

Lecture 9: Intertemporal choices, consumption and investment. Key features of asset markets

ECON-C3100 Intermediate Macroeconomics I

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8.2.2021

Optimal choices by households and firms

- In lecture 8, we saw how the intertemporal budget constraint allows the household to choose from many different combinations of consumption today and consumption tomorrow - but were silent about the **choice** it ultimately makes
- Private consumption is the largest demand component in GDP
- Today, focus on explaining the behaviour of consumption - and investment, the other key component of domestic private demand

- In our growth models, the savings rate s was held constant, for simplicity. Because household behavior plays a secondary role in growth models, it was possible to construct the basic properties of growth dynamics even with this simplistic assumption.
- Households' utility maximizing savings behavior could, however, be incorporated into the growth models with no significant impact on the results concerning economic growth. The only change would be that, instead of a constant s , the savings rate would be determined as an optimal choice by households.
- A constant savings rate is not consistent with empirical facts, and making savings endogenous opens new possibilities for analysis
- Endogenous consumption and saving even more important in business cycle theory

Optimal intertemporal consumption

- Microeconomics: how households decide *what* to consume
- Macroeconomics: how households decide *when* to consume

⇒ simplifying assumption: there is only one good to consume

- The household's optimal choice will depend on his preferences, which are summarized by **indifference curves**
- A particular indifference curve represents now combinations of consumption today and consumption tomorrow that yield the same utility

The household's intertemporal budget constraint

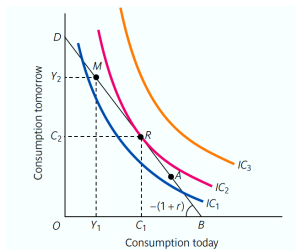
- When the household is on its budget line, it spends its total wealth in the course of the two periods
- Recall the hh's intertemporal budget constraint

$$\underbrace{C_1 + \frac{C_2}{(1+r)}}_{\text{present value of consumption}} = \underbrace{Y_1 + \frac{Y_2}{(1+r)}}_{\text{present value of income}} = \underbrace{\Omega}_{\text{total wealth}}$$

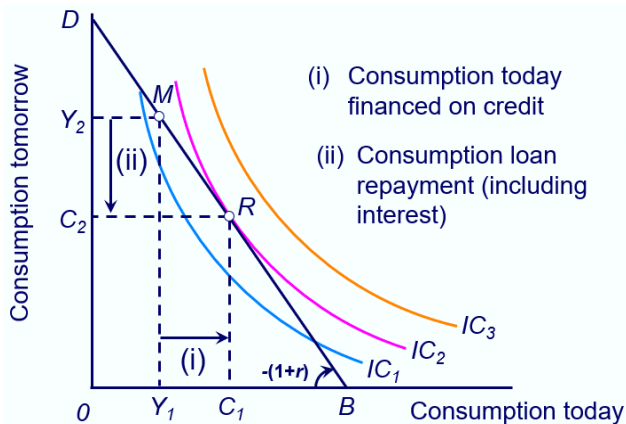
- If the household can borrow and lend as much as it wants at the going interest rate, its consumption pattern over time depends on the present value of his total lifetime wealth and not on the particular timing of his income

Optimal consumption

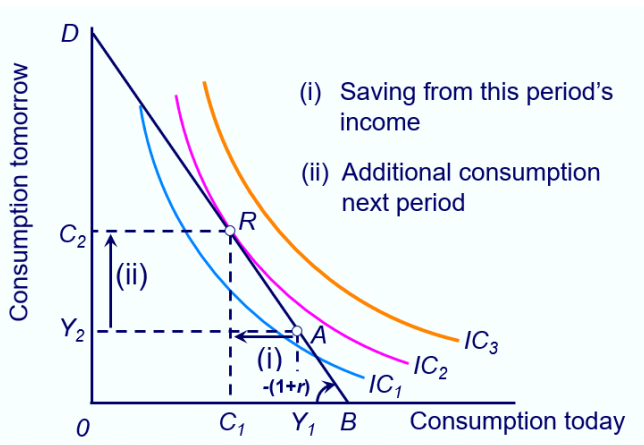
- Slope of indifference curve: willingness to swap consumption tomorrow for consumption today, holding utility constant (the marginal rate of intertemporal substitution)
- Curvature of indifference curve: the willingness to swap depends on the relative abundance of consumption in the two periods
- Optimal consumption is found at the point R where the slope of the indifference curve is equal to the slope of the budget line, i.e. when the marginal rate of substitution is equal to the intertemporal price of consumption



