Chapter 10

The Demand for Money

What is “money” and why does anyone want it? This question is less senseless than it appears, because economists use the term “money” in a special technical sense.

By “money” we mean the medium of exchange, the stuff you use to pay for things—cash, for example. In informal use, “money” sometimes means “income” (“I made a lot of money last year”) or “wealth” (“That guy has a lot of money”).

When economists speak of the “demand for money,” we are asking about the stock of assets held as cash, checking accounts, and closely related assets, specifically not generic wealth or income. Our interest is in why consumers and firms hold money as opposed to an asset with a higher rate of return.

The monetary economy is a significant improvement over the barter system, in which goods were exchanged directly for other goods.

Barter is a system of exchange in which goods or services are directly exchanged for other goods or services without using a medium of exchange, such as money.

The barter system has a number of limitations which make transactions very inefficient, including:

Double coincidence of wants: The needs of a seller of a commodity must match the needs of a buyer. If they do not, the transaction will not occur.

Absence of common measure of value: In a monetary economy, money plays the role of a measure of value of all goods, making it possible to measure the values of goods against each other. This is not possible in a barter economy.

Indivisibility of certain goods: If a person wants to buy a certain amount of another's goods, but only has payment of one indivisible good which is worth more than what the person wants to obtain, a barter transaction cannot occur.

Difficulty of deferred payments: It is impossible to make payments in installments and difficult to make payments at a later point in time.

Difficulty storing wealth: If society relies exclusively on perishable goods, storing wealth for the future may be impractical.

The money system is a significant improvement over the barter system. It provides a way to quantify the value of goods and communicate it to others. ***Money has several defining characteristics.*** It is:

- *Durable.*
- *Divisible.*
- *Portable.*
- *Liquid.*
- *Legal tender.*
- *Resistant to counterfeiting.*

The interaction between the demand for money and the supply of money provides the link through which the monetary authority, the Federal Reserve in the United States, affects output and prices.

Money is the means of payment or medium of exchange. More informally, **money is whatever is generally accepted in exchange**.

M1 consisting of currency plus checkable deposits, comes closest to defining the means of payment.

M2 might better meet the definition of money in a modern payments system

We briefly describe here the components of the monetary aggregates.

1. Currency: Consists of coins and notes in circulation.

2. Demand deposits: Non-interest-bearing checking accounts at commercial banks, excluding deposits of other banks, the government, and foreign governments.

3. Traveler's checks: Only those checks issued by nonbanks (such as American Express). Traveler's checks issued by banks are included in demand deposits.

4. Other checkable deposits: Interest-earning checking accounts, with a variety of legal arrangements and marketing names.

M1 = (1) + (2) + (3) + (4)

M1 contains those claims that can be used directly, instantly, and without restrictions. These claims are liquid. An asset is **liquid** if it can immediately, conveniently, and cheaply be used for making payments.

M1 corresponds most closely to the traditional definition of money as the means of payment.

5. Money market mutual fund (MMMF) shares: Interest-earning checkable deposits in mutual funds that invest in short-term assets. Some MMMF shares are held by institutions; these are excluded from M2.
6. Money market deposit accounts (MMDAs): MMMFs run by banks, with the advantage that they are insured up to $100,000. They were introduced at the end of 1982 to allow banks to compete with MMMFs.
7. Savings deposits: Deposits at banks and other saving institutions that are not transferable by check and are often recorded in a separate passbook kept by the depositor.
8. Small time deposits: Interest-bearing deposits with a specific maturity date. Before that date they can be used only if a penalty is paid. “Small” means less than $100,000.

M 2 = M 1 + (5) + (6) + (7) + (8)

M2 includes M1, plus some less liquid assets (ex. savings accounts and money market funds)

M2 includes, in addition, claims that are not instantly liquid—withdrawal of time deposits, for example, may require notice to the depository institution; money market mutual funds may set a minimum on the size of checks drawn on an account.

Currency earns zero interest, checking accounts earn less than money market deposit accounts, and so on. This is a typical economic tradeoff—in order to get more liquidity, asset holders have to give up yield.

M0: In some countries, such as the United Kingdom, M0 includes bank reserves, so M0 is referred to as the monetary base, or narrow money.

MB: is referred to as the monetary base or total currency. This is the base from which other forms of money (like checking deposits, listed below) are created and is traditionally the most liquid measure of the money supply.

M3: M2 plus large and long-term deposits. Since 2006, M3 is no longer published by the US central bank. However, there are still estimates produced by various private institutions.

MZM: Money with zero maturity. It measures the supply of financial assets redeemable at par on demand (talep üzerine paraya çevrilebilir). Velocity of MZM is historically a relatively accurate predictor of inflation.

