About saving, consumption, and investment

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Abstract

The relation of saving, investment, and consumption is given in this short article. We can also find out the relationship of interest rate and saving, consumption, and investment. The relation of average propensity of consumption and investment to marginal propensity of consumption and investment is also provided. This article explains why higher interest rate leads to less consumption, larger saving, and less investment. Finally, I provide support why stock market usually has more profit than bond market or bank deposit.

Text

Here, I will describe the relation of saving, consumption, and investment and their relationship with interest rate. Based on Keynesian consumption function, we know that:

$$\mathrm{Ct} = \mathrm{a} + \mathrm{bY}$$

Yt is disposable income. It should include saving, investment, and consumption. Then, if we want to know the relation between consumption(C), saving(S), and investment(I), we can have:

$$\mathrm{C1} + \mathrm{b1} + \mathrm{I1} = \mathrm{a1} + (1 + \mathrm{r})\mathrm{b0}$$

And,

$$\mathrm{S1} = \mathrm{b1} - \mathrm{b0}$$

Then,

$$\mathrm{C1} = \mathrm{a1} + \mathrm{rb0} - \mathrm{S1} - \mathrm{I1}$$

The Y will be a1+(1+r)b0, and the rate change dY will be a1+rb0. We can get marginal propensity of saving as(C1=dC, I1=dI)

$$\frac{\mathrm{dS}}{\mathrm{dy}} = \frac{\mathrm{a1} + \mathrm{rb0} - \mathrm{C1} - \mathrm{I1}}{\mathrm{a1} + \mathrm{rb0}} = 1 - \frac{\mathrm{dC}}{\mathrm{dy}} - \frac{\mathrm{dI}}{\mathrm{dy}}$$

Thus, the three marginal propensity should be:

$$MPS + MPC + MPI = 1$$

If we put the MPS and MPI in the category of gross saving S', then MPS+MPI=MPS'.

We then introduce the above result to original Keynesian function:

$$Ct = a + \frac{C1}{(a1 + rb0)} * (a1 + (1 + r)b0) = a + C1 + \frac{C1 * b0}{a1 + rb0}$$

From the above equation, we can get a simpler function if we assume a1=0.

$$Ct = a + C1 * (1 + \frac{1}{r})$$

Thus, the induced consumption compared to first period consumption will be increased by factor 1/r. If the interest rate is larger, the induced consumption will be less. If the interest rate is lower, the induced consumption will be larger. We can also get the relation of interest rate and investment:

$$It = MPI * Yt = \frac{I1}{(a1 + rb0)} * (a1 + (1 + r)b0)$$

If the a1 is zero, we also get:

$$It = I1 * (1 + \frac{1}{r})$$

We can also see the induced investment is related to factor 1/r. If the interest rate is larger, the investment is less. If the interest rate is less, the investment is larger. We can get the saving, investment, and consumption's relation to interest rate:

$$St = MPS * Yt = \frac{S1}{(a1 + rb0)} * (a1 + (1 + r)b0)$$

$$= \frac{a1 + rb0 - C1 - I1}{(a1 + rb0)} * (a1 + (1 + r)b0)$$

When a1 is also zero, we will get the saving is equal to:

$$St = Yt - (1 + \frac{1}{r}) * (I1 + C1)$$

Thus, we get the saving in relation to first period investment and consumption. It is equal to:

$$St = Yt - It - Ct$$

The saving is in direct proportion to the interest rate. We can also get average propensity of saving, investment, and consumption:

$$APS + API + APC = \frac{b1}{Yt} + \frac{I1}{Yt} + \frac{C1}{Yt} = 1$$

And,

$$APC = \frac{a}{Yt} + b = \frac{a}{Yt} + MPC$$

The more income for rich men, there is decreased consumption of APC due to a/Yt since a is a constant. And,

$$\mathrm{APC} = \mathrm{MPC} * (\frac{\mathrm{r}}{1 + \mathrm{r}})$$

The average propensity of investment will be similar to marginal propensity of investment by interest rate factor.

$$\mathrm{API} = \mathrm{MPI} * (\frac{\mathrm{r}}{1 + \mathrm{r}})$$

Finally, I will explain why investment such as stock market is usually more profitable than saving such as banking deposit. Because we know saving is usually larger than investment.

$$\mathrm{S}' = \mathrm{S} + \mathrm{I}$$

Thus,

$$\mathrm{S}' \geq \mathrm{I}$$

If we get the fixed value Z from stock market as well as bank. Then, we have equation:

$$\mathrm{S}' = \frac{\mathrm{Z}}{\mathrm{r}} \geq \frac{\mathrm{Z}}{\mathrm{i}} = \mathrm{I}$$

The stock market profit gain rate i is usually larger than banking interest rate r. Thus, we can know why stock market usually has higher profit than banking deposit or bond market.