MACROECONOMICS

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Course Material Developed by Department of Economics,

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Week 3

Consumer and producer

Models

- Highly abstract logical constructs that contain just as much of the features of life that is needed to explain the given phenomena
- Required features: logical coherency, simpleness, robustness (to fit on empirical data)
- If it fits existing data(explains past events) we can use it to forecast, to experiment

Models

- Market models: cooperation among participants is voluntary exchange
- Equilibrium models: there is harmony among participants'decisions to transact with each other, and it is made possible by the price mechanism
- Buyers buy always as much that sellers sell on markets. An equilibrium is a situation, where – due to free the adjustment of prices – buyers buy what they wish to buy and sellers sell what they wish to sell at the existinhg price

Models

- Many participants, many markets in simultenous equilibrium is: General equilibrium
- In a GE model we concentrate on equilibrium positions only
- Disequilibrium model: some prices do not adjust in some markets, therefore they cannot reach equilibrium
- Technically: prices in hose markets are exogenous, the model would not explain them

Competitive equilibrium

- There can be many types of equilibrium in a model depending on what we assume as for the participants behavior, market structure etc.
- Competitive equilibrium is the generalized concept of perfect competition equilibrium, known from micro. Participants take market prices as given and adjust to those
- On this course we use this equlibrium concept, because it is simple

Models with micro base

- It explicitly contains the decription of goals and budget constraints of model participants and their behavior is derived from those. Behavior is derived from first principles, from optimizing
- It is much more complicated than simply assuming how macro variables behave without referring to participants' decisions
- micro base moved to macro modeling in the 70's

An example: the consumption function

- Take agrregate consumption data and regress it to GDP data. Looks like behavior
  C = a + b(Y – T)
  C = a – bT + bY
- Take an increase in taxes. What to do with b?
- If we coould be sure it is exogenous, we did not need a description of the consumer’s decision process
- If not exogenous, we should try to derive it from the consumer’s objective and the contraints

Micro base

- We do not always insist on it, it depends on the problem we deal with
- If we can establish that individual behavior is not modified in the adjustment process, then we can do without
- Example: to throw a piece of red brick
- The course will discuss micro bsed as well as aggregate models

Building blocks of macro models

- Particpants: consumer, producer, government
- Goods: consumption goods now or in the future
- Productive resouces: time (working), capital
- Technology: production possibilities
- Consumer tastes and preferences

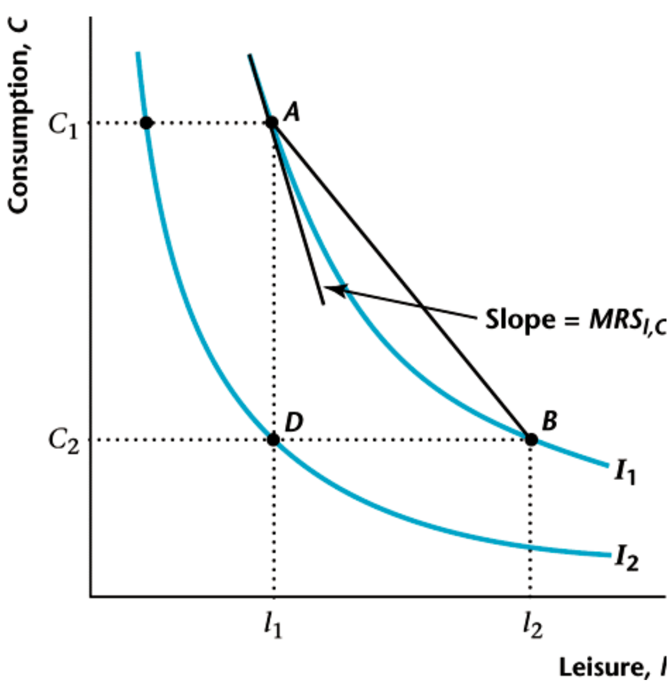
One period (static) model

- Representative (average) consumer
- From our point of view differences among consumers are much less important than similarities. All want to consume and they value their time, they won't give up leisure for free
- One consumer represents many
- Questions of income distribution are excluded by definition