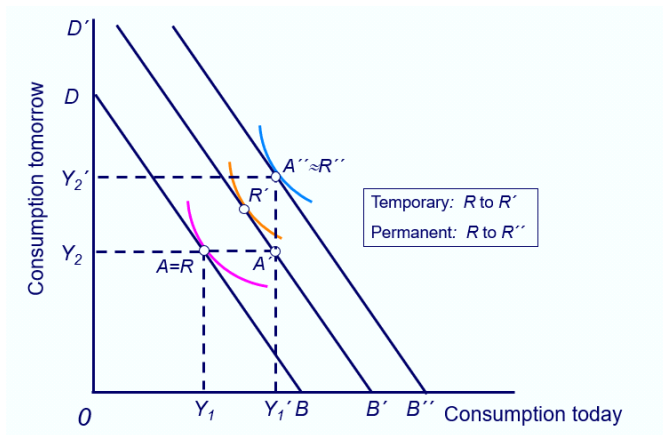
Optimal consumption - Borrower



Optimal consumption - Lender



Permanent versus temporary changes in income

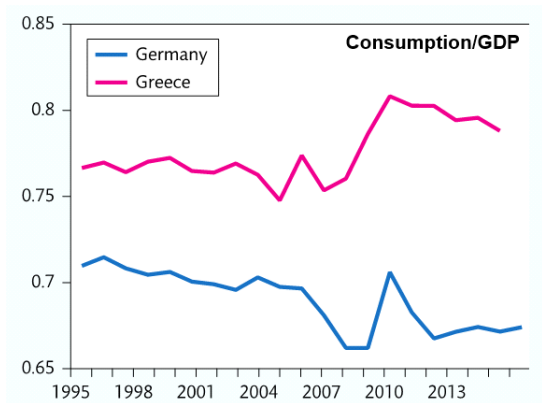


Permanent versus temporary changes in income

- Key insight: even in the case of a temporary increase in income, the household's consumption (point R') will rise in *both* periods. A temporary increase in income is accompanied by a permanent, but smaller, increase in consumption
- A permanent increase in income is absorbed in a permanent increase in consumption of similar size
- Expected increase in income tomorrow: borrow today to afford a better standard of living right away.
- Only *new information* about the future should alter existing consumption behaviour, since anticipated future incomes are already incorporated into current wealth and current consumption fully reflects that information

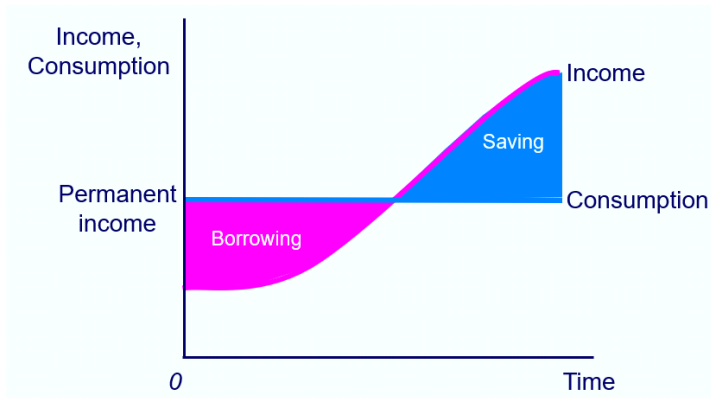
Consumption smoothing

People dislike variable consumption patterns. **Consumption smoothing** explains why aggregate consumption is less variable than GDP



Permanent income and the life cycle

When income is expected to increase over a lifetime, consumption smoothing implies borrowing when young and paying back when older