M4-: M3 + Commercial Paper
M4: M4- + T-Bills (or M3 + Commercial Paper + T-Bills)

Type of money	M0	MB	M1	M2	M3	MZM
Notes and coins in circulation (outside Federal Reserve Banks and the vaults of depository institutions) (currency)	✓[16]	✓	✓	✓	✓	✓
Notes and coins in bank vaults (vault cash)		✓				
Federal Reserve Bank credit (required reserves and excess reserves not physically present in banks)		✓				
Traveler's checks of non-bank issuers			✓	✓	✓	✓
Demand deposits			✓	✓	✓	✓
Other checkable deposits (OCDs), which consist primarily of negotiable order of withdrawal (NOW) accounts at depository institutions and credit union share draft accounts.			✓[17]	✓	✓	✓
Savings deposits				✓	✓	✓
Time deposits less than $100,000 and money-market deposit accounts for individuals				✓	✓	
Large time deposits, institutional money market funds, short-term repurchase and other larger liquid assets[18]					✓	
All money market funds						✓

THE FUNCTIONS OF MONEY

Money is so widely used that we rarely step back to think how remarkable a device it is. It is impossible to imagine a modern economy operating without the use of money or something very much like it. In a imaginary barter economy in which there is no money, every transaction has to involve an exchange of goods (and/or services) on both sides of the transaction. The examples of the difficulties of barter are endless. The economist wanting a haircut would have to find a barber wanting to listen to a lecture on economics; the actor wanting a suit would have to find a tailor wanting to watch a performance; and so on. Without a medium of exchange, modern economies could not operate.

The Functions of Money

- There are four traditional functions of money:
  1. Medium of exchange
     - Money is used to pay for goods and services
     - Eliminates the need for a “double coincidence of wants”
  2. Store of value
     - An asset that maintains value
  3. Unit of account
     - The unit in which prices are quoted
  4. Standard of deferred payment
     - Money units are used in long term transactions (ex. loans)

Money, as **a medium of exchange** , makes it unnecessary for there to be a “double coincidence of wants,” such as the barber and economist bumping into each other at just the right time.

A **store of value** is an asset that maintains value over time. Thus, an individual holding a store of value can use that asset to make purchases at a future date. If an asset were not a store of value, it would not be used as a medium of exchange. Imagine trying to use ice cream as money in the absence of refrigerators. There would hardly ever be a good reason for anyone to give up goods for money (ice cream) if the money were sure to melt within the next few minutes. To be useful as money, an asset must be a store of value, but there are many stores of value other than money—such as bonds, stocks, and houses.

The unit of account is the unit in which prices are quoted and books kept. Prices are quoted in dollars and cents, and dollars and cents are the units in which the money stock is measured. Usually, the money unit is also the unit of account, but that is not essential. In many high-inflation countries, dollars become the unit of account even though the local money continues to serve as the medium of exchange.

Finally, **as a standard of deferred payment**, money units are used in long-term transactions, such as loans. The amount that has to be paid back in 5 or 10 years is specified in dollars and cents. Dollars and cents are acting as the standard of deferred payment. Once again, though, it is not essential that the standard of deferred payment be the money unit. For example, the final payment of a loan may be related to the behavior of the price level, rather than being fixed in dollars and cents. This is known as an indexed loan.

The last two of the four functions of money are, accordingly, functions that money usually performs but not functions that it necessarily performs. And the store-of-value function is one that many assets perform. There is one final point we want to reemphasize: ***Money is whatever is generally accepted in exchange*.**

In the past an amazing variety of monies have been used: simple commodities such as seashells, then metals, pieces of paper representing claims on gold or silver, pieces of paper that are claims only on other pieces of paper, and then paper and electronic entries in banks' accounts. However magnificently a piece of paper may be patterned, it is not money if it is not accepted in payment. And however unusual the material of which it is made, anything that is generally accepted in payment is money. There is thus an inherent circularity in the acceptance of money. Money is accepted in payment only because of the belief that it will later also be accepted in payment by others.

The Demand for Money: Theory

In this section we review the three major motives underlying the demand for money, and we concentrate on the effects of changes in income and the interest rate on money demand.

Before we take up the discussion, we must make an essential point about money demand: The demand for money is a demand for real balances.

In other words, people hold money for its purchasing power, for the amount of goods they can buy with it.

They are not concerned with their nominal money holdings, that is, the number of dollar bills they hold.

The Demand for Money: Theory

Two implications follow:

1. Real money demand is unchanged when the price level increases, and all real variables, such as the interest rate, real income, and real wealth, remain unchanged.

2. Equivalently, nominal money demand increases in proportion to the increase in the price level, given the real variables just specified. In other words, we are interested in a money demand function that tells us the demand for real balances, M/P, not nominal balances, M.

