Money and banking (First part)

Macroeconomics – Money and banking

- Money and its functions
- Different money types
- Modern banking
- Money creation

What is money?

- It is a “symbol of success”, “a source of crime”, and it “makes the world go around”.
- **Money** is any generally accepted means of payment for delivery of goods or settlement of debt. It is the **medium of exchange**.
- Dog’s teeth, sea shells, gold and circular stone disks were all used as money at some point in the past. What matters is not the commodity used but the social convention that it is accepted **without question** as a means of payment.

Life in the absence of money

- A barter economy has no medium of exchange. Goods are traded for other goods.
- In a barter economy trading is costly because there must be a **double coincidence of wants**.
- Both a seller and a buyer must want something that the other has to offer. People spend a lot of time and effort finding others with whom to make mutually satisfactory swaps.
- Using a medium of exchange reduces the costs of matching buyers and sellers, letting society devote scarce resources to other things.

Other functions of money

- Besides being the medium of exchange or means of payment, money (usually) has three other functions: It is (or it may be) a
  - store of value;
  - a unit of account; and
  - a standard of deferred payment.
- However, the key feature of money is its use as a medium of exchange.

Money as a unit of account

- The **unit of account** is the unit in which prices are quoted and accounts are kept.
- It is usually convenient to use the same units for the medium of exchange and unit of account.
- However, there are exceptions. During 2000-2001 many EU shopkeepers quoted prices both in euros and in local currency, even though the euro did not become their medium of exchange until 2002.

Money as a store of value

- Money is a **store of value** because it can be used to make future purchases.
- To be accepted in exchange, money ***has*** to store value. But money is not the only, nor necessarily the best, store of value.
- Houses, stamp collections and interest-bearing bank accounts all serve as stores of value. Since money pays no interest and its real purchasing power is eroded by inflation, there are better ways to store value.

Money as a standard of deferred payment

- Money is a **standard of deferred payment** or unit of account over time.
- When you borrow from your local bank, the amount to be repaid next year is usually (but not always) measured in your local currency.
- However, it is not an essential function of money. E.g. UK citizens can get bank loans specifying in dollars the amount to be repaid next year.

Different kinds of money

- In POW camps, cigarettes were money. In the 19th century money was mainly gold and silver coins.
- These are examples of **commodity money**, ordinary goods with industrial uses (gold) and consumption uses (cigarette) which also serve as a medium of exchange. To use a commodity money society must either cut back on other uses of that commodity or devote scarce resources to additional production of the commodity.

Token money

- A token money is a means of payment whose value or purchasing power as money greatly exceeds its cost of production or value in uses other than as money. It economizes a lot on the resources needed for transacting.
- Token money is accepted either because people believe it can subsequently be used to make payments or because the government makes it **legal tender** (by law it must be accepted as a means of payment).
- The government controls the supply of token money (private production is illegal).

“IOU money”

- In modern economies, token money is supplemented by IOU money (“I owe you”).
- An **IOU money** is a medium of exchange based on the debt of a private firm or individual.
- A bank deposit is IOU money. It is a debt of the bank. Bank deposits are a medium of exchange because they are generally accepted as payment.

Banks and money

- **Banks create money** by making loans, and creating deposits that are not fully backed by cash reserves. These deposits add to the medium of exchange. The **money supply** is the value of the stock of the medium of exchange in circulation.
- **Bank reserves** are the money available in the bank to meet possible withdrawals by depositors. The **reserve ratio** is the ratio of reserves to deposits. Deciding how many reserves to hold involves a trade-off between interest earnings and the danger of insolvency.

The business of banking

- A bank is a business making profits by lending and borrowing. To get money in, the bank offers attractive interest rates to depositors.
- Banks have to find profitable ways to lend what has been borrowed. The bank uses its specialist expertise to acquire a diversified portfolio of investments.
- Most money is lent to households and firms, usually at high interest rates. Some is used to buy securities such as long-term government bonds. Some is more prudently invested in liquid assets (including cash, the most liquid asset of all).

Liquidity

- **Liquidity** is the cheapness, speed and certainty with which asset values can be converted back into money.
- Financial securities such as bills and bonds issued by governments and firms are often very liquid – banks can lend short term and still get their money back in time if depositors withdraw their money.
- In contrast, many loans to firms and households are quite illiquid. The bank cannot easily get its money back in a hurry.

