Microeconomics
Decisions on labor supply and saving

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Structure

Introduction

- Household theory
  - Budget
  - Preferences, indifference curves, and utility functions
  - Household optimum
  - Comparative statics
  - **Decisions on labor supply and saving**
  - Uncertainty
  - Market demand and revenue
- Theory of the firm
- Perfect competition and welfare theory
- Types of markets
- External effects and public goods

Pareto-optimal review

Overview

- Labor supply
- Intertemporal consumption

Labor supply

- Time budget: 24 hours
- Two goods
    - Good 1 = leisure (F), where $24 - F =$ labor supply
    - Good 2 = consumption (C)
- $w =$ wage per hour
- $p =$ price for one unit of the consumption good
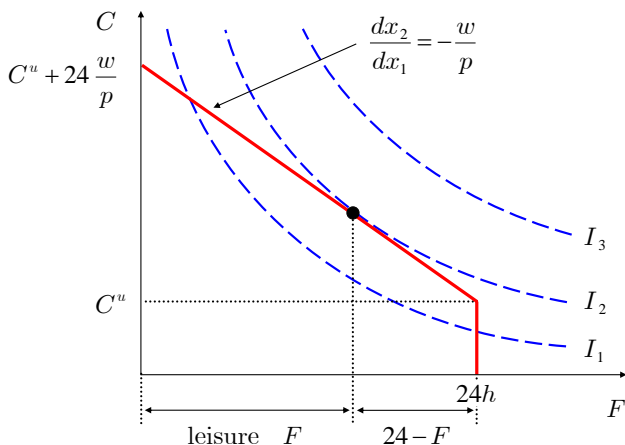- $C^u =$ consumption independent of income

Budget equation:

$$pC = w(24 - F) + pC^u$$

or equivalently

$$wF + pC = w24 + pC^u$$

Labor supply

Problem

How do you call
- $(24, C^u)$?
- $\frac{w}{p}$?

Problem

Is the household a net supplier or a net demander of free time?

Labor supply

Problem

Conny earns €5 per hour and has no other source of income. She has 120 hours in a week to spend on work or on leisure. Her utility function is given by $U(C, F) = CF$. How many hours per week is she going to work?

Problem

Use a figure to illustrate an increase in wages! Assume that the total income effect dominates the substitution effect!

Labor supply

Under which conditions will the household work more due to a decrease in wage?

$$\underbrace{\frac{\partial F}{\partial w}}_{\text{total effect}} = \underbrace{\frac{\partial F^S}{\partial w}}_{\text{substitution effect}} + \underbrace{\frac{\partial F}{\partial m}(24 - F)}_{\substack{\text{total} \\ \text{income effect} \\ \text{with } m = pC^u + w24}} .$$

Social assistance and negative income tax

Problem

How does the budget line change if

- the state wants to secure a minimum level of consumption C_{min} by social assistance? (K 176)
- the state allows for additional income possibilities? (K 146)

Problem

How can a negative income tax be illustrated? (K 176)

Present value of 1000 Euro per year

- Investment theory: Present value (= discounting of future payments) as criterion for an investment
- What is the present value of 1000 Euro per year forever (eternal rent)?

$$\frac{1000}{1+r} + \frac{1000}{(1+r)^2} + \frac{1000}{(1+r)^3} + \ldots +$$

$$= \frac{\text{starting value}}{1 - \text{factor}} = \frac{\frac{1000}{1+r}}{1 - \frac{1}{1+r}} = \frac{\frac{1000}{1+r}}{\frac{1+r}{1+r} - \frac{1}{1+r}}$$

$$= \frac{1000}{r}$$

$$= 10\,000 \text{ for } r = 10\%$$

Intertemporal consumption

- m_1, c_1 income and consumption in period 1
- m_2, c_2 income and consumption in period 2
- r interest rate (deposit interest = debit interest)

Problem

How would you define a creditor and a debtor? Express the creditor's saving by the parameters above!

Problem

What are the marginal opportunity cost of one unit of consumption in period 1 expressed in units of consumption in period 2 for a creditor and for a debtor?

Intertemporal consumption
Effect of interest

- Budget equation:
$$c_2 = m_2 + (m_1 - c_1) + r(m_1 - c_1).$$

- Present value of the two-period budget (discounting):
$$c_1 + \frac{c_2}{1+r} = m_1 + \frac{m_2}{1+r}.$$