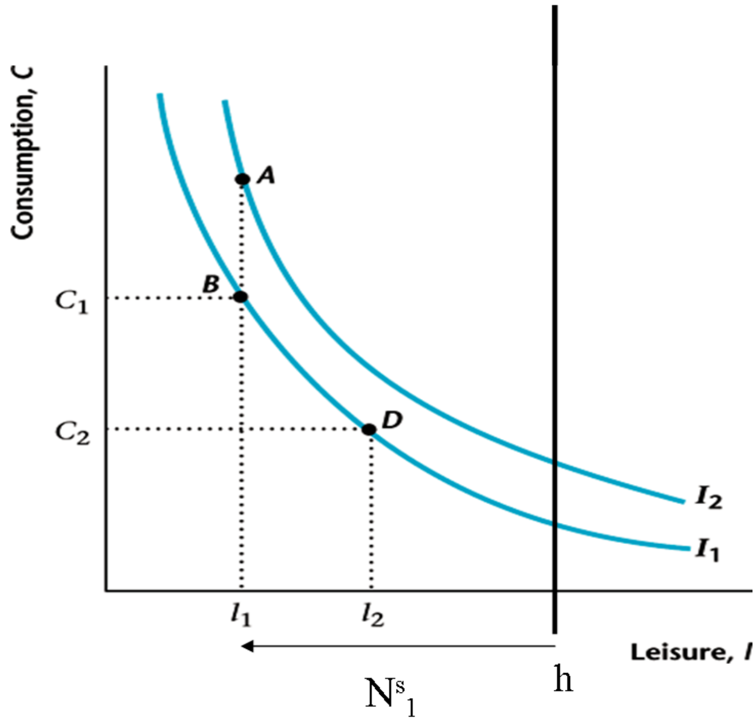
Consumer preferences

- Goods desired: consumption (C), and leisure time (l). With choosing leisure the consimer automatically chooses the time he wants to spend working
- Labor supply: $N^s = h - l$
- Standard utility function: $U(C, h - N^s)$
- Consumption and leisure are both normal goods. Having more resources the consumer wants more of both of them

Consumer preferences



Consumer preferences



Consumer's budget constraint

$$C = wN^S + \pi - T$$

There is no money. We measure everything in units of the consumer good. W, the unit wage, real wage is the price of the unit of leisure. The consumer treats w as given, as beyond her control.

The consumer owns the firm. She gets dividend (profit) from it. She also pays taxes to the government

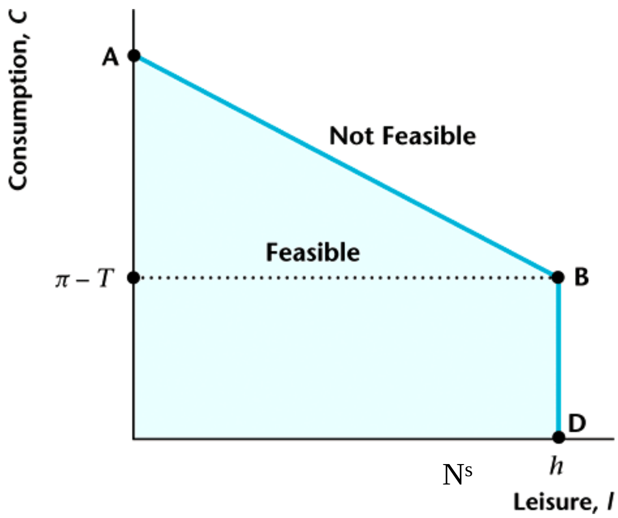
Tjere is no savings in the model, we have just one period. The consumer consumes all her income

Budget constraint

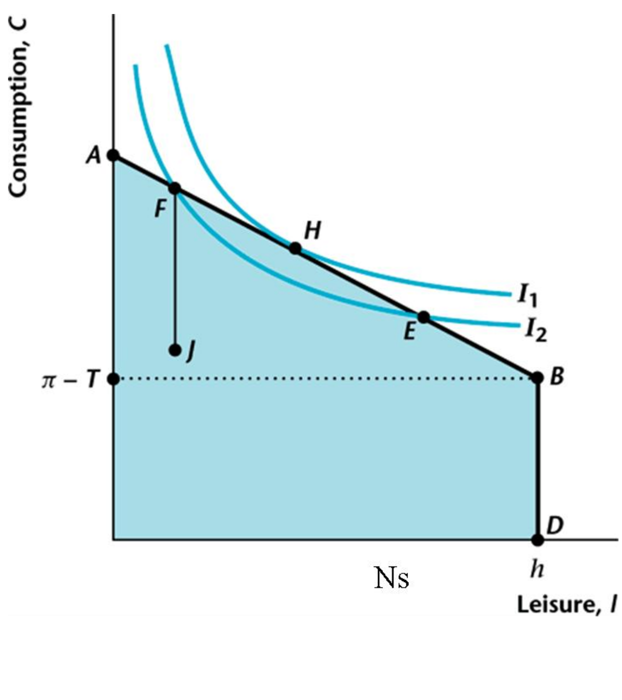
$$C + wl = wh + \pi - T$$

Rearranging, the problem is not differemt from classic consumer chice prblems
C and l are goods to choose from. The right side lists the consumer's resources, the walue of her time and net dividend