Differences between commercial banks and other financial intermediaries

- A **financial intermediary** specializes in bringing lenders and borrowers together. **Commercial banks** are financial intermediaries licensed to make loans and issue deposits, including deposits against which cheques can be written.
- Banks are not the only financial intermediaries. Insurance companies, pension funds, and building societies also take in money in order to relend it. The crucial feature of banks is that some of their liabilities are used as a means of payment, and are thus part of the money stock.

Sight and time deposits

- Liabilities of commercial banks include sight and time deposits. The money in **sight deposits** can be withdrawn ‘on sight’ without prior notice. **Time deposits**, paying higher interest rates, require the depositor to give notice before withdrawing money.
- Checking accounts are sight deposits. Time deposits, which include some savings accounts, pay higher interest rates because banks have time to organize the sale of their high-interest assets in order to have the cash available to meet withdrawals.

Other liabilities

- Certificates of deposit (CDs) are large 'wholesale' time deposits, a one-off deal with a particular client for a specified period, paying more generous interest rates.
- The other liabilities of banks are various 'money market instruments', short-term and highly liquid borrowing by banks.

See Box 22-3 (on page 317) of the textbook for a beginner's guide to financial markets.

How do banks create money?

	Banks				Non-bank private sector			
	Assets		Liabilities		Monetary assets		Liabilities	
Initial	Cash	0	Deposits	0	Cash	1 000	Loans from banks	0
	Loans	0						
Inter-mediate	Cash	1 000	Deposits	1 000	Cash	0	Loans from banks	0
					Deposits	1 000		
Final	Cash	1 000	Deposits	10 000		0	Loans from banks	0
	Loans	9 000			Deposits	10000		

Originally, there was €1000 of cash in circulation. That was the money supply. When paid into bank vaults, it went out of general circulation as the medium of exchange. But the public acquired €1000 of bank deposits against which cheques may be written. The money supply was still €1000. Then the banks created overdrafts not fully backed by cash reserves. Now the public had €10 000 of deposits against which to write cheques. The money supply rose from €1000 to €10 000. Banks created money.

The reserve ratio and financial panics

- In our example, the reserve ratio of the banks was 10%.
- The **reserve ratio** may be imposed by law or it can reflect profit-maximizing smart behaviour by banks that balance risk and reward.
- The risk is the possibility of being short in cash, the reward is the interest rate spread. The **interest rate spread** is the excess of the loan interest rate over the deposit interest rate.
- Everybody knows what the banks are doing. Usually people don't mind. But if people believe that a bank has lent too much, and will be unable to meet depositors' claims, there will be a **run** on the bank.
- If the bank cannot repay all depositors, you try to get your money out first while the bank can still pay. Since everyone does the same thing, the bank will go bankrupt. A **financial panic** is a self-fulfilling prophecy.

Money and banking (Second part)

Macroeconomics – Money and banking

- The monetary base
- The money multiplier
- The money supply

Creation of token money

- Cash reserves of commercial banks are a small fraction of total bank deposits. Bank-created deposit money is much the largest part of money supply in modern economies. Banks' deposits depend on the cash reserves of the banks.
- Through the **central bank**, the government controls the issue of token money in a modern economy. Private creation of token money is outlawed since its value as a medium of exchange exceeds the direct cost of its production.

The monetary base

- The **monetary base** or stock of **high-powered money** is the quantity of notes and coins in private circulation plus the quantity held by the banking system.
- How much of the monetary base is held by commercial banks as cash reserves? Previously we assumed that the public deposited all its cash with the banks. That was only a simplification. Everyone carries some cash around.

The money multiplier

- How is the money supply related to the monetary base, the amount of notes and coins issued by the central bank?
- The money multiplier is the ratio of the money stock to the monetary base:

$$\text{Money stock} = \text{money multiplier} \times \text{monetary base}$$

Determinants of the multiplier

- The value of the money multiplier depends on two key ratios: the banks' desired ratio of cash reserves to total deposits, and the non-bank public's desired ratio of cash in circulation to total bank deposits.
- The lower the desired cash reserves ratio, the more deposits banks create against given cash reserves and the larger is the money supply.
- Similarly, the lower the non-bank public's desired ratio of cash to private sector bank accounts, the larger is the money supply for any monetary base created by the central bank.

