Macroeconomics: BSc Year One

Components of Basic Models - Investment

The Investment Function

Desired investment expenditure is often measured in real terms, using a base year, and looks at the money within the economy that individuals wish to spend on capital goods. For our purposes, capital goods include both those goods bought for manufacture and those with a significant life span.

The easiest way to guess how investment varies is to look at two questions;

a) What determines the optimum capital stock in period t, K_t*?
b) How quickly will people make up any discrepancy between the stock they would like to hold (K_t*) and any stock left from the previous time period (K_{t-1})?

Any capital good yields a rate of return to anyone who owns it. Buyers aim to maximise these returns, by choosing between investment in capital goods or bonds (such as building society savings). If the return rate on capital goods is higher, more will be bought.

The rate of return of a capital good can be given as:

$$r_{1,t} - d_t + \dot{P}_t,$$

where $r_{1,t}$ is the value of services gained, d_t is the depreciation rate, and $\dot{P}_t$ is the inflation rate. It should be noted that expected values must be used, such as $r_{1,t}^e$ and d_t^e.

A bond is a promise to pay the owner a certain amount at the end of a period. The comparison with returns from capital investment is obvious.

The rate of return of investment defined above will decrease with each unit bought, so buyers attempt to purchase at the point when the rate of returns gained from the last unit are equal to the rate of returns from bonds; this equilibrium value is written as r_t^m.

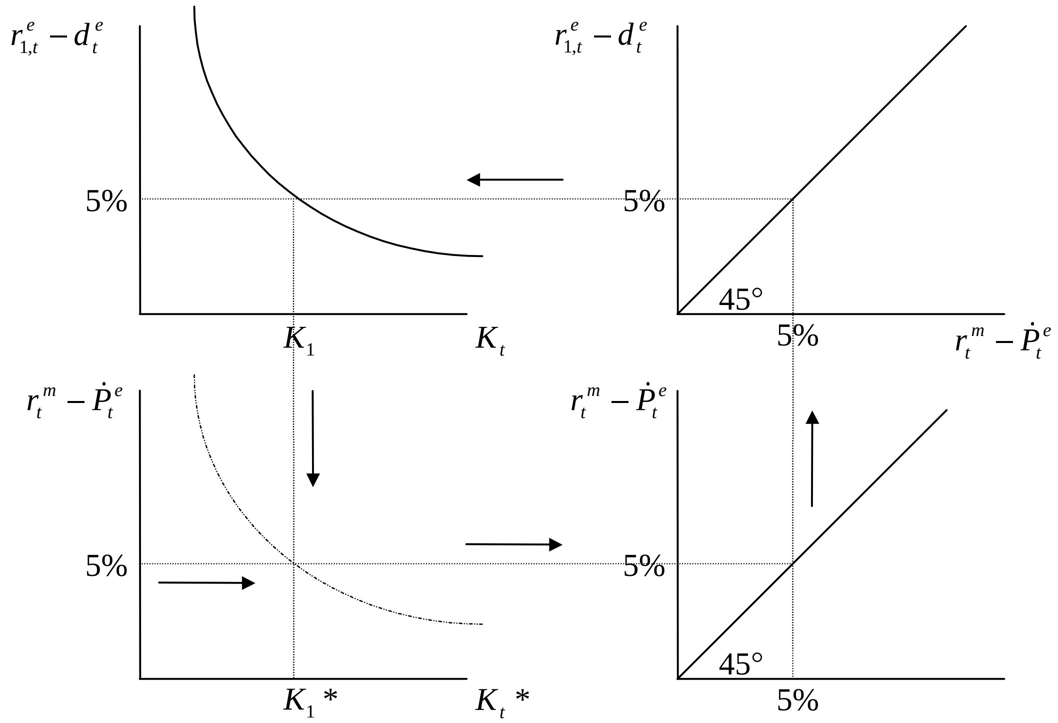
Thus, the major equation for investment must be:

$$r_t^m = r_{1,t}^e - d_t^e + \dot{P}_t^e,$$

or, rearranged:

$$r_t^m - \dot{P}_t^e = r_{1,t}^e - d_t^e.$$

This gives a very important result for the study of investment expenditure, as we shall now show. We are now able to derive how the desired capital varies with bond prices and the (expected) rate of inflation, using a four-graph diagram to trace the effects of a rise in interest rates. There are several assumptions involved, including constant levels of optimism, but these shall be discussed later.



The top left graph shows that as the stock of capital increases, the rate of return falls, and so only at low interest rates will the stock of capital be very large. Following the lines round from a sample point on the y-axis on the bottom right graph, we can find the shape of this graph and, more specifically, can answer the first of our questions above;

$$K_t* = f(r_t^m - \dot{P}_t^e), \qquad \text{where } f'(r_t^m - \dot{P}_t^e) < 0$$

A lower optimism level shifts the top left graph to the left, resulting in the bottom graph also shifting to the left.

If people hold the desired stock of capital, they will not, by definition, buy any more. If there is a deficit, it will be made up slowly over time, and it is this we must look at to answer our second question:

$$i_t = \lambda(K_t * - K_{t-1}), \qquad \text{where } 0 < \lambda < 1\text{; so}$$

$$i_t = \lambda(f(r_t^m - \dot{P}_t^e) - K_{t-1}).$$

This shows that investment depends on three things:

- the money rate of interest on bonds
- the expected rate of inflation

- the stock of good from the previous period.

It is assumed that the actual stock of capital goods in most economies is so large that any changes over a reasonable period will be nearly negated; K is therefore very slow moving and can be assumed to be roughly constant.

If it is then assumed that $f(r_t^m - \dot{P}_t^e)$ is a linear function, we are left with:

$$i_t = I_0 - h(r_t^m - \dot{P}_t^e).$$

This does not, however, give an accurate explanation of how investment does vary; there are many other factors, such as optimism and income, but this model is the closest available to explain investment expenditure.