

Macroeconomics

Based on the textbook by KARLIN and SOSKICE:
Macroeconomics: Institutions, Instability, and the Financial System

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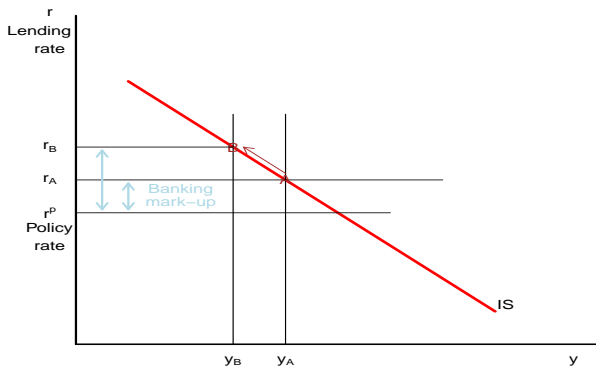
Banks modify the assumptions

Without banks, the central bank controls the market interest rate (r real rate and i nominal rate) directly. With banks, there is the *policy interest rate* i^P, r^P set by the central bank and the *lending rate* i, r .

The lending rate is responsible for the households' spending decisions, as represented by the IS curve. Essentially, the lending rate evolves from a mark-up on the policy rate.

For all interest rates, the real rate and the nominal rate are linked by the *Fisher equation* $i = r + \pi^E$, which is an approximation to $1 + i = (1 + r)(1 + \pi^E)$. Note the crucial significance of *expected* rather than observed inflation.

An IS curve with banking mark-up



An increase in the banking mark-up pushes the market interest rate up and causes output to fall.

The effects of an increase in the risk of loans

Banks use the mark-up as an insurance on the (default) risk of outstanding loans. Thus, if the risk of their loans increases, they demand for a larger mark-up.

With unchanged monetary policy, a larger mark-up implies a higher lending rate r .

The higher lending rate causes a lower output y_B below the equilibrium output. The low output leads to a lower rate of inflation (π on the Phillips curve).

In response to this low rate of inflation, the central bank targets a real expansion by lowering its policy rate. Output eventually returns to its original value.

Why does money exist?

Money permits transactions without explicit *double coincidence of wants* (ill-clad baker and hungry tailor, WILLIAM STANLEY JEVONS). Money provides a numeraire that makes all values comparable.

An economy with money is more efficient than an economy based on barter (search and information costs).

Money is supposed to be a universally accepted means of payment (legal tender). In a modern economy, this definition becomes doubtful. A universally accepted means of payment may not exist ('no cards' vs. 'cards only').

Types of money

Different types of money offer a trade-off between *liquidity* and *interest*:

- ▶ Cash money (notes and coins, created by the central bank) does not bear interest, it offers high liquidity.
- ▶ Checking accounts (created by commercial banks) offer almost no interest but liquidity almost as high as cash, sometimes even higher.
- ▶ Saving deposits and term deposits (created by commercial banks) bear interest and offer less liquidity.

The customary definitions **M0**, **M1**, **M3** roughly correspond to the first item, the sum of the first two items, and the sum of all three items, respectively. During a banking crisis, checking accounts may become illiquid, whereas cash preserves its liquidity.

Narrow and broad money

Narrow money or central-bank money ('monetary base') consists of the notes and coins (cash) in circulation plus the reserves held at the central bank. The aggregates $M_i, i = 0, \dots, 3$ do not include reserves.

Broad money is central-bank money plus all deposits at commercial banks.

In many economies, narrow money is a small share (less than 10%) of broad money. Austrians tend to hold much cash money.

The share of money held in cash is determined by the liquidity preferences of households. The share of money kept as reserves is determined by legal requirements for banks.

Bonds

Essentially, bonds are certificates of loans. A government or a large firm wishes to borrow, households or other agents wish to lend. Bonds bear a fixed rate of interest and can be sold on the bond market.

Bonds have a specified *maturity*, after which the loan is paid back to the bondholder. The historical *consols* had infinite term to maturity. By convention, only securities with a maturity of one year or more at their first issue are called *bonds*, with a shorter maturity they are called *bills*.

If the interest on a bond is defined as $i = \text{coupon}/\text{price}$, with the coupon an annual payment to the bondholder, a low interest on a bond can also be expressed as a high bond price.

A standard concept of money demand

In standard models of households' money demand, households decide to divide their wealth (assets) into interest-bearing bonds and liquid no-interest money. Transactions are assumed to require money.

1. More income, output, economic activity requires more transactions and thus more liquid money;
2. Higher interest rates make it worth while keeping a higher share of wealth as bonds and to swap some bonds into money just before the transaction;
3. Higher prices directly increase money demand, in strict proportion.

