11. Capital market

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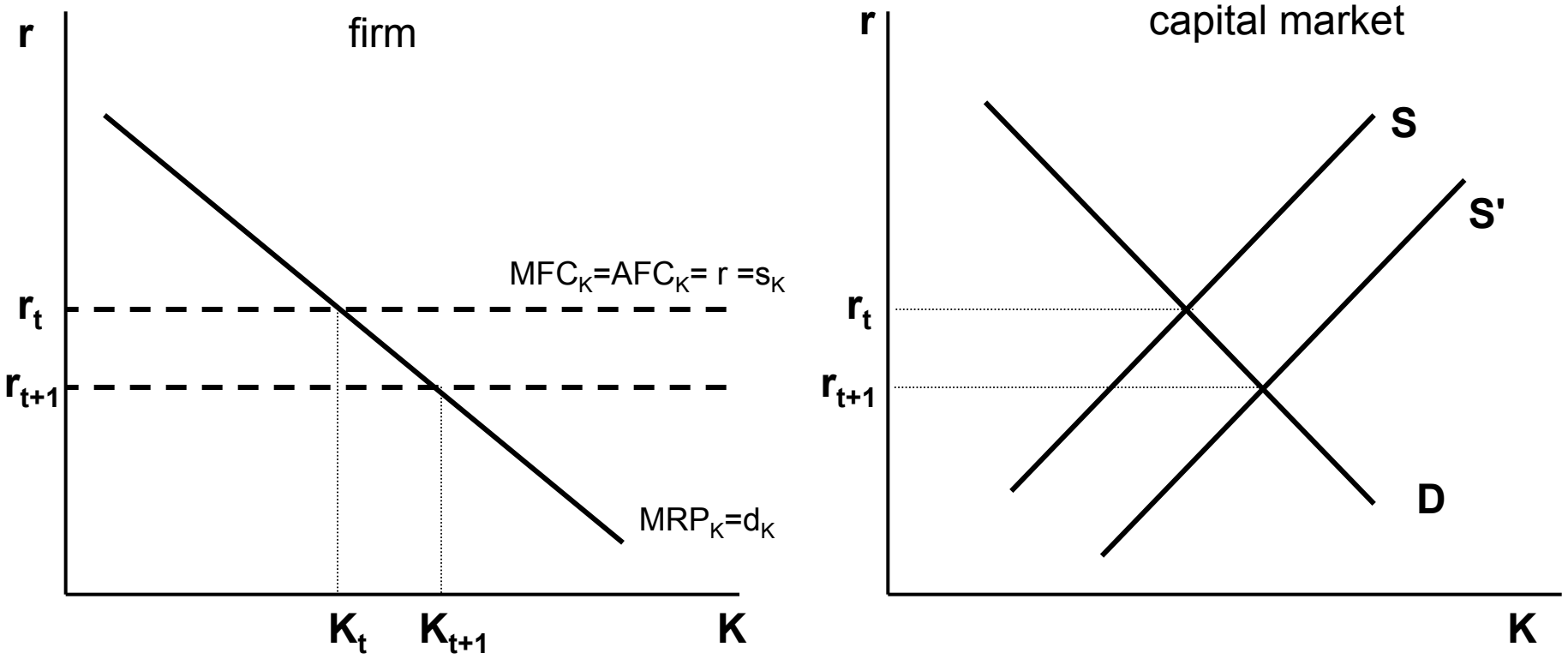
Demand for capital

- we assume perfect competition capital market
- capital is homogenous – it is possible to use the capital for whatever type of production
- in general: capital as a material or as the capital equipment (machines etc.)
- we assume: the entire capital = capital equipment
- volume of labour is fixed
- firms aim: maximal economic profit

Demand for capital – case of leasing

- firm leases the capital equipment – it is not the owner
- firm demands such volume of capital that maximizes the economic profit... for K* stands:
- $MRP_K = MFC_K$
- $MRP_K = MR \,.\, MP_K$
- MP_K is decreasing with increasing volume of capital leased (we assume fixed volume of labour)
- MFC_K = r, rental, derived from the market equilibrium real interest rate

Demand for capital – case of leasing



firm s demand for capital is equal to the MRP_K, which represents perfect relationship between the real interest rate and volume of leased capital