The money multiplier – monetary base

- Suppose banks wish to hold cash reserves R equal to some fraction c_b of deposits D, and that the private sector holds cash in circulation C equal to a fraction c_p of deposits D:

$$R = c_b D \qquad C = c_p D$$

- The monetary base, or stock of high-powered money, H, is either in circulation or in bank vaults:

$$H = C + R = (c_b + c_p)D$$

The money multiplier – money supply

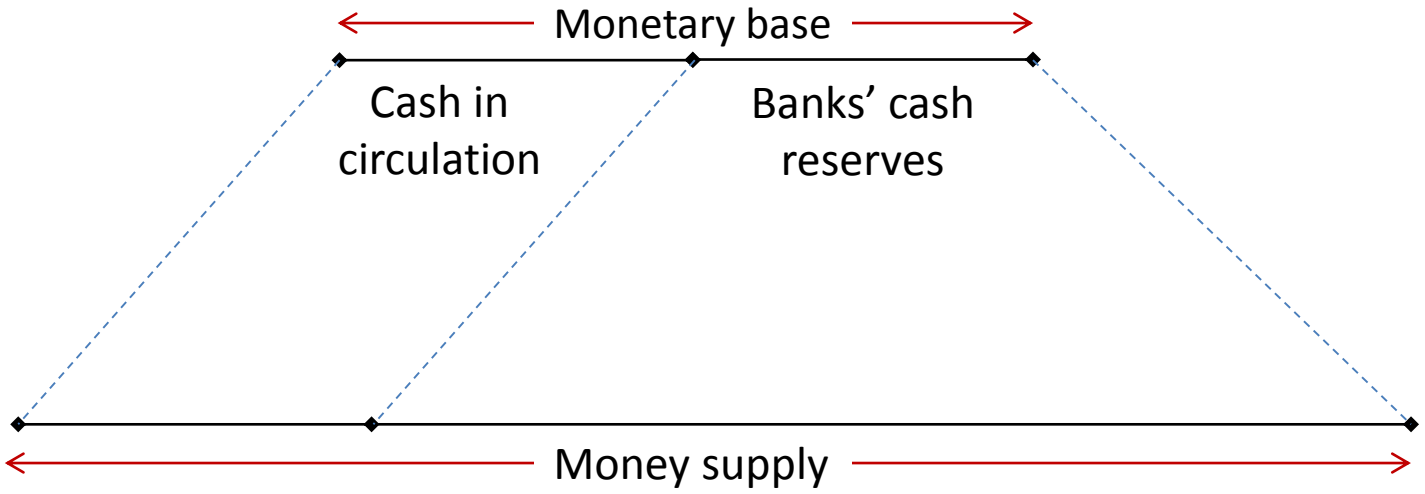
- Finally, the money supply is circulating currency C plus deposits D:

$$M = C + D = (c_p + 1)D$$

- These last two equations give us the money multiplier, the ratio of M to H:

$$M/H = (c_p + 1)/(c_p + c_b) > 1$$

Money supply determination



The money supply comprises currency in circulation and deposits at banks. The monetary base, issued by the central bank, is held either as currency in circulation or as banks' cash reserves. Since deposits are a multiple of banks' cash reserves, the money multiplier exceeds 1. The monetary base is high-powered because part of it is multiplied up as the banking system created additional deposits, the major component of the money supply.

Money and banking (Third part)