The theories we are about to review correspond to Keynes's famous three motives for holding money:

- **The transactions motive**, which is the demand for money arising from the use of money in making regular payments.
- **The precautionary motive**, which is the demand for money to meet unforeseen possibilities.
- **The speculative motive**, which arises from uncertainties about the money value of other assets that an individual can hold.

Transaction and precautionary motives → mainly discussing M1
Speculative motive → M2, as well as non-money assets

Transaction Demand

- The transactions demand for money arises from the lack of synchronization of receipts and expenditures.
- In other words, you aren't likely to get paid at the exact instant you need to make a payment, so between paychecks you keep some money around in order to buy stuff.
- In this section we examine a simple model of how much money an individual will hold to make purchases.
- The tradeoff here is between the amount of interest an individual forgoes by holding money and the costs and inconveniences of holding a small amount of money.

- To make the problem concrete, consider someone who is paid, say, $1,800 each month. Assume the person spends the $1,800 steadily over the course of the month, at the rate of $60 per day. Now at one extreme, the individual could simply leave the $1,800 in cash and spend it at the rate of $60 per day.
- Alternatively, on the first day of the month the individual could take $60 to spend that day and put the remaining $1,740 in a daily-interest savings account. Then every morning the person could go to the bank and withdraw that day's $60 from the savings account.

Transaction Demand

- Suppose the following:
  - Y = $1800/month
  - Person spends the Y evenly over the month, at a rate of $60/day

- Alternative 1:
  - Person could keep the entire $1800 in cash and spend $60/day
  - Cash balances falls smoothly from $1800 to $0 at the end of the month
  - Average balance of

$$\frac{(\$1800 - \$0)}{2} = \$900$$

  - Forgone interest of $i \times \$900$

Transaction Demand

- Suppose the following:
  - Y = $1800/month
  - Person spends the Y evenly over the month, at a rate of $60/day

- Alternative #2:
  - Person could deposit entire amount, and each day take the needed $60 out of the bank
  - Earn interest on money left in the bank over the course of the month
  - Cash balances fall from $1800/30 to zero every day
  - Average balance of
  - Forgone interest of $\frac{\left(\$1800/30 - \$0\right)}{2} = \$30$

$$i \times \$30$$

Transaction Demand

In general:

- Starting income of Y
- n trips to the bank

→ *The average cash balance is* $\frac{Y}{2n}$

- Each trips costs tc

→ *The combined cost of trips plus forgone interest is:*

$$(n \times tc) + i \times \left(Y/2n\right)$$

- Choose n to minimize costs and compute the average money holdings → the famous square-root Baumol-Tobin formula for the demand for money:

$$\frac{M}{P} = \sqrt{\frac{tc \times Y}{2i}} \qquad (1)$$

$$\frac{M}{P} = \sqrt{\frac{tc \times Y}{2i}}$$

- According to equation (1), 3 percent growth in GDP raises money demand 1.5 percent per year. If you increase the nominal money supply by the same 1.5 percent, real money supply and demand will stay in balance with a constant price level.
- Equation (1) shows that the demand for money decreases with the interest rate and increases with the cost of transacting. Money demand increases with income, but less than proportionately. This point is sometimes put in different words by saying that there are economies of scale in cash management.
- Equation (1) makes two very strong predictions: The income elasticity of money demand is 1⁄2, and the interest elasticity is -1⁄2.

The Precautionary Motive

In discussing the transactions demand for money, we focused on transactions costs and ignored uncertainty. In this section, we concentrate on the demand for money that arises because people are uncertain about the payments they might want, or have, to make.

Realistically, an individual does not know precisely what payments she will be receiving in the next few weeks and what payments will have to be made. The person might decide to have a hot fudge sundae, or need to take a cab in the rain, or have to pay for a prescription. If the person does not have money with which to pay, she will incur a loss. The more money an individual holds, the less likely he or she is to incur ***the costs of illiquidity (that is, not having money immediately available)***.

Technology and the structure of the financial system are important determinants of precautionary demand. In times of danger, families may keep hidden hordes of cash in case they need to flee. In contrast, in much of the developed world credit cards, debit cards, and smart cards reduce precautionary demand.

Speculative Demand for Money

The transactions demand and the precautionary demand for money emphasize the medium-of-exchange function of money, for each refers to the need to have money on hand to make payments. Each theory is most relevant to the M 1 definition of money, though the precautionary demand could certainly explain some of the holding of savings accounts and other relatively liquid assets that are part of M2.

Now we move over to the store-of-value function of money and concentrate on the role of money in the investment portfolio of an individual.

An individual who has wealth has to hold that wealth in specific assets. *Those assets make up a portfolio* . One would think an investor would want to hold the asset that provides the highest returns. However, given that the return on most assets is uncertain, it is unwise to hold the entire portfolio in a single risky asset.

