double coincidence of wants (2) the need to establish a large number of independent price ratios of exchanges; (3) the difficulty of establishing mutually consistent cross-rates of exchange; and (4) the absence of a universally acceptable store of value.

Double Coincidence of Wants:

The difficulty of establishing a double coincidence of wants appears in the following example. Suppose a consumer came to the exchange market with horse and wanted to obtain shoes, he immediately confronts three problems. First, he has to discover another individual in the market at the same time who wishes to obtain horse. But second he needs more than that. He needs to find another trader who not only wants horse but also has shoes; he wants to give up in exchange for horse. That considerably intensifies our horse farmer's difficulty. But that still is not the end of the matter. For third, he is then confronted with the difficulty of agreeing on the number of shoes that should be exchanged for a horse. That, perhaps, could be resolved by haggling and bargaining. But two residual difficulties would still exist.

In the first place, neither a horse nor a shoe is divisible. There would not be much sense in bargaining in factions of shoes or horse. and further, both the horse farmer and the shoe maker would need to be sure that the rate of exchange they established between horse and shoes was consistent with what they could establish independently between, say, horse and bananas on the one hand, and bananas and shoes on the other. This illustrates the need for what was referred to in our summer as consistent cross-rates of exchange.

Large Number of Independent

Price Rations:

In the potential exchange transaction, it might not be possible for the horse farmer to obtain what he wants by direct exchange at all. He may have to exchange his horses for, say, and then exchange the horses for cheese, and so on. Only after a long series of exchanges might he end up with the shoes he came to the market to acquire. In all of this a heavy expenditure of time and effort is involved. Valuable resources, which might be put to better use in production, are being absorbed in circuitous trading transaction. At the same time, heavy transaction costs will conceivable be involved.

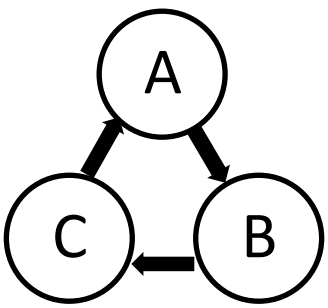
But even if all transactions were effected to everyone's satisfaction, a large number of price rations of exchange would have been established in the process. This fact provides us with a view of what is meant by a commodity price. Let us stay with the point for a moment.

To anticipate what lies ahead, this same interpretation of price as a ratio of exchange carries over to monetary exchange system. For suppose it were possible to acquire on dozen apples for six dollars. The dollar price of apples would be one half in more familiar language we would say simply that the price of an apple is fifty cents. What we

mean by the price of a commodity is, in our developed monetary system, the dollar price. it is a way of stating the established rate of exchange between dollars and the commodity. Furthermore, just as we speak of the dollar price of apples we can also refer to the apple price of dollars. This is no doubt a less –familiar way of speaking of things, but the terminology does have specific application in some branches of our subject. It arises especially in the market for foreign currencies.

Now consider a system of exchange containing three commodities. We are interested in the number of independent price ratios of exchange that would have to be established. Let us refer to the commodities as A, B, and C, in the outcome A would potentially exchange for band C, B would exchange for A and C; and C would exchange for A and B. it appears that six price ratios would therefore be established. That is correct, but only three of these would be in the sense in which the term was used above, independent ratios of exchange. Three of them would be reciprocals of the other three. The A price of B would be the reciprocal of the B of A, and so on.

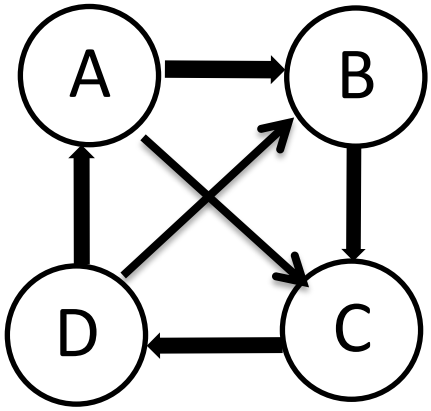
See the following diagrams in the case of three commodities



In the case of three commodities, we want to know how many combinations of items taken two at a time can be obtained from the set three commodities. First, A and B are a pair, second A and C are a pair, and third, Band C are pair. There are three pairs. There are accordingly three independent ratios of exchange. Assume that three are six commodities in the exchange system. In this case three will be fifteen pairs of commodities and therefore fifteen independent ratios of exchange.

We may imagine however, that in a system of 100 commodities one of the commodities is assumed to be exchangeable for each of the others. In that case, that one commodity will be performing one of the functions of money. We shall consider later how it might have been chosen. But instead of having to establish $4{,}950$ independent price ratios in the 100 commodity system as before, it would be necessary to establish only 99. The commodity that has now become the money commodity will establish a ratio of exchange with each of the 99 other. This gets to the heart of one of the principal issues of the economy and efficiency introduced to exchange arrangements when a monetary system replaces a barter system

In the case of four commodities



Mutually consistent cross- rates of exchange

This third defect of barter exchange arrangements can be exhibited by taking another simple case. Suppose there is again a three-commodity exchange system. Now the individual holding commodity A can obtain commodity C in either of two ways. First, he can exchange his A directly for C. second, he can first exchange A for B, and then exchange the B he thus obtained for the amount he wanted of C. we shall refer to the first possible exchange route as direct exchange, and the latter as indirect exchange. What now determines which of the two exchange routes the holder of A will take? it will depend on the most efficient or economical way of proceeding. But this, in turn, will depend on the rates of exchange involved. the direct route gives a rate of exchange described by A/C. the indirect route will give an effective exchange rate described by the

product of the two separate rates, A/B and B /C. the individual holding A will be indifferent between the direct and the indirect routes of exchange when the direct ratio, A/C, is precisely equal to the product of A/B and B/C. when that condition occurs we have mutually consistent cross-rates of exchange. in a pure barter system of exchange, it would be difficult to be sure that such mutually consistent rates could be easily and permanently established.

Store of Value

A final difficulty of a barter system of exchange arrangements is that no one commodity may be universally acceptable as a store of value. if it were, it would by that reason have become a "money" commodity, and the full barter characteristics of the system would have been modified. On the other hand, when money enters the scheme of things its functioning as a store of value is of paramount importance.

Other Considerations of Barter Arrangements

The foregoing discussion drew attention to the costs as well as the difficulties involved in effecting exchanges in a pure barter system. The economic costs would actually be threefold. First there is the direct cost of making the actual exchanges when the possibility of achieving them is finally established. Second, there is the cost of

search time in ferreting out the exchange possibilities. And third, there is the economic opportunity cost of allocating resources to establishing these rounds about exchange processes, when those resources could conceivably be employed in alternative avenues of direct production.

Let us for the moment suppose that a system of monetary exchange has been established in place of a barter system. Deeper implications emerge, not only for the exchange arrangements but also for the production arrangements in the economy.

First, the prospect of being able to exchange surplus production for a money commodity (leaving a side for the moment the question of pure noncommodity money) will make it possible for producers to concentrate their energies and resources on that line of production in which they have superior skills.

Second, they will be able, to put it in familiar economic terms to exploit, their comparative advantages in resource availability and production potential.

Third, specialization of production will be encouraged and facilitated by widened exchange opportunities. This will lead to higher levels of overall production in the economy.

Fourth, the total income of the economy will thereby be increased, with benefits of increased well-being or economic welfare.

In this way the emergence of money accomplishes a widening of the area of exchange, a widening of the potential for economic production, and a general widening of the scope and structure of economic activity.

Exercises

Chapter one

Nonmonetary or barter Systems

Part A: True –False Question

Circle whether the following statements are true (T) or false (F).

1-The invention and use of money permit a widening of the area of production, trade, exchange, and economic activity.

2- In barter system the person would obtain what he wants by direct exchange at all

3- The money is considered commodity and its functioning as a store of value is of Paramount importance.

4- In the barter system, the people focus on both exchange arrangements and production arrangements as a same.

Part B: Multiple –choice question

Circle the appropriate answer

1- .....Is considered of the defects the barter system.

a- the need to establish a small number of independent price ratios of exchange

b- The easy of establishing the necessary double coincidence of wants.

c- The absence of universally acceptance store of value.

d- The easy of establishing mutually consistent cross-rates of exchange

2- Is considered economic cost of the barter system

a- the direct cost. b- the indirect cost.

c- the search time cost. d- all of the above

3- Suppose that there 7 commodities determine the number of independent price ratios of exchange

a- 49. b- 42. c- 21. d- 9

4- Suppose that there 6 commodities, determine the number of price ratios that must be established

a- 36. b- 30. c- 15. d- 18

5- When a consumer wants to compare the price of one product with another, money is being used primarily for which function?

a- store of value. b- unit of account

c- checkable deposit. d- medium of exchange.

6- Which of the following is the most important advantage of the medium of exchange function of

a- money tansfers purchasing power from the present to the future

b- money measures the relative worth of products.

c- money reduces the complications of barter

d- money allows people use credits instead of currency

7- What is not a reason for the replacement of barter with the use of money?

a- money is easily divisible

b- money can never be destroyed

c- money eliminates the need for a coincidence of wants.

d- money allows for greater economic specialization

8- When a consumer wants to compare the price of one product with money is being used primarily for which function?

a- store of value. b- Unit of account.

c- checkable deposit. d- Medium of exchange

9- Which of following is the most important advantage of the medium of exchange function of money?

a- money transfers purchasing power from the present to the future

b- money measures the relative worth of products

c- money reduces the complications of barter.

d- money allows people use credit cards instead of currency

10- What is not a reason for the replacement of barter with the use of money?

a- money is easily divisible

b- money can never be destroyed.

c- money eliminates the need for a coincidence of wants.

d- money allows for greater economic specialization

11- Which of following about a barter economy is correct?

a- without money, there is no way to store wealth.

b- buying and selling cannot be separated

c- the scope of exchange and specialization is restricted.

d- a and b

12- Which of the following can exist in a barter economy?

a- common measure of value

b- price competition

c- lending and borrowing

d- non of the above

13- In a barter economy goods lack a common measure of value this problem could be solved if.

a- goods are homogenous.

b- goods be divided into smaller unit for transactions of small amounts

c- goods are easily portable.

d- a and b

Problem

Problem 1

Suppose that the person has good (X) he want to exchange (X) against (y), assume that exchange rate is: $1\times = 19Y$

Required

1- Applying the conditions for completing this barter assume that this person want to give up $10X$

2- Suppose that there another good (Z), $1 \times = 100$ Z, determine how two persons could be sure that the rate of exchange they established between X and Y was consistent with what they establish independently.

3- Determine the number of independent price ratios of exchange and number of price ratios that would be estimated.

4- Suppose that the holder of X good want to obtain on the Z good determine the possible exchange routes and determine of which two exchange routes the holder of X take.

5- Draw the diagrams in case existing three good X, Y, Z

6- Suppose that there 10 commodities, determine the number of independent price ratios of exchange and the number of price ratios that must be established.

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Chapter two

The Functions of Money

Chapter two

The functions of money

The overriding goal of this chapter is to understand the following topics

Money as a unit of account

- **Money as a unit of account enables us to consider relative economic values**
- **The unit of account provides an important source of information**

Money as a medium of exchange

- **Money has become generalized purchasing power**
- **The principle forms that the commodity selected for use as money should possess.**

Money as a store of value

- **The stability in the value of money**
- **The capitalization rate**
- **The difference between liquidity and marketability**
- **The concept of velocity of circulation of money**
- **Money as a standard for deferred payments**

Chapter two

The functions of money

In the preceding chapter it was argued that the functions of money are necessarily prior to the possible forms of money. Anything will be acceptable as money provided it performs the functions of money efficiently. Much is wrapped up in the notion of efficiency. Certain forms of money may perform one or more functions of money more efficiently and effectively than others. This will influence the shape of the developed monetary system that emerges as the economy and its money-using potential expands.

The deficiencies of barter arrangements point to four essential functions that money can be expected to perform. Money functions as (1) a unit of account, (2) a medium of exchange, (3) a store of value, and (4) a standard for deferred payments.

Money as a Unit of Account

In the unit of account function money acts as a generally recognized measure of value. Suppose, for the want of a name, that the unit of account is called a dollar. Whether, at this stage, the dollar is a commodity or a thing is not important. Our sole concern is with the fact that the value of whatever is produced and available for exchange can now be measured in dollars. This concept of a unit of

account or a measure of value function does, however, raise a number of questions.

Our focus, rather, is on the values that commodities appear to have or assume in relation to each other in the markets of the economy.

First, then, money as a unit of account enables us to consider relative economic values. This is consistent with the earlier notion of a commodity price as a rate of exchange. For purposes of market analysis, we are interested in the rates of exchange between commodities. The price of a commodity is its relative value measured in money terms. If to take our earlier example, a horse has a market price or value of one hundred dollars and a pair of shoes has a price of ten dollars, then a relative price ratio is immediately established between them. The horse farmer knows that if he sells his horse for its market price, he will be able to acquire two pairs of shoes.

Second the unit of – account function is significant in that it provides an important source of information. The information content of this money function means that producers are able to know where potential trading opportunities exist in the economy. This will affect their decisions regarding the allocation of resources to the production of commodities. The same significance of the unit of account applies

to value measurements wherever they occur– in the measurement of the values of assets and liabilities, the computation of incomes, expenditures, and saving, and the measurement of indebtedness between individuals.

Third, the money unit being used in the economy will perform efficiently as a measure of value only so long as its own value is constant. A foot or a yard is a measure of length. But such a measure would not perform its function efficiently if the length of a foot or a yard were to vary. No consistency could be achieved in the comparison of relative lengths at different times and places. Similarly, it is desirable that the unit of money measurement should itself be stable in value.

What this important concept refers to can best be described as general purchasing power of money. The concept itself is admittedly elusive. But ideally, we want to be able to say that at all time and places the unit of money has a constant purchasing power command over commodities in general. Its command over specific commodities may change as the market prices of those commodities vary. But we would like to be able to be sure that on the average, measured over the range of commodities available for exchange in the market system as a whole the purchasing power of money was constant. If this is not the case, if prices in general are rising and the purchasing power of

money is decreasing the usefulness of the unit of money as a measure of value at different times will be diminished. Let us take a simple example.

We may suppose that the total value of the nation's production measured in money terms during 1984 was $3,000 billion, and in the following year the value in money terms was $4,000 billion. It might see on the face of it that during 1985 the nation's production increased by one-third. That would be a remarkable, achievement. But if, during the same time, the general level of prices or the purchasing power of money had changed significantly, the relative economic performance between 1984 and 1985 would appear in a very different light. Suppose the general price level, measured for example by the gross national product deflator (an index of the prices of all commodities included in the national product), has increased during 1985 by 25 percent.

This information can be used to reduce the money value of the 1985 output to what it would have been, in terms of the unit of measurement, if the price level had not changed. To do this we deflate the 1985 values by dividing them by 125 percent. in that case the 1985 production is said to be measured on the same scale as the one used to measure the 1984 production. In more technical terms, the 1985 production would in that case be measured in constant

dollars. Adopting this measurement- adjustment procedure, the 1985 production will then be registered not as $4,000 billion (its current nominal value) but as $3,200 billion, or its current value of $4,000 billion divided by 125. In that case the national production, measured in 1984 or constant dollars, increased by $200 billion from $3,000 billion to $3,200 billion, or by $6\ ^{2}/3$ percent.

Money as a medium of exchange

Money functions as a medium of exchange in the sense observed at the beginning of this chapter. When money has been invented, goods, no longer, exchange directly for goods. Goods now exchange for money, and money exchange for goods, considerable economies and conveniences of arrangement are introduced to exchange system as a result. There will be a greater readiness on the part of producers to produce in excess of their own requirements and to offer commodities for exchange. The area of economic activity is expanded. The nation's income and well-being are correspondingly increased.

Money, in performing this medium of exchange function, has become generalized purchasing power. The possession of money gives the holders a purchasing power command over goods and services which they may exercise at any time or place them choose.

The holding of money permits the transference of purchasing power over time and space. Of course the efficiency with which money performs its basic medium of exchange function will depend on the form it takes. For this reason, attention was given in the early stages of the development of monetary systems to the desirable properties that the commodity selected for use as money should possess.

The money commodity had to be (1) durable so that it would not be easily destroyed or diminished in value by continued use or natural decay. The money commodity would need to (2) divisible, and to have a value in relation to its bulk that permitted it to be divided into units or pieces of a size convenient for making transactions. It would need to be (3) portable, or again have a value in relation to size that made it possible to carry an amount adequate for the usual level of transactions contemplated. Finally, it would need to be (4) easily recognizable or identifiable, to guard against counterfeiting and false representation. For these reason, one of the principle forms of money that appeared at earlier stages of its development was precious metals, principally gold and silver.

Two problems arise, however, ill connection with this medium of exchange function of money.

First, it is subject to difficulties that stem from possible changes in the value of money and in particular, from the public's expectations regarding possible changes in that value in the future. if, in conditions of extreme economic dislocation, for example, the public should have reason to fear that the value of money would diminish sharply in the period ahead (in conditions, that is of expectations of rapid inflation), a generally diminished willingness to accept money may develop. This happened during the fantastically rapid German inflation earlier.

In this century, in such a case money will have lost its acceptability. It can no longer perform its medium of exchange function. Individuals cannot have confidence that if they accept it they will be able to pass it on again to another transactor at a value comparable to that at which they had acquired it. For this reason, we stated earlier that the thing that makes money. Money is its acceptability.

Second, particular problems may arise when the material used as money has a dual value. In addition to its value as money, it may have a value as a commodity usable for nonmonetary purposes. The question will then continually arise to whether its value as a commodity, in the ordinary commodity markets of the economy, is greater or less than its value as money. This problem gave rise to considerable disturbances in the early nineteenth century monetary

system in the United States. At that time attempts were made to maintain both gold and silver in circulation as money, though they then simultaneously had obvious commodity values.

Money as a Store of Value

There are two respects each with very different implications for monetary analysis, in which money may function as a store of value. The first relates to the fact that money is functioning as a temporary store of value when it is used as a means of transporting generalized purchasing power over time and space. We considered that question in the preceding section. The efficiency with which money function as a store of value in this sense depends on the prospective stability in the value of money.

More generally, money may function as a store of value when it is used as one of the assets in which individuals decide to hold a part of their wealth. In this sense money competes with other assets as a wealth holding from. The attractiveness of it for this purpose depends on certain characteristics it possesses in comparison with those other alternative assets. Such wealth assets, or portfolio assets, will possess to greater or lesser degrees the following four properties.

First, they may incur storage costs. Storage costs of money will be minimal, apart, perhaps, from fees paid to banks or other custodians for safekeeping. In the case of real assets, however, storage costs could be significant. If that were the case, such assets need to possess some of setting characteristics, such as the prospect of an increase in their market value, to make them attractive as a wealth-holding from. Moreover, real assets would not perform efficiently as a store of value unless there was reason to believe that a market existed in which they could readily be sold for money at any time, in order to realize their value and obtain liquidity in the future.

Second assets may provide the holder with a rate of return, or a, rate of interest, earned by holding them. Such assets as shares of stock in industrial corporations or government securities promise the holder a rate of return. That return will be fixed in money terms in the case of government securities and will be variable in the case of corporate common stocks. money, however, will not provide the holder with a rate of return (though this general statement is subject to exceptions at the present time when, as a result of recent government legislation, certain kinds of interest - bearing savings accounts in banks and other depository institutions can effectively be used as money).

Third, assets have a certain amount of risk associated with holding them. In particular, there are risks associated with the possible income streams to which we have just referred. There is no effective risk that the fixed annual interest on government securities will not be paid when it is due. The government possesses general taxing powers and money creating power to ensure that the interest due on its debt obligations will always be met. But this is not the case with the securities of industrial corporations. the income paid on many of them, corporate bonds and common stocks for example, depends on the ability of the firm to generate an income stream large enough to pay the interest or dividends after all necessary production costs have been met.

Moreover, there is a risk of a different kind associated with all marketable and income −earning assets, including government securities. We shall see more clearly in a later chapter that the market value of marketable securities varies inversely with the market rate of interest. Suppose a security promises to pay a perpetual income of $\$50$ per annum in interest, and that the level of the rate of interest available on assets of the same class of risk is 5 percent. Then the market value of that asset will be the amount that individual investors would be prepared to pay for it and be able to expect that they would get a rate of return of 5 percent on their investment, this amount

would clearly be $1,000. For by paying $ 1,000 for the asset the holders would ensure themselves of an annual income of $ 50, or 5 percent of their investment. Market values of such assets, therefore, are easily obtained by dividing the dollar amount of interest promised to the holder by the rate of return the investor requires in technical terminology, the market value is the capitalized value of the expected income. This is exactly what is meant by dividing the expected interest by the desired rate of return. This method of determining market values is said to be capitalizing the interest expectation. The required rate of return is referred to as the capitalization rate.

in the case in hand, imagine that the general level of interest rates, and therefore the investor's required rate of return, rose from 5 percent to 6.25 percent. Then the market value of the asset, the capitalized value of the expected income, would be the $50 divided by 6.25 percent. This equals $800. The rise in the interest rate from 5 percent to 6.25 percent has caused the market value of the asset to fall from $1,000 to $ 800. The risk that this might occur while an asset is being held in an individual's asset portfolio is referred to as the interest rate risk, or market value risk.

Assets in general, then, are subject to a range of risks to which money, to the extent that it is held as asset, is not subject. Money has a zero or minimal storage cost, a zero or minimal rate of return, but

also a minimal risk. That however, is not the end of the matter. For one generally perverse risk to which the holding of money is subject still requires consideration. That is the risk that during the period for which money is held the general value or the purchasing power of money may diminish. This refers again to the matter of inflationary changes in the value of money.

Fourth, it is necessary to consider, when the choice between different kinds of wealth portfolio assets is being made, the liquidity of the assets. Liquidity is closely related to marketability, or the likelihood that the asset can be sold or turned into money at any time it is necessary or desirable to do so, but liquidity differs from pure marketability. For liquidity refers not simple to the possibility that the asset could be sold for money at any time. it refers also to the possibility that could be done without realizing a loss on the value of the asset. In this sense. Money possesses perfect liquidity. Other assets possess varying degrees of both marketability and liquidity. it would be possible to order assets on a scale describing the extent to which they possess liquidity. Money, by definition, would, be at the top of the scale. Those assets that ranked close to money would be given the special name or description of "near money". In fact, in the complex economy, we lie in at the present time near-moneyless" is an important asset characteristic. Such near-money as savings accounts,

money market mutual fund shares, short term government securities, and certain kinds of very short term or overnight loans perform highly significant function in the money and financial asset markets.

Fifth point of considerable analytical significance emerges from the discussion of money as a store of value. This refers to the fact that people keep by them an amount of money that bears some relation to the volume of their income or expenditures during a given period, say a year. If, now, the total level of annual expenditures in the economy were divided by the amount of money held in this way, we would have a measure of the rate of turnover of this money stock. It would be a measure of the number of times that, on the average, the stock of money turned over, or passed from one income earner or market transactor to another. In the course of consummating the annual market expenditures. This rate of turnover measure has acquired a special name – in monetary economics. It is referred to as the velocity of circulation of money.

The significance of this velocity of circulation concept rests in the fact that an increased desire on the part of the public to hold money will be reflected in a decline in the velocity of circulation of money. It is necessary, therefore to investigate possible causes of variations in this velocity magnitude. The rate of interest, among other things, is very relevant. For the higher the rate of interest that can be earned on

lending money rather than holding it, the higher will be the income foregone by holding money for the sake of the liquidity it provides. This income sacrificed describes the opportunity cost of holding money. For our present purposes it is sufficient to observe that anything that cause a change in the velocity of circulation of money also causes a change in the overall rate of money expenditure. it is short step of analysis, then to observe that whatever causes a change in the level of monetary expenditure in the economy will have effects on the level of production, incomes, and employment.

Money as a Standard for Deferred Payments

The function of money as a standard for deferred payments is already implicit in the analysis to this point. It means that money provides the measure in which future dated obligations are stated, indebtedness performs a very important in our complex economic arrangement, and a method of stating the amounts due for payments between individuals at future dates is vitally necessary. One of the principal features of our enterprise economy is that large numbers of economic relations are conducted on the basis of clearly stated and legally enforceable contracts. Money as a standard for deferred payments enters this nexus of relations by providing the measurement unit in which contractual obligations are defined.

Money as a standard for deferred payments functions with complete efficiency, of course, only to the extent that the value or purchasing power of money is constant. if, during the course of outstanding debt, the value of money should decline or the general level of prices should rise, this could confer an economic benefit, commonly referred to as a windfall gain, on debtors. This occurs because they would then be able to repay their debts as they become due in dollars that had a lower purchasing power than the dollars they had borrowed at the time of the initial loan contract. Similarly, increases in the purchasing power of money would confer windfall gains on creditors.

Money as a standard for deferred payments has significance for a wide range of such contracts of indebtedness. In our enterprise system many contracts for the payment of current expenses are also extremely significant. Prominent examples are contracts for the payments of wages where trade union may settle wage arrangement for a period of, say. Three years into the future, and contracts for the payment of rents

EVOLUTION OF THE PAYMENTS SYSTEM

We can obtain a better picture of the functions of money and the forms it has taken over time by looking at the evolution of the

payments system, the method of conducting transactions in the economy. The payments system has been evolving over centuries, and with it the form of money. At one point, precious metals such as gold were used as the principal means of payment and were the main form of money. Later, paper assets such as checks and currency began to be used in the payments system and viewed as money. Where the payments system is heading has an important bearing on how money will be defined in the future.

Commodity Money

To obtain perspective on where the payments system is heading, it is worth exploring how it has evolved. For any object to function as money, it must be universally acceptable; everyone must be willing to take it in payment for goods and services. An object that clearly has value to everyone is a likely candidate to serve as money, and a natural choice is a precious metal such as gold or silver. Money made up of precious metals or another valuable commodity is called commodity money, and from ancient times until several hundred years ago, commodity money functioned as the medium of exchange in all but the most primitive societies. The problem with a payments system based exclusively on precious metals is that such a form of money is very heavy and is hard to transport From one place to another. Imagine the holes you'd wear in your pockets if you had to buy things

only with coins! Indeed, for large purchases such as a house, you'd have to rent a truck to transport the money payment.

Fiat Money

The next development in the payments system was paper currency (pieces of paper that function as a medium of exchange). Initially, paper currency carried a guarantee that it was convertible into coins or into a fixed quantity of precious metal. However, currency has evolved into fiat money, paper currency decreed by governments as legal tender (meaning that legally it must be accepted as payment for debts) but not convertible into coins or precious metal. Paper currency has the advantage of being much lighter than coins or precious metal, but it can be accepted as a medium of exchange only if there is some trust in the authorities who issue it and if printing has reached a sufficiently advanced stage that counterfeiting is extremely difficult. Because paper currency has evolved into a legal arrangement, countries can change the currency that they use at will. Indeed, this is what many European countries did when they abandoned their currencies for the euro in 2002.

Major drawbacks of paper currency and coins are that they are easily stolen and can be expensive to transport in large amounts because of their bulk. To combat this problem, another step in the evolution of the

payments system occurred with the development of modern banking: the invention of checks.

Checks

A check is an instruction from you to your bank to transfer money from your account to someone else's account when she deposits the check. Checks allow transactions to take place without the need to carry around large amounts of currency. The introduction of checks was a major innovation that improved the efficiency of the payments system, Frequently payments made back and forth cancel cache other; without checks, this would involve the movement of a lot of currency With checks, payments that cancel each other can be settled by canceling the checks, and no currency need be moved. The use of checks thus reduces the transportation costs associated with the payments system and improves economic efficiency. Another advantage of checks is that they can be written for any amount up to the balance in the account, making transactions for large amounts much easier. Checks are also advantageous in that loss from theft is greatly reduced, and because they provide convenient receipts for purchases.

There are, however, two problems with a payments system based on checks. First, it takes time to get checks from one place to

another, a particularly serious problem if you are paying someone in a different location who needs to be paid quickly. In addition, if you have a checking account, you know that it usually takes several business days before a bank will allow you to make use of the funds from a check you have deposited. If your need for cash is urgent, this feature of paying by check can be frustrating. Second, all the paper shuffling required to process checks is costly; it is estimated that it currently costs over $10 billion per year to process all the checks written in the United States.

Electronic Payment

The development of inexpensive computers and the spread of the Internet now make it cheap to pay bills electronically In the past, you had to pay your bills by mailing a check, but now banks provide Web sites at which you just log on, make a few clicks, and thereby Transmit your payment electronically. Not only do you save the cost of the stamp, but paying bills becomes (almost) a pleasure, requiring little effort. Electronic payment systems provided by banks now even spare you the step of logging on to pay the bill. Instead, recurring bills can be automatically deducted from your bank account. Estimated cost savings when a bill is paid electronically rather than by a check exceed one dollar per transaction. Electronic payment is thus becoming far more common in the United States, but Americans lag

considerably behind Europeans, particularly Scandinavians, in their use of electronic payments (see the E-Finance box, "Why Are Scandinavians So Far Ahead of Americans in Using Electronic Payments?")