Budget constraint



Optimal consumer choice



Optimal choice

- Given w and π the consumer chooses C and l to maximize her utility
- It defines labor supply as well.
- In the optimum point: **MRS** = w holds
- That is $MU_l = w*MU_c$

Calculus

$$\text{Max } U(C.l) = \ln C + \ln(h - N^s)$$

$$C = wN^S + \pi - T$$

Solution:

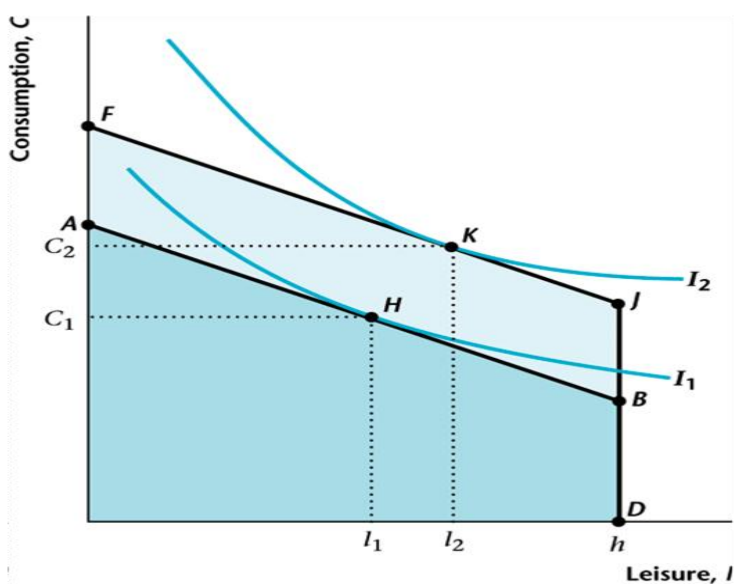
$$\frac{C}{(h - N^s)} = w \qquad C = wN^S + \pi - T$$

$N^s = N^s(w, \pi - T)$, labor supply

$C = C(w, \pi - T)$, consumption demand

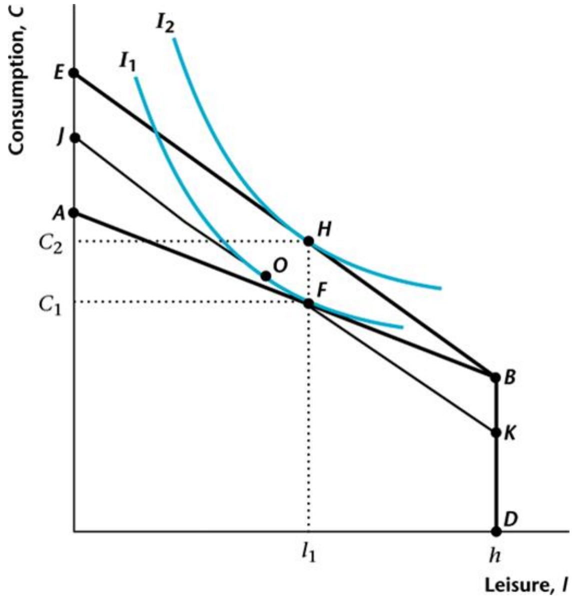
With given wage and non-labor income the consumer determines her consumption demand and labor supply

Change in non-wage income



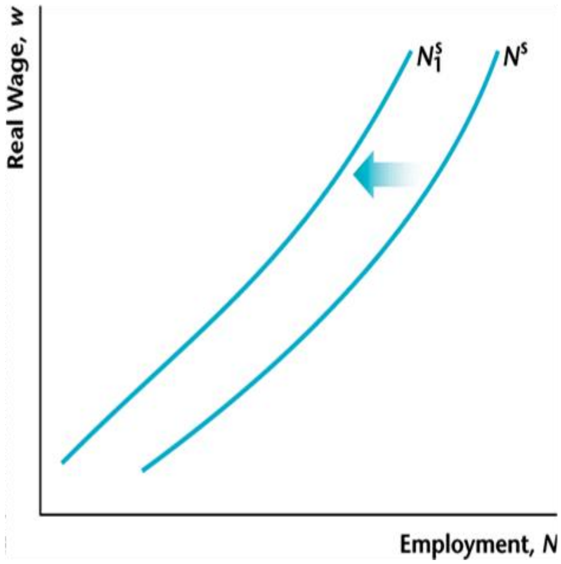
The effect of an increase in wages

Income effet of a wage increase on the demand for leissure is positive, the substitution effect is negative. Therefore, total effect is uncertain, we do not know if labor supply increases or decreases. Consumption increases as both effect are positive



