Intertemporal consumption

EE 311

Chayun Tantivasadakarn

Faculty of Economics, Thammasat University

Topics to be Discussed

- Consumption decision between times, a simple model with money market
  - Comparative static analysis
  - Determination of interest rates

Introduction

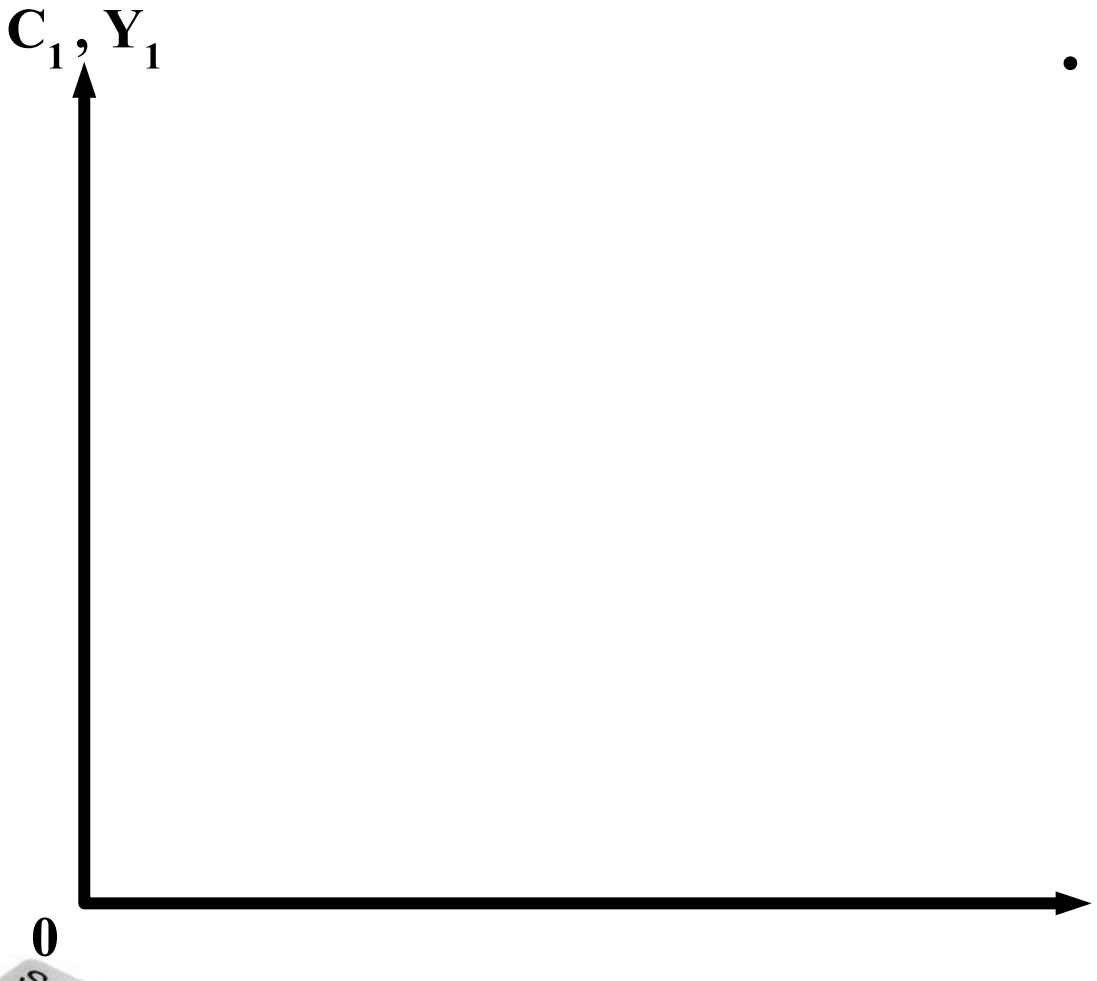
- Consumers need to choose consumption over different periods of time.
- Consumers may choose to save some of the present consumption for the future.

- Or borrow some from the future in order to consume more today.