E-Money

Electronic payments technology can substitute not only or checks, but also for cash, in the form of electronic money (or e-money)- money that exists only in electronic form The first form of e-money was the debit card Debit cards, which look like credit cards, enable consumers to purchase goods and services by electronically transferring funds directly from their bank accounts to a merchant's account. Debit cards are used in many of the same places that accept credit cards and are now often becoming faster to use than cash. At most supermarkets, for example, you can swipe your debit card through the card reader at the checkout station, press a button, and the amount of your purchases is deducted from your bank account. Most banks and companies such as Visa and MasterCard issue debit cards, and your TM card typically can function as a debit card.

A more advanced form of e-money is the stored-value card. The simplest form of stored-value card is purchased for a preset dollar amount that the consumer pays up front, like a prepaid phone card.

The more sophisticated stored-value card is known as a smart card. It contains a computer chip that allows it to be loaded with digital cash from the owner's bank account whenever needed. In Asian countries, such as Japan and Korea, cell phones now have a smart card feature that raises the expression, "pay by phone," to a new level. Smart cards can be loaded from ATM machines, personal computers with a smart card reader, or specially equipped telephones.

A third form of electronic money is often referred to as e-cash, which is used on the Internet to purchase goods or services. A consumer gets e-cash by setting up an account with a bank that has links to the Internet and then has the e-cash transferred to her PC. When she wants to buy something with e-cash, she surfs to a store on the Web and clicks the "buy" option for a particular item, whereupon the e-cash is automatically transferred from her computer to the merchant's computer. The merchant can then have the funds transferred from the consumer's bank account to his before the goods are shipped.

Given the convenience of e-money, you might think that we would move quickly to a cashless society in which all payments are made electronically. However, this hasn't happened, as discussed in the E-Finance box, "Are We Headed for a Cashless Society?

MEASURING MONEY

The definition of money as anything that is generally accepted in payment for goods and services tells us that money is defined by people's behavior. What makes an asset money is that people believe it will be accepted by others when making payment. As we have seen, many different assets have performed this role over the centuries, ranging from gold to paper currency to checking accounts. For that reason, this behavioral definition does not tell us which assets in our economy should be considered money. To measure money, we need a precise definition that tells us exactly which assets should be included

The Federal Reserve's Monetary Aggregates

The Federal Reserve System (the Fed), the central banking authority responsible for monetary policy in the United States, has conducted many studies on how to measure money The problem of measuring money has recently become especially crucial because extensive financial innovation has produced new types of assets that might properly belong in a measure of money Since l9S0, the Fed has modified its measures of money several times and has settled on the following measures of the money supply, which are also referred to as

monetary aggregates (see Table 1 and the Following the Financial News box).

TABLE1. Measures of the Monetary Aggregates	
	Value as of December 2005 ($ billions)
Ml = Currency	725.2
+ Traveler's checks	7.3
+ Demand deposits	338.8
Other checkable deposits	317.8
Total M1	1,389.1
M2 = MI	
+ Small-denomination time deposits	968.8
+ Savings deposits and money market deposit accounts	3626.5
+ Money market mutual fund shares (retail)	723.9
Total M2	5,319.2
Source:www.federalreserve.gov/releases/h6/hist	

The narrowest measure of money that the Fed reports is M1, which includes currency, checking account deposits, and traveler's checks. The components of M1 are shown in Table 1. The currency component of Ml includes only paper money and coins in the hands of the nonbank public and does not include cash that is held in ATMs or

banks vaults. Surprisingly, there is more than $2,000 cash in circulation for each person in the United States (see the FYL box), The traveler's checks component of M1 includes only travelers checks not issued by banks. The demand deposits component includes business checking accounts that do not pay interest as well as traveler's checks issued by banks. The other checkable deposits item includes all other checkable deposits, particularly checking accounts held by households that pay interest. These assets are clearly money, because they can be used directly as a medium of exchange.

Until the mid-1970s, only commercial banks were permitted to establish checking accounts, and they were not allowed to pay interest on them. With the financial innovation that has occurred (discussed more extensively in Chapter 10), regulations have changed so that other types of banks, such as savings and loan associations, mutual savings banks, and credit unions, can also offer checking accounts. In addition, banking institutions can offer other checkable deposits, such as NOW (negotiated order of withdrawal) accounts and ATS (automatic transfer from savings) accounts, that do pay interest on their balances.

The M2 monetary aggregate adds to MI other assets that have check-writing features (money market deposit accounts and money market mutual fund shares) and other assets (savings deposits and

small-denomination time deposits) that are extremely liquid, because they can be turned into cash quickly at very little cost. Small-denomination time deposits are certificates of deposit with a denomination of less than $100,000 that can only be redeemed at a fixed maturity date without a penalty Savings deposits are non-transactions deposits that can be added to or taken out at any time. Money market deposit accounts are similar to money market mutual funds, but are issued by banks. The money market mutual fund shares are retail accounts on which households can write checks.

Because we cannot be sure which of the monetary aggregates is the true measure of money, it is logical to wonder if their movements closely parallel one another. If they do, then using one monetary aggregate to predict future economic performance and to conduct policy will be the same as using another, and it does not matter much that we are not sure of the appropriate definition of money for a given policy decision. However, if the monetary aggregates do not move together, then what one monetary aggregate tells us is happening to the money supply might be quite different from what another monetary aggregate would tell us. The conflicting stories might present a confusing picture that would make it hard for policymakers to decide on the right course of action.

Figure 1 plots the growth rates of M1 and M2 from 1960 to 2005. The growth rates of these two monetary aggregates do tend to move together; the timing of their rise and fall is roughly similar until the 19905, and they both show a higher growth rate on average in the 1970s than in the 1960s.

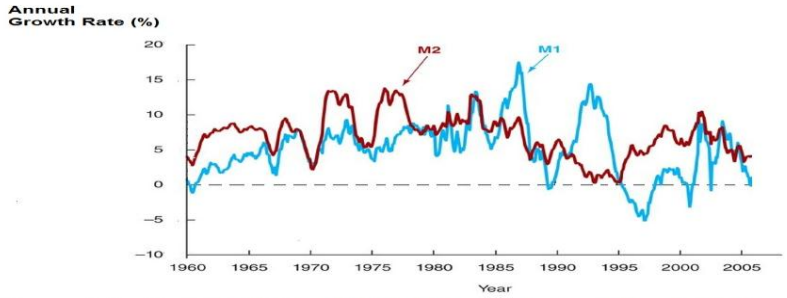
Yet some glaring discrepancies exist in the movements of these aggregates. According to M1, the growth rate of money did not accelerate between 1968, when it was in the 6 -7% range, and 197l, when it was at a similar level. In the same period, the M2 measure tells a different story; it shows a marked acceleration from the 8-10% range to the 12-159% range. Similarly, while the growth rate of M1 actually increased from 1989 to l992, the growth rate of M2 in this same period instead showed a downward trend. Furthermore, from 1992 to 1998, the growth rate of M1 fell sharply while the growth rate of M2 rose substantially; from 1998 to 2002, MI growth generally remained well below M2 growth. Thus, the different measures of money tell a very different story about the course of monetary policy in recent years.

From the data in Figure 1, you can see that obtaining a single precise, correct measure of money does seem to matter and that it does make a difference which monetary aggregate policymakers and economists choose as the true measure of money.

HOW RELIABLE ARE THE MONEY DATA?

The difficulties of measuring money arise not only because it is hard to decide what is the best definition of money, but also because the Fed frequently later revises earlier estimates of the monetary aggregates by large amounts. There are two reasons why the Fed revises its figures. First, because small depository institutions need to report the amounts of their deposits only infrequently, the Fed has to estimate these amounts until these institutions provide the actual figures at some future date. Second, the adjustment of the data for seasonal variation is revised substantially as more data become available. To see why this happens, let's look at an example of the seasonal variation of the money data around Christmastime. The monetary aggregates always rise around Christmas because of increased spending during the holiday season; the increase is greater in some years than in others. This means that the factor that adjusts the data for the seasonal variation due to Christmas must be estimated from several years of data, and the estimates of this seasonal factor become more precise only as more data become available. When the data on the monetary aggregates are revised, the seasonal adjustments often change dramatically from the initial calculation.

Figure 1 Growth Rates of the M1 and M2 Aggregates, 1960–2005



Sources: **Federal Reserve Bulletin, p, A4, Table 1,10, various issues; Citibase databank; www.federalreserve.gov/releases/h6/hist1.txt.**

Table 2 shows how severe a problem these data revisions can be. It provides annual rates of money growth for one-month periods calculated from initial estimates of the M2 monetary aggregate, along with the rates of money growth calculated from a major revision of the M2 numbers, As the table shows, for one-month periods the initial versus the revised data can give a different picture of what is happening to monetary policy. For January 2005, for example, the initial data indicated that the growth rate of M2 at an annual rate was 6.1%, whereas the revised data indicate a much lower growth rate of 2.7%.

A distinctive characteristic shown in Table 2 is that the differences between the initial and revised M2 series tend to cancel out. You can see this by looking at the last row of the table, which shows the average rate of M2 growth for the two series and the average difference between them. The average M2 growth for the initial calculation of M2 is 4.5%, and the revised number is 3.9%, a

difference of 0.6%. The conclusion we can draw is that the initial data on the monetary aggregates reported by the Fed are not a reliable guide to what is happening to short-run movements in the money supply, such as the one-month growth rates. However, the initial money data are reasonably reliable for longer periods, such as a year. The moral is that we probably should not pay much attention to short-run movements in the money supply numbers, but should be concerned only with longer-run movements.

TABLE 2 Growth Rate of M2: Initial and Revised Series, 2005 (percent, compounded annual rate)

Period	Initial Rate	Revised Rate	Difference (Revised Rate - Initial Rate)
January	6.1	2.7	-3.4
February	2.5	3.6	1.1
March	5.9	3.6	-2.3
April	-1.0	1.1	2.1
May	-1.0	1.6	2.6
June	7.2	4.9	-2.3
July	1.4	3.7	2.3
August	7.3	5.5	-1.7
September	6.9	5.5	-1.4
October	7.0	5.3	-1.7
November	4.7	3.9	-0.8
December	7.0	5.1	-1.9
Average	4.5	3.9	-0.6

Source Federal Reserve Statistical Release H.6 www.federalreserve gov/releases/h6.

Exercises

Chapter two

Economists define (1)..... as anything that is generally accepted in payment for goods and services or in the repayment of debts. This usually means currency to most people but to economists this definition is far too narrow. Economists include checking account deposits and travelers checks with currency to come up with a narrow definition of the (2) ..... called M1.

Before discussing the significance of money. It is important that one distinguish money from income. Money is a stock: that is, it represents a measure at a point in time. For example, the money stock, M1, was $1058.9 billion on June 9, 1997. Income is a (3) ..... of earnings per unit of time. Money serves a purpose, or in economists jargon it is productive. if money was not productive, we would abandon its use. Money's productivity results largely from its ability to reduce transaction costs and encourage (4) ..... and the division of labor.

Money has three primary functions: it is a medium of exchange, unit of account, and (5) ..... which all act

the reduce transaction costs and encourage specialization. Generally regarded its most important function, money's ability to serve as a medium of exchange is what distinguishes it from other assets both financial and physical. Without money, exchanges would be strictly (6) .....transactions. And while barter can be an efficient system for small groups of people, transaction costs rise significantly as the population grows because people find it increasingly difficult to satisfy a double coincidence of wants. Money reduces the high search costs that are characteristic of barter exchanges.

Money also lowers information and exchange costs by serving as a unit of account. Comparison shopping is extremely time consuming and costly when goods are not priced in a common unit, whether the units are dollars, cigarettes, or beaver pelts.

Finally, money serves as a store of value. This function of money facilitates the exchange of goods over (7) ..... Although money is not unique as a store of value, it is the most (8) ..... of all assets, and thus it tends to be the preferred store of value for most people most of the time. To illustrate just how this tendency is, consider that people did not completely abandon the use of German currency even during the hyperinflationary 1920s. Though barter did become much more prevalent.

Money's evolution over time has been driven by efforts designed to reduce transaction costs further. The introduction and subsequent acceptance of (9) ..... and checks greatly reduced transportation costs and the loss from theft, respectively. More recently, there has been progression toward a checkless society. Although concerns about fraud have slowed development of an (10) ..... (EFTS), one continues to observe movements in this direction.

Unfortunately, it is much easier to identify the virtues of money than it is to identify which assets actually function as money. In general, economists take two approaches to obtain a precise definition of money: the (11).....approach and the (12)..... .....approach.

The theoretical approach suggests that assets that act as a (13) ..... should be summed to calculate the money supply. The theoretical definition, however, is inherently ambiguous since many assets have money like qualities. For example, in a discussion among Federal Reserve Board members several years ago, someone commented that money market mutual funds should not be included within the narrow money definition because most funds required a $500 minimum on all their checks. Then chairman Paul Volker's response was to the effect that the minimum requirement had not

often prevented his wife from spending from their account, Volcker's comment, though lighthearted, illustrates one problem of the theoretical approach to measuring money.

The empirical approach suggests using that measure which does the best job of predicting the (14) ..... and inflation. To date, the results of his approach have proved mixed, with measures providing little consistency from one-time period to the next.

Because of such confusion, the Fed monitors closely the movements of several (15) ..... most important are the two narrowest definitions. M1 and M2. If both measures moved together and exhibited a high degree of correlation with economic activity, the Fed's job would be much easier. Such is not the case, however, and there seems little optimism among economists that a solution will be found soon to the measurement problem.

Further complicating matters is the unreliability of (16) ..... money statistics. Given all these problems, it is no wonder that some commentators refer to monetary policymaking as an art rather than a science. At the same time, it is this kind of controversy and uncertainly that makes the study of money and banking so interesting.

Exercises

Exercise 1: medium of exchange

Assume that there are three students on campus- named Allen (A), Barbi (B), and Clyde (C). they live in the same dorm and know each other well. allen owns a CD by the Ramones (R). Barbi owns a Rod Stewart (S) CD, and Clyde has a CD by Travis, Tritt (T). further assume thatAllen prefers the Rod Stewart CD to the one by the Ramones and that he prefers the Ramones CD to the one by Travis Tritt. Barbi prefers the Travis Tritt CD to her Rod Stewart CD, but likes the Ramones the least. Clyde prefers the Ramones CD to his Travis Tritt CD, likin the Rod Stewart CD the least. if we rank each student's preferences for the CDs, representing preference with the ">" symbol, we get the following table:

Individual	Preferences	Initial CD
A	S > R >T	R
B	T > S >R	S
C	R > T >S	T

Now assume an economy with no money, so that all trades are barter transactions. Note that when Allen (because he likes Rod Stewart better than the Ramones) approaches Barbi about trading CDs, Barbi will be unwilling to trade since she will be worse off (she prefers Rod Stewart to the Ramones) the same happens when any

two individuals try to trade directly. Allen will be unwilling to give the Ramones for Travis Tritt in a trade with Clyde, and Clyde will be unwilling to trade away. Travis Tritt in an exchange with Barbi.

Thus we see from in this example that barter between any two individuals – because there is not a double coincidence of wants– prevents the three individuals from getting their most preferred musical artist.

However, if we assume that Barbi is aware of Clyde's willingness to trade his Travis Tritt for the Ramones CD, then Barbi will be willing to accept the Ramones CD in exchange for her Rod Stewart since she knows that she will be able exchange with Clyde at a later date.

Finish filling in the table below showing the movement of the CDs among Allen, Barbi, and Clyde.

Individual	**Initial CD**	**intermediate**	**Final CD**
A	**R**	----------	----------
B	**S**	----------	----------
C	**T**	----------	----------

What the Ramones CD functioned as?.....

Exercise 2: the functions of money

Money has three primary functions: it is a medium of exchange, a store of value, and a unit of account. The statements below provide examples of these three functions. Indicate which of the three primary functions of money is illustrated by each statement let M = medium of exchange, S = store of value, and U = unit of account.

1- Erin purchases tickets to the pearl Jam concert by writing a check.

2- Christopher drops the change from his pocket into the wine bottle bank on his study desk.

3- So that they might avoid calculating relative prices of goods in terms of all other goods, the traders at the trading post agreed to value their wares in terms of beaver pelts.

4- Everyone understood, including nonsmokers that the prices of commodities traded in the prisoner of war camp were to be stated in terms of cigarettes.

5- Although he loved to smoke, Andrew saved cigarettes for he would be able to purchase chocolate bars on more favorable term as the supply of cigarettes dwindled in the POW camp.

6- Anthony calculated that the opportunity cost of his time was $10.00 per hour.

7- Meghan purchases for $29.95 the videotape she plans to give to her parents for Christmas.

8- This function of money is important if people are to specialized at what they do best.

9- Function of money that reduces transaction costs in an economy by reducing the number of prices that need to be considered.

10- The role of money that would not be provided if bananas were to serve as money.

Exercise3: function of money - unit of account

The price of one good in terms of another is referred to as the barter price or exchange rate. The benefits of using money are best appreciated by thinking of a barter economy. Between any two goods there is one barter price or exchange rate. But as the number of goods increases, the number of barter prices or exchange rates grows more rapidly. Complete the following table which dramatically illustrates the virtues of a unit of account.

Number of prices in barter versus a money economy

Number of Goods	Number of Prices in a Barter Economy	Number of Prices in a Money Economy
5	----------	5
25	----------	25
50	----------	----------
500	124.750	----------
5000	----------	----------

Exercise 4: measuring money – the Federal Reserve's Monetary Aggregates

After each asset, indicate in the space provided which monetary aggregate M1, M2, M3, or L includes the asset. As an aid the first one has already been completed.

1- Currency M1, M2, M3, L

2- Savings bonds

3- Overnight repurchase agreements

4- Checkable deposits

5- Short-term Treasury securities

6- Small denomination time deposits

7- Money market deposit accounts

8- Money market mutual fund balances (institutional(

9- Savings deposits

Self-test

Part A: true or false questions

Circle whether the following statements are true (T) or False (F)

1- Since checks are accepted as payment for purchases of goods and services, economists consider checking account deposits as money.

2- Of its three functions, it is as a unit of account that distinguishes money from other assets.

3- Money is a unique store of value, since physical goods depreciate over time.

4- Money can be traded for other goods quickly and easily compared to all other assets. Thus money is said to be liquid.

5- Money proves to be a good store of value during inflationary episodes since the value of money is positively related to the price

level.

6- Paper currency evolved because it is less costly to transport than is commodity money.

7- Inflation may reduce economic efficiency if it induces people to resort to barter.

8- The major impetus behind the move to expand the EFTS is the relatively high cost of transporting and processing checks.

9- In times past when only currency functioned as money defining money would have been conceptually much easier.

10- The past behavior of M1 and M2 indicates that using only one monetary aggregate to guide policy is sufficient since they move together very closely.

Part B: Multiplier - choice questions

Circle the appropriate answer

1- When an economist talks about the impossibility of barter he or she really is not saying that barter is impossible. Rather, he or she means to imply that

a- barter transactions are relatively costly

b- barter has no useful place in today's world

c- it is impossible for barter transactions to leave the parties to an

exchange better off

d- each of the above is true

2- The resources expended trying to find potential buyers or sellers and negotiating over price and terms are called

a- barter costs. b- transaction costs

c- information costs d- enforcement costs

3- If cigarettes serve as a medium of exchange, a unit of account. And a store of wealth, cigarettes are said to function as

a- bank deposits b- reserves

c- money d- loanable funds

4- Because money reduces both the time it takes to make exchanges and the necessity of a double coincidence of wants, people will find that they can more easily pursue their individual comparative advantages. Thus money.

a- encourages nonproductive pursuits.

b- encourages specialization.

c- forces people to become too specialized.

d- cause a waste of resources due to the duplication of many activities

5- The narrowest definition of money, called M1,consists of

a- currency

b- currency, checking account deposits, and money market mutual

funds

c- currency, checking account deposits, and money market deposit account funds.

d- currency checking account deposits and traveler's checks.

6- As the transaction costs of selling an asset rise, the asset is said to become.

a- more valuable b- more liquid

c- less liquid d- more money like

7- Which of the following are problems with a payments system based largely on checks؟

a- checks are costly to process

b- checks are costly to transport.

c- Checks take time to move through the check-clearing system

d- all of the above

e- only (a) and (B) of the above

8- which of the following approaches to money definitions have economist considered؟

a- the theoretical approach b- the empirical approach

c- Weighted average approach d- all of the above

e- only (a) and (b) of the above

9- Which of the following is not included in the money aggregate M2?

a- currency

b- money market deposit accounts

c- overnight repurchase agreements

d- Savings bonds

10- Which of the following best describes the behavior of the money aggregates M1 and M2?

a- while both M1 and M2 tend to rise and fall together, they often grow at very different rates.

b- M1 tends to grow at a much rate than M2

c- while both M1 and M2 tend to move closely together over periods as short as a year, in the long run they tend to move in opposite directions.

d- while both M1 and M2 tend to move closely together over periods as short as a year, in the long run they growth ratio are vastly different.

11- The conversion of a barter economy to one that uses money

a- increase efficiency by reducing the need to exchange good

b- increase efficiency by reducing transaction costs.

c- has no effect on economic efficiency since efficiency is production concept, not an exchange concept.

d- decreases efficiency by reducing the need to specialize

12- Which of following are true about the evolution of the payments system?

a- the evolution of the payments system from barter to precious metals, then to fiat money, then to checks can best be understood as a consequence of innovations that allowed traders to more easily escape oppressive taxes on exchange

b- Precious metals had the advantage of being widely accepted being divisible into relatively small units, and being durable but had the disadvantage of being difficult to carry transport from one place to another.

c- paper money has the advantage of being easy to transport but has the disadvantage of being less accepted than checks

d- only (a) and (b) of the above are true.

13- Generally, the problem of defining money becomes troublesome as the pace of financial innovation

a- less; quickens

b- more; quickens

c- more: slows

d- more; stops

14- If an individual " cashes in a US. Savings bond for currency.

a- M1 increases and M2 stays the same

b- M1 stays the same and M2 increases

c- M1 stays the same and M2 stays the same

d- M1 increases and M2 increases.

16- Generally speaking, the initial data on the monetary aggregates reported by the Fed are

a- not a reliable guide to the short - run behavior of the money supply

b- a reliable guide to the long - run behavior of the money supply

c- a reliable guide to the short - run behavior of the money supply

d- both (a) and (b) of the above

e- both (b) and (c) of the above

Chapter two

Part A: True –False Question

Circle whether the following statements are true (T) or false (F).

1- The relative economic values characteristics of a unit of account function of money enable the producer know where potential training opportunities exist in the economy

2- The importance source of information characteristic affect the producer decision regarding the allocation of resources to the production of commodities.

3- The money unit is used as a measure of value only so long as its own value is to vary.

4- The money as a measure of value must be stable in value to perform its function efficiently

5- Money as a standard for deferred payment mean that good exchange for money and money exchange for good

6- The market value of marketable securities varies directly with the market rate of interest.

7- Assets in general are subject to a range of risk to which money, to the extent that it is held as an asset is not subject.

8- Both money and assets face perverse risk.

9- The efficiency with which money performs its basic medium of exchange function will depend on the form it takes.

10- The efficiency with which money function as a store of value depend on the prospective stability in the value of money.

11- The efficiency with which money function as a temporary store of depend on the prospective stability in the value of money.

12- Liquidity is closely related to pure marketability.

13- The money possesses perfect liquidity while other assets possess varying degrees of both marketability and liquidity.

14- Near money refer to those assets that ranked close to money

15- The measure of the rate of turnover would be a measure of number of times that. On average, the stock of money turned over or passed from one income earner or market transactor to another.

Part B: Multiple –choice question

Circle the appropriate answer

1) ……Is /are a function of money that money can be expected to perform

a) a unit of account b) a medium of exchange

c) a store of value d) all of the above

2) In function money act as a generally recognized measure of value

a) a unit of account

b) a medium of exchange

c) a store of value

d) a standard for deferred payments.

3) Is considered of the characteristic money function as a unit of account

a) relative economic values

b) importance source of information

c) a measure of value

d) all of the above

4) is considered of the characteristic money function as a store of value

a) relative economic values

b) importance source of information

c) a measure of value

d) none of above

5) For achieving the function of money as a medium of exchange the money commodity had to be

a) durable b) divisible

c) portable d) all of the above

6) in case the function of money as a store of value any of the following, the holder prefers the money more than assets.

a) storage costs b) rate of return

c) a and b d) none of the above

7) in case the function of money as a store of value any of the following. the holder prefers the assets more than money

a) storage cost b) rate of return

c) a and b d) none of the above

8) In case the function of money as a store of value any of the following, the holder prefer the money more than assets

a) storage costs b) rate of return

c) risk d) all of the above

problems

problem 1

Suppose that the total value of the nation's production measured in money terms during the year 2007 was 2000 billion and in the following year (2008) the value in money terms was 3000 and the general price level increase by

1) 20% 2) 50% 3) price double 4) 60%

required

determine if the national production increased or decreased and by how much

Part A true – false questions

Circle whether the following statements are true (T) or false (F)

1) The interest is very relevant with the velocity of circulation of money

2) There negative relation between the velocity of circulation of money and the interest rate

3) In the unit of account function money acts as a generally recognized measure of value

4) There negative relation between the investment and interest rate

5) There positive relation between income and interest rate.

6) The interest rate thought to have the most important impact on aggregate demand is the short–term interest rate

Part B: multiple choice questions

Circle the appropriate answer

1) ……is / are considered problem/s of money as a medium of exchange function

a) portable value. b) dual value

c) value changes d) b and c

2) suppose that the value of security is $2000 that promise to pay

perpetual income of $100 per annum in interest, if the level of the interest rate available on assets of the same class of risk decreased by 20% how many the value of security now

a) 1500 b) 2000

c) 2500 d) none of the above

3) Suppose that the value of security is $500 that promise to pay perpetual income of $20 per annum in interest, if the level of the interest rate available on assets of the same class of risk increased by %25, how many the value of security now.

a) 500 b) 400

c) 600 d) none of the above

4) When there are excess supply of good, this result in

a) decrease in unplanned inventory

b) increase in unplanned inventory

c) increase in interest rate

d) decrease in interest rate

5) when there are excess demand of money, this result in

a) decrease in unplanned inventory

b) increase in unplanned inventory

c) increase in interest rate

d) decrease in interest rate

6) Suppose that there excess supply of money, any of the following is correct

a) r decrease, M_d decrease, and Q decrease

b) r decrease, M_d decrease, and Q increase

c) r decrease, M_d increase, and Q increase

d) r increase, M_d increase, and Q increase

7) Suppose that there excess demand of good, any of the following is correct

a) r decrease, M_d decrease, and Q decrease

b) r decrease, M_d decrease, and Q increase

c) r decrease, M_d increase, and Q increase

d)r increase, M_d increase , and Q increase

8) A rise in short term interest rates that is believed only to be temporary

a) is likely to have a significant effect on long term interest rates

b) will have a bigger impact on long term interest rates than if the rise in short term rates had been permanent

c) is likely to have only a small impact on long − term interest rates

d) cannot possibly affect long − term interest rates

9) At negative nominal interest rates, which one of the following statements is the most accurate?

a) people would find money strictly preferable to bonds

b) people would find money strictly preferable to bonds and bonds therefore would be in excess supply

c) people would find money strictly preferable to bonds and bonds therefore would be in excess demand.

d) people would find money strictly preferable to bonds and bonds market would be in equilibrium

problems

problem1

suppose that there bond provide return $400 and the value of this bond is $2000

required

according to both Keynes and Friedman

1) determine if the individual prefer holding money or bond today

2) determine if the individual prefer holding money or bonds if interest rate changed in the future as a follow

*if r = 25% *if r = 40% *if r = 10%

problem 2:

you invest $1,000 in an account for five years. earning simple interest of 5% per annum in the following formulae

P denotes the principal amount invested of $1,000

r denotes the interest rate of 5%

n denote the number of years for which the cash is invested ie five years

required

1) every year the amount of interest earned

2) the total interest earned over the five years

3) the total value of the investment at the end of the five-year period

problem 3

You invest $1,000 in an account for five years. earning compound interest of 5% per annum in the following formulae

P denotes the principal amount invested of $1,000

r denotes the interest rate of 5%

n denote the number of years for which the cash is invested ie five years

required

1) every year the amount of interest earned

2) the total interest earned over the five years

3) the total value of the investment at the end of the five-year period

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Chapter Three

The Demand Money

Chapter 3.

The Demand Money

The main goal of this chapter is to understand the following topics:

- quantity theory and money demand

- is velocity a constants or fluctuates

- The liquidity preference theory

- Modern quantity theory of money

Chapter Three

The Demand Money[1]

Quantity theory of money

Developed by the classical economists in the nineteenth early twentieth centuries, the quantity theory of money is a theory of how the nominal value of aggregate income is determination because it also tells us how much money is held for a given amount of aggregate income, it is a theory of the demand money. The most important feature of this theory is that suggests that interest rates have no effect on the demand money.

Velocity of Money and Equation of Exchanges the clearest exposition of the classical quantity the approach is found in the work of the American economist Irving Fisher, in his influential book the purchasing power of more published in 1911. Fisher wanted to examine the link between the total quantity of money M (the money supply) and the total amount of spending on final goods and services produced in the economy $P \times Y$, where P is the price level and Y is aggregate output (income). (Total spending $P \times Y$ is also thought of as aggregate nominal income for the economy or as nominal GDP.

[1]- Frederic S. Mishkin, The Economics of Money, Banking and financial Markets, Eight edition, Boston, U.S.A, 2007,PP.493 - 510.