Labor supply

We assume labor supply reacts positively to a wage increase due to a factor not contained in the one period model. It is intertemporal substitution
Increase in non-wage income decreases labor supply, shifts the curve to the left



Representative firm

- It's constraint is the given technology
- Production function, a relationship between productive resources and the quantity of output produced, known from microeconomics
- Macroeconomic production fubnction
- Representative firm

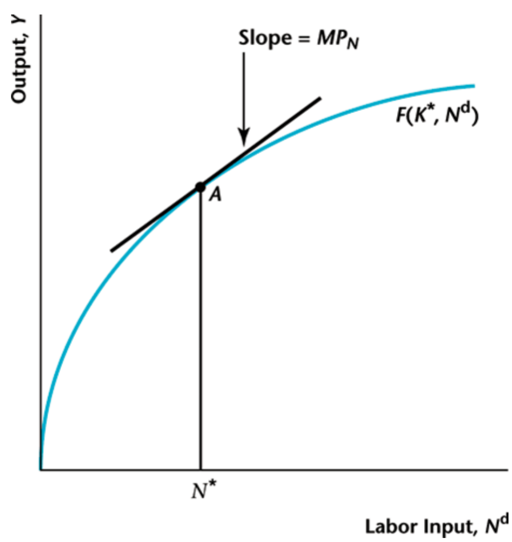
Representative firm

$$Y = zF(K, N^d)$$

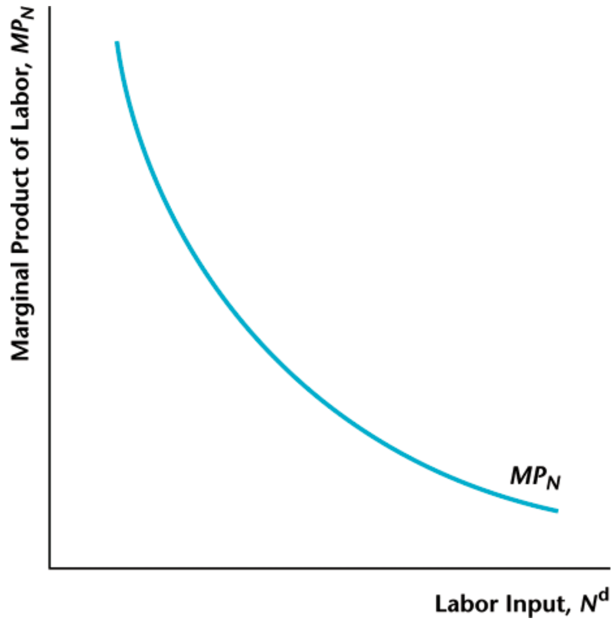
Production technology is represented by a standard neoclassical production function
Return to scale is constant, marginal productivity of labor as well as capital are decreasing
In a one period model there is no accumulation of capital (we do not have a second period), capital is exogenous (constant)
The goal of the firm is to maximize profits. It buys labor and sells consumption good

Marginal product of labor

Marginal product of labor is the derivative of the production function with respect to lapbor. It is the slope of the curve
MPL is decreasing with increasing employment

