

Consumption and Investment

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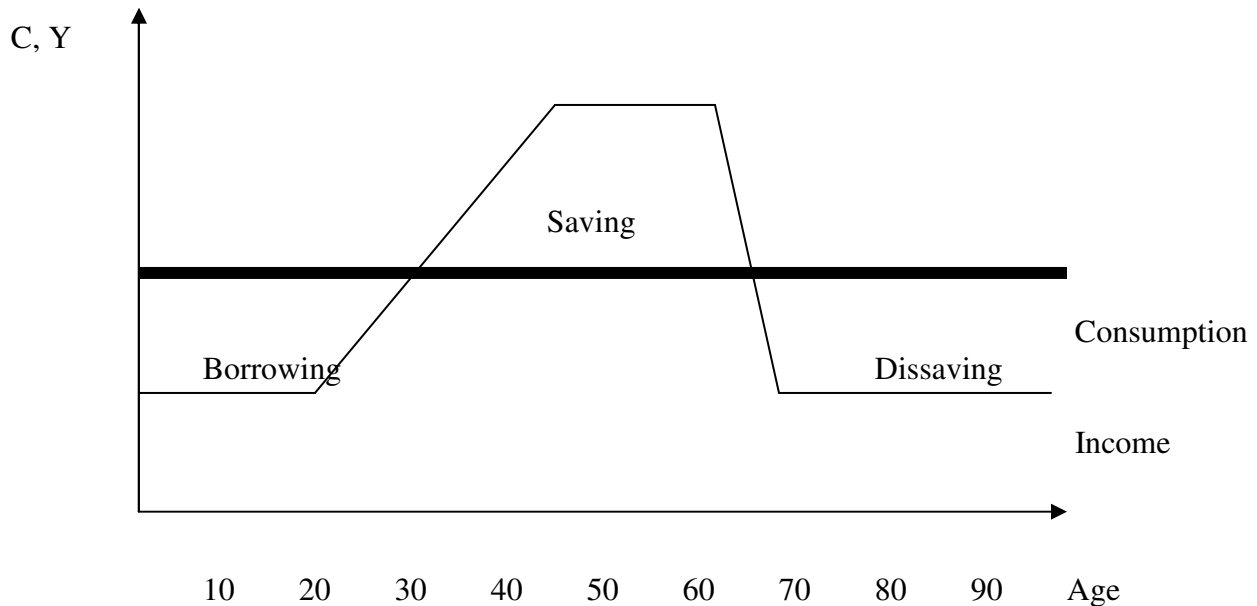
During the last week of class, we sought to create detailed models of the various components in the national income identity: C, I, and G. In class today, we looked at one of these components – government purchases. Given a lack of time, this handout will cover those elements of GDP that we did not go over in class – consumption and investment.

Consumption

First, we want to analyze consumption. Consumption choices form the basis of microeconomic theory. Those of you that have taken 100A will find the budget constraint and indifference curves explanations of consumption familiar. Those of you that have not should review this material in the text, as I will not describe it here.

Life Cycle Hypothesis

Rather, I would like to begin by talking about the life cycle hypothesis. The life cycle-model of consumption is best characterized by the following figure (thanks to Chad Jones for his model). The saving, borrowing, and dissaving sections represent the areas between the curves



When people are young, income is low. As people work, income increases until they retire. After retirement, income is much lower. The life-cycle hypothesis says that consumption is based on lifetime income (not income at a specific age). The basic idea is that people smooth their consumption so that it is constant over time.

Permanent Income Hypothesis

The permanent income hypothesis speculates that individuals should smooth their consumption such that they base their consumption decisions off average income. Take a smaller model than a person's lifetime. Let us look at a one-week period. People do not work seven days a week, yet they equalize their consumption of food across each day. The same holds true for the lifetime – individuals will smooth their consumption across every year.

The theory divides income into two parts: permanent income and transitory income. Permanent income is the income people expect to persist in the future. In other words, permanent income is average lifetime income. Transitory income is the non-persistent deviation from the average. Transitory income is random.