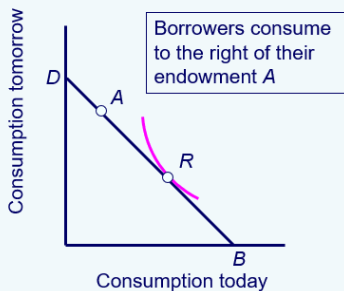


The effect of the real interest rate on consumption

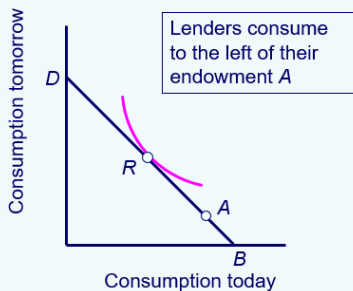
- When the real interest rate rises, so do the rewards of saving
- But whether savings really increase is a more complicated question
- It depends on whether the household is initially a net lender or a net borrower

The effect of the real interest rate on consumption

Difference between borrowers and lenders



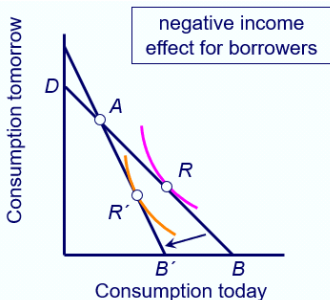
(a) Student
(borrower)



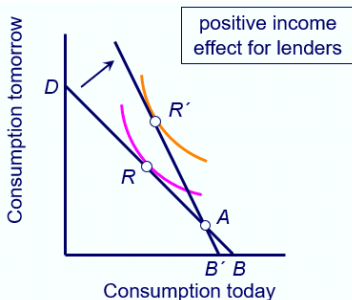
(b) Professional athlete
(lender)

The effect of the real interest rate on consumption

The income effect is different for borrowers and lenders



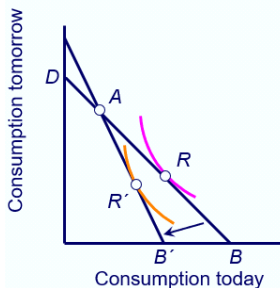
(a) Student
(borrower)



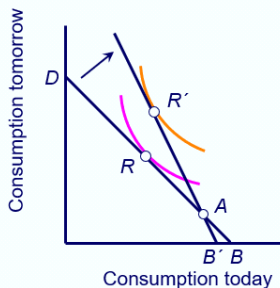
(b) Professional athlete
(lender)

The effect of the real interest rate on consumption

- Borrowers: income and substitution effects work in the same direction (to increase saving)
- Lenders: income and substitution effects work in opposite directions (below: income effect wins)



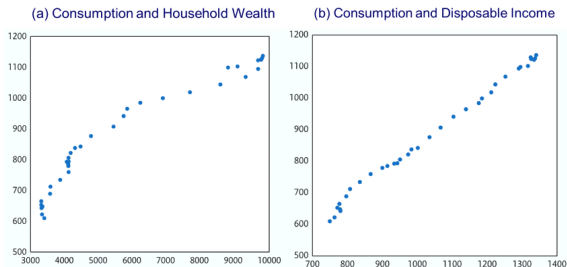
(a) Student
(borrower)



(b) Professional athlete
(lender)

Wealth or income?

The link between consumption and disposable is stronger than that between consumption and wealth - contrary to the theory just developed that consumption is driven by wealth and households smooth consumption



- The observed consumption-income relationship may reflect a common dependence on wealth, which is difficult to measure precisely (stock markets, future income)
- Not all households can borrow and lend (credit constraints)

The consumption function

- The consumption function summarizes how aggregate consumption is linked to its two main determinants

$$C = C \left(\underset{+}{\Omega}, \underset{+}{Y^d} \right)$$

- Consumption increases with both wealth and personal disposable income
- The real interest rate affects consumption through its effect on wealth

Investment - the optimal capital stock

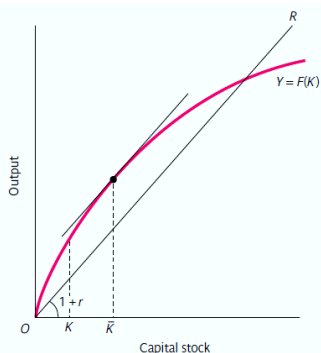
- The firm's expected profit is the difference between what it produces and the cost of production: the opportunity cost of the investment or the marginal cost of capital

$$F(K) - K(1 + r)$$

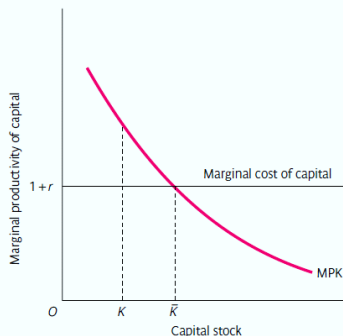
- To maximize profit, the firm chooses the optimal capital stock K such that the slope of the production function is equal to the slope of the cost-of-capital schedule

$$\underbrace{MPK}_{\text{marginal product of capital}} = \underbrace{1 + r}_{\text{marginal cost of capital}}$$

