ECONOMICS 3020:  
ACCELERATED MACROECONOMICS

Baker Laboratories 119

MWF 10:10 AM - 11:00 AM
Savings: Foundations

Private Savings is the aggregate of all savings of all private agents in the economy.

In order to understand how Private Savings behave we first will focus on the individual saving decisions by a typical household.

In doing so we will be able to understand three of most important findings in contemporary macroeconomics.
Savings: Inter-temporal Budget Constraint

Let’s think about the world in which

• There is no inflation;
• Interest rates are fixed (because there is no inflation, real and nominal interest rates coincide);
• The current and future income of the agent in question is known.
• The agent can freely borrow or lend at the market interest rate.
• The agent Lives T periods.
Let’s think about the world in which

• Let its income in each period \( t \) be denoted \( y(t) \). That is in period 1 her income is \( y(1) \), in period 2 it is \( y(2) \), and so on...

• The agent uses her all income to finance her consumption: \( c(1) \) in period 1, \( c(2) \) in period 2, and so on...

• The agent starts out with wealth as he inherited from somewhere.
Savings: Inter-temporal Budget Constraint

Question 1: what is the value of the total income of the agent in the beginning of the period 1?
To answer that question first we have to understand what is present value of the future income the agent is going to receive.

Well, one dollar tomorrow at the rate of interest \( R = 1 + r \), is worth \( 1/(1+r) \) today.

Similarly, one dollar the day after tomorrow is worth \( 1/(1+r)^2 \), and so on...
Savings: Inter-temporal Budget Constraint

That is, the future income is discounted at the rate of interest.

Therefore the present value of the agent’s income is given by:

\[
NPV = a + y(1) + \frac{y(2)}{1+r} + \frac{y(3)}{(1+r)^2} + \ldots + \frac{y(T)}{(1+r)^{T-1}}
\]
We did find the present value of the agents income.

Now, we need to find the price of consumption in different periods in terms of today’s consumption.

With the rate of interest $R=(1+r)$, the price of tomorrow’s consumption in terms of today’s consumption is $1/(1+r)$. 
Savings: Inter-temporal Budget Constraint

To see this note that in order to obtain one unit of consumption tomorrow you need to give up $1/(1+r)$ unit of consumption today.

Indeed, if you put aside $1/(1+r)$ units of consumption today, it will earn interest $(1+r)$ and tomorrow you will have $(1+r) \cdot 1/(1+r)=1$ units of consumption.
Savings: Inter-temporal Budget Constraint

Therefore, the inter-temporal budget constraint of the agent is given by

\[ c(1) + \frac{c(2)}{1+r} + \frac{c(3)}{(1+r)^2} + \ldots + \frac{c(T)}{(1+r)^{T-1}} \leq a + y(1) + \frac{y(2)}{1+r} + \frac{y(3)}{(1+r)^2} + \ldots + \frac{y(T)}{(1+r)^{T-1}} \]

That is, the present value of the agent’s expenditure cannot exceed the present value of the agent’s wealth.
We have established the agent’s budget constraint.

Next, we need to figure out how the agent’s consumption and saving decisions are made, and how they are affected by the changes in the agents income...

• Permanent Income Hypothesis
• Life-Cycle Pattern of Saving and Consumption
• Fiscal Policy Implications (so called Ricardian Equivalence Proposition)
The inter-temporal budget constraint (for two periods) of the agent is given by

\[ c(1) + \frac{c(2)}{1+r} \leq a + y(1) + \frac{y(2)}{1+r}. \]
The Budget Line

![Diagram showing the budget line with points A to G labeled. The budget line is a straight line with points A (33,000, 0), B (30,000, 5000), C (27,500, 10,000), D (22,000, 15,000), E (16,500, 20,000), F (11,000, 25,000), and G (5500, 30,000). The slope of the budget line is given by the equation $\text{Slope} = -(1 + r)$, with $r = -1.10$.](image)
The Budget Line

The diagram illustrates the budget line for a consumer, showing the trade-off between current consumption ($c$) and future consumption ($c'$). The budget line is determined by the consumer's income and the prices of goods. Points such as $X$, $Y$, $W$, and $Z$ represent different combinations of current and future consumption that the consumer can afford. The budget lines $IC^1$ and $IC^2$ indicate an increase in income or a decrease in prices, respectively, allowing the consumer to purchase more of both goods.
Each indifference curve represents all pairs of goods \( c(1) \) and \( c(2) \) between which the agent is indifferent.

Indifference curves do not intersect. Informally, the reason is that...
The Optimal Consumption Combination
An Increase in Income or Wealth