The concept that provides the link between M and P × Y is called the velocity of money (often reduced to velocity), the average number of times per year (turnover) that a dollar is spent in buying the total amount of goods and services produced in the economy .Velocity V is defined more precisely as total spending P × Y divided by the quantity of money M:

$$\mathbf{V} = \frac{P \times Y}{M} \qquad (1)$$

If , for example ,nominal GDP (P × Y) in a year is $5 trillion and the quantity of money is 1$ trillion, velocity is 5, meaning that the average dollar bill is spent five times in purchasing final goods and services in the economy.

By multiplying both sides of this definition by M, we obtain the equation of exchange, which relates nominal income to the quantity of money and velocity:

$$\mathbf{M} \times \mathbf{V} = \mathbf{P} \times \mathbf{Y} \qquad (2)$$

The equation of exchange thus states that the quantity of money multiplied by the number of times that this money is spent in a given year must equal nominal income (the total nominal amount spent on goods and services in that year)[2].

[2] - Fisher actually first formulated the equation of exchange, In terms of me nominal value of transaction in the economy PT

As it stands, Equation 2 is nothing more than an identity a relationship that is true by definition. It does not tell us, for instance that when the money supply M changes, nominal income ($P \times Y$) changes in the same direction; a rise in M, for example, could be offset by a fall in V that leaves $M \times V$ (and therefore $P \times Y$) unchanged. To convert the equation of exchange (an identity) into a theory of how nominal income is determined requires an understanding of the factors that determine velocity.

Irving Fisher reasoned that velocity is determined by the institutions in an economy that affect the way individuals conduct their transactions. If people use charge accounts and credit cards to conduct their transactions, as they can today, and consequently use money less often when making purchases, less money is required to conduct the transactions generated by nominal income (M falls relative to $P \times Y$), and velocity $(P \times Y)/M$ will increase. Conversely, if it is more convenient for purchases to be paid for with cash or checks

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$$MV_T = PT$$

Where P = average price per transaction

T = number of transactions conducted in a year

VT = PTIM = transaction velocity of money

Because the nominal value of transactions T is difficult to measure, the quantity theory has been formulated in terms of aggregate output Y as follows T is assumed to proportional to Y so T = vY, where v is a constant of proportionality, substituting vY for T in Fishers equation of exchange Yields $MV_T = vPY$, which can be written as Equation 2 in the text, in which $V = V_T/v$.

(both of which are money), more money is used to conduct the transactions generated by the same level of nominal income and velocity will fall. Fisher took the view that the institutional and technological features of the economy would affect velocity only slowly over time, so velocity would normally be reasonably constant in the short run.

Quantity theory

Fisher's view that velocity is fairly constant in the short run transforms the equation of exchange into the quantity theory of money, which states that nominal income is determined solely by movements in the quantity of money: when the quantity of money M doubles M $\times$ V doubles and so must P $\times$ Y, the value of nominal income. To see how this works, let's assume that velocity is 5, nominal income (GDP) is initially $\$5$ trillion, and the money supply is $\$1$ trillion. If the money supply doubles to $\$2$ trillion, the quantity theory of money tells us that nominal income will double to $\$10$ million (= $5 \times \$2$ trillion)

Because the classical economists (including Fisher) thought that wages and prices were completely flexible, they believed that the level of aggregate output Y produced in the economy during normal times would remain at the full – employment level, so Yin the equation of

exchange could also be treated as reasonably constant in the short run. The quantity theory of money then implies that if M doubles, P must also double in the short run, because V and Y are constant. In our example, if aggregate output is $5 trillion, the velocity of 5 and a money supply of $1 trillion indicate that the price level equals 1 because 1 times $5 trillion equals the nominal income of $5 trillion. When the money supply doubles to $2 trillion, the price level must also double to 2 because 2 times $5 trillion equals the nominal income of $10 trillion. For the classical economists, the quantity theory of money provided an explanation of movements in the price level: movement in the price level result solely from changes in tile quantity of money.

Quantity Theory of Money Demand

Because the quantity theory of money tells us how much money is held for a given amount of aggregate income, it is, fact, a theory of the demand for money, we can see this by dividing both sides of the equation of exchange by V, thus rewriting it as

$$\mathbf{M} = \frac{\mathbf{1}}{\boldsymbol{V}} \times \mathbf{PY}$$

Where nominal income P × Y written as PY. When the money market is in equilibrium the quantity of money. M that people hold equals the quantity of money demanded M^d, so we can replace M in

the equation by M^d Using K to represent the quantity $1/V$ (a constant, because V is a constant), we can rewrite the equation as

$$M^d = K \times PY \qquad (3)$$

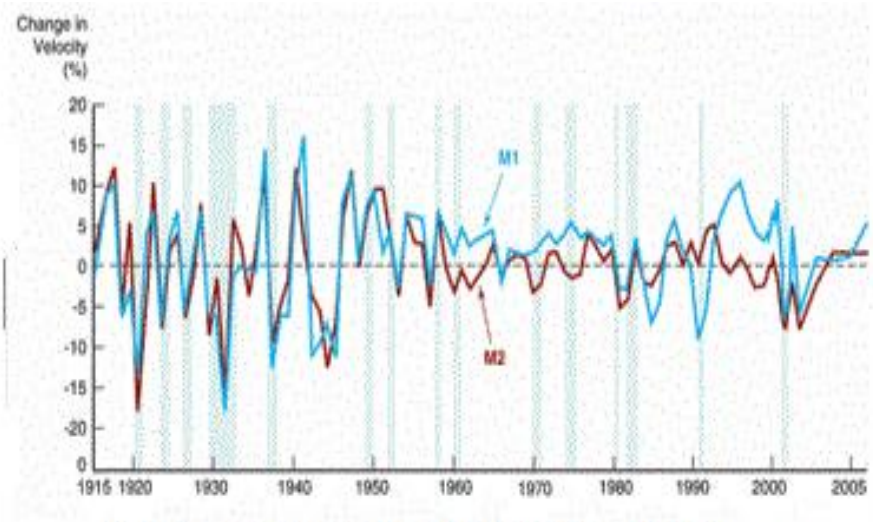
Equation 3 tells us that because is a constant, the level of transactions generated by a fixed level of nominal income PY determines the quantity of money M^d that people demand. Therefore, fisher's quantity theory of money suggests that the demand for money is purely a function of income, and interest rates have no effect on the demand for money.[3]

Fisher came to this conclusion because he believed the people hold money only to conduct transactions and have no freedom of action in terms of the amount they want to hold the demand for money is determined (1) by the level of transactions generated by the level of nominal income PY and (2) by the institutions in the economy that affect the way people conduct transactions and thus determine velocity and hence K.

[3] - While Fisher was developing his quantity theory approach to the demand for money, a group of classical economists in Cambridge, England led by Alfred Marshall and A. C pigou, came to similar conclusions, although with slightly different reasoning. They derived Equation 3 recognizing mat two properties of money motivate people to hold it: utility as a medium of exchange and as a store of wealth.

Is Velocity A Constant?

The classical economist's conclusion that nominal income determined by movements in the money supply rested on their belief that velocity PYIM could be treated as reasonable constant.[4] Is it reasonable to assume that velocity is constant? To answer this, let's look at Figure 1, which shows the year- to- year changes in velocity from 1915 to 2005 (nominal income it represented by nominal GDP and the money supply by M1 and M2)



Figure(1) change in the Velocity of M1 and M2 from Year to Year. 1915- 2005
shaded area indicates recessions Velocities are calculated using nominal GNP before 1959 and nominal CDP there after.

[4] - Actually the classical conclusion still holds if velocity grows at so uniform rate over time that reflects changes in transaction technology. Hence, the concept of a constant velocity should more accurately thought of here as a lack of upward and downward fluctuations is velocity.

What we see in figure 1 is that even in the short run velocity fluctuates 100 much to be viewed as a constant prior to 1950, velocity exhibited large swings 3 and down. This may reflect the substantial instability of the economy in this period, which included two world wars and the Great Depression. (Velocity actually falls, or at least its rate of growth declines, in year where recessions are taking place). After 1950, velocity appears to have more moderate fluctuations, yet there are large differences in the growth rate of velocity from year to year. The percentage change in MI velocity (GDP/MI) from 1981 to 1982, for example, was 2.5% whereas from 1980 to 1981 velocity grew at a rate of 4.29. This difference of 6.7% means that nominal GDP was 6.7% low than it would have been if velocity had kept growing at the same rate as in 1980−1981.[5] The drop is enough to account for the severe recession that took place in 1981 – 1982. After 1982, M1 velocity appears to have because even more volatile, a fact that has puzzled researchers when they examine the empirical evidence on the demand for money (discussed later in this chapter) M2 velocity remained more stable than M1 velocity after 1982, with the result that the Federal Reserve dropped its M1 targets m 1987

[5] - We reach a similar conclusion if we use MI velocity. The percentage change in M2 velocity (GDP/M2) from 1981 to 1982 was -50% whereas from 1980 to 1981 it was + 2.3%. This difference of 7.3% means that normal GOP was 7.3% lower than it would have been if M2 velocity had kept growing at the same rate as in 1980 - 1981.

and began to focus more on M2 targets. However, instability of M2 velocity in the early 1990s resulted in the Fed's announcement in July 1993 that it no that it no longer felt that any of the monetary aggregates, including M2, was a reliable guide for monetary policy.

Until the Great Depression, economists did not recognize that velocity declines sharply during severe economic contractions. Why did the classical economists not recognize this fact when it is easy to see in the pre-Depression period in figure 1 unfortunately, accurate data on GDP and the money supply did not exist before World War Π. (Only after the war did the government starts to collect these data.) Economists had no way of knowing that their view of velocity as a constant was demonstrably false. The decline in velocity during the great Depression year was so great; however, that even the crude data available to economists at that time suggested that velocity was not constant. This explain why after the Great Depression economists began to s arch for other factors influencing the demand for money that might help explain the large fluctuations in velocity.

Let us now examine the theories of money demand that arose from this search for a better explanation of the behavior of velocity.

Keynes's Liquidity Preference Theory

In his famous 1936 book the General theory of employment interest, and money, John Maynard Keynes abandoned the classical view that velocity was a constant and developed a theory of money demand that emphasized the importance of interest rates. His theory of the demand for money which he called the liquidity preference theory, asked the question: why do individuals hold money? He postulated that there are three motives behind the demand for money: the transactions motive the precautionary motive, and the speculative motive.

Transaction Motive

In the classical approach, individual are assumed to hold money because it is a medium of exchange that can be used to carry out everyday transactions. Following the classical tradition, Keynes emphasized that this component of the demand for money is determined primarily by the level of people's transactions. Because he believed that these transactions were proportional to income, like the classical economists, he took the transactions component of the demand for money to be proportional to income.

Precautionary Motive

Keynes went beyond the classical analysis by recognizing that in addition to holding money to carry out current transactions, people hold money as a cushion against an unexpected need. Suppose that you've been thinking about buying a fancy stereo; you walk by a store that is having a 50% - off sale on the one you want. If you are holding money as a precaution for just such an occurrence, you can purchase the stereo right away; if you are not holding precautionary money balances, you cannot take advantage of the sale. Precautionary money a balances also come in handy if you are hit with an unexpected bill–say, for car repair or hospitalization.

Keynes believed that the precautionary money balances people want to hold are determined primarily by the level of transactions that they expect to make in the future and that these transactions are proportional to income. Therefore, he postulated the demand for precautionary money balances is proportional to income.

Speculative Motive:

If Keynes had ended has theory with the transactions and precautionary motives. Income would be the only important determinant of the demand for money, and he would not have added much to the classical approach. However, Keynes took the view that

people also hold money as a store of wealth. He called this reason for holding money the speculative motive. Because he believed that wealth is tied closely to income, the speculative component of money demand would be related to income. However, Keynes looked more carefully at other factors that influence the decisions regarding how much money to hold as a store of wealth, especially interest rates.

Keynes divided the assets that can be used to store wealth into two categories: money and bonds. He then asked the following question: why would individuals decide to hold their wealth in the form of money rather than bonds?

Thinking back to the discussion of the theory of asset demand you would want to hold money if its expected return was greater than the expected return from holding bonds. Keynes assumed that the expected return on money was zero because in his time, unlike today, most checkable deposits did not earn interest for bonds, there are two components of the expected return: the interest payment and the expected rate of capital gains.

You learned that when interest rates raise, the price of a bond falls if you expect interest rates to rise, you expect the price of the bond to fall and therefore suffer a negative capital gain that is, a capital loss. If you expect the rise in interest rates to be substantial

enough the capital loss might outweigh the interest payment and your expected return on the bond would be negative. In this case you would want to store your wealth as money because its expected return is higher; us zero return exceeds the negative return on the bond.

Keynes assumed that individuals believe that interest rates gravitate to some normal value (an assumption less plausible in today's world). If interest rates are below this normal value individuals expect the interest rate on bonds to rise in the future and so expect to suffer capital losses on them. As a result individuals will be more likely to hold their wealth as money rather than bonds and the demand for money will be high.

What would you expect to happen to the demand for money when interest rates above the normal value? In general people will expect interest rates to fall, bond prices to rise, and capital gains to be realized. At higher interest rates they are more likely to expect the return from holding a bond to be positive, thus exceeding the expected return from holding money. They will be more likely to hold bonds than money, and the demand for money will be quite low. From Keynes reasoning, we can conclude that as interest rates rise, the demand for money falls, and therefore money demand is negatively related to the level of interest rates.

Putting the Three Motives Together

In putting the three motives for holding money balances together into a demand for money equation, Keynes was careful to distinguish between nominal quantities and real quantities. Money is valued in terms of what it can buy if for example, all prices in the economy double (the price level doubles), the same minal quantity of money will be able to buy only half as nomany goods. Keynes thus reasoned that people want to hold a certain amount of real money balances (the quantity of money in real terms) an amount that their motives indicated would be related to real income Y and to interest rates i. Keynes wrote down the following demand for money equation, known as the liquidity preference function, which says that the demand for real money balances M^d/P is a function of (related to) I and y:[6]

$$\frac{M^d}{P} = \underset{- \ +}{\mathbf{f}\ (I.Y)} \qquad (4)$$

[6] - The classical economists' money demand equation can also be written in terms of real money balances by dividing both sides of Equation 3 by the price level P to obtain: $M^D = k \times Y$

The minus sign below I in the liquidity preference function means that the demand for real money balances is negatively related to the interest rate I, and the plus sign below Y means that the demand for real money balances and real income Y are positively related. This money demand function is the same one used in our analysis of money demand in Keynes's conclusion that the demand for money is related not only to income but also to interest rates is a major departure from Fisher's view of money demand, in which interest rates have no effect on the demand for money.

By deriving the liquidity preference function for velocity PY/M, we can see that Keynes's theory of the demand for money implies that velocity is not constant, but instead fluctuates with movements in interest rates. The liquidity preference equation can be rewritten as

$$\frac{P}{M^d} = \frac{1}{f(i, Y)}$$

Multiplying both sides of this equation by Y and recognizing that M^d can be replaced by M because they must be equal in money market equilibrium, we solve for velocity:

$$V = \frac{PY}{M} = \frac{Y}{f(i, Y)} \qquad (5)$$

We know that the demand for money is negatively related to interest rates; when I goes up, f (I,Y) declines , and therefore velocity rises. In other words, a rise in interest rates encourages people to hold lower real money balances for a given level of income; therefore, the rate at which money turns over (velocity) must be higher. This reasoning implies that because interest rates have substantial fluctuations, the liquidity preference theory of the demand for money indicates that velocity has substantial fluctuations as well.

An interesting feature of Equation 5 is that it explains some of the velocity movements in Figure 1, in which we noted that when recessions occur, velocity falls or its rate of growth declines what fact regarding the cyclical behavior of interest rates might help us explain this phenomenon You might recall that interest rates are procyclical, rising in expansions and falling recessions, the liquidity preference theory indicates that a rise in interest rates will cause velocity to rise also. The procyclical movements of interest rates should induce procyclical movements in velocity, and that is exactly what we see in Figure1.

Keyness model of the speculative demand for money provides another reason why velocity might show substantial fluctuations. What would happen to the demand for money if the view of the normal level to which interest rates & gravitate changes? For example, what if

people expect the future normal interest rate to be higher than the current normal interest rate? Because interest rates are then expected to be higher in the future, more people will expect the prices of bonds to fall and will anticipate capital losses. The expected returns from holding bonds will decline, and money will become more attractive relative to bonds. As a result, the demand for money will increase. This means that f (I, Y) will increase and so velocity will fall velocity will change as expectations about future normal levels of interest rates change, and unstable expectations about future movements in normal interest rates can lead to instability of velocity. This is one more reason why Keynes rejected the view that velocity could be treated as a constant

Further Developments in the Keynesian Approach

After world war Π economists began to take the Keynesian approach to the demand for money even further by developing more precise theories to explain the three Keynesian motives for holding money. Because interest rates were viewed as a crucial element in monetary theory, a Key focus of this research was to understand better the role of interest rates in the demand for money.

Transactions Demand

William Baumol and James Tobin independently developed similar demand for money models, which demonstrated that even money balances held for transactions purposes are sensitive to the level of interest rates.[7] In developing their models, they considered a hypothetical individual who receives a payment once a period and spends it over the course of this period. In their model, money, which earns zero interest, is held only because it can be used to carry out transactions.

To refine this analysis, let's say that Grant smith receives $1,000 at the beginning of the month and spends it on transaction that occur at a constant rate during the course of the month. If Grant Keeps the $ 1,000 in cash to carry out his transactions, his money balances follow the saw tooth pattern displayed in panel (a) of Figure 2. At the beginning of the month he has $1,000, and by the end of the month he has no cash left because he has spent it all. Over the course of the month, his holdings of money will on average be $500 (his holdings at the beginning of the month, $1,000, plus his holdings at the end of the month, $0, divided by 2).

[7] - William J Baumol, The Transactions Demand for Cash: An inventory. Theoretic Approach, Quarterly Journal of Economics 66 (1952): 545 - 556; James Tobin, The interest Elasticity of the Transactions Demand for Cash, Review of Economics and statistics 38 (1956): 241 - 247.

At the beginning of the next month, grant receives another $1,000 payment, which he holds as cash, and the same decline in money balances begins again. This process repeats monthly, and his average money balance during the course of the year is $500 since his yearly nominal income is $ 12,000 and his holdings of money average $500, the velocity of money (V = PY/M) is $ 12. 000/$500 = 24.

Suppose that as a result of taking money and banking course, Gram realizes that he can improve his situation by not always holding cash. In January, then, he decides to hold part of his $1,000 in cash and puts part of it into an income earning security such as bonds. At the beginning of each month, Grant Keeps $500 in cash and uses the other $500 to a Treasury bond. As you can see in panel (b), he starts out each month with $500 of cash, and by the middle of the month; his cash balance has run down to zero. Because bonds cannot be used directly to carry out transactions, Grant must sell them and turn them into cash so that he can carry out the rest of the months' transactions. At the middle of the month, then Grants cash balance rises back up to $500. By the end of the month, the cash is gone. When he again receives his next $1,000 monthly payment, he again divides it into $500 of cash and $500 of bonds, and the process continues. The net result of this process is that average cash balance

held during the month is $\$500/2 = \$250-$ just half of what it was before velocity has doubled to $\$12{,}000/\$250 = 48$.

FIGURE 2 Cash Balances in the Baumol-Tobin Model

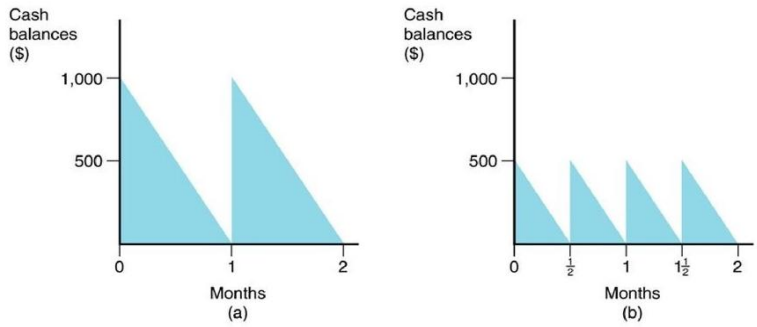


Figure 2 Cash Balances in the Baumol - Tobin Model
in pabel (a) , the $1,000 payment at the beginning of the month is held entirely in cash and is spent at a constant rate unit it is exhausted by the end of the month . in panel (b), half of the monthly payment is put into cash and the other half into bonds. At thre middle of the month, cash balances reach zero and bonds must be sold to bring balances up to $500. by the end of the month, cash balance again dw indie to zero

What has Grant Smith gained from his new strategy? He has earned interest on $\$500$ of bonds that he held for half the month. If the interest rate is 1% per month, he has earned an additional $\$2.50$ $(= {}^{1}/_{2} \times \$500 \times 1\%)\ per\ month$

Sounds like a pretty good deal, doesn't it? In fact, if he had kept $\$333.33$ in cash at the beginning of the month, he would have been able to hold $\$666.67$ in bonds for the first third of the month. Then he could have sold $\$333.33$ of bonds and held on to $\$333.34$ of bonds for the next third of the month. Finally, two –thirds of the way through the month, he would have had to sell the remaining bonds to raise

cash. The net result of this is that Grant would have earned $3.33 per month [= 1/3 × $666.67× 1%) + (1/3 × $333.34 × 1%)]. This is an even better deal. His average cash holdings in this case would be $333.33/2 = $166.67. Clearly, the lower his average cash balance, the more interest he will earn.

As you might expect, there is a catch to all this. In buying bonds, Grant incurs transaction costs of two types. First, he must pay a straight brokerage fee for the buying and selling of the bonds these fees increase when average cash balances are lower because Grant will be buying and selling bonds more often. Second, by holding less cash, he will have to take time to sell the bonds to get the cash. Because time is money, this must also be counted as part of the transaction costs.

Grant faces a trade-off if he holds very little cash, he can earn a lot of interest on bonds, but he will incur greater transaction costs. If the interest rate is high, the benefits of holding bonds will be high relative to the transaction costs, and he will hold more bonds and less cash. Conversely, if interest rates are low, the transaction costs involved in holding a lot of bonds may outweigh the interest payments, and Grant would then be better off holding more cash and fewer bonds.

The conclusion of the Baumol–Tobin analysis may be staled as follows: As interest rates increase, the amount of cash held for transaction purposes will decline, which in turn means that velocity will increase as interest rates increase.[8] Put another way, the transactions component of the demand for money is negatively related to the level of interest rates.

The basic idea in the Baumol–Tobin analysis 15 that there is an opportunity cost of holding money – the interest that can be earned on other assets. There is also a benefit to holding money – s– the avoidance of transaction costs. When interest rates increase, people will try to economize on their holdings of money for transactions purposes, because the opportunity cost of holding money has increased. By using Simple models, Baumol and Tobin revealed something that we might not otherwise have seen: that the transactions demand for money, and not just the speculative demand,

[8] - Similar reasoning leads to the conclusion that as brokerage fees increase, the demand for transactions money balances increases as well. When these fees rise, the benefits from holding transactions money balances increase because by holding these balances, an individual will not have to sell bonds as often thereby avoiding these higher brokerage costs. The greater benefits to holding money balances relative to the opportunity cost of interest forgone, then, lead to a higher demand for transactions balances.

will be sensitive to interest rates. The Baumol- Tobin analysis presents a nice demonstration of the value of economic modeling.[9]

Precautionary Demand

Models that explore the precautionary motive of the demand for money have been developed along limes similar to the Baumel- Tobin framework, so we will not go into great detail about them here. We have already discussed the benefits of holding precautionary money balances, but weighed against these benefits must be the opportunity cost of the interest forgone by holding money. We therefore have a trade-off similar to the one for transactions balances. As interest rates rise, the opportunity cost of holding precautionary balances rises, so the holdings of these money balances fall. We then have a result similar to the one found for the Baumol- Tobin analysis.[10] The precautionary demand for money is negatively related to interest rates.

[9] - The mathematics behind the Baumol - Tobin model can be found in an appendix to this chapter on this books web site at www.Myeconlab.com/mishkin

[10]- These models of the precautionary demand for money also reveal that as uncertainty about the level of future transactions grows the precautionary demand for money increase. This is so because grows uncertainty means that individuals are more likely to incur transaction costs if they are not holding precautionary balances. The benefits holding such balances then increases relative to the opportunity forgone interest, and so the demand for them rises.

Speculative demand Keyness analysis of the speculative demand for money will open to several serious criticisms. it indicated that an individual hold only money as a store of wealth when the expected return bonds is less than the expected return on money and holds o bonds when the expected return on bonds is greater than expected return on money. Only when people have expected returns on bonds and money that are exactly equal (a r instance) would they hold both. Keynes's analysis therefore implies that practically no one holds a diversified portfolio bonds and money simultaneously as a store of wealth. Because diversification is apparently a sensible strategy for choosing which assets to hold, the fact that it rarely occurs in Keynes's analysis a serious shortcoming of this theory of the speculative demand money.

Tobin developed a model of the speculative demand money that attempted to avoid this criticism of Keynes analysis.[11] His basic idea was that not do people care about the expected return on one asset versus another when they decide what to hold in their portfolio, but they also care about riskiness of the returns from each asset. Specifically, to assumed that most people are risk averse that they would willing to hold an asset with a lower expected return if it is

[11] - James Tobin, liquidity Preference as Behavior Towards Risk, of Economic studies 25 (1958): 65 - 86.

risky. An important characteristic of money is that its return certain; Tobin assumed it to be zero. Bonds, by contrast, can h substantial fluctuations in price, and their returns can be q risky and sometimes negative. So even if the expected returns bonds exceed the expected return on money, people might: want to hold money as a store of wealth because it has less risk associated with its return than bonds do.

The Tobin analysis also shows that people can reduce the total amount of risk in a portfolio by diversifying- that is, by holding both bonds and money. The model suggests that individuals will hold bonds and money simultaneously as stores of wealth. Because this is probably a more realistic description of people's behavior than Keynes's Tobin's rationale for the speculative demand for money seems to rest on more solid ground.

Tobin's attempt to improve on Keynes's rationale for the speculative demand for money was only partly successful, however. It is still not clear that the speculative demand even exists. What if there are assets that have no risk-like money-but earn a higher return will there be any speculative demand for money No, because an individual will always be better off holding such an asset rather than money. The resulting portfolio will enjoy a higher expected return yet has no higher risk. Do such assets exist in the American economy the answer is

yes. U.S. treasury bills and other assets that have no default risk provide certain returns that are greater than those available on money. Therefore, why would anyone want to hold money balances as a store of wealth (ignoring for the moment transactions and precautionary reasons)?

Although Tobin's analysis did not explain why money is held as a store of wealth, it was an important development in our understanding of how people should choose among assets. Indeed, his analysis was an important step in the development of the academic field of finance, which examines asset pricing and portfolio choice (the decision to buy one asset over another).

To sum up, further developments of the Keynesian approach have attempted to give a more precise explanation for that transactions, precautionary, and speculative demand for money. The attempt to improve Keynes's rationale for the speculative demand for money has been only partly successful: it is still not clear that this demand even exists. However, the model of the transactions and precautionary demand for money indicate that these components of money demand are negatively related to interest rates. Hence Keynes's proposition that the demand for money is sensitive to interest rates suggesting that velocity is not constant and that nominal

income might be affected by factor other than the quantity of money – is still supported.

Friedman's Modern Quantity Theory of Money

In 1956 Milton Friedman developed a theory of the demand for money in a famous article, " The quantity theory of money: A restatement"[12] Although Friedman frequently refer to Irving Fisher and the quantity theory, his analysis of the demand for money is actually closer to that of Keynes.

Like his predecessors, Friedman pursued the question of why people choose to hold money. Instead of analyzing the specific motives for holding money, as Keynes did Friedman simply stated that the demand for money must be influenced by the same factors that influence the demand for any assets Friedman then applied the theory of asset demand to money

The theory of asset demand indicates that the demand for money should be a function of the resources available to individuals (their wealth) and the expected returns on other assets relative to the expected return on money. Like Keynes, Friedman recognized that people want to hold a certain amount of real money balances (the

[12] - Milton Friedman, the Quantity, theory of money: A restatement, studies in the Quantity Theory of money, ed, Milton Friedman (Chicago university of Chicago press, 1956), pp. 3- 21.

quantity of money in real terms) from the reasoning Friedman expressed his formulation of demand for money as follows:

$$\frac{M^d}{P} = f\left(\underset{+}{Y_p}, r_b \bar{\_} r_m, r_e \bar{\_} r_m, \pi^e \bar{\_} r_m\right) \quad (6)$$

Where M^d/P = demand for real money balances

Y_P = Friedman's measure of wealth, known as permanent income (technically, the present discounted value of all expected future income, but more easily described as expected average long – run income)

r_m = expected return on money

r_b =expected return on bonds

r_e = expected return on equity (common stocks)

π^e =expected inflation rate

The signs underneath the equation indicate whether the demand for money is positively (+) related or negatively (−) related to the terms that are immediately above them.[13]

[13] - Friedman also added to his formulation a term h that represented the ratio of human to nonhuman wealth. He reasoned that if people had more permanent income coming from labor income and thus from their human capital, they would be less liquid than if they were receiving income from financial assets. In this case, they might want to hold more money because it is a more liquid asset than the alternatives. The term h plays no essential role in

Let us look in more detail at the variables in Friedman's money demand function and what they imply for the demand for money.