The optimal capital stock



(a)



(b)

Investment and the real interest rate

- Ignoring depreciation, optimal investment would simply be the difference between the optimal capital stock \bar{K} and the current capital stock K
- Therefore, given the present stock of capital and the rate of depreciation, the determinants of optimal investment are the same as those of the optimal stock of capital
- An increase in the real interest rate diminishes the scope for profitable investments just as it lowers the optimal stock of capital
- The investment function

$$I = I \left(\underset{-}{r}, \underset{+}{\Delta Y}, \underset{+}{q} \right)$$

where q is Tobin's q , the shadow price of investment, the ratio of the market value of installed capital to the replacement cost of installed capital

Asset markets' role in the macroeconomy

- All economic agents have incentives to borrow and lend
- Households, firms, the public sector and the rest-of-the-world can by borrowing and lending shift income and spending between the present and the future
- Asset markets facilitate the intertemporal shifting of resources described in lecture 8 - this is why they are central to a well-functioning economy
- They channel savings into loans that finance expenditures, and put a price tag on time and on risk
- They play a crucial role in transmitting the impulses of monetary policy

Characteristics of asset markets

- Financial assets are **durable** and have a negligible storage cost - natural vehicle for saving for future consumption
 - Durability means that the *future value* of each asset is a key concern
 - Asset markets are thus forward-looking, but participants do not have complete information of the future
- Financial asset markets deal in **stocks** not flows. The entire stock of tradeable assets could be brought to the market at once
 - Very different from goods and services markets where demand and supply of flows must be balanced. In asset markets prices move to clear demand and supply of the whole stock
 - Huge size and potential *volatility*
- Asset markets can handle large sudden volumes with ease. Today large part is computerized - close to perfect competition
 - Profit opportunities are quickly dissipated by participants' actions - the **no-profit condition**

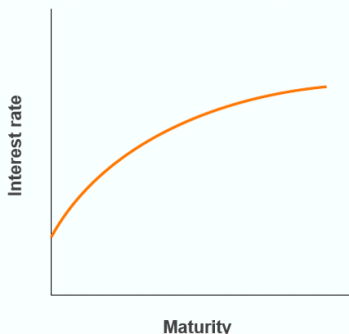
Three essential economic functions of asset markets

- Intermediation
 - Most individuals act indirectly through *financial intermediaries*, of which banks are the most prominent form - especially in Europe
- Financial markets price the future
 - The price of the future - or the reward for waiting - is the *interest rate* paid by borrowers
 - Market interest rates reflect the overall impatience of borrowers and lenders. Typically, for given riskiness interest rates are higher the longer the *maturity* of the loan - represented by the *yield curve*
- Allocation and pricing of risk
 - Some asset holders are more risk-averse than others. Financial uncertainty can be diminished, but not eliminated, by diversification
 - People are compensated for bearing risk through the risk premium

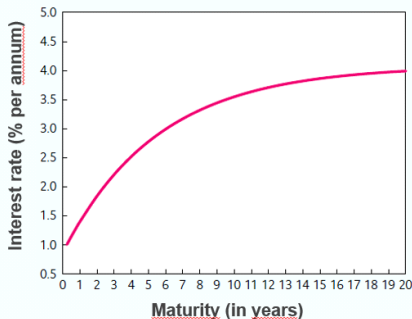
The yield curve - the term structure of interest rates

- As the time horizon lengthens, uncertainty grows and liquidity decreases
- The borrower is willing to pay a **maturity premium** because the funds remain longer at its disposal

(a) Theory



(b) Euro area



Panel (b) shows the yield curve observed on May 11th, 2011, for high-quality government bonds in euros for maturities that range from 3 months to 20 years.

The yield curve

Euro area yield curve for AAA rated countries published by the ECB

