# Interest rates and monetary transmission

Micro- and macroeconomics



Higher real income tends to increase the quantity of real money demanded and higher interest rates are required to offset this, maintaining the quantity of real money demanded in line with the unchanged real supply.

## The transmission mechanism

- The central bank sets interest rates, but how do interest rates affect the real economy?
- The **transmission mechanism** of monetary policy is the channel through which it affects output and employment.
- In a closed economy, monetary policy affects consumption and investment demand by affecting real interest rates.

## Nominal and real interest rates

- The central bank chooses the nominal interest rate. If prices are fixed, this is also the real interest rate.
- Once we allow prices to vary, monetary policy needs to anticipate what inflation will be.
- Since the real interest rate is simply the nominal interest rate minus the inflation rate, monetary policy then sets the nominal interest rate to get the desired real interest rate.

## Consumption and interest rates

- How can monetary policy affect autonomous consumption demand?
- Suppose real wealth rises because of a stock market boom. Households spend some of their extra wealth on a new car.
- At each level of disposable income, consumption demand is higher. The entire consumption function shifts up when household wealth increases.

## The wealth effect

- The wealth effect is the shift in the consumption function when household wealth changes.
- Money and interest rates affect household wealth, and thus consumption and aggregate demand, in two ways.
- First, since money is a component of household wealth, a higher real money supply adds directly to household wealth.

## Interest rates and wealth

- Second, interest rates affect household wealth indirectly.
- The price of company shares and long-term government bonds is the present value of the expected stream of divided earnings or promised coupon payments.
- When interest rates fall, future earnings, now discounted at a lower interest rate, are worth more today.
- Lower interest rates make the price of bonds and corporate shares rise and make households wealthier.

## Durables and consumer credit

- When spending exceeds disposable income, net wealth falls. People sell off assets or borrow money to finance their dissaving.
- The higher the interest rate, the lower the quantity that households can borrow while still being able to make repayments out of their future disposable incomes.

#### Components of investment demand

- Total investment spending is investment in fixed capital and investment in working capital.
- Fixed capital includes factories, houses, plant, and machinery. The share of investment in GDP fluctuates between 10 and 20 per cent in developed countries.
- Although the total change in inventories is quite small, this component of total investment is volatile and contributes significantly to changes in the total level of investment.

## Investment in fixed capital

- Firms add to plant and equipment because they foresee profitable opportunities to expand output, or because they can reduce costs by using more capital-intensive production methods. Examples:
- BT needs new equipment because it is developing new products for data transmission.
- Nissan needs new assembly lines to substitute robots for workers in car production.

## Cost-benefit analysis

- The benefit occurs in the future, but the costs are incurred when the plant is built or the machine bought.
- The firm compares the value of extra future profits with the current cost of the investment.

## **Opportunity costs**

- Will the investment yield enough extra profit to pay back with interest the loan used to finance the original investment?
- Equivalently, if the project is funded out of existing profits, will the new investment yield a return at least as great as the return that could have been earned by lending the money instead?
- The higher the interest rate, the larger must be the return on a new investment to match the opportunity cost of the funds tied up.

## Potential investment projects

- At any instant there are many investment projects a firm could undertake. The firm ranks these projects, from the most profitable to the least profitable.
- At a high interest rate, only a few projects earn enough to cover the opportunity cost of the funds employed. As the interest rate falls, more and more projects earn a return at least matching the opportunity cost of the funds used to undertake the investment. The firm invests more.

#### Example: evaluating projects

Potential investment projects	Total cost (€ thousands)	Rate of return (%)
<b>A</b> . A new ERP system	92	25
<b>B</b> . A new (larger) plant	598	20
<b>C</b> . A new subsidiary company in a foreign country	345	15
<b>D</b> . Sales promotion activities	23	12
E. Purchase of a new lorry	23	10
<b>F</b> . Advertising campaign	92	7
<b>G</b> . A new vending machine for employees	23	5

## Evaluating investments (2)



• The lower the interest rate, the more projects are undertaken by the firm (and consequently, by all firms in the economy).

## The investment demand schedule



For a given price of capital goods and given expectations about the profit stream to which new investments give rise, a higher interest rate reduces the number of projects that can provide a return matching the opportunity cost of the funds used. As interest rates rise from  $r_0$  to  $r_1$ , desired investment falls from  $I_0$  to  $I_1$ .

## The price of capital goods

- The height of the schedule *II* reflects the cost of new capital, and the stream of profits to which it gives rise.
- For a given stream of expected future profits, a higher price of new capital goods reduces the return on the money tied up in investment.
  Fewer projects match the opportunity cost of any particular interest rate.
- Since desired investment is then lower at any interest rate, a rise in the cost of new capital goods shifts the investment demand schedule *II* downwards.

## Expectations about future profits

- Similarly, pessimism about future output demand reduces estimates of the stream of profits earned on possible investment projects. The return on each project falls.
- At each interest rate, fewer projects match the opportunity cost of the funds. Desired investment falls at any interest rate. Lower expected future demand shifts the investment demand schedule downwards.

## The slope of the investment demand schedule

- The investment demand schedule can be used to analyse both business investment in plant and machinery and residential investment in housing.
- What about the slope of the schedule? There is a big difference between a machine that wears out in three years and a house or factory lasting 50 years. The longer the economic life of the capital good, the larger the fraction of its total returns earned in the distant future, and the more the original cost of the goods accumulates at compound interest before the money is repaid.

## Short- and long-term projects

- Hence a change in interest rates has a larger effect the longer the life of the capital good.
- The investment demand schedule is flatter, and the monetary transmission more powerful, for long-lived house and factories than for short-term machinery.
- A change in interest rates has more effect on long-term projects.

## Inventory investment

- There are three reasons why firms desire stocks of raw materials, partly finished goods, and finished goods awaiting sale.
- First, the firm may be betting on price changes. Sometimes, firms hold large stocks of oil, believing it cheaper to buy now rather than later. Similarly, firms may hold finished goods off the market hoping to get a better price later.
- Second, many production processes take time. A ship cannot be built in a month, or even a year.
  Some stocks are simply the throughput of inputs on their way to becoming outputs.

## Inventory investment (2)

- Third, stocks help smooth costly adjustments in output. If output demand rises suddenly, plant capacity cannot be changed overnight.
- A firm has to pay big overtime payments to meet the upsurge in orders. It is cheaper to carry some stocks, available to meet a sudden rise in demand.
- Similarly, in a temporary downturn, it is cheaper to maintain output and pile up stocks of unsold goods than to incur expensive redundancy payments to cut the workforce and reduce production.

## The cost of holding inventories

- These are the benefits of holding inventories.
- The cost is that, by retaining unsold goods or buying goods not yet inputs to production, a firm ties up money that could have earned interest.
- The cost of holding inventories is the interest forgone (= given up), plus any storage charges for holding stocks.

# Investment demand for working capital or inventories

- Thus the investment demand schedule *II* for fixed capital also applies to increases in working capital, or inventories.
- Other things equal, a higher interest rate reduces desired stockbuilding, an upward move along the investment demand schedule. This is part of the monetary transmission mechanism.
- But a rise in potential speculative profits, or fall in storage costs for inventories, shifts the schedule *II* up and raises inventory investment at any interest rate.
- Not all changes in investment demand are caused by monetary policy.