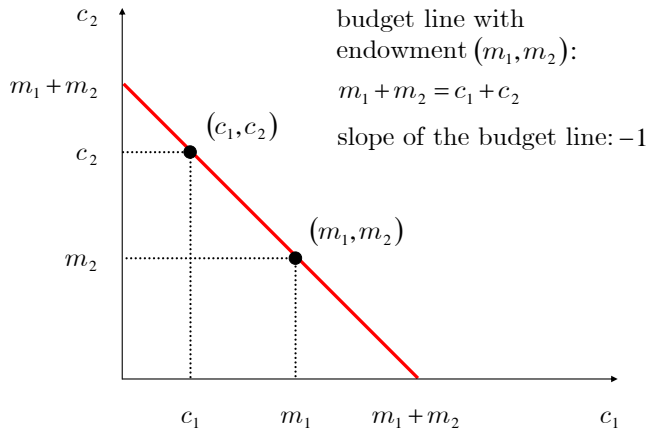- Future value of the two-period budget (compounding):
$$c_1(1+r) + c_2 = m_1(1+r) + m_2.$$

Problem

What is today's value of one Euro that I receive in 15 years? What is the value in 15 years of one Euro invested today? Assume an interest rate of 10%! (A calculator may be useful.)
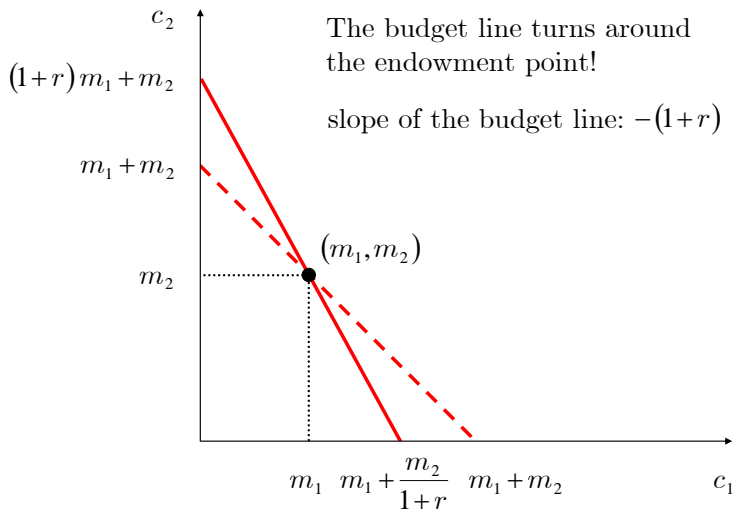
Intertemporal consumption
Without interest

budget line with
endowment (m_1, m_2):

$m_1 + m_2 = c_1 + c_2$

slope of the budget line: -1

Intertemporal consumption

The budget line turns around the endowment point!

slope of the budget line: $-(1+r)$

The figure shows axes c_2 (vertical) and c_1 (horizontal). On the vertical axis are marked $(1+r)m_1+m_2$, m_1+m_2, and m_2. The endowment point (m_1, m_2) is marked. On the horizontal axis are marked m_1, $m_1+\dfrac{m_2}{1+r}$, and m_1+m_2.

Intertemporal consumption

With interest

For monotonicity and "nicely shaped" indifference curves the
household optimum can by derived

- using

$$c_1 + \frac{c_2}{1+r} \overset{!}{=} m_1 + \frac{m_2}{1+r}$$

- and

$$MRS = \left| \frac{dc_2}{dc_1} \right| \overset{!}{=} 1 + r.$$

Intertemporal consumption
Impatience, deposit interest and debit interest

Problem

How does impatience affect the slope of the indifference curve?

Problem

How does the budget line look like if deposit interest is higher than debit interest?

(Humankapital K 171, 173)

Central tutorial I

Problem F.4.1.

$C^u = 20$, $p = 2$, $w = 5$

      a) Draw the budget line!

      b) $C^u = 30$ and 20% income tax
         Draw the budget line! Intersection?

Problem F.4.2.

A worker can decide between 8 or 0 working hours per day.
Sketch indifference curves such that:

- worker chooses 8 hours but
- her optimum (for a free choice of working hours per day) is 6 hours.

Central tutorial II

Problem F.4.3.
What is the household optimum for a consumer with a marginal rate of substitution between c_1 and c_2 of one? Assume the interest rate is positive!

Problem F.4.4.
Bank director Miller reckons: "Common sense tells that people save more if interest rates increase." Is he right?
Hint: Apply an appropriate Slutsky equation using the future-value representation of the budget equation and assuming that consumption in period 1 is a normal good.

Problem F.4.5.

Lucas has the utility function $U(c_1, c_2) = c_1^{\frac{1}{2}} + 2c_2^{\frac{1}{2}}$, where c_i is consumption in period i. He earns 100 units of the consumption good in period 1 as well as in period 2. Lucas can borrow and lend at an interest rate of 10%.

a) Derive the budget line!

b) What is Lucas's marginal rate of substitution between future and present consumption $\left|\frac{dc_2}{dc_1}\right|$ if he neither borrows nor lends? What is the marginal rate of substitution in the household optimum?

c) What is the ratio of future to present consumption in the intertemporal optimum?