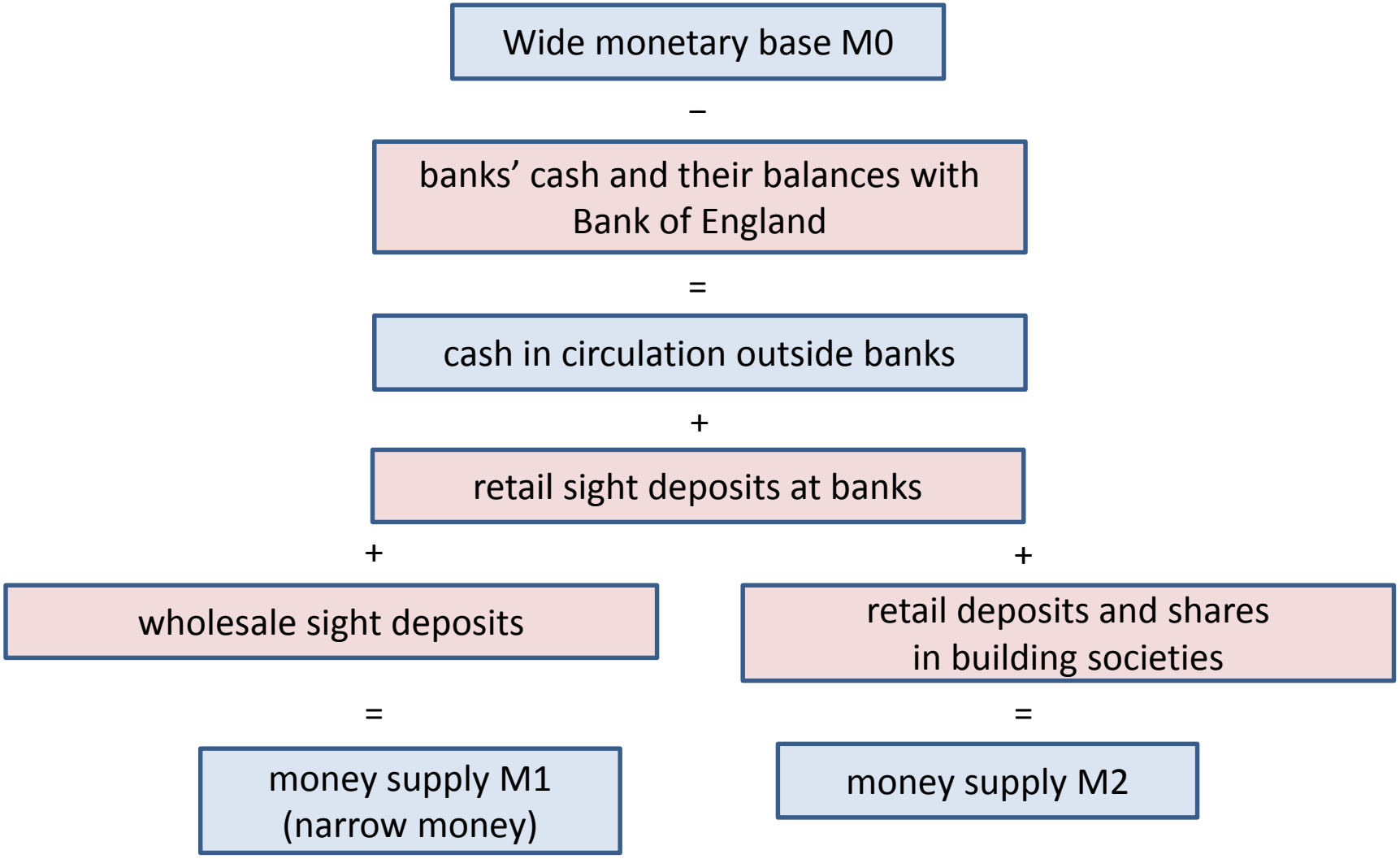
Macroeconomics – Money and banking

- Measures of money
- Competition between firms
- The demand for money

Measures of money

- Money is the medium of exchange available to make transactions. Hence, the money supply is cash in circulation outside banks, plus bank deposits.
- We can think of a spectrum of liquidity:
  - Cash, by definition, is completely liquid.
  - Sight deposits (chequing accounts) are almost as liquid.
  - Time deposits (savings accounts) used to be less liquid, but now many banks offer automatic transfer between savings and chequing accounts when the latter run low. Savings deposits are almost as liquid as chequing accounts.

UK monetary aggregates (part 1)



UK monetary aggregates (part 2)

money supply M1

+

UK private sector time deposits and certificates of deposit

=

money supply M3

+

UK private sector deposits and shares in building societies

–

Building society holdings of cash, bank deposits and bank CDs

=

money supply M4 (wide[st]/broad[est] money)

The wide monetary base and narrow money

- The figure on the previous slide shows different monetary aggregates and their relation to one another.
- **M0** is the wide monetary base: cash in circulation outside the banks, cash inside banks, and the banks' own accounts at the Bank of England (central bank).
- M0 is the narrowest measure of money. Wider measures begin from cash in circulation. Adding all sight deposits, we get **M1**, which used to be considered a good measure of narrow money.