Simple model: Assumptions

- C_0 and C_1 are consumption where 0 denotes this period, 1 denotes next period.
- They are both normal goods
- Y_0 and Y_1 are endowments.
- The economy has a money market for lending and borrowing at an interest rate = r per period. Assuming no risk.
- No debt or bequest will be left after period 1.
- A consumer chooses the consumption bundle that maximizes utilit given the endowment and interest rate.

Budget line for 2 periods



- From ϖ, Y_0 has a future value or worth [1+r] Y_0 in the next period if he lends all Y_0.
  - The maximum amount he can borrow (B) must not generate debt more than Y_1 or [1+r] B = Y_1. Hence, B = Y_1 /[1+r] which is the present value of Y_1.

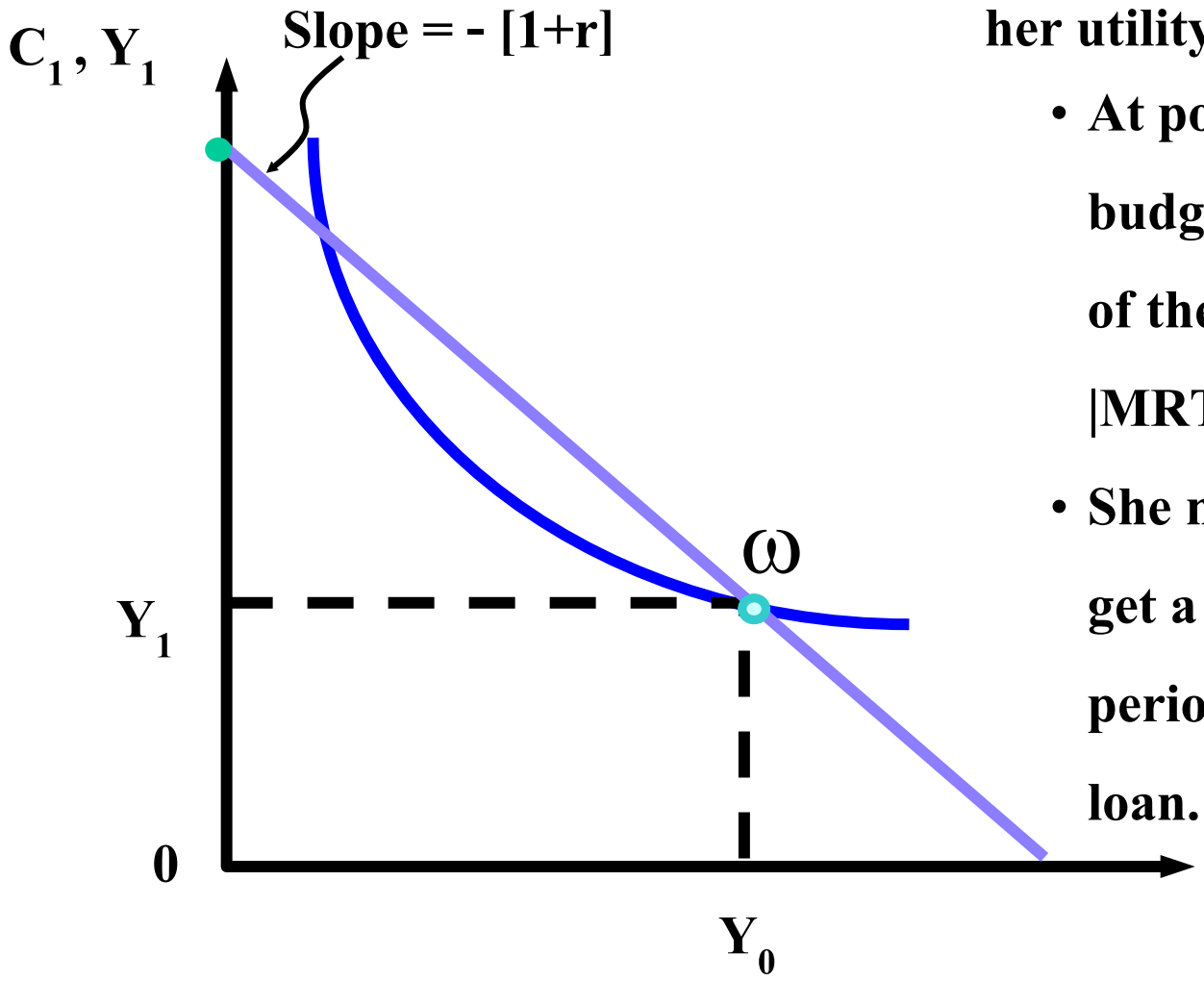
Budget line for 2 periods

- Since the total consumption must be equal to the total endowment; hence,

- The present value of the endowment must equal to the present value of the consumption