Because the demand for an asset is positively related to wealth, money demand is positively related to Friedman's wealth concept, permanent income (indicated by the plus sign beneath it). Unlike our usual concept of income, permanent income (which can be thought of as expected average long – run income) has much smaller short- run fluctuation, because many movement of income are transitory (short-lived), for example, in a business cycle expansion, income increases rapidly, but because some of this increase is temporary, average long-run income does not change very much. Hence in a boom, permanent income rises much less than income. During a recession, much of the income decline is transitory, and average long-run income (hence permanent income) falls less than income. One implication of Friedman's use of the concept of permanent income as a determinant of the demand for money is that the demand for money will not fluctuate much with business cycle movements.

An individual can hold wealth in several forms besides money. Friedman categorized them into three types of assets: bonds equity

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Friedman 's theory and has no important implications for monetary theory. That is why we ignore it in the money demand function.

(common stocks, an goods. e incentives for holding these assets rather than money are represented by the expected return on each of these assets relative to the expected return on money, the last three terms in the money demand function. The minus sign beneath each indicates that as each term rises, the demand for money will fall.

The expected return on money r_m, which appears in all three terms, is influenced by two factors:

(1) The services provided by banks on deposits included in the money supply, such as provision of receipts in the form of canceled checks or the automatic paying of bills. When these services are increased, the expected return from holding money rises.

(2) The interest payments on money balance. Now accounts and other deposits that are included in the money supply currently pay interest. As these interest payments rise, the expected return on money rises

The terms $r_b - r_m$ and $r_e - r_m$ represent the expected return on bonds and equity relative to money; as they rise, the relative expected return on goods relative to money. The expected return from holding goods is the expected rate of capital gains that occurs when their prices rise and hence is equal to the expected inflation rate π^e . if the expected inflation rate is 10%, for example, then goods prices are

expected to rise at a 10% rate, and their expected return is 10%. When $\pi^e - r_m$ rises, the expected return on goods relative to money rises, and the demand for money falls.

Distinguishing Between the Friedman and Keynesian Theories

There are several differences between Friedman's theory. One is that by including many assets as alternatives to money, Friedman recognized that more than one interest rate is important to the operation of the aggregate economy. Keynes, for his part, lumped financial assets other than money into one big category bands because he felt that their returns generally move together. If this is so, the expected return on bonds will be a good indicator of the expected return on other financial assets, and there will be no need to include them separately in the money demand function.

Also in contrast to Keynes, Friedman viewed money and goods as substitutes, that is, people choose between them when deciding how much money to hold. That is why Friedman included the expected return on goods relative to money as a term in his money demand function. The assumption that money and good are substitutes indicates that changes in the quantity of money may have a direct effect on aggregate spending

In addition, Friedman stressed two issues in discussing his demand for money function that distinguish it from Keyness liquidity preference theory. First Friedman did not take the expected return on money to be a constant, as Keynes did. When interest rates rise in the economy, banks make more profits on their loans, and they want to attract more deposits to increase the volume of their now more profitable loans. If there are no restrictions on interest payments on deposits, banks attract more deposits by higher interest rates on them. Because the industry is competitive, the expected return on money held as bank deposits then rises with the higher interest rates on bonds and loans. The banks compete to get deposits until there are no excess profits, and in doing so they close the gap between interest earned on loans and interest paid on deposits, the net result of this competition in the banking industry is that $r_b - r_m$ stays relatively constant when the interest rate I rises.[14]

What if there are restrictions on the amount of interest that banks can pay on their deposits? Will the expected return on money be a constant. As interest rates rise, will $r_b - r_m$ rise as well Friedman thought not. He argued that although banks might be restricted from

[14] - Friedman does suggest that there is some increase in $r_b - r_m$ when i r because pan of the money supply (especially currency) is held in form that cannot pay interest in a pecuniary or non-pecuniary from. See example, Milton Friedman, Why a Surge of inflation is likely years, Wall Street Journal, September 1, 1983, P. 24.

making pecuniary payments on their deposits, they can still compete on the quality dimension. For example, they can provide more services to depositors by hiring more tellers paying bills automatically, or making more cash machines available at accessible locations. The result of these improvements in money services is that the expected return from holding deposits will rise. So despite the restrictions on pecuniary interest payments, we might still find that a rise in market interest rates will raise the expected return on money sufficiently so that $r_b - r_m$ will remain relatively constant. Unlike Keynes's theory, which indicates that interest rates are an important determinant of the demand for money, Friedman's theory suggests that changes in interest rates should have little effect on the demand for money.

Therefore, Friedman's money demand function is essentially one in which permanent income is the primary determinant of money demand, and his money demand equation can be approximated by

$$\frac{M^d}{P} = f(Y_p)$$

In Friedman's view, the demand for money is insensitive to interest rates –s– not because he viewed the demand for money as insensitive to changes in the incentives for holding other assets relative to money, but rather because changes in interest rates should have little effect on these incentive terms in the money demand

function. The incentive terms remain relatively constant, because any rise in the expected returns on other assets as a result of the rise in interest rates would be matched by a rise in the expected return on money,

The second issue Friedman stressed is the stability of the demand for money function. In contrast to Keynes Friedman suggested that random fluctuations in the demand for money are small and that the demand for money can be predicted accurately by the money demand function. When combined with his view that the demand for money is insensitive to changes in interest rates, this means that velocity is highly predictable. We can see this by writing down the velocity that is implied by the money demand equation (Equation 7)

Because the relationship between Y and Y_p is usually quite predictable, a stable money demand function (one that does not undergo pronounced shifts, so that it predicts the demand for money accurately) implies that velocity is predictable as well. If we can predict what velocity will be to the next period, a change in the quantity of money will produce a predictable change in aggregate spending. Even though velocity is no longer assumed to be constant, the money supply continues to be the primary determinant of nominal income as in the quantity theory of money. Therefore, Friedman's

theory of money demand is to indeed a restatement of the quantity theory, because it leads to the same conclusion about the importance of money to aggregate spending.

You may recall that. We said that the Keynesian liquidly preference function (in which interest rates are an import determinant of the demand for money) is able to explain the procyclical movements of velocity that we find in the data. Friedman's money demand formulation explains this procyclical velocity phenomenon as well?

The key clue to answering this question is the presence permanent income rather than measured income in the money demand function. What happens to permanent income in business cycle expansion? Because much of the increase income will be transitory, permanent income rises much less thee income, Friedman's money demand function then indicates that the demand for money rises only a small amount relative to the rise in measured income, and Equation 8 indicates, velocity rises. Similarly, in a recession, the demand for money falls less than income, because the decline in permanent income is small relative to income, and velocity falls. In this way, we have the procyclical movement in velocity

To summarize, Friedman's theory of the demand for money used a similar approach to that of Keyness but did not go into detail about the motives for holding money. Instead, Friedman made use of the theory of asset demand to indicate that demand money will be a function of permanent income and the expect returns on alternative assets relative to the expected return money. There are two major differences between Friedman's theory and Keynes's, Friedman believed that changes in interest rates have little effect on the expected returns on other assets relative to money. Thus in contrast to Keynes, he viewed the demand for money as insensitive to interest rates. In addition, he differed from Keynes in stressing that the money demand function does not undergo substantial shifts and is, therefore stable. These two differences also indicate that velocity is predictable; yielding a quantity theory conclusion that money is the primary determinant of aggregate spending.

Empirical evidence on the demand for money

As we have seen, the alternative theories of the demand for money can have very different implications for our view of the role of money in the economy which of these theories is an accurate description of the real world is an important question, and it is the reason why evidence on the demand for money has been at the center of many debates on the effects of monetary policy on

aggregate economic activity here we examine the empirical evidence on the two primary issues that distinguish the different theories of money demand and affect their conclusions about whether the quantity of money is the primary determinant of aggregate spending: is the demand for money sensitive to changes in interest rates, and is the demand for money function stable over time?[15]

Interest rates and money demand

Earlier in the chapter, we saw that if interest rates do not affect the demand for money, velocity is more likely to be a constant –s– or at least predictable– so that the quantity theory view that aggregate spending is determined by the quantity of money is more likely to be true. However, the more sensitive the demand for money is to interest rates, the more unpredictable velocity will be, and the less clear the link between the money supply and aggregate spending will be. Indeed, there is an extreme case of ultra–sensitivity of the demand for money to interest rates, called the liquidity trap, in which monetary policy has no direct effect on aggregate spending, because a change in the money supply has no effect on interest rates. (If the demand for money is ultra–sensitive to interest rates, a tiny change in interest

[15] - If you are interested in a more detailed discussion of the empirical research on the demand for money, you can find it in an appendix to this chapter on this book's web sue at www.myeconlab.com/ mishkin

rates produces a very large change in the quantity of money demanded. Hence, in this case, the demand for money is completely flat in the supply and demand, therefore, a change in the money supply that shifts the money supply curve to the right or left results in it intersecting that flat money demand curve at the same unchanged interest rate).

The evidence on the interest sensitivity of the demand for money found by different researchers is remarkably consisted. Neither extreme case is supported by the data: in situations which nominal interest rates have not hit a floor of zero, the demand for money is sensitive to interest rates, and there is evidence that a liquidity trap has ever existed. They can to lower. In this situation, a liquidity trap has occurred because the demand for money is now completely flat. Indeed, Japan has been experiencing a liquidity trap of this type in recent years, which one reason why it has been difficult for Japanese monetary authorities to stimulate the economy.

Stability of money demand

If the money demand function, like Equation 4 or 6, unstable and undergoes substantial unpredictable shifts, as Keynes thought, then velocity is unpredictable, and the quantity of money may not be tightly linked LO aggregate spending, as it is in the modern quantity theory.

The stability of the money demand function is also crucial to whether the Federal Reserve should target interest rates or the money supply. Thus it is important look at the question of whether the money demand function stable, because it has important implications for how monetary policy should be conducted.

By the early 1970s, evidence strongly supported stability of the money demand function. However, after 1973, rapid pace of financial innovation, which changed which item could be used as money, led to substantial instability in estimate money demand functions. The recent instability of the money demand function calls into question whether our theories empirical analyses are adequate. It also has important implication for the way monetary policy should be conducted, because it is doubt on the usefulness of the money demand function as a provide guidance to policy makers. In particular, because the money demand function has become unstable, velocity is now harder to predict, setting rigid money supply targets to control aggregate spending in the economy may not be an effective way to conduct monetary policy.

Exercises

The earliest treatment of the demand for money was offered by the classical economists. The classical economists – most notably Irving Fisher – argued that the demand for money was a function of nominal aggregate income. The followed from their assumption regarding (1)..... the average number of times per year that a dollar is spent on final goods and services produced in the economy) and the equation of exchange.

The classical economists argued that the speed with which money is spent is a function of the institutional features of the economy. Although these features certainly change over time (due to improvements in technology, for example), velocity could be regarded as fixed in the short run.

Nothing more than an identity, the equation of (2) ..... states that the quantity of money time's velocity must equal nominal income. But when combined with Irving Fisher's assumption regarding the fixity of velocity, the equation of exchange is transformed into the quantity theory of (3) ..... . Given the assumption of constant velocity, the quantity theory of money implies that changes in nominal income are determined solely by changes in the quantity of money. The classical economists also

assumed that prices and wages were completely (4) ..... meaning that the economy would always remain at full employment. This last assumption meant that changes in the money supply had no effect on aggregate output and could therefore affect only the (5) .....

Dividing both sides of the equation of exchange by the constant velocity makes clear that the quantity of money people hold is a constant fraction of nominal income. Thus, the classical economists regarded the demand for money as a demand for a medium of exchange.

The Cambridge economists criticized the quantity theory of money as too mechanistic. Instead, they focused on the factors influencing how much money individuals would want to hold. Like Fisher. They regarded the level of income as the most significant factor influencing people's holdings of money. But they also believed that changes in (6) .....could affect individuals' decisions about using money as a store of wealth.

John Maynard Keynes believed that a decline in velocity in part explained the Great Depression, and his efforts to explain this decline in velocity led to his theory of money demand, which he called (7) ..... theory. Keynes contended that there were three

separate and distinct motives for holding money: the transactions motive, the precautionary motive, and the (8) .....motive.

It was the speculative motive that distinguished Keynes's theory from the other theories. Keynes argued that interest rates played an important role in determining the amount of wealth people desire to hold in the form of money. Though bonds pay interest, a rise in interest rates causes bond values to (9) ..... subjecting their holders to capital losses and even negative returns if bond values fall significantly. thus at low rates of interest, people reduce their holdings of bonds and hold more money as they expect interest rates to rise, returning to their normal levels. Therefore, Keynes concluded that the demand for money was (10) .....related to the level of interest rates.

Since Keynes's early attempt, economists have improved on his analysis providing a better rational for the (11) ..... relationship between interest rates and velocity. the works of Baumol and Tobin indicate that the transaction component (and, by extension, the precautionary component) of the demand for money is negatively related to the level of interest rates.

Milton Friedman has offered an alternative explanation for the (12) .....behavior of velocity. Rather than rely on the procyclical behavior of interest rates, Friedman argues that since changes in actual income exceed changes in permanent income, velocity will tend to move procyclically.

Friedman–noting that the interest rate paid on checking deposits tends to move with market rates so that the differential between market interest rates and the interest rate paid on money remains relatively constant – believes that changes in interest rates will have little effect on the demand for money. This result does not require the absence of deposit rate ceilings, as banks pay implicit interest on deposits by providing "free" services such as branch offices, more tellers, or "free" checking. Friedman's modern quantity theory of money is consistent with the procyclical behavior of velocity, as are the other modern money demand stories. We see that the anticipated effectiveness of fiscal [policy depends upon one's view of money demand

Research on demand for money indicates that while the demand for money is sensitive to interest rates, there is little evidence that the liquidity trap has ever existed. also, because of the rapid pace of financial innovation , since 1973, the demand for money has been quite unstable.

Exercises

Exercise1: The Keynesian approach to money demand

a- What are the three motives behind the demand for money postulated by Keynes؟

1-……

2-……

3-……

B- What motive did Keynes believe was a function of the interest rate?

1-……

C- Tobin's model of the speculative demand for money shows that people hold money as a store of wealth as a way of reducing.

1-……

Exercise 2: velocity and the quantity theory of money

Complete the following table

	M	V	P	Y
	200	5	1	1000
1	200	6	2	
2	300	5	1.5	
3	400	6		1200
4	400		1	1600
5		5	2	2000

Exercise3: The Demand for Money

indicate whether the following statements are associated with Fisher's quantity theory of money (Q), the Cambridge approach to money demand (C), Keynes's liquidity preference theory (K) or with Friedman's modern quantity theory of money (F) place the appropriate letter in the blank: to the left of the statement

1- Interest rates have no effect on the demand for money.

2- Money has two properties explaining why people want to hold it: money functions as a medium of exchange and as a store of wealth.

3- The demand for money is proportional to income, but the effect of interest rates on the demand for money cannot be completely ignored.

4- There are three distinct motives for holding money: (a) a transactions motive where money balances are held if there is imperfect synchronization between receipts and expenditures; (b) a precautionary motive. Where money is held because of uncertainty of future expenditures; and (c) a speculative motive, where money is held if bonds are expected to fall in value.

5-Permanent income is the primary determinant of money demand, and changes in interest rates should have little effect on the demand for money

6-The demand for money is insensitive to interest rates, not because the demand for money is insensitive to changes in the opportunity cost of holding money, but because changes in interest rates actually have little effect on the opportunity cost of holding money.

7-More recent developments in this approach suggest that interest rates are important to the transactions and precautionary components of money demand, as well as to the speculative component.

8-The transactions and precautionary components of the demand for money are proportional to income, while the speculative component is negatively related to the level of interest rates.

9- Movements in the price level result solely from changes in the quantity of money

10-The demand for money is purely a function of income; interest rates have no effect on the demand for money.

11-Theory that offered an explanation for the decline in velocity during the Great Depression.

12-The demand for money is a function of both permanents income and the opportunity cost of holding money.

Self -Test

Part A: true - false questions

Circle whether the following statements are true (T) or false (F)

1- The equation of exchange states that product of the quantity of money and the average number of times that a dollar is spent on final goods and services in a given period must equal nominal income

2- Irving Fisher argued that velocity would be relatively constant in the short run, since institutional feature of the economy. Such as the speed at which checks were cleared, were likely to change only slowly over time.

3- The classical economist's contention that velocity could be regarded as a constant transformed the equation of exchange (an identity) into the quantity theory of money.

4- The Cambridge economists argued that the demand for money was unaffected by changes in interest rates.

5- at relatively low interest rates people might be reluctant to hold money due to a concern about capital losses should interest rates rise.

6- Keynes's liquidity preference theory offered an explanation for why velocity had fallen during the Great Depression.

7- The demand for money approach developed by Keynes is consistent with the procyclical movements in velocity observed in the United States.

8- Studies by economists in the 1950s found evidence that even the transactions motive for holding money was sensitive to the level of interest rates.

9- James Tobin suggested that people might prefer to hold money to bonds as a store of wealth as an effort to reduce risk.

10-The permanent income argument in Friedman's demand for money formulation suggests that velocity will fluctuate with business cycle movements.

Part B: Multiple- choice questions

Circle the appropriate answer.

1- The quantity theory of money suggests that cutting the money supply by one- third will lead to

a- a sharp decline in output by one-third in the short run and a decline in the price level by one-third in the long run.

b- a decline in output by one- third

c- decline in output by one sixth and a decline in the price level by one sixth.

d- a decline in the price level by one-third.

e- none of the above.

2- The classical economists believed that velocity could be regarded as constant in the short run, since

a- institutional factors, such as the speed with which checks were cleared though the banking system, changed slowly over time.

b- The opportunity cost of holding money was close to zero.

c- financial innovation tended to offset changes in interest rates.

d- none of the above are true.

3- Empirical evidence supports the contention that

a-velocity tends to be procyclical; that is, velocity declines (increases) when economic activity contracts (expands).

b-velocity tends to be countercyclical; that is, velocity declines (increases) when economic activity contracts (expands).

c-velocity tends to be countercyclical; that is, velocity increases

(declines) when economic activity contracts (expands).

d- velocity is essentially a constant.

4- Keynes's liquidity preference theory explains why velocity can be expected to rise when.

a- income increases

b- wealth increases

c- brokerage commissions increase

d- interest rates increase

5- Keynes argued that people were more likely to increase their money holdings if they believed that

a- interest rates were about to fall

b- bond prices were about to rise

c- bond prices were about to fall

d- none of the above was true.

6- The Baumol- Tobin analysis suggests that

a- velocity is relatively constant.

b-the transactions component of money demand is negatively related to the level of interest rates.

c- the speculative motive for money is nonexistent

d- both (a) and (c) of the above are true

e- both (b) and (c) of the above are true.

7- One possible implication of the elimination of deposit rate ceiling is that the implicit interest rate on money will more closely approach bond rates. This suggests that changes in interest rates will

a- have a greater impact on money demand

b- have less effect on the demand for money

c- no longer affect the speculative demand for money

d- cause velocity to become more volatile.

8- Milton Friedman argues that the demand for money is relatively insensitive to interest rates because

a- the demand for money is insensitive to changes in the opportunity cost of holding money

b- competition among banks keeps the opportunity cost of holding money relatively constant.

c- people base their investment decisions on expected profits not interest rates.

d- transactions are not subject to scale economics as wealth increases.

9- Friedman's belief regarding the interest insensitivity of the demand for money implies that

a- the quantity of money is the primary determinant of aggregate spending.

b- velocity is countercyclical

c- both (a) and (b) of the above are correct

d- neither (a) nor (b) of the above are correct

10- In Friedman's view, because income tends to decline relative to permanent income during business cycle contractions, the demand for money with respect to actual income will increase causing velocity to

a- rise

b- decline

c- remain unchanged, since velocity is only sensitive to changes in interest rates.

d- decline, provided that interest rates increase when the economy contracts.

chapter three

the demand money

Part A True – false questions

Circle whether the following statements are true (T) or false (F)

1) the equation of exchange relates nominal income to the quantity of money and velocity

2) according to classical, the velocity would normally be reasonable constant in the long run

3) according to classical, there negative relation between the velocity and quantity of money

4) according to classical, there negative relation between the velocity and the nominal GDP

Part B multiple – Choice questions

Circle the appropriate answer

1) is a theory of how the nominal value of aggregate income is determined

a) liquidity theory

b) modern quantity theory of money

c) classic quantity theory of money

d) none of the above

2) the velocity is calculated by formula

a) V = P.Y/M*** b) V = P.M/Y

c) V = M.P/Y d) V = Y.M / P

3) According to fisher the demand for money is determined by

a) the level of transactions generated by the level of nominal income PY

b) the institutions in the economy that affect the way people conduct transactions

c) a and b

d) none of the above

4) According to Keynes's the motive behind the demand for money

a) the transactions motive b) precautionary

c) speculative motive d) all of the above

5) According to Keynes, the motive for transactions that individuals expect to make in the future and that these transactions are proportional to income

a) the transactions motive b) precautionary motive

c) speculative motive d) all of the above

6) according to Friedman indicates that demand for money should a function of the resources available to individuals

a) the asset demand theory b) modern quantity theory

c) classical quantity theory d) the liquidity theory

7) The quantity theory of money is a theory of

a) how the money supply is determined

b) how interest rates are determined

c) how the nominal value of aggregate income is determined

d) all of the above

8) Because the quantity theory of money tells us how much money is held for a given amount of aggregate income. it is also a theory of

a) interest −rate determination

b) the demand for money

c) exchange rate determination

d) none of the above

9) The average number of times that a dollar is spent in buying the total amount of final goods and services produced during a given time period is known as

a) gross national product

b) the spending multiplier

c) the money multiplier

d) velocity

10) the velocity of money is

a) the average number of times that a dollar is spent in buying the total amount of final goods and services

b) the ratio of the money stock to high − powered money

c) the ratio of the money stock to interest rates

d) none of the above

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Chapter four

Multiple Deposit Creation and the Money Supply Process

Multiple Deposit Creation and the Money Supply Process

Preview

As we will see in later chapters on monetary theory, movements in the money supply affect interest rates and the overall health of the economy and thus affect us all. Because of its far-reaching effects on economic activity, it İs important to understand how the money supply is determined. Who controls it? What causes it to change? How might control of it be improved? In this and subsequent chapters, we answer these questions by providing a detailed description of the money supply process, the mechanism that determines he level of the money supply.

Because deposits at banks are by far the largest component of the money supply, understanding how these deposits are created is the first step in understanding the money supply process. This chapter provides an overview of bow the banking system creates deposits, and describes the basic principles of the money supply, needed to understand later chapters>

FOUR PLAYERS IN THE MONEY SUPPLY PROCESS

The "cast of characters" in the money supply story is as follow:

1. The central bank – the government agency that oversees the banking system and is responsible for the conduct of monetary policy; in the United States, it is called the Federal Reserve System

2. Banks (depository institutions) the financial intermediaries that accept deposits from individuals and institutions and make loans: commercial banks, savings and loan associations, mutual savings banks, and credit unions

3. Depositors individuals and institutions that hold deposits in banks

4. Borrowers from banks – individuals and institutions that borrow from the depository institutions and institutions that issue bonds that are purchased by the depository institutions

Of the four players, the central bank the Federal Reserve System--is the most important. The Fed's conduct of monetary policy involves actions that affect its balance sheet (holdings of assets and liabilities), to which we turn now.

THE FED'S BALANCE SHEET

The operation of the Fed and its monetary policy involve actions that affect is balance sheet, its holdings of assets and liabilities. Here we discuss a simplified balance sheet that includes just four items that are essential to our understanding of the money supply process.

Federal Reserve System	
Assets	Liabilities
Government securities Discount loans	Currency in circulation Reserves

Liabilities

The two liabilities on the balance sheet, currency in circulation and reserves, are often referred to as the monetary liabilities of the Fed, They are an important part of the money supply story, because increases in either or both will lead to an increase in the money supply (everything else being constant), The sum of the Fed's monetary liabilities (currency in circulation and reserves) and the US, Treasury's monetary liabilities (Treasury currency in circulation, primarily coins) is called the monetary base, When the monetary base, we will focus only on the monetary liabilities of the Fed because

the monetary liabilities of the Treasury account for less than 10% of the base.

1. Currency in circulation. The Fed issues currency (those green and-gray pieces of paper in your wallet that say "Federal Reserve Note" at the top). Currency in circulation is the amount of currency in the hands of the public, Currency held by depository institutions is also a liability of the Fed, but is counted as part of the reserves.

Federal Reserve notes are IOUs from the Fed to the bearer and are also liabilities, but unlike most, they promise to pay back the bearer solely with Federal Reserve notes, that is, they pay off IOUs with other IOUs. Accordingly, if you bring a $100 bill to the Federal Reserve and demand payment, you will receive two $50s, five $205, ten $10, or one hundred $1 bills.

People are more willing to accept IOUs From the Fed than From you or me because Federal Reserve notes are a recognized medium of exchange; that Is, they are accepted as a means of payment and so function as money Unfortunately, neither you nor I can convince people that our 1OUs are worth anything more than the paper they are written on.

2. Reserves. All banks have an account at the Fed in which they hold deposits. Reserves consist of deposits at the Fed plus currency that is

physically held by banks (called vault cash because it is stored in bank vaults) Reserves are assets for the banks but liabilities for the Fed, because the banks can demand payment on them at any time and the Fed is required to satisfy its obligation by paying Federal Reserve notes, As you will see, an increase in reserves leads to an increase in the level of deposits and hence in the money supply

Total reserves can be divided into two categories: reserves that the Fed requires banks to hold (required reserves) and any additional reserves the banks cho0sc to hold (excess reserves) For example, the Fed might require that for every dollar of deposits at a depository institution, a certain fraction (say, 10 cents) must be held as reserves. This fraction (10%) is called the required reserve ratio. Currently, the Fed pays no interest on reserves

Assets

The two assets on the Feds balance sheet are important for two reasons. First, changes in the asset items lead to changes in reserves and consequently to changes in the money supply. Second, because these assets (government securities and discount loans) earn interest while the liabilities (currency in circulation and reserves) do not, the Fed makes billions of dollars every year–its assets earn income, and its liabilities cost nothing. Although it returns most of its earnings to

the federal government, the Fed does spend some of it on "worthy causes, such as supporting economic research.

1. Government securities. This category of assets covers the Feds holdings of securities issued by the U.S, Treasury As you will see, the Fed provides reserves to the banking system by purchasing securities, thereby increasing is holdings of these assets. An increase in government securities held by the Fed leads to an increase in the money supply.

2. Discount loans. The Fed can provide reserves to the banking system by making discount loans to banks. For these banks, the discount loans they have taken out are referred to as borrowings from the Fed or, alternatively, as borrowed reserves. These loans appear as a liability on banks' balance sheets. An increase in discount loans can also be the source of an increase in the money supply. The interest rate charged banks for these loans is called the discount rate.

CONTROL OF THE MONETARY BASE

The monetary base (also called high-powered money) equals currency in circulation C plus the total reserves in banking system R. The monetary base MB can be expressed as

$$MB = C + R$$

The Federal Reserve exercises control over the monetary base through its purchases or sale of government securities in the open market, called open market operations, and through its extension of discount loans to banks.

Federal Reserve Open Market Operations

The primary way in which the Fed causes changes in the monetary base $100 through its open market operations. A purchase of bonds by the Fed is called an open market purchase, and a sale of bonds by the Fed is called an open market sale.

Open Market Purchase from a Bank. Suppose that the Fed purchases $100 of bonds from a bank and pays for them with a $100 check To understand what occurs as a result of this transaction, we look at T-accounts, which list only the changes that occur in balance sheet items starting from the initial balance sheet position. The bank will either deposit the check in its account with the Fed or cash it in for currency, which will be counted as vault cash. Either action means that the bank will find itself with $100 more reserves and a i reduction in its holdings of securities of $100 The T-account for the banking system, then, is

Banking System	
Assets	Liabilities
Securities − $100	
Reserves +$100	

The Fed, meanwhile, finds that its liabilities have increased by the additional $100 of reserves, while its assets have increased by the $100 of additional securities that it now holds. Its T−account is

Federal Reserve System	
Assets	Liabilities
Securities − $100	Reserves +$100

The net result of this open market purchase is that reserves have increased by $100, the amount of the open market purchase. Because there has been no change of currency in circulation, the monetary base has also risen by S100.

Open Market Purchase from the Nonbank Public. To understand what happens when there is an open market purchase from the nonbank public, we must look at two cases. First, let's assume that the person or corporation that sells the $100 of bonds to the Fed deposits the Feds check in the local bank. The nonbank public's T−account after this transaction is

Nonbank Public	
Assets	Liabilities
Securities − $100 Checkable deposits +$100	

When the hank receives the check, it credits the depositor's account with the $100 and then deposits the check in its account with the Fed, thereby adding to its reserves. The banking system's T−account becomes

Banking System			
Assets		Liabilities	
Reserves	+$100	Checkable deposits	+$100

The effect on the Feds balance sheet is that it has gained $100 of securities in its assets column, while it has an increase of S100 of reserves in its liabilities column:

Federal Reserve System			
Assets		Liabilities	
Securities	+ $100	Reserves	+$100

As you can see in the above T−account, when the Feds check is deposited in a bank the net result of the Fed's open market purchase from the nonbank public is identical to the effect of its open market

purchase from a bank: Reserves increase by the amount of the open market purchase, and the monetary base increases by the same amount.