M2, M3, and M4 (near money and wide money)

- Augmenting M1 by (UK) private-sector time deposits and CDs gives **M3**. That *used to be* considered the best definition of broad money.
- **M2** is cash in circulation plus retail sight deposits at banks and retail deposits and shares in building societies.
- **M4** is the old M3 plus (UK) private sector deposits and shares in building societies, minus building society holdings of cash bank deposits and bank CDs.

Competition between banks

- Financial deregulation, allowing the entry of more and more banks, has made modern banking very competitive.
- Banks compete with one another both in the interest rates they offer to attract depositors and in the interest rates they charge borrowers for loans.

Competition and profits

- The interest rate spread between the lending rate and the rate paid on deposits is what covers the cost of providing banking services.
- When spreads exceed this amount, banks make profits. Profits are a signal for new banks to enter, which competes away spreads.
- With more competition, interest rates on loans fall and rates paid on deposits rise.

The demand for money

- Money is the medium of exchange, for which it must also be a store of value.
- These two functions of money provide the reasons why people wish to hold it.
- People can hold their wealth in various forms – money, bills, bonds, equities, and property.
- For simplicity, assume that there are only two assets: money, the medium of exchange that pays no interest, and bonds, which we use to stand for all other interest-bearing assets that are not directly a means of payment.

Motives for holding money

- The **cost of money** is the interest given up by holding money rather than bonds.
- People hold money only if there is a benefit to offset the cost. What is that benefit?
  - The transactions motive
  - The precautionary motive
  - The asset motive

The transactions motive

- The transactions motive for holding money reflects the fact that payments and receipts are not synchronized.
- Must we hold money between being paid and making subsequent purchases? We could put our income into interest-earning assets, to be resold later when we need money for purchases. However, every time we buy and sell assets there are brokerage and bank charges. It is easier to hold some money.
- How much money we need to hold depends on the value of transactions we later wish to make and the degree of synchronization of our payments and receipts.

The demand for money

- The **demand for money** is a demand for real money balances.
- We need a given amount of real money, nominal money deflated by the price level, to make a given quantity of transactions.
- When the price level doubles, other things equal the demand for nominal money balance doubles, leaving the demand for real money balances unaltered.

The transactions motive (2)

- We assume that the transactions motive for holding real money balances rises with **real income**.
- The transactions motive for holding money also depends on the synchronization of payments and receipts. A nation's habits for making payments change only slowly.
- In our simplified model we assume that the degree of synchronization is constant over time. Thus we focus on real income as the measure of the transactions motive for holding real money balances.

