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MICROECONOMICS I

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EIGHTH PART: CAPITAL MARKETS

The capital market

At any given time, some individuals and firms borrow money in order to spend more than their current income, while some other individuals and firms lend money in order to enjoy higher income in the future.

The exchange between savers and borrowers happen in the **capital market**, or the market for loanable funds.

Sellers and buyers in this particular market do not directly meet, but the savings of the former (bank accounts, bonds, company stocks, etc.) are directed to the latter by **financial intermediaries**.

In the following, we'll make the simplifying assumption that in capital markets saving decisions (the **supply**) are taken by households, and borrowing decisions (the **demand**) are taken by firms.

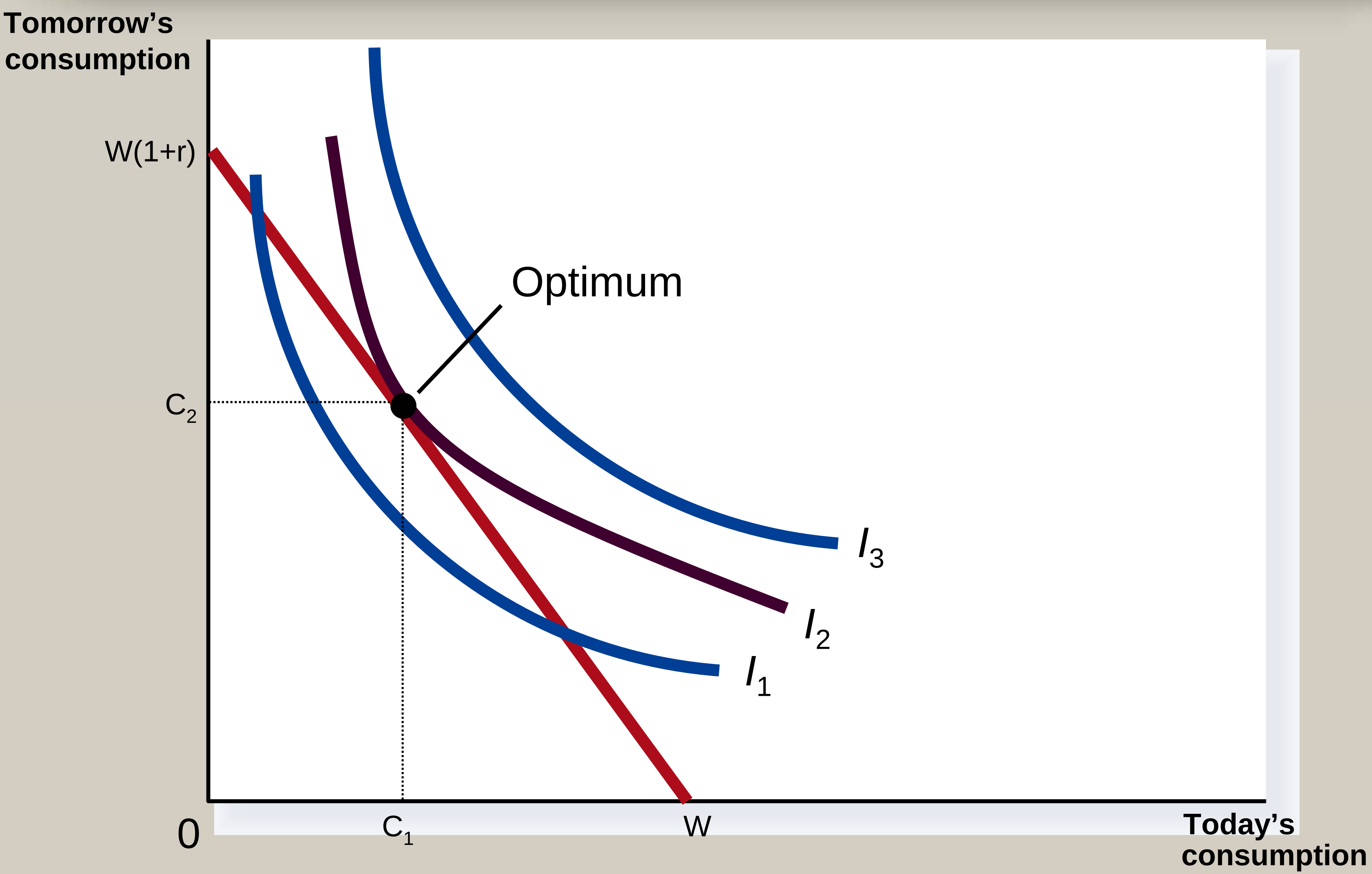
Households as "sellers" in capital markets

The household saving decision can be analyzed with the same tools we used for consumption choices (budget constraint and indifference curves). In fact, the decision to save is equivalent to the decision to postpone consumption, and can be analyzed as a choice of **intertemporal consumption**.