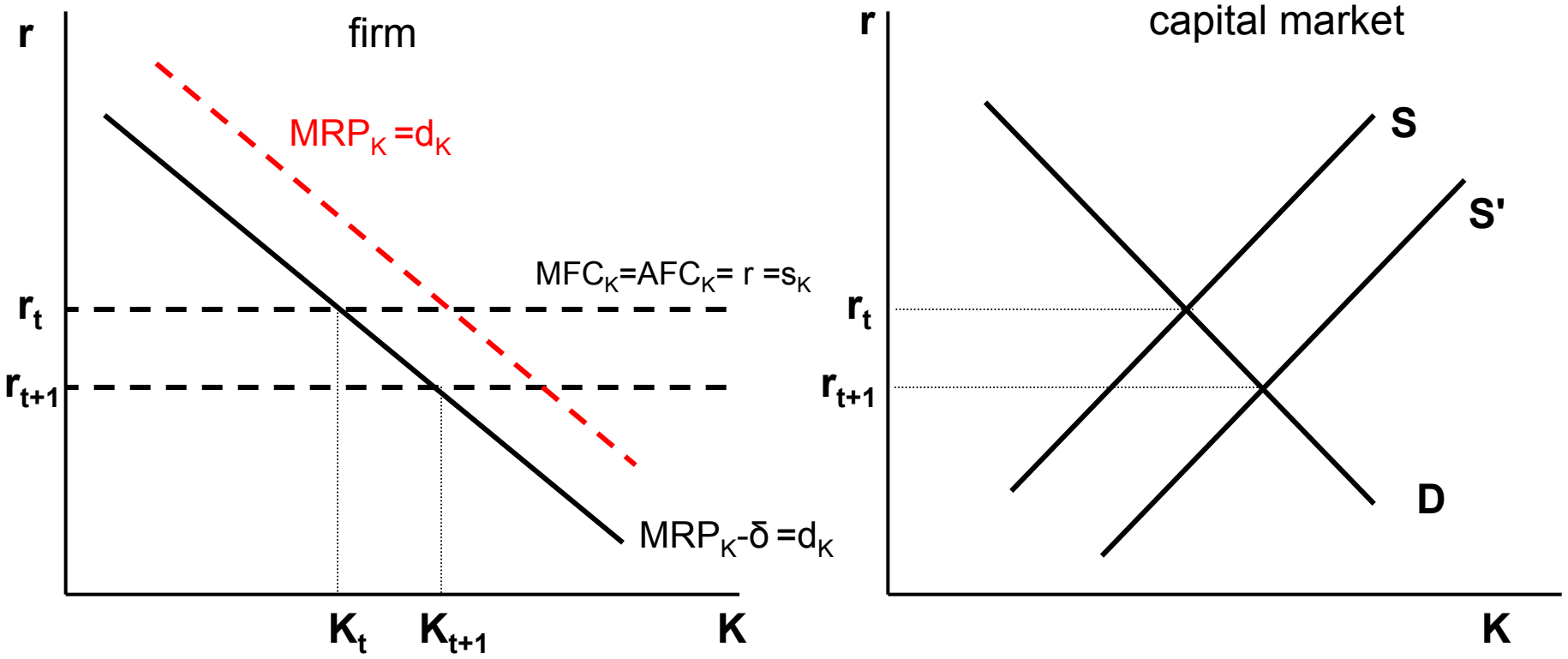
Demand for capital – firm is the owner

- firm invests in the capital eqpuipment – becomes the owner of the capital equipment
- different structure of costs on capital: R + D
- R…sacrificed interest
- D…sum of the capital depreciation

- R = r.P a D = δ.P
- r…sacrificed interest rate
- δ…rate of capital depreciation
- P…capital purchase price

- the marginal factor costs on capital: $MFC_K=r+\delta$
- for K* stands: $MRP_K=MFC_K \rightarrow MRP_K=r+\delta \rightarrow MRP_K-\delta=r$