You may have a hot tip that a certain stock will surely double within the next two years, but you would be wise to recognize that hot tips are far from infallible. The typical investor will want to hold some amount of a safe asset as insurance against capital losses on assets whose prices change in an uncertain manner. Money is a safe asset in that its nominal value is known with certainty.

In a famous article, James Tobin argued that money would be held as the safe asset in the portfolios of investors. The title of the article, “Liquidity Preference as Behavior towards Risk,” explains the essential notion.

In this framework, the demand for money—the safest asset—depends on the expected yields as well as on the riskiness of the yields on other assets.

Tobin showed that an increase in the expected return on other assets—an increase in the opportunity cost of holding money (that is, the return lost by holding money)—lowers money demand. By contrast, an increase in the riskiness of the returns on other assets increases money demand.

Empirical Estimates

This section examines the empirical evidence—the studies made using actual data—on the demand for money. We know that the interest elasticity of the demand for money plays an important role in determining the effectiveness of monetary and fiscal policies. We showed that there are good theoretical reasons for believing that the demand for real balances should depend on the interest rate. The empirical evidence supports that view. Empirical studies have established that the demand for money is negatively related to the interest rate.

The theory of money demand also predicts that the demand for money should depend on the level of income. The response of the demand for money to the level of income, as measured by the income elasticity of money demand, is also important from a policy viewpoint.

Empirical Estimates FOR M1 DEMAND

Four essential properties of money demand:

- Demand for money balances responds negatively to the rate of interest.
- Demand for money increases with the level of real income.
- Short-run responsiveness of money demand to changes in interest rates and income is considerably less than the long-run response. (the long-run responses are estimated to be about 5 times the size of the short-run responses)
- Demand for nominal money balance is proportional to the price level. There is no money illusion; in other words, the demand for money is a demand for real balances.

Empirical Estimates FOR M2 DEMAND

Innovation in the financial system has made it easier to move back and forth between M1 and other assets. For example, automatic teller machines typically allow cash withdrawals from savings accounts. We would say that savings accounts are now better substitutes for M1 than they were in the past. When money flows between savings accounts and cash, as an example, M1 changes but M2 does not. For this reason, financial innovation has made the demand for M2 more stable than the demand for M1.

We would expect real money demand to depend negatively on the opportunity cost of holding M2, the difference between a market interest rate, such as the Treasury bill rate, and a weighted average of the interest rates paid on various kinds of deposits constituting M2. We also expect real M2 money demand to depend positively on the level of income. These hypotheses are, indeed, confirmed by the empirical evidence. It confirms that the elasticity with respect to the opportunity cost is negative. The short-run elasticities are smaller than the long-run elasticities.

The Income Velocity

The income velocity of money is the number of times the stock of money is turned over per year in financing the annual flow of income. It is equal to the ratio of nominal GDP to the nominal money stock.

$$V \equiv \frac{P \times Y}{M} = \frac{Y}{M/P} \qquad (2)$$

that is, the ratio of nominal income to the nominal money stock or, equivalently, the ratio of real income to real balances.

The concept of velocity is important largely because it is a convenient way of talking about money demand. Let the demand for real balances be written M/P = L (i , Y). Substituting into equation (2), velocity can be rewritten as V = Y/ L (i , Y). This is especially convenient if money demand is proportional to income, as is roughly true for long-run M2 demand, so money demand can be written as L (i , Y) = Y x *l* (i). In this case equation (2) is simply V = 1 /*l* (i), so velocity is a quick way to summarize the effect of interest rates on money demand—remembering that high velocity means low money demand.

The Income Velocity

- Concept of velocity is important largely because it is a convenient way of talking about money demand

  – Demand for real balances is: $M/P = L(i,Y)$

  → Substituting into equation (2), velocity can be written as: $V = Y/L(i,Y)$

  → Money demand can be written as: $L(i,Y) = Y \times l(i)$

  → Velocity of money is: $V = 1/l(i)$

The Quantity Theory

- The *quantity theory of money* provides simple way to think about the relation between money, prices, and output:

$$M \times V = P \times Y \qquad (3)$$

  - Equation (3) is the famous *quantity equation*, linking the price level and the level of output to the money stock
  - The quantity equation became the *classical quantity theory* of money with it was argued that both V and Y were fixed

    $\rightarrow$ If both V and Y are fixed, it follows that the price level is proportional to the money stock

The Quantity Theory

- The classical quantity theory = theory of inflation
  - The classical quantity theory is the proposition that the price level is proportional to the money stock: The price level is proportional to the money stock:

$$P = \frac{V \times M}{Y} \qquad (3a)$$

  - If V is constant, changes in the money supply translate into proportional changes in *nominal GDP*
  - With the classical case (vertical) supply function, Y is fixed, and changes in money translate into changes in the overall price level, P