Consider **next graph**, with future consumption on the vertical axis and current consumption on the horizontal axis. The budget constraint captures the trade-off in the household decision: the opportunity cost of spending 1 euro today is a reduction in tomorrow's consumption by $1 + r$ euros (r is the interest rate).

Indifference curves capture the household preferences for future and current consumption. The **optimal choice** is the point at which the marginal rate of substitution between current and future consumption ($MRS = MU_1/MU_2$) is equal to the slope of the budget constraint ($= 1 + r$).

The household decision to save



Savings and the interest rate

In the previous graph, C_1 is the optimal amount of current consumption, while C_2 is the optimal amount of future consumption. Thus, **optimal savings** are: $S = W - C_1$. And: $C_2 = (1+r)(W - C_1) = (1+r)S$.

$\Rightarrow$ Note that r is the **real interest rate**, which equals the nominal interest (i) rate minus the rate of inflation (π). If $i = 10\%$ and $\pi = 4\%$, by saving 1 euro today, we can increase tomorrow's consumed goods by $r = 6\%$.

What's the effect of r on savings? It depends on the income and substitution effect of a change in r (which is the relative price of current consumption in terms of future consumption).

- if $r \uparrow$: $C_1 \uparrow$, $C_2 \uparrow$, and then $S \downarrow$ (**income effect**)
- if $r \uparrow$: $C_1 \downarrow$, $C_2 \uparrow$, and then $S \uparrow$ (**substitution effect**)

Hence, the overall effect of r depends on which effect dominates the other.

The time value of money

Since we can earn interest on our savings, the cost of 1 euro of current consumption is more that simply 1 euro of future consumption. Thus, 1 euro today is worth more than 1 euro tomorrow. This reflects the **time value** of money.

The concept of **present discounted value** tells us how to measure the time value of money. The present value (PV) of a future quantity (FV) is:

$$FV = (1+r)PV \Rightarrow PV = \frac{1}{1+r}FV.$$

This gives us the present discounted value of 1 euro received an year from now.

Similarly, the present discounted value t years from now can be calculated as:

$$PV = \frac{1}{(1+r)^t}FV.$$

Note that this formula takes into account the future interest paid on the interest (**compound interest**).

An example

Assume you could realize a three-year project, which would yield $10,000$ euros in the first year, $15,000$ in the second, and $50,000$ in the third (for overall nominal returns equal to $75,000$ euros).

Further assume that the real interest rate is 10%, and that in order to start the project you must immediately pay $60,000$ euros. Is the project profitable?

The comparison between nominal returns and costs $(75,000-60,000 = 15,000)$ is misleading, since costs are measured in today's money and some returns are measured in future money. You must use the **present discounted value**.

- PV of first-year returns $= 10,000/1.10 = 9,091$ euros.
- PV of second-year returns $= 15,000/(1.10)^2 = 12,397$ euros.
- PV of third-year returns $= 50,000/(1.10)^3 = 37,566$ euros.

Hence, the PV of total returns $(9,091 + 12,397 + 37,566 = 59,054)$ is lower than the PV of total costs $(60,000)$. The project is not profitable.

Other relevant issues about savings

- **Aggregate savings**. At any time, some individuals are saving and others are dissaving. Hence, the aggregate saving rate depends on the individual household saving decisions, but also on *demographic factors* (since - for instance - the old typically dissave and the young save).

- **Social security**. Another important determinant of savings is Social Security. Social security programs can be divided between **pay-as-you-go** and **fully funded**. The former is a form of intergenerational transfer, while the latter is a form of (voluntary or compulsory) saving. Government can decide to implement a pay-as-you-go system, or to make people save in a fully funded system, according to *market failures* considerations.

Investment alternatives

So far, to simplify our discussion, we have assumed that saving earns a single interest rate (r), but there are many different ways in which individuals can invest their savings, and these may offer different returns (i.e., interest rates).

Savers wishing to invest face a wide range of alternatives:

- bank deposits;
- housing;
- bonds;
- shares of stock;
- mutual funds.

Each investment alternative is associated to a different combination of **expected return** (interest plus capital gain) and **riskiness**. These are the two relevant dimensions in order to compare investment opportunities.

Firms as "buyers" in capital markets

Let's go back to the demand side of the capital market. Firms need to borrow the savings of households to fund their purchases of **capital goods** (e.g., machines, tools, buildings, etc.).

The relevant price for firms' demand of capital is the interest rate. In fact, the user cost of capital increases when the interest rate rises.

- At a higher interest rate, firms demand less capital and need to borrow less.
- At a lower interest rate, firms demand more capital and need to borrow more.

In the capital market, the intersection between demand and supply determines the **equilibrium interest rate** (r^*). See next graph.

Equilibrium in the capital market