Saving and Lending Equilibrium

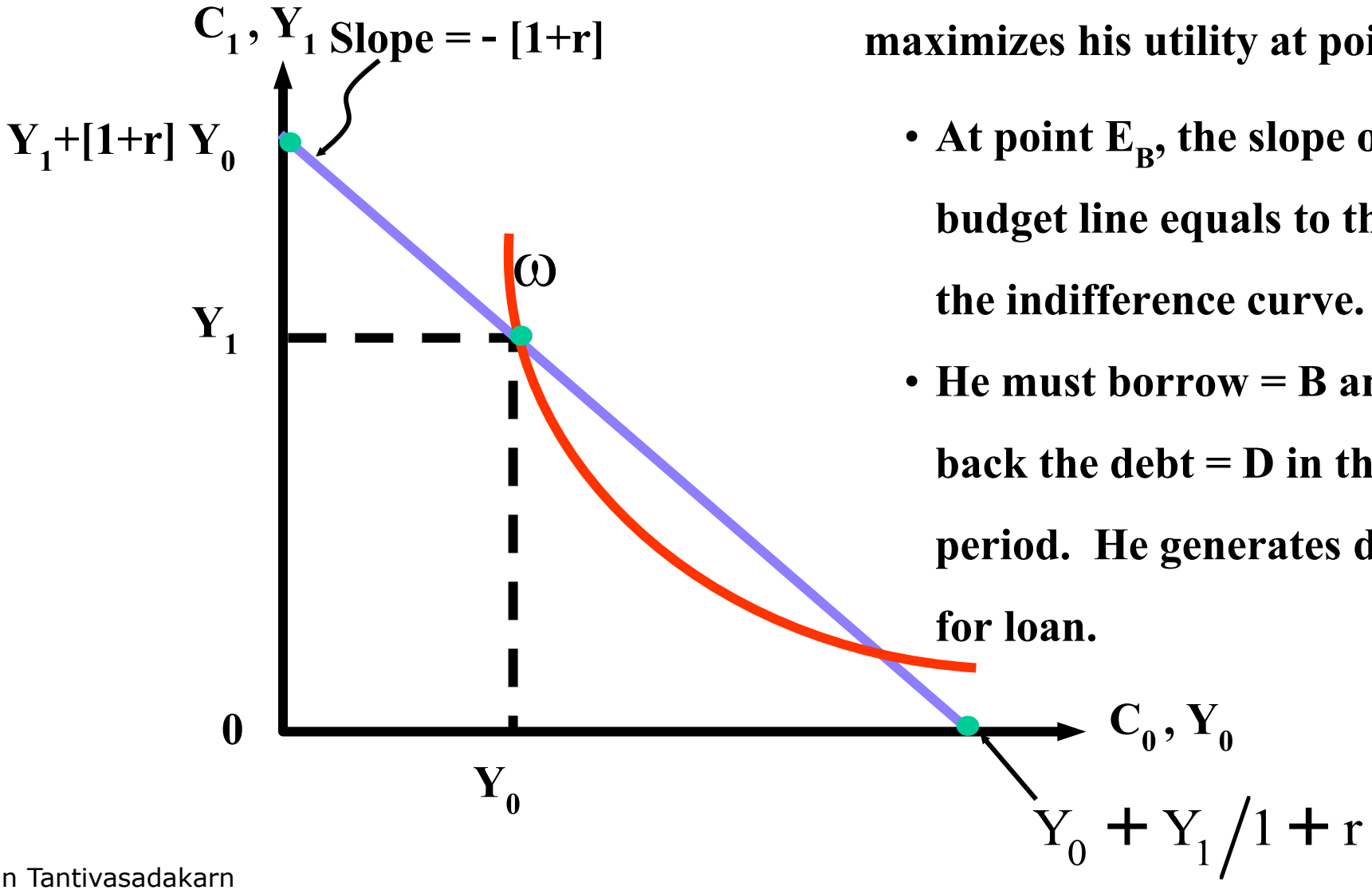
Relatively flat ICs compared to 1+r



- **From ω, this consumer maximizes her utility at point E_L.**
  - **At point E_L, the slope of the budget line equals to the slope of