Demand for capital – firm is the owner



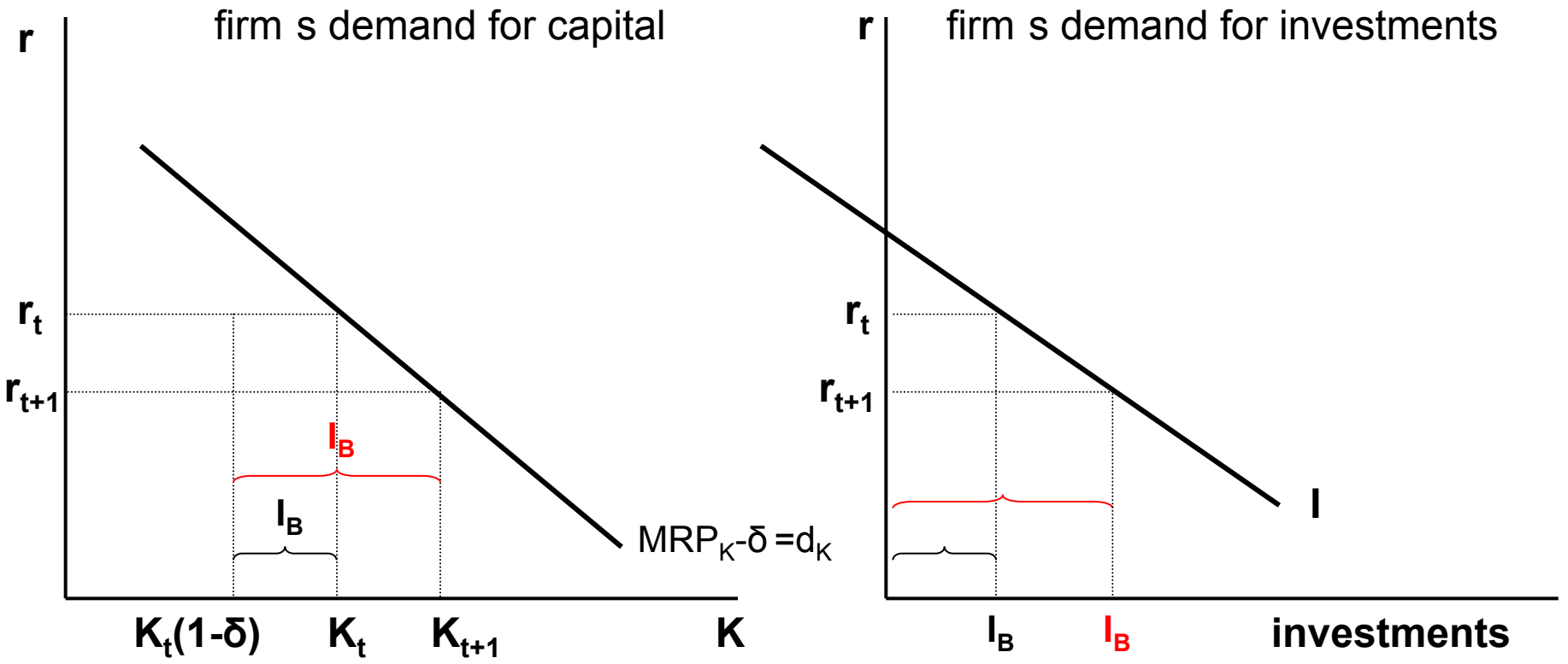
demand for capital equals to $MRP_K - \delta$

$MRP_K = d_K$ = demand for capital in the case of leasing

Deriving the demand for investments

- INVESTMENTS = allocation of firm s expenditures into the capital equipment with the aim to appreciate them
- Gross Investments = Net Investments + Depreciation (Restitution Investments)
- Restitution Investments = necessary to keep the capital stock constant $\rightarrow I_R=\delta.K=K-(1-\delta).K$
- Net Investments = increase of the capital stock