The money demand function

The traditional money demand function is increasing in output and falling in the nominal interest rate:

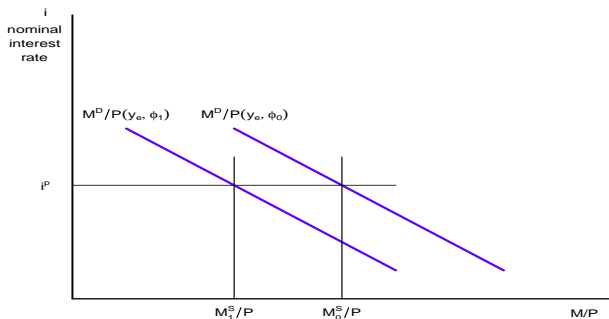
$$M^D = P \cdot f(y, i; \phi), \quad \frac{M^D}{P} = f(y, i; \phi),$$

with ϕ capturing the structure of the financial sector, such as technology of payment, financial instruments, and confidence.

The relevant interest rate is the *money market rate* for short-term lending (under one year = 'money market') that should ideally be close to the policy rate i^P .

It is customary to graph money demand functions in a (M, i) diagram for fixed output and fixed financial technology.

Money demand functions as graphs



Improved payment technology (ϕ_1 rather than ϕ_0) shifts the money demand function left. The policy rate determines the money supply.

The mark-up of the lending rate

A simple model assumes that the mark-up μ^B set by commercial banks

$$r = (1 + \mu^B)r^P$$

depends on their loan risk (default risk), risk tolerance (default cost), and equity (assets minus liabilities, capital cushion).

Moral hazard and collateral

Firms taking a loan and exerting less effort in pursuing their project than if they had used their own funding, thus increasing default risk, are in the situation of *moral hazard*.

The fact that the borrower has more information on the project than the lender is an instance of *asymmetric information*. This situation may even entail that good debtors leave a market that is dominated by the worst cases: *adverse selection*.

As an insurance against default risk, the bank may require assets (often real estate) that can be pledged and repossessed in case of a default: *collateral*.

Banks as intermediaries

Banks work as intermediaries in financial transactions. Their specific tasks can be summarized as

1. *Maturity transformation*: savers wish to access their savings at short notice, borrowers may wish to finance long-term projects;
2. *Aggregation*: many small savers may provide the funding for one major loan that is used in construction investment;
3. *Risk pooling*: large banks can cope well with some defaulting borrowers.

Liquidity risk and deposit insurance

Liquidity risk is the risk that a bank does not have sufficient amounts of liquid reserves to satisfy their customers. If all savers wish to withdraw, this may be difficult (bank runs).

Usually, the bank has access to loans from the central bank. The central bank is the *lender of last resort* (LOLR). The government may guarantee savings up to a certain level.

The law obliges commercial banks to keep reserves at the central bank, in proportion to the money created by commercial banks. Such reserves pay low interest typically less than i^p . Currently, the eurozone reserve requirements are at 1%, their interest rate is 0%.

Solvency of banks and bail-out

If the value of a bank's assets (loans, reserves, bonds) is less than its liabilities (deposits of customers etc.), then it will be insolvent or bankrupt: banking failure.

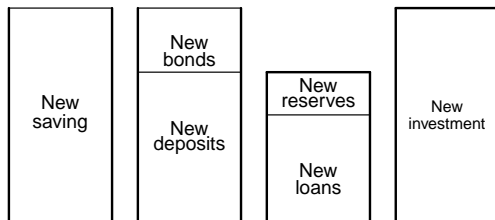
In order to avoid a dangerous chain reaction of banking failures, the government can decide to bail out insolvent banks. A danger may be moral hazard on the side of commercial banks that may expect a bail-out in case they fail.

A representational bank balance sheet

Assets	% of balance	Liabilities	% of balance
Cash	2	Deposits	50
Bonds	10	Repo borrowing secured with collateral	30
Asset-backed securities	20	Unsecured borrowing	16
Repo lending	11		
Loans, mortgages	55		
Fixed assets	2		
Total Assets	100	Total Liabilities	96
		Equity	4

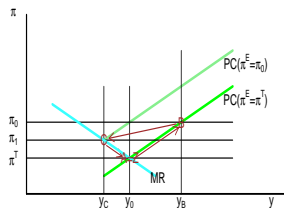
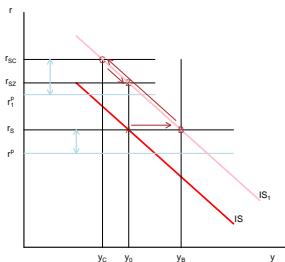
Leverage (total assets/net worth) = $100/4 = 25$

New saving becomes investment



New saving funds new investment via the banking system. A part of the saving is allocated to bonds, another one to deposits, for which banks must keep reserves. Out of their reserves, the central bank may purchase bonds.

Monetary policy following an investment boom



A demand shock shifts the IS curve out. The central bank raises the policy rate to r_1^P , which yields the short-run rate r_{SC} , then lowers it slowly to target r_{SZ} . Eventually, inflation will be back at π^T .