If, however, the person or corporation selling the bonds to the Fed cashes the Fed's check either at a local bank or at a Federal Reserve bank for currency, the effect on reserves is different. This seller will receive currency of SI 00 while reducing holdings of securities by $\$100$. The bond seller's T-account will be

Nonbank Public	
Assets	Liabilities
Securities − $\$100$ Checkable deposits +$\$100$	

The Fed now finds that it has exchanged S100 of currency for $\$100$ of securities, so its T-account is

Federal Reserve System	
Assets	Liabilities
Securities + $\$100$	Currency in circulation +$\$100$

The net effect of the open market purchase in this case is that reserves are unchanged while currency in circulation increases by the $\$100$ of the open market purchase. Thus the monetary base

increases by the $100 amount of the open market purchase, while reserves do not. This contrasts with the case in which the seller of the bonds deposits the Fed's check in a bank; in that case, reserves increase by $100, and so does the monetary base.

The analysis reveals that the effect of an open market purchase on reserves depends on whether the seller of the bonds keeps the proceeds from the sale in currency or in deposits. If the proceeds are kept in Currency, the open market purchase has no effect on reserves; if the proceeds are kept as deposits, reserves increase by the amount of the open market purchase.

The effect of an open market purchase on the monetary base, however, is always the same (the monetary base increases by the amount of the purchase) whether the seller of the bonds keeps the proceeds in deposits or in currency. The impact of an open market purchase on reserves is much more uncertain than its impact on the monetary base.

Open Market Sale. If the Fed sells $100 of bonds to a bank or the nonbank public, the monetary base will decrease by $100. For example, if the Fed sells the bonds to an individual who pays for them with currency, the buyer exchanges $100 of currency for S100 of bonds, and the resulting T-account is

Nonbank Public	
Assets	Liabilities
Securities + $100 Currency −$100	

The Fed, for its part, has reduced its holdings of securities by $100 and has also lowered its monetary liability by accepting the currency as payment for its bonds. Thereby reducing the amount of currency in circulation by $100:

Federal Reserve System			
Assets		Liabilities	
Securities	− $100	Currency in circulation	−$100

The effect of the open market sale of $100 of bonds is to reduce the monetary base by an equal amount, although reserves remain unchanged. Manipulations of T-accounts in cases in which the buyer of the bonds is a bank or the buyer pays for the bonds with a check written on a checkable deposit account at a local bank lead to the same $100 reduction in the monetary base, although the reduction occurs because the level of reserves has fallen by $100.

The following conclusion can now be drawn from our analysis of open market purchases and sales: The effect of open market operations on the monetary base is much more certain than the effect

on reserves. Therefore, the Fed can control the monetary base with open market operations more effectively than it can control reserves.

Open market operations can also be done in other assets besides government bonds and have the same effects on the monetary base we have described here.

Shifts from Deposits into Currency

Even if the Fed does not conduct open market operations, a shift from deposits to currency will affect the reserves in the banking system. However, such a shift will have no effect on the monetary base, another reason why the Fed has more control over the monetary base than over reserves.

Let's suppose that Jane Brown (who opened a $100 checking account at the First National Bank) decides that tellers are so abusive in all banks that she closes her account by withdrawing the $100 balance in cash and vows never to deposit it in a bank again. The effect on the T-account of the nonbank public is

Nonbank Public	
Assets	Liabilities
Checkable deposits −$100 Currency +$100	

The banking system loses $100 of deposits and hence S100 of reserves:

Banking System			
Assets		Liabilities	
Reserves	−$100	Checkable deposits	−$100

For the Fed, Jane Browns action means that there is $l00 of additional currency circulating in the hands of the public, while reserves in the banking system have fallen by $100. The Feds T−account is

Federal Reserve System			
Assets		Liabilities	
		Currency in circulation	+$100
		Reserves	− $100

The net effect on the monetary liabilities of the Fed is a wash; the monetary base is unaffected by Jane Brown's disgust at the banking system. But reserves are affected. Random fluctuations of reserves can occur as a result of random shifts into currency and out of deposits, and vice versa. The same is not true for the monetary base, making it a more stable variable,

Discount Loan

In this chapter so far we have seen changes in the monetary base solely as a result of open market operations, However, the monetary base is also affected when the Fed makes a discount loan to a bank, When the Fed makes a $100 discount loan to the First National Bank, the bank is credited with $100 of reserves from the proceeds of the loan. The effects on the balance sheets of the banking system and the Fed are illustrated by the following T-accounts:

Banking System		Federal Reserve System	
Assets	Liabilities	Assets	Liabilities
Reserves +$100	Discount +$100 Loan (borrowing From the Fed)	Discount +$100 Loan (borrowing From the Fed)	Reserves +$100

The monetary liabilities of the Fed have now increased by $100, and the monetary base, too, has increased by this amount, However, if a bank pays off a loan from the Fed, thereby reducing its borrowings from the Fed by S100, the T-accounts of the banking system and the Fed are as follows:

Banking System		Federal Reserve System	
Assets	Liabilities	Assets	Liabilities
Reserves −$100	Discount −$100 Loan (borrowing From the Fed)	Discount −$100 Loan (borrowing From the Fed)	Reserves −$100

The net effect on the monetary liabilities of the Fed, and hence on the monetary base, is a reduction of S100. We see that the monetary base changes one−for−one with the change in the borrowings from the Fed.

Other Factors That Affect the Monetary Base

So far in this chapter, it seems as though the Fed has complete control of the monetary base through its open market operations and discount loans. However, the world is a little bit more complicated for the Fed. Two important items that are not controlled by the Fed but affect the monetary base are float and Treasury deposits at the Fed. When the Fed clears checks for banks, it often credits the amount of the check to a bank that has deposited it (increases the banks reserves) but only later debits (decreases the reserves of) the bank on which the check is drawn. The resulting temporary net increase in the total amount of reserves in the banking system (and hence in the

monetary base) occurring from the Feds check-clearing process is called float, When the U.S. Treasury moves deposits from commercial banks to its account at the Fed, leading to an increase in Treasury deposits at the Fed, it causes a deposit outflow at these banks like that shown in thus causes reserves In the banking system and the monetary base to decrease. Thus float (affected by random events such as the weather, which affects how quickly checks are presented for payment) and Treasury deposits at the Fed (determined by the U.S. Treasury's actions) both affect the monetary base but are not fully controlled by the Fed. Decisions by the U.S, Treasury to have the Fed intervene in the foreign exchange market also affect the monetary base.

Overview of the Fed's Ability to Control the Monetary Base

The factor that most affects the monetary base is the Feds holdings of securities, which are completely controlled by the Fed through its open market operations. Factors not controlled by the Fed (for example, float and Treasury deposits with the Fed) undergo substantial short-run variations and can be important sources of fluctuations in the monetary base over time periods as short as a week. However, these fluctuations are usually predictable and so can be offset through open market operations. Although float and Treasury deposits with the Fed undergo substantial short-run fluctuations,

which complicate control of the monetary base, they do not prevent the Fed from accurately controlling it.

MULTIPLE DEPOSIT CREATION: A SIMPLE MODEL

With our understanding of how the Federal Reserve controls the monetary base and how banks operate (Chapter 9), we now have the tools necessary to explain how deposits are created When the Fed supplies the banking system with $1 of additional reserves, deposits increase by a multiple of this amount – a process called multiple deposit creation.

Deposit Creation: The Single Bank

Suppose that the $100 open market purchase described earlier was conducted with the First National Bank. After the Fed has bought the $100 bond from the First National Bank, the bank finds that it has an increase in reserves of $100. To analyze what the bank will do with these additional reserves, assume that the bank does not want to hold excess reserves because it earns no interest on them. We begin the analysis with the following T-account:

First National Bank		
Assets		Liabilities
Securities	- $100	
Reserves	+ $100	

Because the bank has no increase in its checkable deposits, required reserves remain the same, and the bank finds that its additional $100 of reserves means that its excess reserves have increased by $100. Let's say that the bank decides to make a loan equal in amount to the $100 increase in excess reserves. When the bank makes the loan. it sets up a checking account for the borrower and puts the proceeds of the loan into this account. In this way the bank alters its balance sheet by increasing its liabilities with $100 of checkable deposits and at the same time increasing its assets with the $l00 loan. The resulting T-account looks like this:

First National Bank			
Assets		Liabilities	
Securities	- $100	Checkable deposits	+$100
Reserves	+ $100		
Loans	+$100		

The batik has creed checkable deposits by its act of lending. Because checkable deposits are part of the money supply, the bank's act of lending has, in fact, created money. In its current balance sheet position, the First National Bank still has excess reserves and so might want to make additional loans. However, these reserves will not stay at the bank for very long. The borrower took out a loan not to

leave $100 idle at the First National Bank but to purchase goods and services from other individuals and corporations. When the borrower makes these purchases by writing checks, they will be deposited at other banks, and the $100 of reserves will leave the First National Bank. A bank cannot safely make loans for an amount greater than the excess reserves it has before it makes the loan.

The final T- account of the First National Bank is

First National Bank		
Assets		Liabilities
Securities	- $100	
Reserves	+ $100	

The increase in reserves of $100 has been converted into additional loans of $100 at the First National Bank, plus an additional $100 of deposits that have made their way to other banks. (All the checks written on accounts at the First National Bank are deposited in banks rather than converted into cash, because we are assuming that the public does not want to hold any additional currency.) Now let's see what happens to these deposits at the other banks.

Deposit Creation: The Banking System

To simplify the analysis, let us assume that the $l00 of deposits created by First National Banks loan is deposited at Bank A and that this bank and all other banks hold no excess reserves. Bank A's T-account becomes

Bank A	
Assets	Liabilities
Reserves + $100	Checkable deposits + $100

If the required reserve ratio is 10%, this bank will now find itself with a $10 increase in required reserves, leaving it S90 of excess reserves. Because Bank A (like the First National Bank) does not want to hold on to excess reserves, it will make loans for the entire amount. ILs loans and checkable deposits will then increase by $90, but when the borrower spends the $90 of checkable deposits, they and the reserves at Bank A will fall back down by this same amount. The net result is that Bank As T-account will look like this:

Bank A	
Assets	Liabilities
Reserves + $10 Loans +$90	Checkable deposits + $100

If the money spent by the borrower to whom Bank A lent the S90 is deposited in another bank, such as Bank B, the T-account for Bank B will be

Bank B	
Assets	Liabilities
Reserves + $90	Checkable deposits + $90

The checkable deposits in the banking system have increased by another $90, for a total increase of $190 ($100 at Bank A plus $90 at Bank B). In fact, the distinction between Bank A and Bank B is not necessary to obtain the same result on the overall expansion of deposits. If the borrower from Bank A writes checks to someone who deposits them at Bank A, the same change in deposits would occur. The T-accounts for Bank B would just apply to Bank A, and its checkable deposits would increase by the total amount of $190.

Bank B will want to modify its balance sheet further It must keep 10% of $90 ($9) as required reserves and has 90% of $90 ($81) in excess reserves and so o can make loans of this amount. Bank B will make an $81 loan to a borrower, who spends the proceeds from the loan. Bank B's T-account will be

Bank B			
Assets		Liabilities	
Reserves	+ $9	Checkable deposits	+ $90
Loans	+$81		

The $81 spent by the borrower from Bank B will be deposited in another bank (Bank C). Consequently, from the initial S100 increase of reserves in the banking system, the total increase of checkable deposits in the system so far is $271 (= S100 + $90 + $81).

Following the same reasoning, if all banks make loans for the full amount of their excess reserves, further increments in checkable deposits will continue (at Banks C, D, E, and so on), as depicted in Table 1. Therefore, the total increase in deposits from the initial $100 increase in reserves will be $1,000: The increase is tenfold, the reciprocal of the 10% (0.10) reserve requirement.

If the banks choose to invest their excess reserves in securities, the result is the same. If Bank A had taken its excess reserves and purchased securities instead of making loans, its T-account would have looked like this:

Bank A			
Assets		Liabilities	
Reserves	+ $10	Checkable deposits	+ $100
Securities	+$90		

When the bank buys $90 of securities, it writes a $90 check to the seller of the securities, who in turn deposits the $90 at a bank such as Bank B. Bank B's checkable deposits increase by s90, and the deposit expansion process is the same as before Whether a bank chooses to use its excess reserves to make loans or to purchase securities, the effect on deposit expansion is the same.

You can now see the difference in deposit creation for the single bank versus the banking system as a whole. Because a single bank can create deposits equal only to the amount of its excess reserves, it cannot by itself generate multiple deposit expansion. A Single bank cannot make loans greater in amount than its excess reserves, because the bank will lose these reserves as the deposits created by the loan find their way to other banks However, the banking system as a whole can generate a multiple expansion of deposits, because when a bank loses its excess reserves, these reserves do not leave the banking system even though they are lost to the individual bank. So as each bank makes a loan and creates deposits, the reserves find their way to another bank, which uses them to make additional

loans and create additional deposits. As you have seen, this process continues until the initial increase in reserves results in a multiple increase in deposits.

TABLE 1	Creation of Deposits (assuming 10% reserve requirement and a $100 Increase in reserves)		
Bank	Increase in Deposits ($)	Increase in Loans ($)	Increase in Reserves ($)
First National	0.00	100.00	0.00
A	100.00	90.00	10.00
B	90.00	81. 00	9.00
C	81. 00	72.90	8. 10
D	72.90	65.61	7. 29
E	65.61	59.05	6. 56
F	59.05	53.14	5. 91
.	.	.	.
.	.	.	.
.	.	.	.
Total for all banks	l,000.00	l,000.00	l00.00

The multiple increase in deposits generated from an increase in the banking systems reserves is called the simple deposit multiplier". In our example with a l0% required reserve ratio, the simple deposit multiplier is 10 More generally, the simple deposit multiplier equals the reciprocal of the required reserve ratio, expressed as a fraction $(10 = 1/0.10)$, so the formula for the multiple expansion of deposits can be written as follows:

$$\Delta D = \frac{1}{r} X \Delta R \qquad (1)$$

Where ΔD = change in total checkable deposıts in the banking system

r = required reserve ratio $(0.10$ in the example$)$

ΔR = change in reserves lor the banking system $(\$100$ in the example$)$'

Deriving the Formula for Multiple Deposit Creation

The formula for the multiple creation of deposits can also be derived directly using algebra. We obtain the same answer for the relationshıp between a change in deposits and a change in reserves, but more quickly.

Our assumption that banks do not hold on to any excess reserves means that the total amount of required reserves for the banking system RR will equal the total reserves in the banking system R:

$$RR = R$$

The total amount of required reserves equals the required reserve ratio r times the total amount of checkable deposits D:

$$RR = r \times D$$

Substituting r X D for RR in the first equation

$$r \times D = R$$

and dividing both sides of the preceding equation by r gives

$$D = \frac{1}{r} \times R$$

Taking the change in both sides of this equation and using delta to indicate a change gives

$$\Delta D = \frac{1}{r} \times \Delta R$$

which is the same formula for deposit creation found in Equation 1.

This derivation provides us with another way of looking at the multiple creation of deposits, because it forces us to look directly at the banking system as a whole rather than at one bank at a time. For

the banking system as a whole, deposit creation (or contraction) will stop only when all excess reserves in the banking system are gone; that is the banking system will be in equilibrium when the total amount of required reserves equals the total amount of reserves, as seen in the equation RR = R. When r X D is substituted for RR, the resulting equation R = r X D tells us how high checkable deposits will have to be for required reserves to equal total reserves, Accordingly, a given level of reserves in the banking system determines the level of checkable deposits when the banking system is in equilibrium (when ER = 0); put another way, the given level of reserves supports a given level of checkable deposits.

In our example, the required reserve ratio is 10%. If reserves increase by $100, checkable deposits must rise by $1,000 for total required reserves also to increase by $100. If the increase in checkable deposits is less than this, say $900, then the increase in required reserves of $90 remains below the $100 increase in reserves, so there are still excess reserves somewhere in the banking system. The banks with the excess reserves will now make additional loans, creating new deposits, and this process will continue until all reserves in the system are used up. This occurs when checkable deposits rise $1,000.

We can also sec this by looking at the T−account of the banking system as a whole (including the First National Bank) that results from this process:

Banking System			
Assets		Liabilities	
Securities	− $100	Checkable deposits	+ $1,000
Reserves	+ $100		
Loans	+$1,000		

The procedure of eliminating excess reserves by loaning them out means that the banking system (First National Bank and Banks A, B, G, D, and so on) continues to make loans up to the $1,000 amount until deposits have reached the $1,000 level. In this way, $100 of reserves supports $1,000 (ten times the quantity) of deposits.

Critique of the Simple Model

Our model of multiple deposit creation seems to indicate that the Federal Reserve is able to exercise complete control over the level of checkable deposits by setting the required reserve ratio and the level of reserves, The actual creation of deposits is much less mechanical than he simple model indicates. If proceeds from Bank A's $90 loan are not deposited but are kept in cash, nothing is deposited in Bank B, and the deposit creation process stops dead in its tracks. The total

increase in checkable deposits is only $100—considerably less than the $1,000 we calculated. Thus, if some proceeds from loans are used to raise the holdings of currency, checkable deposits will not increase by as much as our simple model of multiple deposit creation tells us.

Another situation ignored in our model is one in which banks do not make loans or buy securities in the full amount of their excess reserves. If Bank A decides to hold on to all $90 of its excess reserves, no deposits would be made in Bank B, and this would also stop the deposit creation process. The total increase in deposits would again be only $l00 and not the $1,000 increase in our example. Hence, if banks choose to hold all or some of their excess reserves, the full expansion of deposits predicted by the simple model of multiple deposit creation does not occur

Our examples rightly indicate that the Fed is not the only player whose behavior influences the level of deposits and therefore the money supply. Banks' decisions regarding the amount of excess reserves to hold, depositors' decisions regarding how much currency to hold, and borrowers' decisions on how much to borrow from banks can cause the money supply to change. We stress the behavior and interactions of the four players in constructing a more realistic model of the money supply process.

SELF-TEST

Part A: True-False Questions

Circle whether the following statements are true (T) or false (F).

T F 1. The U.S. Treasury functions as the central bank of the United States.

T F 2. Currency held by depository institutions (banks) is added to currency circulating in the hands of the public to get total currency in circulation.

T F 3. The Fed's buying and selling of bonds in the open market is referred to as widening the market.

T F 4. If the First Security Bank of Belfry has $50 in excess reserves, it will be able to lend more than an additional $50 as long as the required reserve ratio is below 100%.

T F 5. Assuming that the required reserve ratio is 20%, and open market sale of S100 in government bonds by the Fed will cause the money supply to fall by $S00 in the simple deposit expansion model.

T F 6. When a bank chooses to purchase securities instead of making loans, deposit expansion is diminished.

T F 7. In the simple model, deposits in the banking system contract by a multiple of the loss in reserves caused by a Federal Reserve sale of government bonds.

T F 8. A rise in Treasury deposits at the Fed increases the monetary base.

T F 9. The Federal Reserve can offset an increase in float by purchasing government securities.

T F 10. Because many factors beyond the direct control of the Fed affect the monetary base, it is unreasonable to expect the Fed to have any meaningful control over the monetary base.

Part B: Multiple Choice Questions

Circle the appropriate answer.

1. The monetary bane s comprised of

a. currency in circulation and Federal Reserve notes.

b. currency in circulation and government securities.

c. currency in circulation and reserves.

d, reserves and government securities.

2. The sum of vault cash and bank deposits with the Fed minus required reserves is called

a. the monetary base.

b. the money supply.

c, excess reserves,

d, total reserves,

3. When the Fed simultaneously purchases government bonds and extends discount loans to banks,

a. the money supply unambiguously falls.

b. the money supply unambiguously rises.

c. the net effect on the money supply cannot be determined because the two Fed actions counteract each other.

d. the Fed action has no effect on the money supply.

4. When the Fed simultaneously extends discount loans and sells government bonds,

a. the money supply unambiguously increases.

b. the money supply unambiguously falls.

c. the net effect on the money supply cannot be determined without further information because the two Fed actions counteract each other.

d. the Fed action has no effect on the money supply.

5. When the Fed wants to reduce reserves in the banking system, it will

a. purchase government bonds.

b. extend discount loans to banks.

c. print more currency.

d. sell government bonds.

6. The simple deposit multiplier is equal to 4 when the required reserve ratio is equal to

a. 0.25.

b. 0.40.

c. 0.05.

d. 0.15.

7. The First National Bank of Galata has $150 in excess reserves. If the required reserve ratio is 10%, how much extra can the First National Bank lend?

a. $1500

b. $750

c. $150

d. $0

8. If excess reserves in the banking system amount to $75 and the required reserve ratio is 0.20, checkable deposits could potentially expand by

a. $75,

b. $750.

c. $37.50.

d. $375.

9. A sale of government bonds by the Fed

a. is called an open-market sale.

b. reduces the nonborrowed base, all else the same.

c. reduces the borrowed base, all else the same.

d. does all of the above.

e. does only (a) and (b) of the above.

10. If a member of the nonbank public purchases a government bond from the Federal Reserve with currency, then

a. both the monetary base and reserves will fall.

b. both the monetary base and reserves will rise.

c. the monetary base will fall, but reserves will remain unchanged.

d. the monetary base will fall, but currency in circulation will remain unchanged.

e. none of the above will occur.

11. Which of the following are found on the asset side of the Federal Reserve's balance sheet?

a. Treasury securities

b. Treasury deposits

c. Discount loans

d. Both (a) and (b) of the above

e. Only (a) and (c) of the above

12. Which of the following are found on the liability side of the Federal Reserve's balance sheet?

a. Cash items in the process of collection

b. Deferred availability cash items

c. Gold

d. All of the above

e. only (b) and (c) of the above

13. When float increases,

a. currency in circulation falls.

b. the monetary base falls.

c. the monetary base rises.

d. the monetary supply falls.

e. none of the above occurs.

14. A reduction in which of the following leads to an increase in the monetary base?

a. U.S. Treasury deposits

b. Float

c. Discount loans

d. All of the above

Chapter five

Determination of the Money Supply

Chapter Five

Determinants of the money supply

The main objectives of this chapter is to study and understand the following topics

- **deriving the money multiplier by the algebraic approach**
- **Factors that determine the money multiplier**

Chapter Five

Determinants of the money supply[16]

In deriving a model of the money supply process, we foci here on a simple definition of money 9 currency plus checkable deposits), which corresponds to MI. Although broader definition of money– particularly, M2– are frequently used in policymaking, we conduct the analysis with an M1 definition because it is le complicated and yet provides a basic understanding of the money supply process. Furthermore, all analyses and results using the M definition apply equally well to the M2 definition. A somewhere more complicated money supply model for the M2 definition developed in an append to this chapter.

The money supply model and the money multiplier

Because as we saw. The fed can control the monetary base better than it can control reserves, it makes– sense to link the money supply M to the monetary base MB through a relationship such as the following:

$$M = m \times MB \quad (1)$$

[16] - Frederic S. Mishkin Op. cit, pp. 351 - 368.

The variable m is the money multiplier, which tells us how much the money supply changes for a given change in the monetary base MB. This multiplier tells us what multiple of the monetary base is transformed into the money supply. Because the money multiplier is larger than 1, the alternative name for the monetary base, high-powered money, is logical; a $1 change in the monetary base leads to more than a $1 change in the money supply.

The money multiplier reflects the effect on the money supply of other factors besides the monetary base, and the following model will explain the factors that determine the size of the money multiplier. Depositors' decisions about their holdings of currency and checkable deposits are one set of factors affecting the money multiplier. The reserve requirements imposed by the fed on the banking system also affect the size of the multiplier, as do banks' decisions about excess reserves.

Deriving the money multiplier

In our model of multiple deposit creation, we ignored

holdings of currency and banks' holdings of excess reserves. Now we incorporate these changes into our model of the money supply process by assuming that the desired level of currency C and excess reserves ER grows proportionally with checkable deposits D;

in other words, we assume that the ratios of these items to checkable deposits are constants in equilibrium, as the braces in the following expressions indicate:

$$c = \{C/D\} = \textbf{currency ratio}$$

$$e = \{ER/D\} = \textbf{excess reserves ratio}$$

we will now derive a formula that describes how the currency ratio desired by depositors, the excess reserves ratio desired by banks, and the required reserve ratio set by the Fed affect the multiplier m. we begin the derivation of the model of the money supply with the following equation:

$$R = RR + ER$$

This states that the total amount of reserves in the banking system R equals the sum of required reserves RR and excess reserves ER. (Note that this equation corresponds to the equilibrium condition RR = R, where excess reserves were assumed to be zero.)

The total amount of required reserves equals the required reserve ratio R times the amount of checkable deposits D:

$$RR = r \times D$$

Substituting r × D for RR in the first equation yields an equation that links reserves in the banking system to the amount of checkable deposits and excess reserves they can support:

$$\mathbf{R} = (\mathbf{r} \times \mathbf{D}) + \mathbf{ER}$$

A key point here is that the Fed sets the required reserve ratio to less than 1. Thus $\$1$ of reserves can support more than $\$1$ of deposits, and the multiple expansion of deposits can occur.

Let's see how this works in practice. If excess reserves are held at zero $(\text{ER} = 0)$, the required reserve ratio is set at $r = 0.10$ and the level of checkable deposits in the banking system is $\$\ 800$ billion, then the amount of reserves needed to support these deposits is $\$\ 80$ billion $(= 0.10 \times \$800$ billion$)$. The $\$80$ billion of reserves can support ten times this amount in checkable deposits, because multiple deposit creation will occur.

Because the monetary base MB equals currency C Plus reserves R, we can generate an equation that links the amount of the monetary base to the levels of checkable deposits and currency by adding currency to both sides of the equation:

$$\mathbf{MB} = \mathbf{R} + \mathbf{C} = (\mathbf{r} \times \mathbf{D}) + \mathbf{ER} + \mathbf{C}$$

Another way of thinking about this equation is to recognize that it reveals the amount of the monetary base needed to support the existing amounts of checkable deposits, currency and excess reserves.

An important feature of this equation is that an additional dollar of MB that arises from an additional dollar of currency does not support any additional deposits. This occurs because such an increase leads to an identical increase in the right-hand side of the equation with no change occurring in D. the currency component of MB does not lead to multiple deposit creation as the reserves component does. Put another way, an increase in the monetary base that goes into currency is not multiplied, whereas an increase that goes into supporting deposits is multiplied.

Another important feature of this equation is that an additional dollar of MB that goes into excess reserves ER does not support any additional deposits or currency the reason for this is that when a bank decides to hold excess reserves, it does not make additional loans, so these excess reserves do not lead to the creation of deposits. Therefore, if the Fed injects reserves into the banking system and they are held as excess reserves, there will be no effect on deposits or currency and hence no effect on the money supply. In other words, you can think of excess reserves as an idle component of reserves

that are not being used to support any deposits. This means that for a given level of reserves, a higher amount of excess reserves implies that the banking system, in effect, has fewer reserves to support deposits.

To derive the money multiplier formula in terms of the currency ratio c = {C/D} and the excess reserves ratio e = {ER/D}, we rewrite the last equation, specifying C as c × D and ER as e × D:

$$MB = (R \times D) + (e \times D) + (c \times D) = (r + e + c) \times D$$

We next divide both sides of the equation by the term inside the parentheses to get an expression linking checkable deposits D to the monetary base MB:

$$\mathbf{D} = \frac{\mathbf{1}}{\boldsymbol{r+e+c}} \times \mathbf{MB} \qquad (2)$$

Using the definition of the money supply currency plus checkable deposits (M = D + C) and again specifying C as c D,

$$\mathbf{M} = \mathbf{D} + (\mathbf{c} \times \mathbf{D}) = (\mathbf{1} + \mathbf{c}) \times \mathbf{D}$$

Substituting in this equation the expression for D from Equation 2, we have

$$M = \frac{1+c}{r+e+c} \times MB \qquad (3)$$

Final, we have achieved our objective of deriving an expression in the form of our earlier Equation 1. As you can see the ratio that multiplies MB IS the money multiplier that tells how much the money supply changes in response to a given change in the monetary base (high-powered money). The money multiplier.

$$m = \frac{1+c}{r+e+c} \times MB \qquad (4)$$

It is a function of the currency ratio set by depositors c, the excess reserves ratio set by banks e, and the required reserve ratio set by the Fed r.

Although the algebraic derivation we have just completed shows you how the money multiplier is constructed, you need to understand the basic intuition behind it to understand and apply the money multiplier concept without having to memorize it.

Intuition behind the money multiplier

To get a feel for what the money multiplier means, let us again construct a numerical example with realistic numbers for the following variables:

R = required reserve ratio = 0.10

C = currency in circulation = $\$400$ billion

D = checkable deposits = $800 billion

ER = excess reserves = $0.8 billion

M = money supply (MI) = C + D = $1,200 billion

From: these numbers we can calculate the values for the currency ratio C and the excess reserves ratio e:

$$C = \frac{\$400\ billion}{\$800\ billion} = 0.5$$

$$e = \frac{\$0.8\ billion}{\$800\ billion} = 0.001$$

The resulting value of the money multiplier is

$$m = \frac{1+0.5}{0.1+0.001+0.5} = \frac{1.5}{0.601} = 2.5$$

The money multiplier of 2.5 tells us that, given the required reserve ratio of 10% on checkable deposits and the behavior of depositors as represented by c = 0.5 and banks as represented by e = 0.001, a $1 increase in the monetary base leads to a $2.50 increase in the money supply (MI).