Deriving the demand for investments



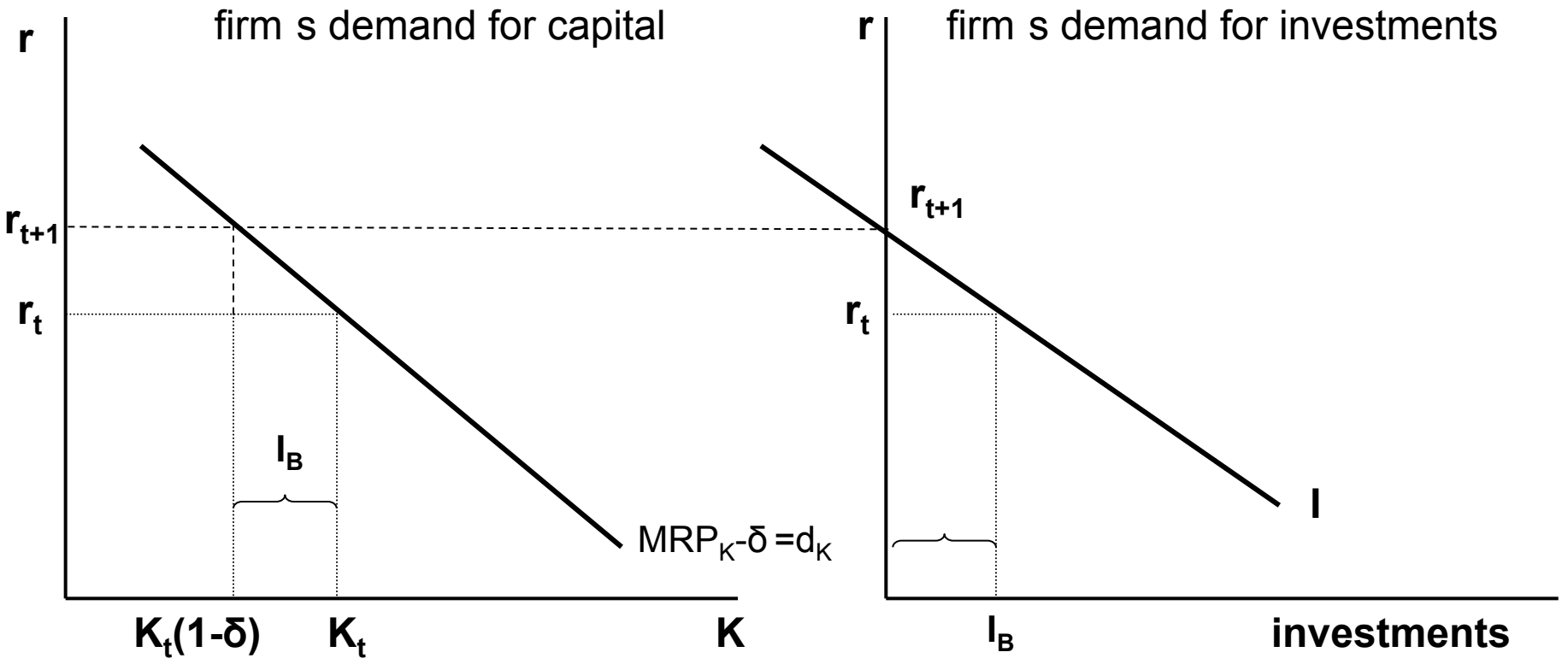
K_t – desired capital stock upon r_t

$K_t(1-\delta)$ – capital stock after 1 period

If the firm desires to keep the initial level of capital stock, it has to invest to renew the depreciated capital: $K_t - K_t(1-\delta)$, which also equals to the volume of gross investments

Interest rate decreases, then the firm demands the capital stock at K_{t+1}. Then it has to invest to renew the depreciated capital + to invest into the new capital equipment. Gross investments increase

Deriving the demand for investments



If the interest rate increases to r_{t+1}, firm desires to keep the capital stock after depretiation during one period – gross investments equal to zero

If the interest rate increases above r_{t+1}, firm desires to decrease the capital stock under the level after depretiation – it has to sell some capital equipment – gross investments are negative