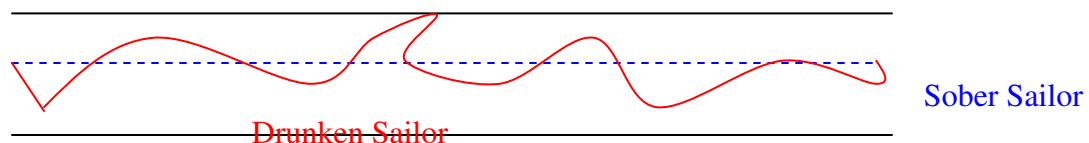
Thus, $Y_{\text{total}} = Y_{\text{permanent}} + Y_{\text{transitory}}$.

The hypothesis speculates that consumption is based on permanent income – in other words, individuals will smooth their consumption such that $C = aY_{\text{permanent}}$, where “a” is a constant between zero and one that measures the fraction of permanent income consumed.

Random Walk Hypothesis

If consumers have rational expectations and the permanent income hypothesis holds, changes in consumption should also be unpredictable. According to this hypothesis, some component of permanent income is random (unexpected). Thus, if consumption is based off permanent income, which is in part random and people realize this, then $C = aY_{\text{permanent}}$ must also be random.

A variable follows a random walk if changes in the variable are unpredictable – in other words, we cannot tell if the variable is above or below its mean. A good example of this is a sailor seeking to return home from the bar. If the sailor is sober, he will walk a straight path to his house – this is like the long run average trend of a variable. But, if he is a drunken sailor, the sailor will stagger around the side-walk going side to side. His path will be random and will not follow a straight line. The drunken sailor reaches his destination (we hope), but he does it with some random deviations from his normal path. See the following figure analyzing the drunken sailor's random walk.



These three theories, in addition, to a Keynesian model of consumption and microeconomic models provide us with a good base to study consumption behavior. Thus, we will now turn to investment decisions.

Investment

Recall that there are three different types of investment: business fixed investment, residential investment, and inventory investment. Business fixed investment is the equipment businesses use in the production process. Residential investment is new housing. Inventory investment is the goods put into storage by businesses. I will outline two of the models below, but you should review the other models of investment in the textbook.

Neoclassical Model

The neoclassical model of investment analyzes the benefits and costs of firms owning capital goods. The model says three components help predict the level of investment in the economy – these are the marginal product of capital (MPK), the interest rates, and tax rules.

Recall that the first derivative of a Cobb-Douglas production function implies that $MPK = \alpha A(L/K)^{1-\alpha}$. Also recall that the real rental rate = MPK. Thus, the higher the stock of K, the lower the rental price of capital. A higher the amount of L implies a higher the rental price. Finally, better technologies (higher A) imply the rental price of capital will be greater.

The rule for purchasing capital is that if MPK is greater than the cost of capital, firms should rent capital. If the MPK is less than the cost of capital, firms should reduce their amount of capital.

Furthermore, when renting capital, firms must pay the prevailing nominal interest rate. Thus, the level of investment is also a function of the interest rate.

The corporate income tax (taxes corporate profits) and the investment tax credit (a credit that encourages the accumulation of capital) influence the levels of investment. Both of these taxes raise or lower the level of investment.

The Accelerator Model

This model assumes that firms hold a given stock of investment – this stock is a given proportion of the firms' output. If there is a boom in the economy (a positive output gap), then firms want more merchandise to sell to consumers. If the output gap is positive, manufacturers need more inputs to produce more goods. Thus, $N = bY$ where N is the economy's stock of inventories, Y is output, and b is a number between zero and one that reflects the amount of inventories firms desire to hold.

Thus, inventory investment, I, is equal to $I = \Delta N = b\Delta Y$. The model predicts that inventory investment is proportional to the change in output. When there is a positive output gap, inventory investment goes up. When output falls, firms want to hold a smaller stock of inventory.

Each of these models helps to explain investment. The detailed theories of consumption, investment, and the government budget constraint (which we covered in section) provided us with a more detailed view of the national income identity.