An important characteristic of the money multiplier is that it is less than the simple deposit multiplier of 10. The Key to understanding this result of our money supply model to realize that although there is multiple expansion of deposits. There is no such expansion for currency. Thus, if some portion of the increase in high- powered

money finds its way into currency, this portion does not undergo multiple deposit expansion in our analysis, we did not allow for this possibility, and so the increase in reserves led to the maximum amount of multiple deposit creation. However, in our current model of the money multiplier, the level of currency does increase when the monetary base MB and checkable deposits D increase because c is greater than zero. As previously stated, any increase in MB that goes into an increase in currency is not multiplied, so only part of the increase in MB is available to support checkable deposits that undergo multiple expansions. The overall level of multiple deposit expansion must be lower meaning that the increase in M, given an increase in MB, is smaller than the simple model indicated.[17]

[17] - Another reason the money multiplier is smaller is that e is a constant fraction greater than zero, indicating that an increase in MB and D leads to higher excess reserves. The resulting higher amount of excess reserve means that the amount of reserves used to support checkable deposits not increase as much as it otherwise would. Hence the increase checkable deposits and the money supply will be lower, and the money multiplier will be smaller. However, because e is currently so tiny- around 0.001 the impact of this ratio on the money multiplier is now quite but there has been period when e has been much larger and so has more important role in lowering the money multiplier.

This result can be demonstrated from the Equation 4 formula as follows when r increase, the denominator of the money multiplier increases, therefore the money multiplier must decrease.

Factors that determine the money multiplier

To develop our intuition of the money multiplier e further, let us look at how this multiplier changes in responsible changes in the variables in our model c, e, and r. the game are playing is a familiar in economics: we ask what happens w one of these variables changes, leaving all other variables same (ceter is paribus).

Changes in the required reserve ratio

If the required reserve ratio on checkable deposits increases reserves cannot support as large an amount of checkable deposits, more reserves are needed because required reserves for these checkable deposits have increased. The resulting deficiency in reserves then means that banks must contract their loans causing a decline in deposits and hence in the money supply the reduced money supply relative to the level of MB, which has remained unchanged, indicates that the money multiplier has declined as well. Another way to see this is to realize that when r is higher less multiple expansion of checkable deposits occurs. With less multiple deposit expansion, the money multiplier must decrease

We can verify that the foregoing analysis is correct by seeing what happens to the value of the money multiplier in our numerical

example when r increases from 10% to 15% (leaving all the other variables unchanged) money multiplier becomes

$$m = \frac{1+0.5}{0.15+0.001+0.5} = \frac{1.5}{0.651} = 2.3$$

Which as we would expect, is less than 2.5

The analysis just conducted can also be applied to the cause in which the required reserve ratio falls. In this case, there will be more multiple expansions for checkable deposits because the same level of reserves can now support more checkable deposits, and the money multiplier will increase. For example, if r falls from 10% to 5%, plugging this value into our money multiplier formula (leaving all the other variables unchanged) yields a money multiplier of

$$m = \frac{1+0.5}{0.05+0.001+0.5} = \frac{1.5}{0.551} = 2.72$$

Which is above the initial value of 2.5

We can now state the following result: the money multiplier and the money supply are negatively related to the required reserve ratio r. in the past, the Fed sometimes used reserve requirements to affect the size of the money supply. In recent years, however, reserve requirements have become a less important factor in the determination of the money multiplier and the money supply (see the FYI box)

FYI the declining importance of reserve requirements

Two developments in recent years have led to the decreasing importance of reserve requirements in determining the money multiplier and the money supply.

We discussed how financial innovation led to the development of sweep accounts, in which any balances above a certain amount in a checking account at the end of a business day are "swept out" of the account and invested in overnight securities that pay interest and then redeposited the next morning. The resulting reduction in checking account balances has led to a substantial reduction in the amount of required reserves in recent years.

At the same time, banks have found that they need to put more cash in their ATMs to satisfy customer needs, particularly on the weekends and holidays when banks are closed. This cash is classified as vault cash, so it is counted as reserves. The fed also allows banks to classify some of the reserves they hold as deposits at the federal reserve banks as contractual clearing balances, which earn credits that can be used to pay for Federal reserve services such as check clearing and the use of Fed wire to transfer funds. The result is that approximately 70% of banks voluntarily have contractual clearing balances and vault cash that exceed the amount of their required

reserves.[18] We describe this situation by saying that reserve requirement are not binding, in other words, higher reserve requirements would not change the banks holdings of reserves because they already want to hold more than the required amount of reserves as vault cash in their ATMs and as contractual clearing balances.

A change in reserve requirement would have no effect on the banks behavior for a bank for which reserve requirements are not binding: A change in reserve requirements would not cause the bank to change the amount of its reserves, which already exceed. The reserve requirements. For the 70% of banks for which reserve requirements are not binding, a change in reserve requirements would have no effect on the amount of deposits and the money supply. It is only for the minority of banks for which reserve requirements are binding that change in reserve requirements matter. Because reserve requirements have a much smaller effect on the money multiplier and, the money supply than they did in the past, the Federal Reserve no longer views reserve requirements as a useful tool for controlling the money supply

[18] - See Paul Bennett and standard Peristiani are reserve requirement Binding? Federal Reserve Bank of New York, Economic policy review (May 2002)

Changes in the currency ratio c

Next, what happens to the money multiplier when depositor behavior causes the currency ratio c to increase with all other variables unchanged? An increase in c means that depositors are converting some of their checkable deposits into currency. As shown before, checkable deposits undergo multiple expansion while currency does not. Hence, when checkable deposits are converted into currency, there is a switch from a component of the money supply that undergoes multiple expansion to one that does not. The overall level of multiple expansion declines, and so must the multiplier.[19]

This reasoning is confirmed by our numerical example, where c rises from 0.50 to 0.75. The money multiplier then falls from 2.5 to

$$\mathbf{m} = \frac{1+0.75}{0.1+0.001+0.75} = \frac{1.75}{0.851} = \mathbf{2.06}$$

We have now demonstrated another result: the money multiplier and the money supply are negatively related to the currency ratio c.

[19] - As long as r + e is less than 1 (as is the case using the realistic numbers we have used), an increase in c raises the denominator of the money multiplier proportionally by more than it raises the numerator. The increase in e cause the multiplier to fall. If you would like to know more about what explains movements in the currency ratio c, take a look at an appendix to this chapter on this topic, which can be found on this book's web site at www.myeconlab.com/mishkin. The appendix at the end of this chapter discusses how the Money multiplier for M2 is determined.

Changes in the excess reserves ratio e

When banks increase their holdings of excess reserves relative to checkable deposits, the banking system, in effect, has fewer reserves to support checkable deposits. This means that given the same level of MB, banks will contract their loans, causing a decline in the level of checkable deposits and a decline in the money supply, and the money multiplier will decrease.[20]

This reasoning is supported in our numerical example when e rises from 0.001 to 0.005 the money multiplier declines from 2.5 to

$$m = \frac{1+0.5}{0.1+0.005+0.5} = \frac{1.5}{0.605} = 2.48$$

Note that although the excess reserves ratio has risen fivefold there has been only a small decline in the money multiplier. This decline is small, because in recent years e has been extremely small, so changes in it have only a small impact on the money multiplier. However, there have been times, particularly during the Great depression, when this ratio was far higher, and its movements had a substantial effect on the money supply and the money multiplier thus

[20] - This result can be demonstrated from the Equation 4 formula as follow when e rises, the denominator of the money multiplier rises, and so money multiplier must fall.

our final result is still an important one: the money multiplier and the money supply are negatively related to the excess reserves ratio e.

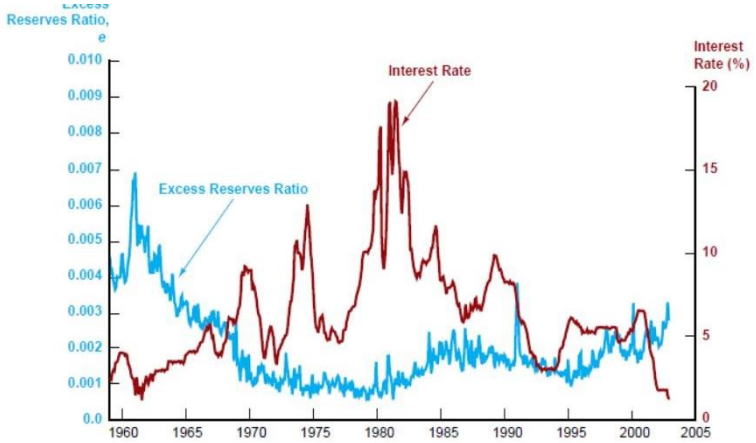
To understand the factors that determine the level of e in the banking system, we must look at the costs and benefits to banks of holding excess reserves. When the costs of holding excess reserves rise, we would expect the level of excess reserves and hence e to fall; when the benefits of holding excess reserves rise, we would expect the level of excess reserves and e to rise. Two primary factors affect these costs and benefits and hence affect the excess reserves ratio: market interest rates and expected deposit outflows.

Market interest rates. As you may recall from our analysis of bank management, the cost to a bank of holding excess reserves is its opportunity cost, the interest that could have been earned on loans or securities if they had been held instead of excess reserves. For the sake of simplicity, we assume that loans and securities earn the same interest rate i, which we call market interest rate. If i increase, the opportunity cost of holding excess reserves rises, and the desired ratio of excess reserves to deposits falls. A decrease in I, conversely, will reduce the opportunity cost of excess reserves, and e will rise. The banking system's excess reserves ratio e is negatively related to the market interest rate i.

Another way of understanding the negative effect of market interest rates on e is to return to the theory of asset demand, which states that if the expected returns on alternative assets rise relatives to the expected returns on a given asset, the demand for that asset will decrease. As the market interest rate increases, the expected return on loans and securities rises relative to the zero return on excess reserves, and the excess reserves ratio falls.

Figure 1 shows us (as the theory of asset demand predicts) that there is a negative relationship between the excess reserves ratio and a representative market interest rate, the federal funds rate. The period 1960 – 1981 saw an upward trend in the federal funds rate and a declining trend in e, whereas in the period 1981– 2005, a decline in the federal funds rate is associated with a rise in e. the empirical evidence thus supports our analysis that the excess reserves ratio is negatively related to market interest rates.

Figure (no.1) the excess ratio and the interest rate (federal funds rate)



Expected deposit outflows. Our analysis of bank management also indicated that the primary benefit to a bank of holding excess reserves is that they provide against losses due to deposit outflows; that is , they enable the bank experiencing deposit outflows to escape the costs of calling in loans, selling securities borrowing from the Fed or other corporations, or bank failure , if banks fear that deposit outflows are likely to increase (that is, if expected deposit outflows increase), they will want more insurance against this possibility and will increase the excess reserves ratio. Another way to put it is this: if expected deposit outflows rise, the expected benefits, and hence the expected returns for holding excess reserves. Increase. As the theory of asset demand predicts, excess reserves will then rise. Conversely a decline

in expected deposit outflows will reduce the insurance benefit of excess reserves, and their level should fall. We have the following result: the excess reserves ratio e is positively related to expected deposit outflows.

The variables are grouped by the player or players when either influence the variable or are most influenced by it. The Federal Reserve, for example, influences the money supply by controlling the first three variables (called tools of the Fed) – r, MB_n and BR. Depositors influence the money supply though their decisions about the currency ratio c. while banks influence the money supply by their decisions about e, which are affected by their expectations about deposit outflows. Because depositors' behavior also influences bankers' expectations about deposit outflows, this variable also reflects the role of both depositors and bankers in the money supply process. Market interest rates, as represented by I, affect the money supply through the excess reserves ratio e the demand for loans by borrowers influences market interest rates, as does the supply of money. Therefore, all four players are important in the determination of i.

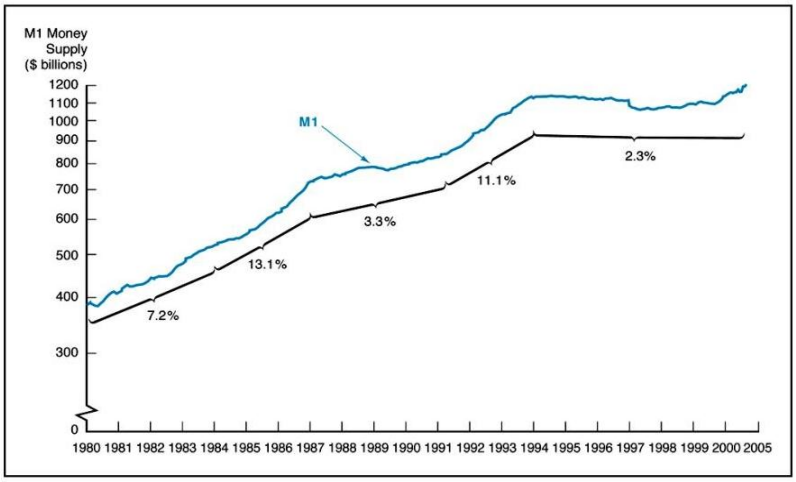
Application Explaining Movements in the Money Supply, 1980–2005.

To make the theoretical analysis of this chapter more concrete, we need to see whether the model of the money supply process developed here helps us understand recent movements of the money supply. We look at money supply movements from 1980 to 2005 – a particularly interesting period, because the growth rate of the money supply displayed unusually high variability.

Figure 2 shows the movements of the money supply (MU from 1980 to 2005, with the percentage next to each bracket representing the annual growth rate for the bracketed period: from January 1980 to October 1984, for example, the money supply grew at a 7.2% annual rate. The variability of money growth in the 1980 – 2005 period is quite apparent, swinging from 7.2% to 13.1% down to 3,3%, then up to 11.1% and finally back down to 1.6%. What explains these sharp swings in the growth rate of the money supply?

Our money supply model as represented by Equation 5, suggests that the movements in the money supply that, we see in Figure 2 are explained by either changes in MB, + BR (the nonborrowed monetary base plus borrowed reserves) or be changes in

Figure 2 Money Supply 1980 -2005



percentage for each bracket indicates the annual growth rate of the money supply over the bracketed period.

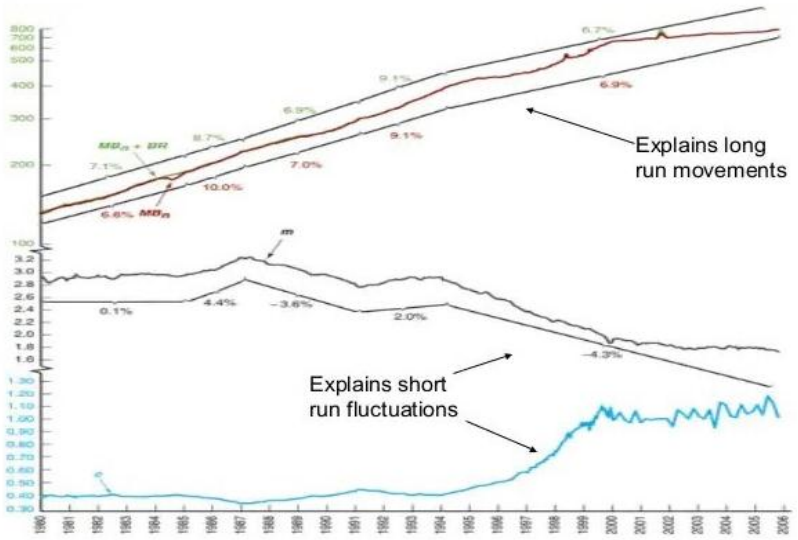
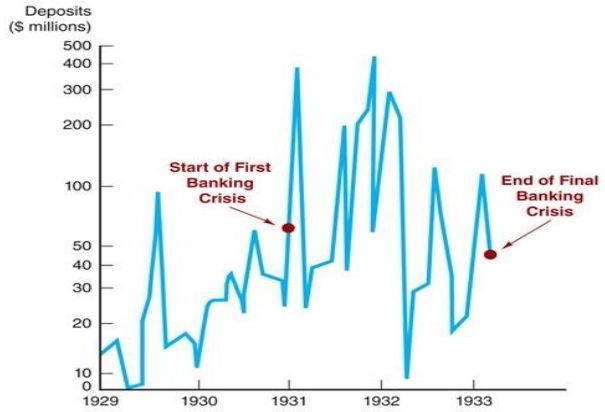


Figure3. Determinants of the Money Supply, 1980 - 2005
percentage for each bracket indicates the annual growth rate of the series over the bracketed period.

Figure 4 Deposits of Failed Commercial Banks, 1929–1933



Figure(no 4) Deposits of Failed commercial Banks 1929 1933

See that another consequence of bank panics is that they can cause a substantial reduction in the money supply. As we will see in the chapters on monetary theory later in the book, such reductions can also cause severe damage to the economy.

Figure 4 traces the bank crisis during the Great Depression by showing the volume of deposits at failed commercial banks from 1929 to 1933. In their classic book. A monetary History of the United States, 1867–1960, Milton Friedman and Anna Schwartz describe the onset of the first banking crisis in late 1930 as follows:

Before October 1930, deposits of suspended [failed] commercial banks had been somewhat higher than during most of 1929 bur not out of line with experience during the preceding decade. In November

1930, they were more than double the highest value recorded since the start of monthly data in 1921. A crop of bank failures, particularly in Missouri, Indiana, Illinois, Iowa, Arkansas, and North Carolina, led to widespread attempts to convert checkable and time deposits into currency, and also, to a much lesser extent, into postal savings deposits.

Figure 5
Excess Reserves Ratio and Currency Ratio, 1929–1933

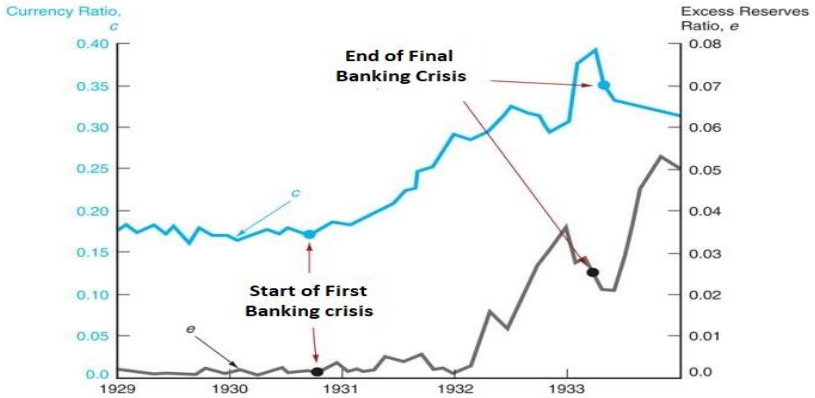


Figure 5. Excess reseres Ratio and Currency Ratio.1929 -1933

A contagion of fear spread among depositors, starting from the agricultural areas, which had experienced the heaviest impact of bank failures in the twenties. But failure of 256 banks with $180 million of deposits in November 1930 was followed by the failure of 532 with over $370 million of deposits in December (all figures seasonally

unadjusted), the most dramatic being the failure on December 11 of the bank of United States with over $200 million of deposits. That failure was especially important. The Bank of United States was the largest commercial bank, as measured by volume of deposits, ever to have failed up to that time in U.S. history. Moreover, though it was just an ordinary commercial bank, the Bank of United States 's name had led many at home and abroad to regard it somehow as an official bank, hence its failure constituted more of a blow to confidence than would have been administered by the fall of a bank with a less distinctive name.[21]

The first bank panic, from October 1930 to January 1931, is clearly visible in Figure 4 at the end of 1930, when there is a rise in the amount of deposits at failed banks. Because there was no deposit insurance at the time (the FDIC wasn't established until 1934), when a bank failed, depositors would receive only partial repayment of their deposits. Therefore, when banks were failing during a bank panic, depositors knew that they would be likely to suffer substantial losses on deposits and thus the expected return on deposits would be

[21] - Mihon Friedman and Anna Jacobson Schwanz, A Monetary History of the united states, 1867-1960 (Princeton NJ.: Princeton University press. 1963) pp 308 - 311.

Figure 6 M1 and the Monetary Base, 1929–1933

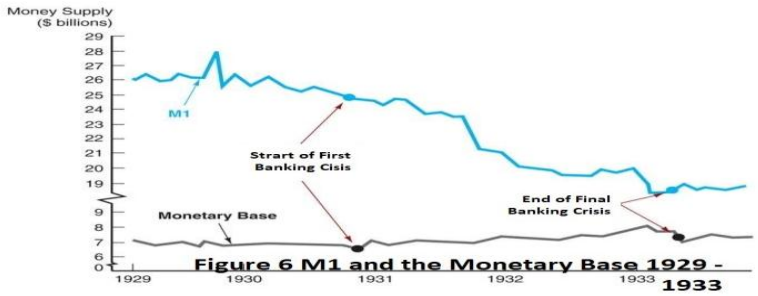


Figure 6 M1 and the Monetary Base 1929 -

Figure 6. M1 and the Monetary Base 1929 - 1933

negative. The theory of asset demand predicts that with the onset of the first bank crisis, depositors would shift their holdings from checkable deposits to currency by withdrawing currency from their bank accounts and c would rise. Our earlier analysis of the excess reserves ratio suggests that the resulting surge in deposit outflows would cause the banks to protect themselves by substantially increasing their excess reserves ratio e. both of these predictions are borne out by the data in figure 5. During the first bank panic (October 1930– January 1931) c began to climb. Even more striking is the behavior of e, which more than doubled from November 1930 to January 1931.

The money supply model predicts that when e and c increase, the money supply will contract. The rise in c results in a decline in the overall level of multiple deposit expansion, leading to a smaller money multiplier and a decline in the money supply, while the rise in e

reduces the amount of reserves available to support deposits and also causes the money supply to decrease. Thus our model predicts that the rise in e and c after the onset of the first bank crisis would result in a decline in the money supply a prediction borne out by the evidence Figure6.

Banking crises continued to occur from 1931 to 1933, and the pattern predicted by our model persisted: c continued to rise and so did e. by the end of the crises in March 1933, the money supply (M1) had declined by over 25% by far the largest decline in all of American history and coincided with the nation's worst economic contraction. even more remarkable is that this decline occurred despite a 20% rise in the level of the monetary base-which illustrates how important the changes in c and e during bank panics can be in the determination of the money supply it also illustrates that the Fed's job of conducting monetary policy can be complicated by depositor and bank behavior.

The M2 Money Multiplier

The derivation of a money multiplier for the M2 definition of money requires only slight modifications to the analysis in the chapter. The definition of M2 is

$$M2 = C + D + T + MMF$$

where

C = currency in circulation

D = checkable deposits

T = time and savings deposits

MMF = primarily money market mutual fund shares and money market deposit accounts, plus overnight repurchase agreements and overnight Eurodollars

We again assume that all desired quantities of these variables rise proportionally with checkable deposits so that the equilibrium ratios c, t = {T/D}, and mm = {MMF/D} set by depositors are treated as constants. Replacing C by c X D, T by t X D, and MMF by mm X D in the definition of M2 just given, we get

$$M2 = D + (C \times D) + (t \times D) + (mm \times D)$$

$$= (1 + c + t + mm) \times D$$

Substituting in the expression for D from Equation 2 in the chapter, we have

$$M2 = \frac{\mathbf{1 + c + t + mm}}{r + e + c} \times MB \qquad (1)$$

To see what this formula implies about the M2 money multiplier, we continue with the same numerical example in the chapter, with the additional information that T= \$2,400 billion and MMF = \$400 billion

so that t = 3 and mm = 05. The resulting value of the multiplier for M2 is

$$m_2 = \frac{1 + 0.5 + 3 + 0.5}{0.10 + 0.001 + 0.5} = \frac{0.5}{0.601} = 8.32$$

An important feature of the M2 multiplier is that it is substantially larger than the M1 multiplier of 2.5 that we found in the chapter. The crucial concept in understanding this difference is that a lower required reserve ratio for time deposits or money market mutual fund shares means that they undergo more multiple expansion because fewer reserves are needed to support the same amount of them. Time deposits and MMFs have a lower required reserve ratio than checkable deposits –zero–and they will therefore have more multiple expansion than checkable deposits will. Thus the overall multiple expansion for the sum of these deposits will be greater than for checkable deposits alone, so the M2 money multiplier will be greater than the M1 money multiplier.

FACTORS THAT DETERMINE

THE M2 MONEY MULTIPLIER

Changes in r, c, and e

The economic reasoning analyzing the effect of changes in the required reserve ratio and the currency ratio on the M2 money multiplier is identical to that used for the M1 multiplier in the chapter. An increase in the required reserve ratio r will decrease the amount of multiple deposit expansion, thus lowering the M2 money multiplier. An increase in c means that depositors have shifted out of checkable deposits into currency. Because currency has no multiple deposit expansion, the overall level of multiple deposit expansion for M2 must also fall, lowering the M2 multiplier. An increase in the excess reserves ratio e means that banks use fewer reserves to support deposits, so deposits and the M2 money multiplier fall.

We thus have the same results we found for the Ml multiplier: The M2 money multiplier and M2 money supply are negatively related to the required reserve ratio r, the currency ratio c, and the excess reserves ratio e.

Response to Changes in t and mm

An increase in either t or mm leads to an increase in the M2 multiplier because the required reserve ratios on time deposits and

money market mutual fund shares are zero and hence are lower than the required reserve ratio on checkable deposits.

Both time deposits and money market mutual fund shares undergo more multiple expansion than checkable deposits. Thus a shift out of checkable deposits into time deposits or money market mutual funds, increasing t or mm, implies that the overall level of multiple expansion will increase, raising the M2 money multiplier.

A decline in t or mm will result in less overall multiple expansion, and the M2 money multiplier will decrease, leading to the following conclusion: The M2 money multiplier and M2 money supply are positively related to both the time deposit ratio t and the money market fund ratio mm.

The response of the M2 money supply to all the depositor and required reserve ratios is summarized in Table 1.

SUMMARY	TABLE 1 Response of the M2 Money Supply to Changes in MB_n , BR , r , e , c , t , and mm		
Variable	Change in Variable	M2 Money Supply Response	Reason
MB_n	↑	↑	More MB to support C and D
BR	↑	↑	More MB to support C and D
r	↑	↓	Less multiple deposit expansion
e	↑	↓	Fewer reserves to support D
c	↑	↓	Less multiple deposit expansion
t	↑	↑	More multiple deposit expansion
mm	↑	↑	More multiple deposit expansion
Note: Only increases (t) in the variables are shown; the effects of decreases in the variables on the M2 money supply would be the opposite of those indicated in the "Response" column.			

Exercises

The sum of currency in circulation and total reserves is called the monetary base or high-powered money. because Federal Reserve actions have a more predictable effect on the monetary base than on (1)..... money supply models typically focus on the Fed's control over high powered money.

In our model of multiple deposit creation. We ignored the effects on deposit creation of changes in the public's holding of (2) ..... and banks holding of excess reserves. We incorporate these changes into the deposit expansion model by assuming that the desired levels of currency and excess reserves grow proportionally with (3) ..... That is, the currency and excess reserves ratios are constants

The money multiplier is the Key factor separating the Fed's control of the money supply from its ability to affect the (4) ..... An important characteristic of the money multiplier is that it is less than the simple deposit multiplier (of 10).

Inclusions of depositor behavior into the money supply model reveal that the money multiplier depends on depositor preferences for currency relative to checkable deposits. A numerical example that accounts for currency withdrawals reveals that the simple deposit

multiplier greatly (5) ..... the expansion in deposits. The key to understanding this result is that although there is multiple expansion of deposits, there is no such expansion for currency. Since an (6) ..... in the monetary base will mean an increase in currency in circulation, only part of any increase in the monetary base will be available for deposit expansion. Because reserves leave the bank as currency in circulation, the money supply will not increase as much for a given change in the monetary base, meaning a smaller money multiplier.

When banks increase their holdings of excess reserves, their volume of loans contracts for a given level of the monetary base. Thereby causing a (7) ..... in the money multiplier. The banking system's excess reserves ratio is negatively related to the market (8).....but (9) .....related to expected deposit outflows

Changes in the required reserve ratio, the currency ratio, and the excess reserve ratio alter the value of the money (10) ..... increases in any of these ratios – because they reduce the reserves available for lending and deposit expansion reduce the money multiplier.

Also, banks decisions to borrow reserves from the Fed affect the money supply. If banks seek additional discount loans from the Fed, the money supply (11) ……, if the Fed does not act to offset the increase in reserves. Alternatively, if banks choose to reduce their level of discount borrowing, the money supply contracts. The amount of discount loans demanded by banks is positively related to the market interest rate and (12) …… related to the discount rate.

An examination of the 1980 – 1996 time periods indicates that the behavior of players other than Federal Reserve can lead to sharp changes in money supply growth in the short run. Importantly, the period indicates that growth rate of the money supply is closely linked to the growth rate of the (13)…… monetary base.

Exercises

The money multiplier

A– Write the formula for the money multiplier.