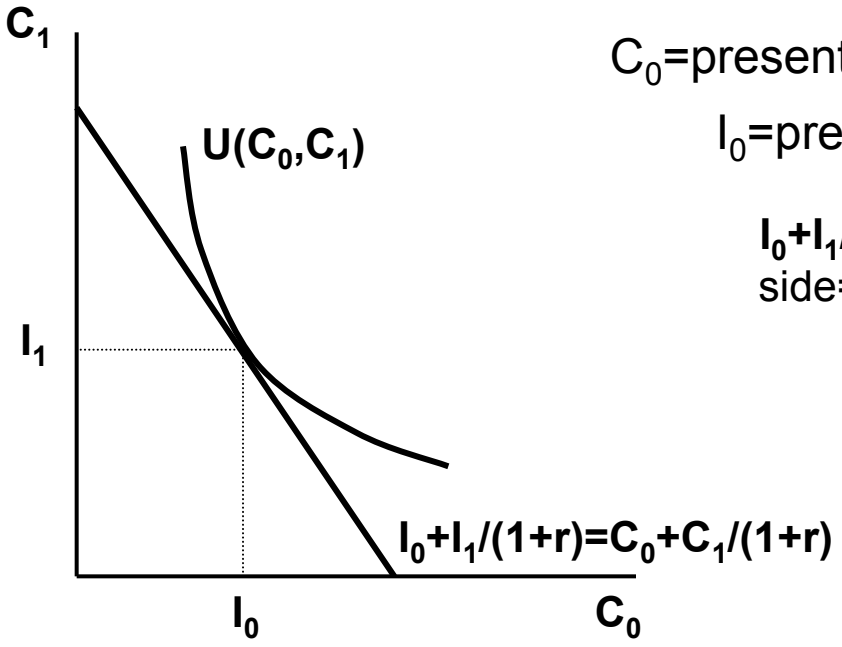
Demand for investments - conclusions

- demand for investments more elastic than the demand for capital
- upon high interest rates – possibility of firm s negative investments
- on the aggregate level in a closed economy: investments cannot be negative – if a firm sells capital there must be some other firm that buys it

Deriving the supply of capital

- capital supply = willingness to lend disposable incomes upon different real interest rates → capital supply = supply of savings
- households pick out of consumption „today“ and consumption „tomorrow“
- households would postpone present consumption to the future only upon some bonus – real interest rate
- households also may consume today more than the present disposable income allows – then they become borrowers
- what type of position (lender or borrower) is preferred depends on the households preferences – what type of position maximizes the total utility

Deriving the supply of capital



C_0=present consumption, C_1=future consumption

I_0=present income, I_1=future income

$I_0+I_1/(1+r)=C_0+C_1/(1+r)$ – budget line function: left side=present value of resources (present+future), right side=present value of consumption (present+future)

budget line slope: –(1+r)

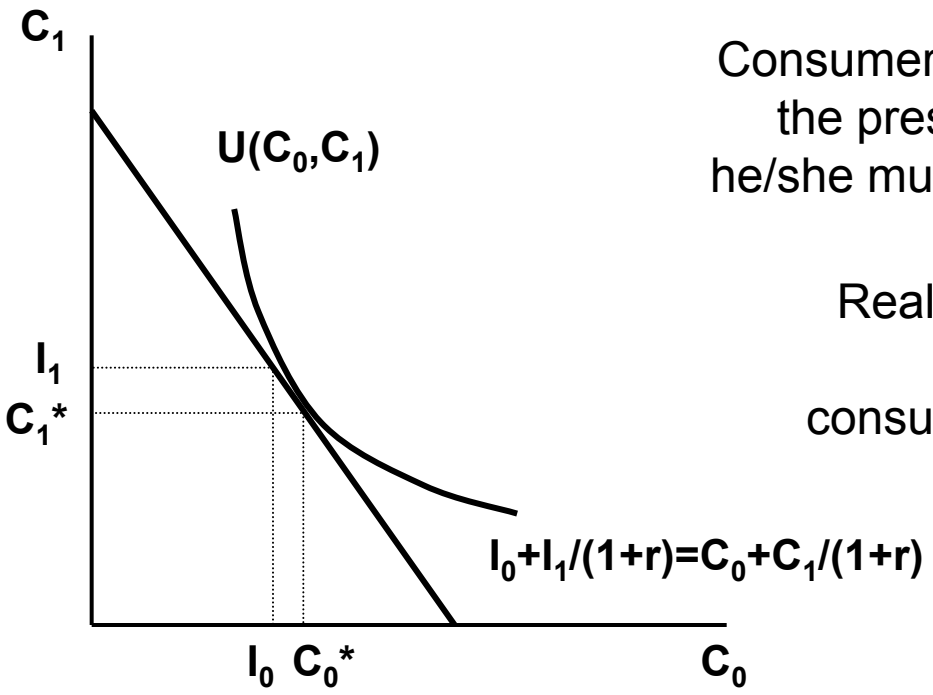
if positive real interest rate,
then max. value of C_0< max. value of C_1

slope of IC (marginal rate of time preferences) = ratio of marginal utilities of C_0 and C_1: –(1+τ)

consumer s equilibrium – spot of tangent of IC and BL, so if:: -(1+r) = -(1+τ), or if: r =τ

in the above case the consumer does not shift present consumption to the future or vice versa