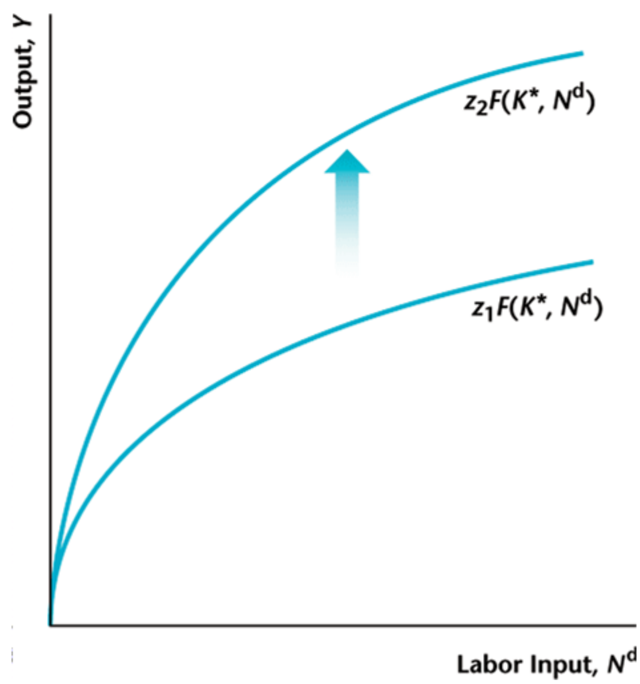


The curve of marginal labor product



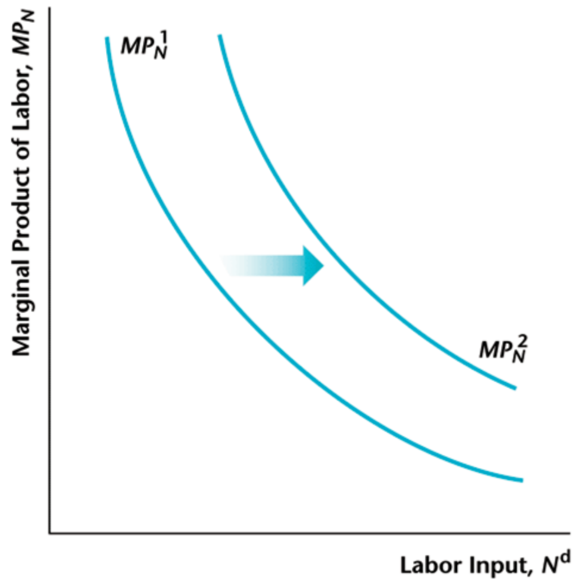
Productivity

An increase in total factor productivity increases output with given level of capital and labor. It also increases the marginal product of labor
The production function gets steeper



The effect of increasing TFP

It increases the marginal product of labor. The curve shifts to the tight, labor supply increases.



TFP

- *Z* comprises everything that is not explained by the quantity of K and N. Not just technoogical change.
- In the long run it increases, as technology and production methods keep improving
- In the short run it fluctiates. Weather, impact of government regulation, changes in prices of materials, energy etc. cause that
- Z can be calculated as a residual

$$Y = zK^{0.36}(N^d)^{0.64}$$

$$z = \frac{Y}{K^{0.36}(N^d)^{0.64}}$$

Profit maximization

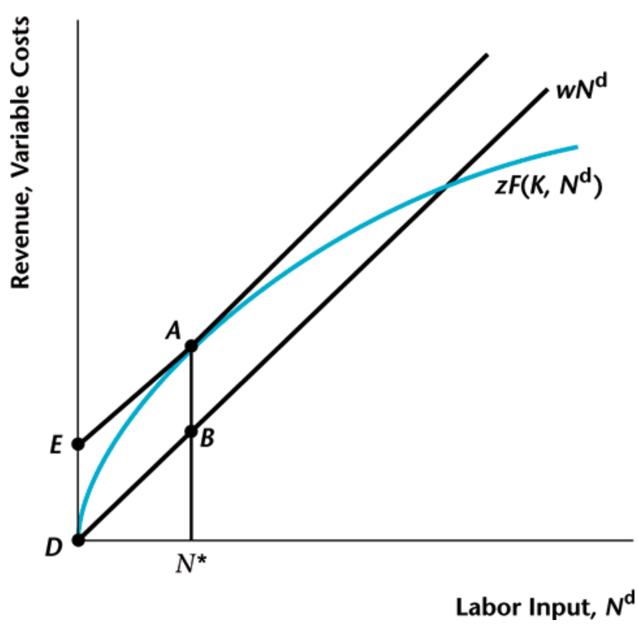
- Profit is the difference between revenues and costs
- $\Pi = z\text{F}(\text{K},\text{N}^d) - \text{wN}^d$ – cost of capital
- Profit is maximized at te level of employment that makes $\text{MP}_\text{N} = \text{w}$
- This defines demand for labor. Labor demand cuve is the same as the marginal product of labor curve

Example

- We assume capital away
- Let us have $Y = z\ln(1 + \text{N}^d)$, then:
  $\Pi = z\ln(1 + \text{N}^d) - \text{wN}^d$
- Demand for labor is*:*

$$\frac{Z}{(1 + \text{N}^d)} = \text{w}$$

Profit maximization



Labor demand curve