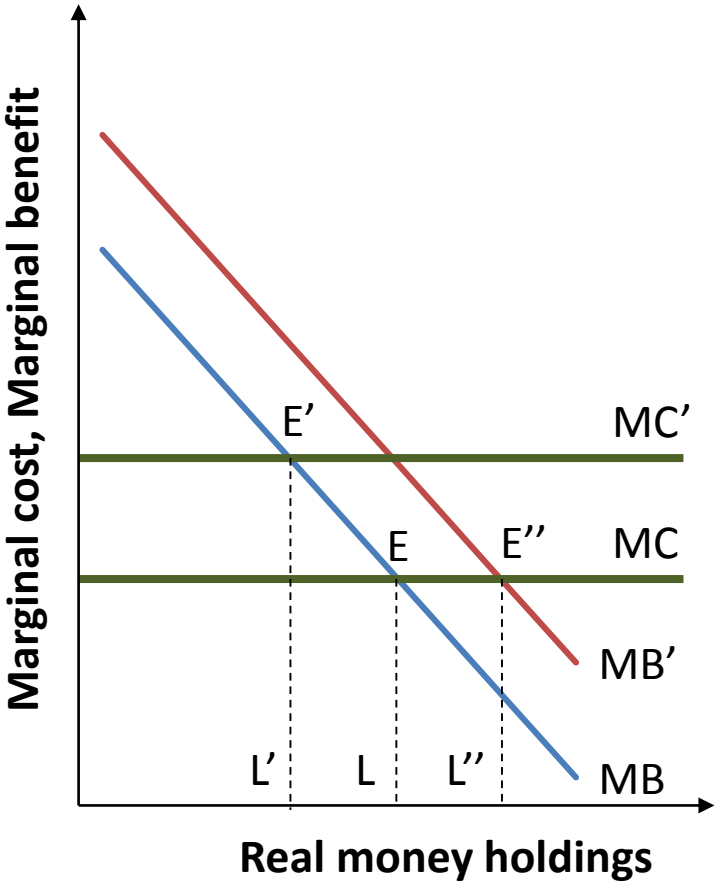
The precautionary motive

- In an uncertain world, there is a precautionary motive to hold money. In advance, we decide to hold money to meet contingencies that we cannot yet foresee.
- The benefits grow with the volume of transactions we undertake and with the degree of uncertainty. If uncertainty is assumed to be roughly constant over time, the level of transactions determines the benefit from real money held for precautionary reasons.

The demand for money: prices, real income and interest rates

- The transactions and the precautionary motives suggest that there are benefits to holding money.
- But there is also a cost, the interest foregone by not holding higher interest-earning assets instead.
- People hold money up to the point at which the marginal benefit of holding another pound (euro, dollar, etc.) just equals its marginal cost

Desired money holdings



The horizontal axis shows the purchasing power of money in terms of goods. The *MC* schedule shows the interest sacrificed by putting the last pound into money rather than bonds. The *MB* schedule is drawn for a given real income and shows the marginal benefits of the last pound of money. The marginal benefit falls as money holdings increase. The desired point is *E*, at which marginal cost and marginal benefit are equal.

An increase in interest rates, a rise in the opportunity cost schedule from *MC* to *MC'*, reduces desired money holdings from *L* to *L'*. An increase in real income increases the marginal benefit of adding to real balances. The *MB* schedule shifts up to *MB'*. Facing the schedule *MC*, a shift from *MB* to *MB'* increases real money holdings to *L"*.

The demand for money: prices, real income and interest rates

Quantity demanded	Effect of rise in		
	Price level	Real income	Interest rate
Nominal money	Rises in proportion	Rises	Falls
Real money	Unaffected	Rises	Falls

If all prices of goods and services double but interest rates and real income are unaltered, neither *MC* nor *MB* shift. The desired point remains *E* and the desired level of *real* money remains *L*. Since prices have doubled, people hold twice as much nominal money to preserve their real money balances at *L*.

The asset motive

- Think of someone deciding in which assets to hold wealth. Since people dislike risk, they will not put all their eggs in one basket. As well as holding some risky assets, they will keep some of their wealth in safer assets.
- The **asset motive** for holding money reflects people's dislike for risk. People sacrifice a higher average rate of return to obtain a portfolio with a lower but safer rate of return.
- This demand is larger the larger the total wealth to be invested and the lower the interest differential between deposits and risky assets.

Money and banking (Fourth part)

Macroeconomics – Money and banking

- Portfolio theories of money demand
- Currency and the underground economy
- Instruments of monetary policy

Money demand – asset motive

- Theories of money demand that emphasize the role of money as a store of value (the asset motive) are called portfolio theories.
- According to these theories, people hold money as part of their portfolio of assets. The key insight is that money offers a different combination of risk and return than other assets.
- In particular, money offers a safe (nominal) return, whereas the prices of stocks and bonds may rise or fall. Thus, some economists have suggested that households choose to hold money as part of their optimal portfolio.

Portfolio theories

- Portfolio theories predict that the demand for money should depend on the risk and return offered by money and by the various assets households can hold instead of money.
- In addition, money demand should depend on total wealth, because wealth measures the size of the portfolio to be allocated among money and the alternative assets.

The money demand function

- For example, we might write the money demand function as:

$$(M/P)^D = L(r_s, r_b, \pi^e, W),$$

- where r_s is the expected real return on stock (→ shares), r_b is the expected real return on bonds, π^e is the expected inflation rate, and W is real wealth.

Determinants of money demand

- An increase in r_s or r_b reduces money demand, because other assets become more attractive.
- An increase in π^e also reduces money demand, because money becomes less attractive. ($-\pi^e$ is the expected real return to holding money.)
- An increase in W raises money demand, because higher wealth means a larger portfolio.

Portfolio theories and money demand

- Are portfolio theories useful for studying money demand? The answer depends on which measure of money we are considering.
- Narrow measures of money, such as M1, include only currency and deposits in chequing accounts. These forms of money earn zero or very low rates of interest.
- There are other assets – such as savings accounts, Treasury bills, certificates of deposit, and money market mutual funds that earn higher rates of interest and have the same risk characteristics as currency and chequing accounts.