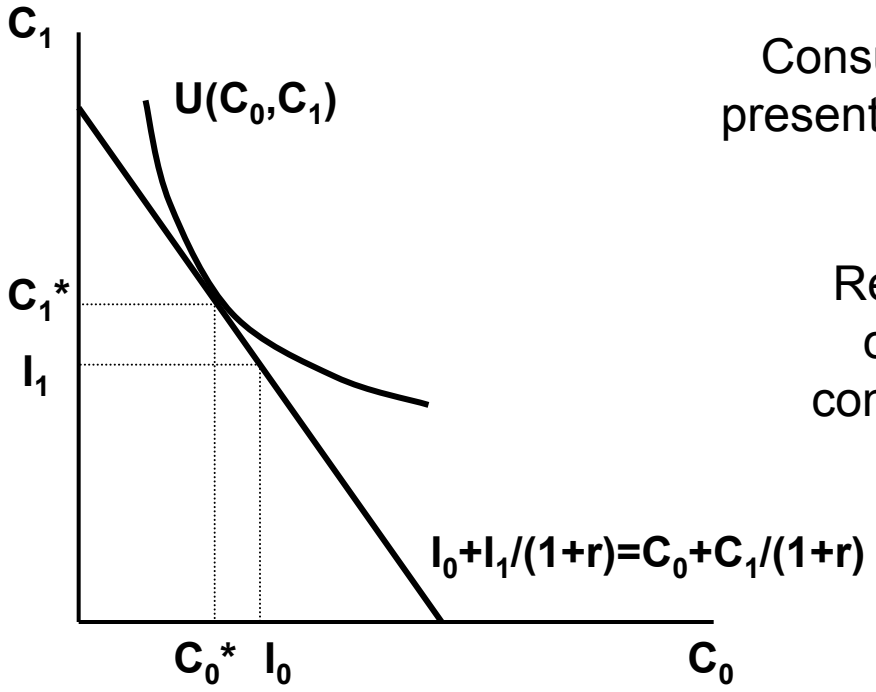
The borrower



Consumer desires consume today more than the present disposable income allows – he/she must borrow. The loan equals to I_0-C_0*

Real interest rate is positive → increase of consumption today < decrease of consumption tomorrow (consumer has to pay the interest)