……

B– Calculate the currency ratio, the excess reserves ratio, and the money multiplier for the following numbers

ID = 0.10 C = $280 billion

D = $800 billion ER = $40 billion

{C/D} =……

{ER/D} =……

M=……

C- Calculate required reserves (RR), total reserves (R), and the monetary base (MB)

RR$ =……

R$ = ……

MB$ = ……

D- Calculate the new money multiplier and money supply assuming that the Fed lowers the required reserve ratio on checkable deposits to 0.08 and does nothing to change the monetary base. Assume that the deposit ratios remain unchanged

m = ……

M = $……

E- Calculate the new level of deposits (D) and currency in circulation (C)

D = $……

C = $……

F- Calculate the new level of required reserves (RR) and excess reserves (ER)

RR = $.....

ER = $.....

Exercise 2: Adding Bank Behavior into the Money Supply model

A . Given the following values, calculate the money multiplier and the money supply

$r_D = 0.10$ {C/D} = 0.40

ER = DL = 0 $MB_n = \$400$ billion

m = ...

M = $.....

B- Calculate the level of currency (C), the level of deposits (D), the level of required reserves (RR), and the level of total reserves (R) in banking system

C = $..... RR = $.....

D = $..... R = $.....

C - Suppose that bankers suddenly decide to hold a cushion of excess reserves equal to six percent of their checkable deposits.

Calculate the new money multiplier, the new money supply. The level of deposits, currency in circulation, and the amount of excess reserves that banks will now hold

m = ……..

M = $ ……

D = $ ……

C = $……..

RR = $……

ER = $……

Exercise 3: Factors that Affect the Money Supply

Indicate how the money supply responds to the following changes by filling in the second column of the table below with either a (↑) to indicate a rise in the money supply or a (↓) to indicate a fall in the money supply

Player	Change in variable		Money Supply Response
Federal reserve	rD	↓	
system	MB_n	↓	
	id		
depositors	{C/D}	↓	
Depositors & Banks	Expected deposit outflows	↓	
Borrowers & other players	1	↓	

Self-Test

Part A True - False Questions

Circle whether the following statements are true (T) or false (F)

1- The ratio that relates the change in the money supply to a given change in the monetary base is called the money multiplier.

2- Another name for the nonborrowed base is high powered money.

3- The banking system's excess reserves ratio is negatively related to the market interest rate.

4- The excess reserves ratio is negatively related to expected deposit outflows.

5- When individuals reduce their holdings of currency by depositing these funds in their bank accounts, the money multiplier increases.

6- If the Fed purchase $ 10,000 in government securities from a bank and simultaneously extends $ 10,000 in discount loans to the same bank, then the Fed has kept the monetary base from changing.

7- The Fed has better control over the nonborrowed base than the borrowed base.

8- As the currency ratio falls, fewer reserves are available to support checkable deposits causing a decrease in the money supply.

9- For a given level of the monetary base, if the Fed began to pay interest on deposits that banks maintain at the Federal Reserve, Banks would have greater incentive to hold excess reserves, which would lead to a decline in the money supply, all else constant.

10- The money multiplier from the money supply model that includes depositor and bank behavior is larger than the simple deposit multiplier.

Part B: Multiple Choice Questions

Circle the appropriate answer

1- When comparing the simple model of multiple deposit creation with the money supply model that accounts for depositor and bank behavior, the more complicated model indicates that

a- an increase in the monetary base that goes into currency is not multiplied.

b- the money multiplier negatively related to their currency ratio

c- the money multiplier positively related to the excess reserves ratio

d- all of the above occur.

e. only (a) and (b) of the above

2- The money multiplier increase in value as the

a- currency ratio increases.

b- excess reserves ratio increases

c- required reserve ratio decreases

d- required reserve ratio increases

3- Depositors often withdraw more currency from their bank accounts during Christmastime. Therefore, one would predict that

a- the money multiplier will tend to fall during Christmastime.

b- the money multiplier will tend to rise during Christmastime.

c- discount borrowing will tend to fall during Christmastime.

d- none of the above will occur.

4- The Fed lacks complete control over the monetary base because

a- it cannot set the required reserve ratio on checkable deposits.

b- it cannot perfectly predict the amount of discount borrowing by banks

c- it cannot perfectly predict shifts from deposits to currency.

d- of each of the above.

e- of only (a) and (b) of the above

5- The money multiplier is smaller than the simple deposit multiplier when

a - the currency ratio is greater than zero.

b- the excess reserves ratio is greater than zero.

c-the required reserve ratio on checkable deposits is greater than zero.

d- all of the above occur

e- both (a) and (b) of the above occur.

6- the money multiplier is negatively related to

a- the excess reserves ratio.

b- the currency ratio،

c- the required reserve ratio on checkable deposits.

d- all of the above.

e- only (a) and (b) the above.

7- For a given level of the monetary base, a drop in the excess reserve ratio means

a- an increase in the money supply.

b- an increase in the monetary base

c- an increase in the nonborrowed base

d- all of the above

e- only (b) and (c) of the above

8- for a given level of the monetary base, a drop in the currency ratio means

a- an increase in the nonborrowed base, but a decrease in the borrowed base of equal magnitude

b- an increase in the borrowed base, but a decrease in the nonborrowed base of equal magnitude

c- an increase in the money supply.

d- a decrease in the money supply

e- none of the above.

9- If banks reduce their holdings of excess reserves

a- the monetary base will increase

b- the money supply will increase

c- both (a) and (b) of the above will occur

d- neither (a) nor (b) of the above will occur.

10- An examination of the 1980 -1996 period indicates that

a- the primary detertminant of movements in the money supply is the nonborrowed base.

b- the shorter the time period, the better is the Fed's control over the money supply.

c- both (a) and (b) of the above are true

d- neither (a) nor (b) of the above are true.

11- The banking system's excess reserves ratio is

a- negatively related to both the market interest rate and expected deposit outflows.

b- positively related to both the market interest rate and expected deposit outflows.

c- positively related to the market interest rate and negatively related to expected deposit outflows.

d-negatively related to the market interest rate and positively related to expected deposit outflows.

12- The monetary base less discount loans is called

a- reserves

b- high powered money

c- the nonborrowed monetary base.

d- the borrowed monetary base

13- If the required reserve ratio is one-fourth, currency in circulation is $400 billion, excess reserves are not held, and checkable deposits are $1200 billion, then the money multiplier is approximately.

a- 2.3 b- 2.8 c- 2.0 d- 1.8

The following questions cover the material in the appendix.

14- The M2 money multiplier is……than M1 multiplier because the required reserve ratio for a time deposit or a money market mutual fund share is……than the reserve requirement for checkable deposits.

a- larger – lower b- larger - higher

c- smaller – lower d- smaller – higher

15- The M2 money multiplier is positive related to

a- high- powered money

b- the time deposit - checkable deposit ratio

c- the required reserve ratio

d- the excess reserves ratio

Exercises

chapter four

determinants of the money supply

part A true or false questions

Circle whether the following statements are true (T) or false (F)

1) The quantity theory of money is a theory of the supply of money.

2) A given change in the monetary base will lead to a smaller increase in checkable deposits than indicated by the simple deposit multiplier.

3) The money multiplier is positively related to the excess reserve ratio

4) The money multiplier is smaller than the simple deposit multiplier when the excess reserves ratio is zero.

5) The money multiplier is smaller than the simple deposit multiplier when the currency − checkable deposit ratio is greater than zero

6) For a given level of the monetary base, an increase in the required reserve ratio on checkable deposits will mean an increase in the money supply.

7) All else constant, an increase in the required reserve ratio on checkable deposits will cause the money supply to fall.

8) For a given level of the monetary base, a decrease in the required reserve ratio on checkable deposits will mean a decrease in the money supply.

9) For a given level of the monetary base, an increase in the required reserve ratio on checkable deposits causes the money multiplier to decrease and the money supply to decrease.

10) For a given level of the monetary base, an increase in the currency − checkable deposit ratio will mean a decrease in the money supply.

part B: multiple- choice question

circle the appropriate answer

1) if the money supply is 500 and nominal income is 3.000, the velocity of money is

a) 60 b) 6 c) 1/6 d) undefined

2) if nominal GDP is $ 10 trillion, and velocity is 10, the money supply is

a) $100 trillion b) $10 trillion c) $5 trillion d) $ 1 trillion

3) If the money supply is $ 2 trillion and velocity is 5, then nominal GDP is

a) $2 trillion. b) $5 trillion

c) $10 trillion d) $ 1 trillion

4) The velocity of money is defined as

a) real GDP divided by the money supply.

b) nominal GDP divided by the money supply.

c) real GDP times the money supply.

d) nominal GDP times the money supply.

5) The equation of exchange states that the quantity of money multiplied by the number of times this money is spent in a given year must equal

a) nominal income

b) real income

c) real gross national product

d) velocity

6) The ratio that relates the change in the money supply to a given change in the monetary base is called the

a) money multiplier

b) required reserve ratio

c) deposit ratio

d) discount rate

7) The formula linking the money supply to the monetary base is

a) M = m/MB b) M = m*MB

c) m = M*MB d) MB = M*m

8) The variable that reflects the effect on the money supply of changes in factors other than the monetary base is the

a) currency − checkable deposits ratio

b) required reserve ratio

c) money multiplier

d) non borrowed base

9) An increase in the monetary base that goes into currency is…….while an increase that goes into deposit is…….

a) multiplied, multiplied

b) not multiplied, multiplied

c)multiplied, not multiplied

d) not multiplied, not multiplied

10) During the Christmas holiday season, depositors typically withdraw more currency from their accounts. this implies that

a) the money multiplier falls during the Christmas season

b) the money multiplier rises during the Christmas season

c) discount borrowing falls during the Christmas season

d) none of the above

11) If the Fed inject reserves into the banking system and they are held as excess reserves then the money supply.

a) increases by only the initial increase in reserves

b) increases by only one half the initial increase

c) increases by a multiplier of the initial increase in reserves

d) does not change

12) The Fed injects reserves into the banking system and they are held as excess, then the monetary base and the money supply

a) remains unchanged, remains unchanged

b) remains unchanged, increases

c) increases, increases

d) increases, remains unchanged

13) The formula for the money multiplier that includes excess reserves and currency is

a) $m = 1/(r + e + c)$ b) $M = 1/(r + e + c)$

c) $M = (1 + c)/(r + e\ c)$ d) $D = 1/(r + e + c)$

14) The formula for the checkable deposits that includes excess reserves and currency is

a) m = $1/(r + e + c)$ b) M = $1/(r + e + c)$

c) M = $(1 + c)/(r + e\ c)$ d) D = $(1/(r + e + c))$ x MB

15) The formula for the money supply that includes excess reserves and currency is

a) m = $1/(r + e + c)$ b) D = $1/(r + e + c)$

c) M = $(1 + c)/(r + e + c)$ d) M= $((1 + c)/(r + e + c))$ x MB

16) If the required reserve ratio is 10 percent, currency in circulation is $\$400$ billion, checkable deposits are $\$800$ billion, and excess reserves total $\$0.8$ billion, then the money supply is

a) $\$8000$ b) $\$1200$ c) $\$1200.8$ d) $\$8400$

17) If the required reserve ratio is 10 percent, currency in circulation is $\$400$ billion, checkable deposits are $\$800$ billion, and excess reserves total $\$0.8$ billion, then the money multiplier is approximately

a) 2.5 b) 1.67 c) 2.0 d) 0.601

18) If the required reserve ratio is 10 percent, currency in circulation is $\$400$ billion, checkable deposits are $\$800$ billion, and excess reserves total $\$0.8$ billion, then the currency ratio is

a) 25 b) 50 c) 40 d) 05

19) If the required reserve ratio is 10 percent, currency in circulation is $400 billion, checkable deposits are $800 billion, and excess reserves total $0.8 billion, then the excess reserves− checkable deposit ratio is

a) 0.001 b) 0.10 c) 0.01 d) 0.05

20) If the required reserve ratio is 10 percent, currency in circulation is $400 billion, checkable deposits are $800 billion, and excess reserves total $0.8 billion, then the monetary base is

a) $ 480 billion b) $ 480.8 billion

c) $ 80 billion d) $ 80.8 billion

21) If the required reserve ratio is 15 percent, currency in circulation is $400 billion, checkable deposits are $800 billion, and excess reserves total $0.8 billion, then the money multiplier is approximately

a) 2.5 b) 1.67 c) 2.3 d) 0.651

22) If the required reserve ratio is 5 percent, currency in circulation is $400 billion, checkable deposits are $800 billion, and excess reserves total $0.8 billion, then the money multiplier is approximately

a) 2.5 b) 2.72 c) 2.3 d) 0.551

23) If the required reserve ratio is 10 percent, currency in circulation is $400 billion, checkable deposits are $1000 billion, and excess reserves total $1billion, then the money supply is

a) $10.000 b) $4000 c) $1400 d) $10.400

24) If the required reserve ratio is 10 percent, currency in circulation is $400 billion, checkable deposits are $1000 billion, and excess reserves total $1 billion, then the money multiplier is approximately

a) 2.5 b) 2.8 c) 2.0 d) 0.7

25) If the required reserve ratio is 10 percent, currency in circulation is $400 billion, checkable deposits are $1000 billion, and excess reserves total $1 billion, then the currency ratio is

a) 25 b) 50 c) 40 d) .05

27) If the required reserve ratio is 10 percent, currency in circulation is $400 billion, checkable deposits are $1000 billion, and excess reserves total $1 billion, then the monetary base is

a) $400 billion b) $401 billion

c) $500 billion d) $501 billion

28) If the required reserve ratio is 15 percent, currency in circulation is $400 billion, checkable deposits are $1000 billion, and excess reserves total $1 billion, then the money multiplier is approximately

a) 2.55 b) 2.67 c) 2.35 d) .0551

29) If the required reserve ratio is one − third, currency in circulation is $300 billion, and checkable deposits are $900 billion, then the money supply is

a) $2700 b) $3000 c) $1200 d) $1800

30) If the required reserve ratio is one − third, currency in circulation is $300 billion, and checkable deposits are $900 billion, then the money multiplier is approximately

a) 2.5 b) 2.8 c) 2.0 d) 0.67

31) If the required reserve ratio is one − third, currency in circulation is $300 billion, and checkable deposits are $900 billion, then the currency ratio is

a) 2.5 b) 33 c) 67 d) 375

32) If the required reserve ratio is one − third, currency in circulation is $300 billion, and checkable deposits are $900 billion, then the level of excess reserves in the banking system is

a) $300 billion b) $30 billion c) $3 billion d) 0

33) If the required reserve ratio is one − third, currency in circulation is $300 billion, and checkable deposits are $900 billion, then the monetary base is

a) $300 billion b) $600 billion

c) $333 billion d) $667 billion

34) Because an increase in the monetary base will mean an increase in the level of currency in circulation

a) the actual money multiplier will be smaller than the simple deposit multiplier

b) a given change in the monetary base will lead to a smaller increase in checkable deposits than indicated by the simple deposit multiplier.

c) a given change in the monetary base will lead to a larger increase in checkable deposits than indicated by the simple deposit multiplier.

d) both a and b of the above will occur

35) the money multiplier is smaller than the simple deposit multiplier when

a) the currency − checkable deposit ratio is zero

b) the currency checkable deposit

c) banks choose to hold excess reserves

d) only b and c of the above are true

36) Assuming initially that r = 10%, c = 40%, and e = 0, an increase in r to 15% causes

a) the money multiplier to increase from 2.55 to 2.8

b) the money multiplier to decrease from 2.8 to 2.55

c) the money multiplier to increase from 1.82 to 2

d) the money multiplier to decrease from 2 to 1.82

37) Assuming initially that r = 10%, c = 40%, and e = 0, an decrease in r to 15% causes

a) the money multiplier to increase from 2.8 to 3.11

b) the money multiplier to decrease from 3.11 to 2.8

c) the money multiplier to increase from 2 to 2.22

d) the money multiplier to decrease from 2.22 to 2

Chapter Six

Money and Inflation

Money and Inflation

Preview

Since the early 1960s, when the inflation rate hovered between 1% and 2%, the economy has suffered from higher and more variable rates of inflation. By the late 1960s, the inflation rate had climbed beyond 5%, and by 1974, it reached the double-digit level. Alter moderating somewhat during the 1975-1978 period, it shot above 10% in 1979 and 1980, slowed to around 5% from 1982 to 1990, declined further to around 2% in the late 1990s, and remained around that level through 2005. Inflation, the condition of a continually rising price level, has become a major concern of politicians and the public, and how to control it frequently dominates the discussion of economic policy.

How do we prevent the inflationary fire from igniting and end the roller-coaster ride in the inflation rate of the past 40 years? Milton Friedman provides an answer in his famous proposition that "Inflation is always and everywhere a monetary phenomenon." He postulates that the source of all inflation episodes is a high growth rate of the money supply: Simply by reducing the growth rate of the money supply to low levels, inflation can be prevented.

In this chapter, we use aggregate demand and supply analysis to reveal the role of monetary policy in creating inflation. You will find that as long as inflation is defined as the condition of a continually and rapidly rising price level, almost all economists agree with Friedman's proposition that inflation is a monetary phenomenon.

But what causes inflation? How does inflationary monetary policy come about? You will see that inflationary monetary policy is an offshoot of other government policies: the attempt to hit high employment targets or the running of large budget deficits. Examining how these policies lead to inflation will point us toward ways of preventing it at minimum cost in terms of unemployment and output loss.

MONEY AND INFLATION: EVIDENCE

The evidence for Friedman's statement is straightforward. Whenever a country's inflation rate is extremely high for a sustained period of time, its rate of money supply growth is also extremely high. Indeed, this is exactly what we shows that the countries with the highest inflation rates have also had the highest rates of money growth.

Evidence of this type seems to support the proposition that extremely high inflation is the result of a high rate of money growth.

Keep in mind, however, that you are looking at reduced-form evidence, which focuses solely on the correlation of two variables money growth and the inflation rate. As with all reduced-form evidence, reverse causation (inflation causing money supply growth) or an outside factor that drives both money growth and inflation could be involved.

How might you rule out these possibilities? First, you might look for historical episodes in which an increase in money growth appears to be an exogenous event; a high inflation rate for a sustained period following the increase in money growth would provide strong evidence that high money growth is the driving force behind the inflation. Luckily for our analysis, such clear-cut episodes-hyperinflations (extremely rapid inflations with inflation rates exceeding 50% per month) have occurred, the most notorious being the German hyperinflation of 1921-1923.

German Hyperinflation, 1921-1923

In 1921, the need to make reparations and reconstruct the economy after World War I caused the German government's expenditures to greatly exceed revenues. The government could have obtained revenues to cover these increased expenditures by raising taxes, but that solution was, as always, politically unpopular and would

have taken much time to implement. The government could also have financed the expenditure by borrowing from the public, but the amount needed was far in excess of its capacity to borrow. There was only one route left: the printing press. The government could pay for its expenditures simply by printing more currency (increasing the money supply) and using it to make payments to the individuals and companies that were providing it with goods and services. As shown in Figure l, this is exactly what the German government did, in late 1921, the money supply began to increase rapidly, and so did the price level.

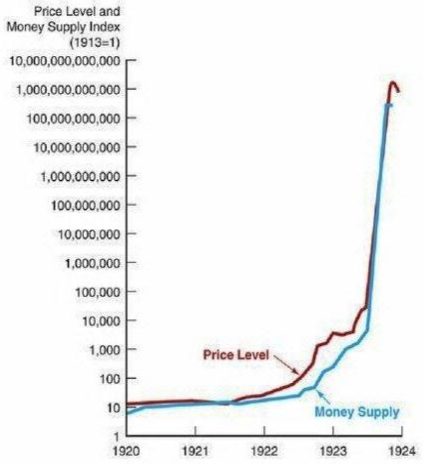
In 1923, the budgetary situation of the German government deteriorated even further. Early that year, the French invaded the Ruhr, because Germany had failed to make its scheduled reparations payments. A general strıke in the region then ensued to protest the French action, and the German government actively supported this "passive resistance" by making payments to striking workers As a result, government expenditures climbed dramatically, and the government printed currency at an even faster rate to finance this spending. As displayed in Figure 1, the result of the explosion in the money supply was that the price level blasted off, leading to an inflation rate for 1923 that exceeded 1 million percent!

The invasion of the Ruhr and the printing of currency to pay striking workers it the characteristics of an exogenous event Reverse causation (that the rise in the price level caused the French to invade the Ruhr) is highly implausible, and it is hard to imagine a third factor that could have been a driving force behind both inflation and the explosion in the money supply Therefore, the German hyperinflation qualifies as a "controlled experiment" that supports Friedman's proposition that inflation is a monetary phenomenon.

Recent Episodes of Rapid Inflation

Although recent rapid inflations have not been as dramatic as the German hyperinflation, many countries in the 1980s and 1990s experienced rapid inflations in which the high rates of money growth can also be classified as exogenous events. For example, of all Latin American countries in the decade from 1980 to 1990, Argentina, Brazıl, and Peru had both the highest rates of money growth and the highest average inflation rates. However, in recent years, inflation in these countries has been brought down considerably.

FIGURE 1 Money Supply and Price Level in the German Hyperinflation



Source: Frank D. Graham, *Exchange, Prices and Production in Hyperinflation: Germany, 1920–25* (Princeton, NJ: Princeton University Press, 1930), pp. 105–106.

The explanation for the high rates of money growth in these countries is similar to the explanation for Germany during its hyperinflation: The unwillingness of Argentina, Brazil, and Peru to finance government expenditures by raising taxes led to large budget deficits (sometimes over 15% of GDP), which were financed by money creation.

That the inflation rate is high in all cases in which the high rate of money growth can be classified as an exogenous event (including episodes in Argentina, Brazil, Peru, and Germany) is strong evidence that high money growth causes high inflation.

MEANING OF INFLATION

You may have noticed that all the empirical evidence on the relationship of money growth and inflation discussed so far looks only at cases in which the price level is continually rising at a rapid rate. It is this definition of inflation that Friedman and other economists use when they make statements such as "Inflation is always and everywhere a monetary phenomenon." This is not what your friendly newscaster means when reporting the monthly inflation rate on the nightly news. The newscaster is only telling you how much, in percentage terms, the price level has changed from the previous month. For example, when you hear that the monthly inflation rate 1s 1% (12% annual rate), this indicates only that the price level has risen by 1% in that month. This could be a one-shot change, in which the high inflation rate is merely temporary, not sustained. Only if the inflation rate remains high for a substantial period of time (greater than 1% per month for several years) will economists say that inflation has been high.

Accordingly, Milton Friedman's proposition actually says that upward movements in the price level are a monetary phenomenon only if this is a sustained process. When inflation is defined as a continuing and rapid rise in the price level, almost all economists agree with Friedman's proposition that money alone is to blame.

VIEWS OF INFLATION

Now that we understand what Friedman's proposition means, we can use the aggregate supply and demand analysis learned to show that large and persistent upward movements in the price level (high inflation) can occur only if there is a continually growing money supply.

How Money Growth Produces Inflation

First, let's look at the outcome of a continually growing money supply (see Figure 2). Initially, the economy is at point 1, with output at the natural rate level and the price level at P_1, (the intersection of the aggregate demand curve AD_1, and the short-run aggregate supply curve AS_1). Il he money supply increases steadily over the course of the year, the aggregate demand curve shifts rightward to AD_2, At first, for a very brief time, the economy may move to point 1' and output may increase above the natural rate level to Y', but the resulting decline in unemployment below the natural rate level will cause wages to rise, and the short-run aggregate supply curve will quickly begin to shift leftward. It will stop shifting only when it reaches AS_2, at which time the economy has returned to the natural rate level of output on the long-run aggregate supply curve. "At the new equilibrium, point 2, the price level has increased from P_1 to P_2.

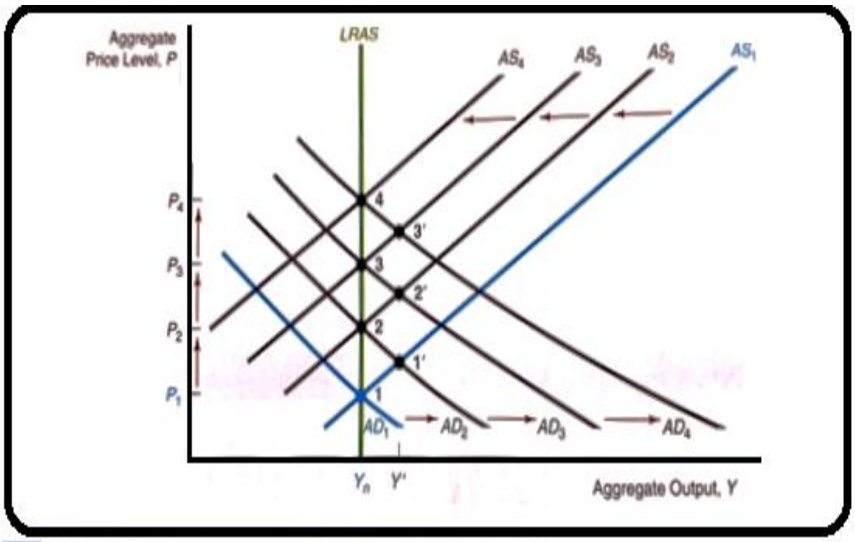


FIGURE 2 Response to a Continually Rising Money Supply
A continually rising money supply shifts the aggregate demand curve to the right from AD_1 to AD_2 to AD_3 to AD_4, while the short-run aggregate supply curve shifts to the left from AS_1 to AS_2 to AS_3 to AS_4. The result is that the price level rises continually from P_1 to P_2 to P_3 to P_4.

If the money supply increases the next year, the aggregate demand curve will shift to the right again to AD_3, and the short-run aggregate supply curve will shilt from AS_2, to AS_3; the economy will move to point 2' and then to point 3, where the price level has risen to P_3. If the money supply continues to grow in subsequent years, the economy will continue to move to higher and higher price levels. As long as the money supply grows, this process will continue, and inflation will occur. High money growth produces high inflation.

Can Other Factors Besides Money Growth Produce a Sustained Inflation?

In the aggregate demand and supply analysis, you learned that other factors besides changes in the money supply (such as fiscal policy and supply shocks) can affect the aggregate demand and supply curves Doesn't this suggest that these other factors can generate high inflation? The answer, surprisingly, is no. To see why high inflation is always a monetary phenomenon, let's dig a little deeper into aggregate demand and supply analysis to see whether other factors can generate high inflation in the absence of a high rate of money growth.

Can Fiscal Policy by Itself Produce Inflation? To examine this question, let's look at Figure 3, which demonstrates the effect of a one-shot permanent increase in government expenditure (say, from \$500 billion to \$600 billion) on aggregate output and the price level. Initially, we are at point 1, where output is at the natural rate level and the price level is P_1. The increase in government expenditure shifts the aggregate demand curve to AD_2, and we move to point 1', where output is above the natural rate level at Y_1. Because of this, the short-run aggregate supply curve will begin to shift leftward, eventually reaching AS_2, where it intersects the aggregate demand

curve AD_2, at point 2, at which output is again at the natural rate level and the price level has risen to P_2.

The net result of a one-shot permanent increase in government expenditure is a one-shot permanent increase in the price level. What happens to the inflation rate? When we move from point I to $1'$ o 2, the price level rises, and we have a positive inflation rate. But when we finally get to point 2, the inflation rate returns to zero. We see that the one-shot increase in government expenditure leads to only a temporary increase in the inflation rate, not to an inflation in which the price level is continually rising.

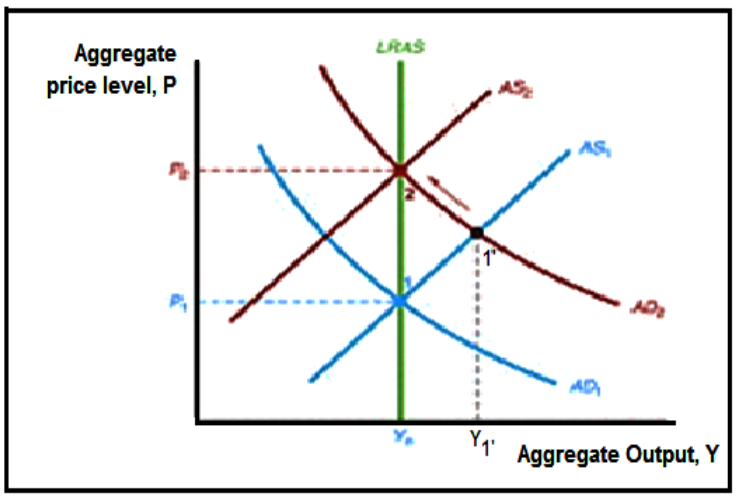


FIGURE 3
Response to a one-shot permanent Increase in Government Expenditure
A one-shot permanent increase in government expenditure shifts the aggregate demand curve rightward from AD_1 to AD_2 , moving the economy from point 1 to point 1' Because output now exceeds the nature rate level Y_n , the short-run aggregate supply cur eventually shifts leftward AS_2, and the price level rises from P_1 to P_2, one-shot permanent increase but not a continuing increase.