Narrow money as a store of value

- Economists say that narrow money (M1) is a dominated asset: as a store of value, it exists alongside other assets that are always better.
- Thus, it is not optimal for people to hold narrow money as part of their portfolio, and portfolio theories (or 'the asset motive') cannot explain the demand for these dominated forms of money.

Broad measures of money

- Portfolio theories are more plausible as theories of money demand if we adopt a broad measure of money. The broad measures include many of those assets that dominate currency and chequing accounts.
- When we examine why people hold assets in the form of M2, M3, or M4, rather than bonds or stock, the portfolio considerations of risk and return may be paramount.
- Hence, although the portfolio approach to money demand may not be plausible when applied to M1, it may be a good theory to explain the demand for M2, M3, or M4.

Simplified money demand function

- For the rest of this course, we will use a simplified money function:

$$(M/P)^D = L(i, Y)$$

- This version uses real income Y, as a proxy for real wealth W (or value of transactions T).
- The only return variable it includes is the nominal interest rate i, which is the sum of the real return on bonds and expected inflation:

$$i = r + \pi^e$$

Currency and the underground economy

- How much currency are you holding right now in your wallet? How many 20000 forint (or €100) notes?
- In the United States, the amount of currency per person is about $2000. About half of that is in $100 bills.
- Most people find this fact surprising, because they hold much smaller amounts and in smaller denominations.

Underground economy

- Some of this currency is used by people in the underground economy – that is, by those engaged in illegal activity such as the drug trade and by those trying to hide income to evade taxes.
- People whose wealth was earned illegally may have fewer options for investing their portfolio, because by holding wealth in banks, bonds, or stock, they assume a greater risk of detection.
- For criminals, currency may not be a dominated asset: it may be the best store of value available.

Inflation as a tax

- Some economists point to the large amount of currency in the underground economy as one reason that *some* inflation may be desirable.
- Inflation is a tax on the holders of money, because it erodes the real value of money.
- A drug dealer holding €20,000 in cash pays an inflation tax of €2000 per year when the inflation rate is 10%. The inflation tax is one of the few taxes those in the underground economy cannot evade.

Central banks and the instruments of monetary policy

- In most modern economies, the **central banks** (FED, ECB, Bank of England etc.) control the money supply indirectly by altering either the monetary base or the reserve-deposit ratio.
- The main instruments of monetary policy are:
  - Open-market operations (most frequently used)
  - The discount rate
  - Reserve requirements (least frequently used)

Open-market operations

- Open-market operations are the purchases and sales of government bonds by the central bank.
- When the central bank buys bonds from the public, the pounds (or euros, dollars etc.) it pays for the bonds increase the monetary base and thereby increase the money supply.
- When the central bank sells bonds to the public, the pounds it receives reduce the monetary base and thus decrease the money supply.

Reserve requirements

- Reserve requirements are government regulations that impose on banks a minimum reserve-deposit ratio (c_b).
- An increase in reserve requirements raises the reserve-deposit ratio and thus lowers the money multiplier and the money supply.
- Changes in reserve requirements are usually the least frequently used of the central bank's main policy instruments.

The discount rate

- The discount rate is the interest rate that the central bank charges when it makes loans to banks. Banks borrow from the central bank when they find themselves with too few reserves to meet reserve requirements.
- The lower the discount rate, the cheaper the borrowed reserves, and the more banks borrow at the central bank's discount window.
- Hence, a reduction in the discount rate raises the monetary base and the money supply.

Central banks and the money supply

- Although these three instruments – open-market operations, reserve requirements and the discount rate – give the central banks substantial power to influence money supply, they cannot control the money supply perfectly.
- Bank discretion in conducting business can cause the money supply to change in ways the central bank did not anticipate.

Unexpected changes (money supply)

- Banks may choose to hold excess reserves – that is, reserves above the reserve requirement. The higher the amount of excess reserves, the higher the reserve-deposit ratio, and the lower the money supply.
- As another example, the central banks cannot precisely control the amount banks borrow from the discount window. The less banks borrow, the smaller the monetary base, and the smaller the money supply.
- Hence, the money supply sometimes moves in ways the central bank does not intend.