The lender

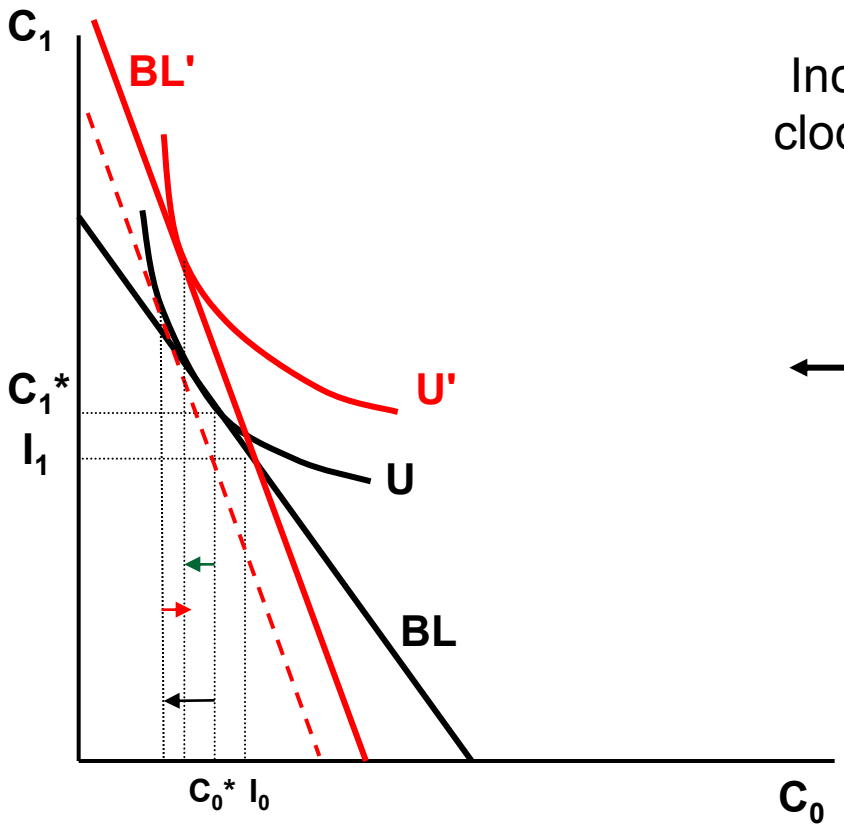


Consumer desires to save a part of his/her present disposable income – savings equal to: $I_0 - C_0^*$

Real interest rate is positiv – increase of consumption tomorrow > decrease of consumption today (consumer is paid with the interest)

To derive the savings supply curve we have to analyze the impact of the change of real interest rate

Increase of the real interest rate – the lender



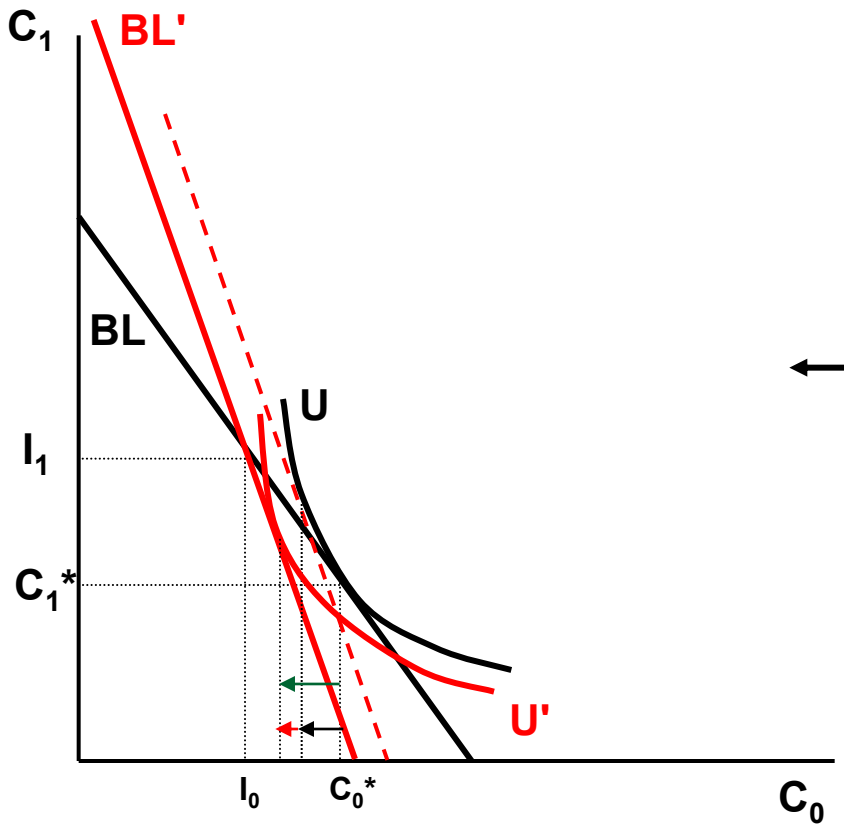
Increase of the real interest rate induces the clock-wise rotation of BL, around the spot I_0, I_1

← SE – consumption today is substituted with consumption tomorrow–becomes relatively cheaper

→ IE – induces an increase of consumption of desireable goods (consumption in whatever period is desireable)

← TE = SE+IE – depends on which of the partial effects prevails (here SE prevails → total effect leads to the increase of savings)