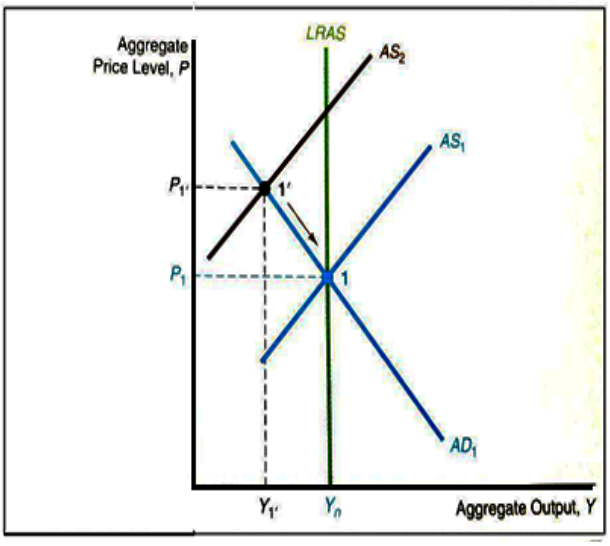
If government spending increases continually, however, we could get a continuing rise in the price level. It appears, then, that aggregate demand and supply analysis could reject Friedman's proposition that inflation is always the result of money growth. The problem with this argument Is that a continually increasing level of government expenditure is not a feasible policy There is a limit on the total amount of possible government expenditure; the government cannot spend more than 100% of GDP In fact, well before this limit is reached, the political process would stop the increases in government spending. As revealed in the continual debates in Congress over balanced budgets and government spending, both the public and politicians have a particular target level of government spending they deem appropriate; although small deviations from this level might be tolerated, large deviations would not. Indeed, public and political perceptions impose tight limits on the degree to which government expenditures can increase.

What about the other side of fiscal policy-taxes? Could continual tax cuts generate an inflation? Again the answer is no. The analysis in Figure 3 also describes the price and output response to a one-shot decrease in taxes. There will be a one-shot increase in the price level, but the increase in the inflation rate will be only temporary. We can increase the price level by cutting taxes even more, but this

process would have to stop–once taxes reach zero, they can't be reduced further. We must conclude, then, that high inflation cannot be driven by fiscal policy alone.

Can Supply–Side Phenomena by Themselves Produce Inflation? Because supply shocks and workers' attempts to increase their wages can shift the short–run aggregate supply curve leftward, you might suspect that these supply–side phenomena by themselves could stimulate inflation. Again, we can show that this suspicion is incorrec

FIGURE 4
Response to a Supply Shock
A negative supply shock (or a wage push) shifts the short-run aggregate supply curve leftward to AS_2 and results in high unemployment at point 1 As a result, the short-run aggregate supply curve shifts back to the right to AS_1, and the economy returns to point 1, where the price level has returned to P_1.



Suppose that a negative supply shock tor example, an oil embargo–raises oil prices (or workers could have successfully pushed up their wages). As displayed in Figure 4, the negative supply shock shifts the short–run aggregate supply curve fromAS_1, to AS_2. If the money supply remains unchanged, leaving the aggregate demand curve at AD_1, we move to point 1', where output Y is below the

natural rate level and the price level P_1 is higher The short-run aggregate supply curve will now shift back to AS_1, because unemployment is above the natural rate, and the economy slides downAD_1, from point $1'$ to point 1. The net result of the supply shock is that we return to full employment at the initial price level, and there is no continuing inflation. Additional negative supply shocks that again shift the short-run aggregate supply curve leftward will lead to the same outcome: The price level will rise temporarily, but inflation will not result. The conclusion that we have reached is the following: Supply-side phenomena cannot be the source of high inflation.

Summary

Our aggregate demand and supply analysis shows that high inflation can occur only with a high rate of money growth. As long as we recognize that inflation refers to a continuing increase in the price level at a rapid rate, we now see why Milton Friedman was correct when he said that Inflation is always and everywhere a monetary phenomenon.

ORIGINS OF INFLATIONARY MONETARY POLICY

Although we now know what must occur to generate a rapid inflation--a high rate of money growth--we still can't understand why high inflation occurs until we have learned how and why inflationary

monetary policies come about. 1f everyone agrees that inflation is not a good thing for an economy, why do we see so much of it? Why do governments pursue inflationary monetary policies? Because there is nothing intrinsically desirable about inflation and because we know that a high rate of money growth doesn't happen of its own accord, it must follow that in trying to achieve other goals, governments end up with a high money growth rate and high inflation. In this section, we will examine the government policies that are the most common sources of inflation.

High Employment Targets and Inflation

The first goal most governments pursue that often results in inflation is high employment. The U,S. government is committed by law (the Employment Act of 1946 and the Humphrey-Hawkins Act of 1978) to promoting high employment. Though it is true that both laws require a commitment to a high level of employment consistent with a stable price level, in practice our government has often pursued a high employment target with little concern about the inflationary consequences of its policies. This was true especially in the mid-1960s and 1970s, when the government began to take a more active role in attempting to stabilize unemployment.

Two types of inflation can result from an activist stabilization policy to promote high employment: cost-push inflation, which occurs because of negative supply shocks or a push by workers to get higher wages, and demand-pull inflation, which results when policymakers pursue policies that shift the aggregate demand curve to the right. We will now use aggregate demand and supply analysis to examine how a high employment target can lead to both types of inflation.

Cost-Push Inflation. In Figure 5, the economy is initially at point 1, the intersection of the aggregate demand curve AD_1, and the short-run aggregate supply curve AS_1, Suppose that workers decide to seek higher wages, either because they want to increase their real wages (wages in terms of the goods and services they can buy) or because they expect inflation to be high and wish to keep up with inflation. The effect of such an increase (similar to a negative supply shock) is to shit the short-run aggregate supply curve leftward to AS_2." If government fiscal and monetary policy remains unchanged. the economy would move to point 1' at the intersection of the new short-run aggregate supply curve AS_2, and the aggregate demand curve AD_1. Output would decline to below its natural rate level Y_n, and the price level would rise to P_1.

What would activist policymakers with a high employment target do if this situation developed? Because of the drop in output and

resulting increase in unemployment, they would implement policies to raise the aggregate demand curve to AD_2, so that we would return to the natural rate level of output at point 2 and price level P_2. The workers who have increased their wages have not fared too badly. The government has stepped in to make sure that there is no excessive e unemployment, and they have achieved their goal of higher wages. Because the government has, in effect, given in to the demands of workers for higher wages, an activist policy with a high employment target is often referred to as an accommodating policy.

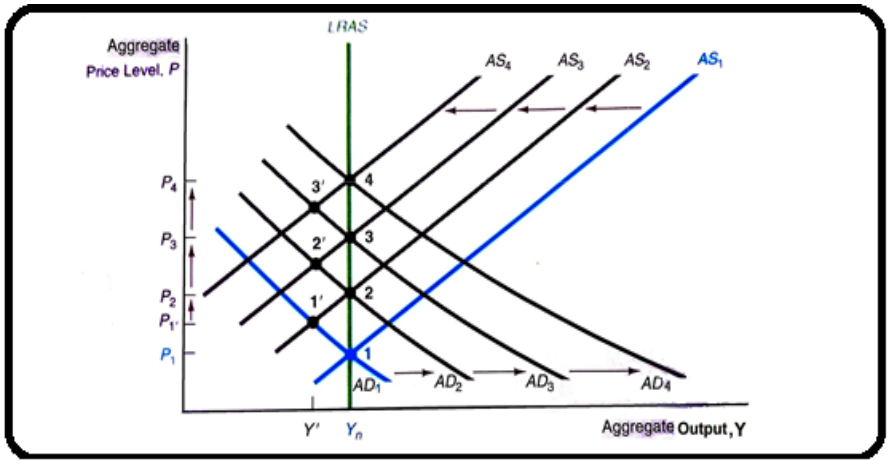


FIGURE 5 Cost-Push Inflation with an Activist Policy to Promote High Employment
In a cost-push inflation, the leftward shifts of the short-run aggregate supply curve from AS_1, to AS_2, to AS_3, and so on cause a government with a high employment target to shift the aggregate demand curve to the right continually to keep unemployment and output at their natural rate levels. The result is a continuing rise in the price level from P_1, to P_2, to P_3, and so on.

The workers, having eaten their cake and had it too, might be encouraged to seek even higher wages. In addition, other workers might now realize that their wages have fallen relative to their fellow

workers, and because they don't want to be left behind, these workers will seek to increase their wages. The result is that the short-run aggregate supply curve shifts leftward again, to AS_3. Unemployment develops again when we move to point $2'$, and the activist policies will once more be used to shift the aggregate demand curve rightward to AD_3, and return the economy to full employment at a price level of P_3,. If this process continues, the result will be a continuing increase in the price level-a cost-push inflation.

What role does monetary policy play in a cost-push inflation? A cost-push inflation can occur only if the aggregate demand curve is shifted continually to the right The first shift of the aggregate demand curve to AD_2, could be achieved by a one-shot increase in government expenditure or a one-shot decrease in taxes. But what about the next required rightward shift of the aggregate demand curve to AD_3, and the next, and the next? The limits on the maximum level of government expenditure and the minimum level of taxes would prevent the use of this expansionary fiscal policy for very long. Hence it cannot be used continually to shift the aggregate demand curve to the right. But the aggregate demand curve can be shifted continually rightward by continually increasing the money supply--that is, by going to a higher rate of money growth. Therefore, a cost-push inflation is a monetary phenomenon because it cannot occur without

the monetary authorities pursuing an accommodating policy of a higher rate of money growth.

Demand-Pull Inflation. The goal of high employment can lead to inflationary monetary policy in another way. Even at full employment, some unemployment is always present because of frictions in the labor market, which make it difficult to immediately match unemployed workers with employers. An unemployed autoworker in Detroit may not know about a job opening in the electronics industry in California or, even if he or she did, may not want to move or be retrained. So the unemployment rate when there is full employment (the natural rate of unemployment) will be greater than zero. If policymakers set a target for unemployment that is too low because it is less than the natural rate of unemployment, this can set the stage for a higher rate of money growth and a resulting inflation. Again we can show how this can happen using an aggregate supply and demand diagram (see Figure 6).

If policymakers have an unemployment target (say, 4%) that is below the natural rate (estimated to be between $4\frac{1}{2}$% and $5\frac{1}{2}$% currently), they will try to achieve an output target greater than the natural rate level of output. This target level of output is marked Y_T, in Figure 6. Suppose that we are initially at point 1; the economy is at the natural rate level of output but below the target level of output Y_T.

To hit the unemployment target of 4%, policymakers enact policies to increase aggregate demand, and the effects of these policies shift the aggregate demand curve until it reaches AD_2, and the economy moves to point 1' . Output is at Y_T and the 4% unemployment rate goal has been reached

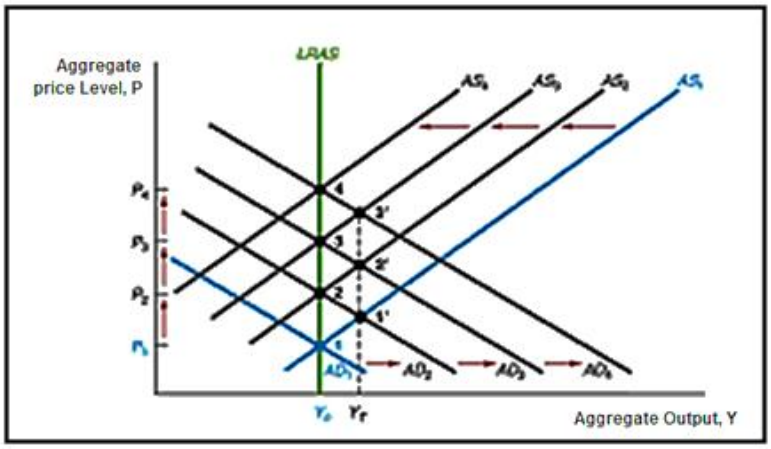


FIGURE 6 Demand-Pull Inflation: The Consequence of Setting Too Low an Unemployment Target
Too low an unemployment target (too high an output target of Y_T) causes the government shift the aggregate demand curve rightward from AD_1 to AD_2 to AD_3 and so on, while the short-run aggregate supply Curve shifts leftward from AS_1 to AS_2, to AS_3 and so on. The result is a continuing rise in the price level known as a demand-pull inflation.

If the targeted unemployment rate was at the natural rate level between $4\frac{1}{2}$% and $5\frac{1}{2}$%, there would be no problem However, because at Y_T the 4% unemployment rate is below the natural rate level, wages will rise and the short-run aggregate supply curve will shift in to AS_2, moving the economy from point 1' to point 2. The economy is back at the natural rate of unemployment, but at a higher price level of P_2, We could stop there, but because unemployment is again higher than the target level. Policymakers would again shift the

aggregate demand curve rightward to AD_3, to hit the output target at point $2'$, and the whole process would continue to drive the economy to point 3 and beyond. The overall result is a steadily rising price level -- an inflation.

How can policymakers continually shift the aggregate demand curve rightward? We have already seen that they cannot do it through fiscal policy, because of the limits on raising government expenditures and reducing taxes. Instead they will have to resort to expansionary monetary policy: a continuing increase in the money supply and hence a high money growth rate.

Pursuing too low an unemployment rate target or, equivalently, too high an output target is the source of inflationary monetary policy in this situation, but it seems sense- less for policymakers to do this. They have not gained the benefit of a permanently higher level of output but have generated the burden of an inflation. lt. however, they do not realize that the target rate of unemployment is below the natural rate, the process that we see in Figure 6 will be well under way before they realize their mistake

Because the inflation described results from policymakers pursuing policies that shift the aggregate demand curve to the right, it is called a demand-pull inflation. In contrast, a cost-push inflation

occurs when workers push their wages up Is t easy to distinguish between them in practice? The answer is no. We have seen that both types of inflation will be associated with higher money growth, so we cannot distinguish between them on this basis. Yet as Figures 5 and 6 demonstrate, demand-pull inflation will be associated with periods when unemployment is below the natural rate level, whereas cost-push inflation is associated with periods when unemployment is above the natural rate level. To decide which type of inflation has occurred, we can look at whether unemployment has been above or below its natural rate level. This would be easy if economists and policymakers actually knew how to measure the natural rate of unemployment, unfortunately, this difficult research question is still not fully resolved by the economics profession. In addition, the distinction between cost-push and demand-pull inflation is blurred, because a cost-push inflation can be initiated by a demand-pull inflation: When a demand-pull inflation produces higher inflation rates, expected inflation will eventually rise and cause workers to demand higher wages so that their real wages do not fall. In this way, demand-pull inflation can eventually trigger cost-push inflation.

Budget Deficits and Inflation

Our discussion of the evidence on money and inflation suggested that budget deficits are another possible source of inflationary

monetary policy. To see if this could be the case, we need to look at how a government finances its budget deficits.

Government Budget Constraint. Because the government has to pay its bills just as we do, it has a budget constraint. There are two ways we can pay for our spending raise revenue (by working) or borrow. The government also enjoys these two options raise revenue by levying taxes or go into debt by issuing government bonds. Unlike us, However, it has a third option: The government can create money and use it to pay for the goods and services it buys.

Methods of financing government spending are described by an expression called the government budget constraint, which states the following: The government budget deficit DEF, which equals the excess of government spending Gover tax revenue T, must equal the sum of the change in the monetary base ΔMB and the change in government bonds held by the public ΔB. Algebraically, this expression can be written as follows:

$$DEF = G - T = \Delta MB + \Delta B \qquad (1)$$

To see what the government budget constraint means in practice, let's look at the case in which the only government purchase is a S100 million supercomputer. If the government convinces the electorate that such a computer is worth paying for, it will probably be

able to raise the S100 million in taxes to pay for it, and the budget deficit will equal zero. The government budget constraint then tells us that no issue of money or bonds is needed to pay for the computer, because the budget is balanced. If taxpayers think that supercomputers are too expensive and refuse to pay taxes for them, the budget constraint indicates that the government must pay for it by selling $100 million of new bonds to the public or by, in effect, printing $100 million of currency to pay for the computer. In either case, the budget constraint is satisfied; the $100 million deficit is balanced by the change in the stock of government bonds held by the public (ΔB = $100 million) or by the change in the monetary base (ΔMB = $100 million).

The government budget constraint thus reveals two important facts: If the government deficit is financed by an increase in bond holdings by the public, there is no effect on the monetary base and hence on the money supply. But, if the deficit is not financed by increased bond holdings by the public, the monetary base and the money supply increase.

There are several ways to understand why a deficit leads to an increase in the monetary base when the public's bond holdings do not increase. The simplest case is when the government's treasury has the legal right to issue currency to finance its deficit. Financing the

deficit is then very straightforward: The government just pays for the spending that is in excess of its tax revenues with new currency. Because this increase in currency adds directly to the monetary base, the monetary base rises and the money supply with it through the process of multiple deposit creation.

In the United States, however, and in many other countries, the government does not have the right to issue currency to pay for its bills. In this case, the government must finance its deficit by first issuing bonds to the public to acquire the extra funds to pay its bills. Yet if these bonds do not end up in the hands of the public, the only alternative is that they are purchased by the central bank For the government bonds not to end up in the hands of the public, the central bank must conduct an open market purchase, which, leads to an increase in the monetary base and in the money supply. This method of financing government spending is called monetizing the debt because, as the two-step process described indicates, government debt issued to finance government spending has been removed from the hands of the public and has been replaced by high-powered money This method of financing, or the more direct method when a government just issues the currency directly, is also, somewhat inaccurately, referred to as printing money because high-powered money (the monetary base) is created in the process. The

use of the word printing is misleading because what is essential to this method of financing government spending is that the monetary base increases when the central bank conducts open market purchases, just as it would if more currency is put in circulation.

We thus see that a budget deficit can lead to an increase in the money supply if it is financed by the creation of high-powered money. However, earlier in this chapter you have seen that inflation can develop only when the stock of money grows continually. Can a budget deficit financed by printing money do this? The answer is yes, if the budget deficit persists for a substantial period of time. In the first period, if the deficit is financed by money creation, the money supply will rise, shifting the aggregate demand curve to the right and leading to a rise in the price level (see Figure 2). If the budget deficit is still present in the next period, it has to be financed all over again. The money supply will rise again, and the aggregate demand curve will again shift to the right, causing the price level to rise further. As long as the deficit persists and the government resorts to printing money to pay for it, this process will continue. Financing a persistent deficit by money creation will lead to a sustained inflation.

A critical element in this process is that the deficit is persistent. If temporary, it would not produce an inflation because the situation would then be similar to that shown in Figure 3, in which there is a

one-shot increase in government expenditure In the period when the deficit occurs, there will be an increase in money to finance it, and the resulting rightward shift of the aggregate demand curve will raise the price level. If the deficit disappears in the next period, there is no longer a need to print money. The aggregate demand curve will not shift further, and the price level will not continue to rise. Hence the one-shot increase in the money supply from the temporary deficit generates only a one-shot increase in the price level, and no inflation develops.

To summarize, a deficit can be the source of a sustained inflation only if it is persistent rather than temporary and if the government finances it by creating money rather than by issuing bonds to the public.

If inflation is the result, why do governments frequently finance persistent deficits by creating money? The answer is the key to understanding how budget deficits may lead to inflation.

Budget Deficits and Money Creation in Other Countries. Although the United States has well-developed money and capital markets in which huge quantities of its government bonds, both short- and long-term, can be sold, this is not the situation in many developing countries. If developing countries run budget deficits, they cannot

finance them by issuing bonds and must resort to their only other alternative, printing money. As a result, when they run large deficits relative to GDP, the money supply grows at substantial rates, and inflation results.

Earlier we cited Latin American countries that had high inflation rates and high money growth as evidence that inflation is a monetary phenomenon. The Latin American countries that had high money growth are precisely the ones that had persistent and extremely large budget deficits relative to GDP The only way to finance the deficits was to print more money, so the ultimate source of their high inflation rates was their large budget deficits.

In all episodes of hyperinflation, huge government budget deficits are also the ultimate source of inflationary monetary policies. The budget deficits during hyperinflations are so large that even if a capital market exists to issue government bonds, it does not have sufficient capacity to handle the quantity of bonds that the government wishes to sell. In this situation, the government must also resort to the printing press to finance the deficits.

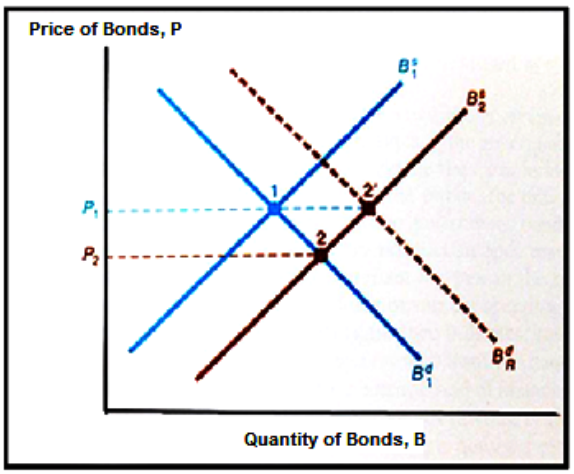
Budget Deficits and Money Creation in the United States. So far we have seen why budget deficits in some countries must lead to money creation and inflation. Either the deficit is huge, or the country

does not have sufficient access to capital markets in which it can sell government bonds. But neither of these scenarios seems to describe the situation in the United States. True, the United States' deficits were large in the 1980s, early 19905 and mid-2000s, but even so, the magnitude of these deficits relative to GDP was small compared to the deficits of countries that have experienced hyperinflations: The U.S. deficit as a percentage of GDP reached a peak of 6% in 1983 whereas Argentina's budget deficit sometimes exceeded 15% of GDP Furthermore, because the United States has the best-developed government bond market of any country in the world, it can issue large quantities of bonds when it needs to finance its deficit.

Whether the budget deficit can influence the monetary base and the money supply depends critically on how the Federal Reserve chooses to conduct monetary policy If the Fed pursues a policy goal of preventing high interest rates, many economists contend that a budget deficit will lead to the printing of money: Their reasoning, using the supply and demand analysis of the bond market, is as follows: When the Treasury issues bonds to the public, the supply of bonds rises (from B_1^S to B_2^S in Figure 7), causing bond prices to fall from P_1, to P_2, and hence interest rates to rise. If the Fed considers the rise in interest rates undesirable, it will buy bonds to prop up bond prices and reduce interest rates. The net result is that the government budget

deficit can lead to Federal Reserve open market purchases, which raise the monetary base (create high-powered money) and raise the money supply If the budget deficit persists so that the quantity of bonds supplied keeps on growing, the upward pressure on interest rates will continue, the Fed will purchase bonds again and again, and the money supply will continually rise, resulting in an inflation.

FIGURE 7
Interest Rates and the Government Budget Deficit
When the Treasury issues bonds to finance the budget deficit, the supply Curve for bonds shifts rightward from B_1^S to B_2^S Many economists take the position that the equilibrium moves to point 2 because the bond dermand Curve remains unchanged, with the result that the bond price falls from P_1 tc P_2, and the interest rate rises. Adherents of Ricardian equivalence, however, suggest that the demand Curve for bonds also increases to B_R^d moving the equilibrium to point 2', where the bond price is unchanged at P_1, so that the interest rate does not rise and there is no need for the Fed to buy bonds and increase the money supply.



Economists such as Robert Barro of Harvard University, however, do not agree that budget deficits influence the monetary base in the manner just described. Their analysis (which Bo named Ricardian equivalence after the nineteenth-century British economist David Ricardo contends that when the government runs deficits and issues bonds, the public recognizes that it will be subject to higher taxes in the future to pay off these bonds. The public then saves more in anticipation of these future taxes, with the net result that the public

demand for bonds increases to match the increased supply The demand curve for bonds shifts rightward to B in Figure 7, leaving the bond price and interest rate unchanged. There is now no need for the Fed to purchase bonds to keep the interest rate from rising.

To sum up, although high inflation is 'always and everywhere a monetary phenomenon" in the sense that it cannot occur without a high rate of money growth, there are reasons why this inflationary monetary policy might come about. The two underlying reasons are the adherence of policymakers to a high employment target and the presence of persistent government budget deficits.

Exercises: SELF-TEST

Part A: True-False Questions

Circle whether the following statements are true (T) or false (F).

T F 1. If inflation is defined as a continuous rise in the price level, then it is true that inflation can be eliminated by reducing the growth rate of the money supply to a low level.

T F 2. Keynesians disagree with the monetarists' proposition that inflation is a monetary phenomenon. That is, Keynesians believe that inflation can occur even when money growth has not been excessive.

T F 3. In the early 1980s, both Argentina and Israel experienced hyperinflation. They differed, however, in that Israel had not overly expanded its money supply.

T F 4. The price level may rise in any one month due to factors unrelated to changes in the money supply. Thus one can conclude that continual price-level increases need not be related to changes in the money supply.

T F 5. Keynesians argue that factors other than a continually increasing money supply may lead to sustained inflation.

T F 6. Sustained inflation occurs when unions successfully push up wages, even if the monetary authorities refuse to accommodate the higher wages by expanding the money supply

T F 7. Inflation according to one view, is the side effect of government efforts to cure high unemployment.

T F 8. At first glance, one would expect falling unemployment to be associated with demand-pull inflation.

T F 9. Huge government budget deficits have been the initiating source of inflationary monetary policies in every instance of hyperinflation.

TF 10. An examination of the period from 1960 through 1980 suggests that large government deficits are to blame for the inflationary monetary policies of this period.

Part B: Multiple Choice Questions

Circle the appropriate answer.

1, A continual increase in the money supply, according to Keynesian analysis, will cause

a. the price level to increase, but have no lasting effect on the inflation rate.

b. the price level to fall.

c. inflation.

d. output to increase and will have no effect on cither the price level or inflation.

e. none of the above.

2. Inflation occurs whenever

a. the price level rises.

b. the money supply increases.

c. the price level rises continuously over a period of time.

d. any of the above occur.

3. In general, most economists believe that inflation can only occur if

a. government spending increases.

b. strong labor unions demand higher wages.

c. negative supply shocks continuously hit the economy.

d. the money supply is continually expanded.

4. Monetarists emphasize the importance of 2 constant money growth rate rule more than the balanced-budget amendment or restrictions on union power because

a. they tend to regard excessive money growth as the cause of inflation.

b. while they do not believe that excessive money growth is the cause of inflation, they do believe that it is related to excessive government expenditures.

c. while they regard unions as the source of inflation, they know that they are too powerful politically to deal with.

d. of each of the above

5. Analysis of hyperinflationary episodes indicates that the rapid money growth leading to the inflation results when

a. government finance massive budget deficits by printing money.

b. centeal banks attempt to peg Interest rates.

c. government taxes become too excessive.,

d, central banks lower reserve requirements too much.

6. A one-shot increase in government spending will have whit effect on the inflation rate, according to the Keynesian analysis?

a. Permanent increase

b. Temporary increase

0. Temporary decrease

d. No effect

7. **Assume workers know that government policymakers, because unemployment is politically unpopular, always accommodate wage increases by expanding the money supply. What type of inflation is likely to result if workers demand higher wages not fearing a rise in unemployment?**

a. Demand-pull inflation

b. Hyperinflation

C. Cost-push inflation

d. Demand-shock inflation

8. If an economist were interested in testing whether federal budget deficits had been the source of excessive money growth for a particular country during the time period 1900-1930, he or she would be interested in the behavior of

a. inflation

b. the money supply–to –monetary–base ratio.

c. interest rates.

d. the government debt–to–GNP ratio.

9. When the government sets an unemployment target that is unrealistically low without realizing it, what is the likely result?

a. Inflation

b. An unemployment rate that may actually drop below the natural rate for a period of time

c. Excessive money growth

d. All of the above

10. Governments are likely to lose credibility in fighting inflation when

a. government budget deficits remain high.

b. government policymakers continue to accommodate wage demands and negative supply shocks.

c. the commitment to high unemployment is viewed 2 government's number–one goal for political reasons.

d. all of the above are true

11. The German hyperinflation of the 1920s supports the proposition that excessive money growth leads to higher prices, and not the other way 2round, since the increase in money growth appears to have been

a. unintentional.

b. intentional.

c. exogenous.

d. endogenous.

12. A common element of hyperinflationary episodes discussed in the text is government unwillingness to

a. finance expenditures by raising taxes.

b. increase expenditures.

c, finance expenditures by printing money.

d, finance transfer payments by printing money.

13. Which of the following statements are true?

a. The price level may rise in any one month due to factors unrelated to changes in the money supply. Thus one can conclude that

continual price-level increases need not be related to changes in the money supply.

b. Within the aggregate demand and supply framework, a continually increasing money supply has the effect of continually shifting the aggregate demand curve to the right.

c. Keynesians argue that factors other than a continually increasing money supply may lead to sustained inflation.

d. Sustained inflation occurs when unions successfully push up wages, even if the monetary authorities refuse to accommodate the higher wages by expanding the money supply.

14. Workers will have greater incentives to push for higher wages when government policymakers place greater concern on ____ than ____ and are thus ___ likely to adopt accommodative policies.

a. inflation; unemployment; less

b. inflation; unemployment; more

c. unemployment; inflation; less

d, unemployment; inflation; more

15. Which of the following statements are true?

a. Cost-push inflation is not a monetary phenomenon. United States.

b. At first glance, one would expect rising unemployment to be associated with demand pull inflation.

c. Huge government budget deficits have been the initiating source of inflationary monetary policies in every instance of hyperinflation.

d. Large government deficits are to blame for the inflationary monetary policies of the 1970s in the

16. Economists such as Robert Barro reject hold the view that deficits

a. cause the monetary base to decrease.

b. cause the monetary base to increase.

c. have no effect on the monetary base.

d. are inflationary even when financed by tax hikes.