Increase of the real interest rate – the borrower

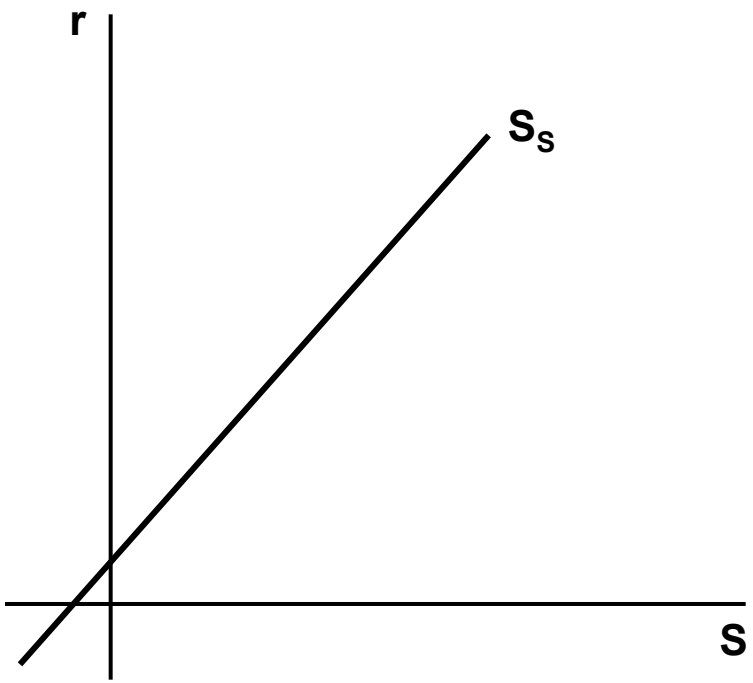


SE – consumption today is substituted with consumption tomorrow–becomes relatively cheaper

IE – induces a decrease of consumption of desireable goods (consumption in whatever period is desireable)

TE = SE+IE – induces a decrease of consumption in both periods – induces the increase of savings (decreases the borrower s indebtedness)

Individual supply of savings



If the increase of real interest rate motivates to higher saving, then the individual supply curve of savings is positive sloped

Upon low real interest rates, the individual saving might be negative

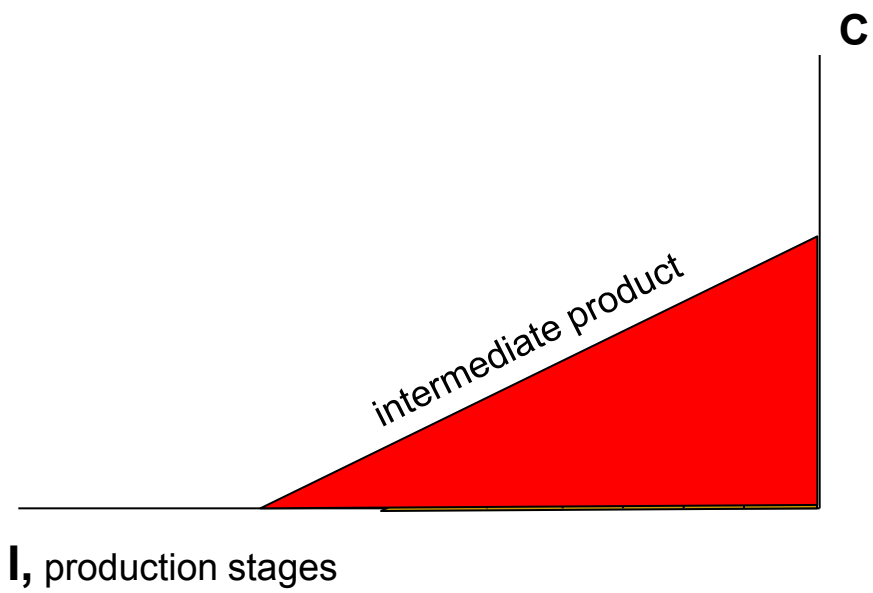
But: on the aggregate level the savings cannot be negative (lender s income effect is neutralized with borrowe s income effect) – each lender meets a borrower

On aggregate level only substitution effect matters!!

Hayekian triangle

- a part of the Austrian theory of capital
- capital is heterogenous
- explains how additional production stages increase the economy s product in the long run
- we use the capital market + PPF

Hayekian triangle



each production stage produces the specific volume of intermediate product – last production stage=consumption

the longer horizontal leg (the more production stages) the higher level of final consumption

Hayekian triangle

Consumers wish to increase their savings – supply of savings increases, real interest rate decreases, volume of investments demanded increases

In the short run the economy shifts alongside the PPF towards „more investments“ and „less consumption“ – inputs shift from the late production stages to implement the new ones

The horizontal leg of the triangle extends, the vertical shortens – after the new production stages are finished, the level of final consumption increases, PPF shifts rightwards – the economy grows