the indifference curve or |MRTP| = 1+ r.**
  - **She must save and lend = L to get a return = R in the next period. She generates supply of loan.**

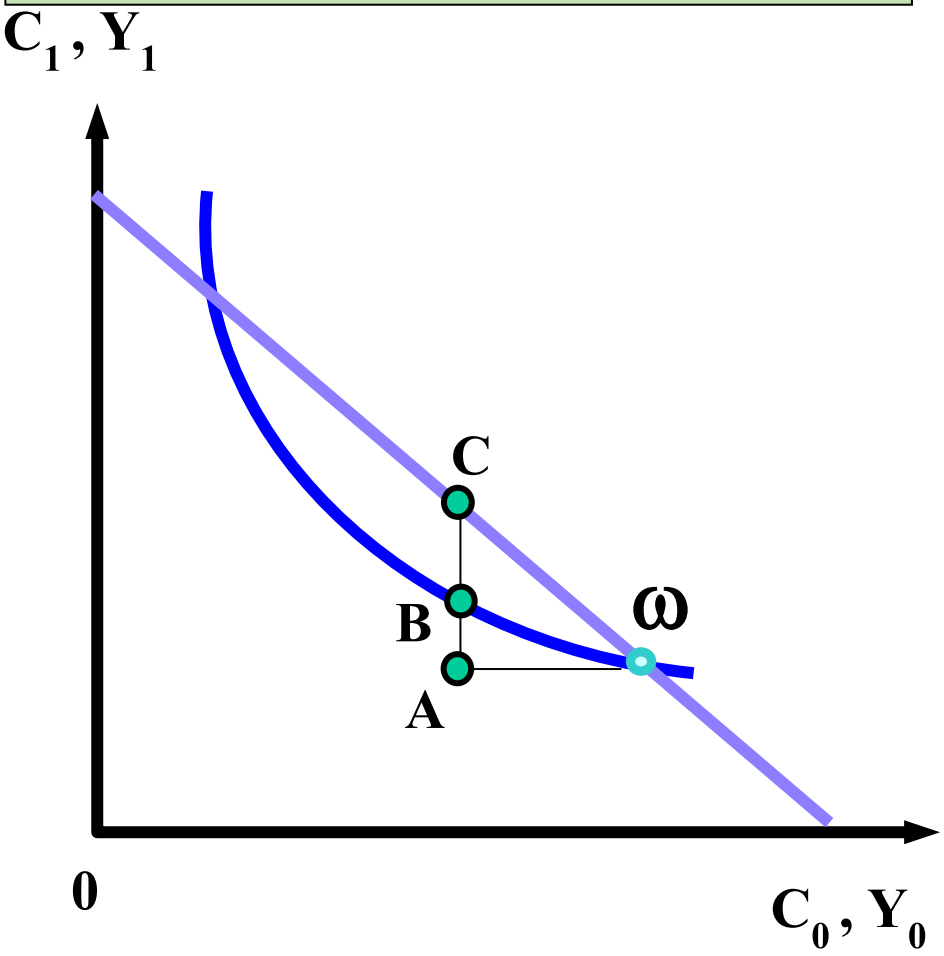
Borrowing Equilibrium

Relatively steep ICs compared to 1+r

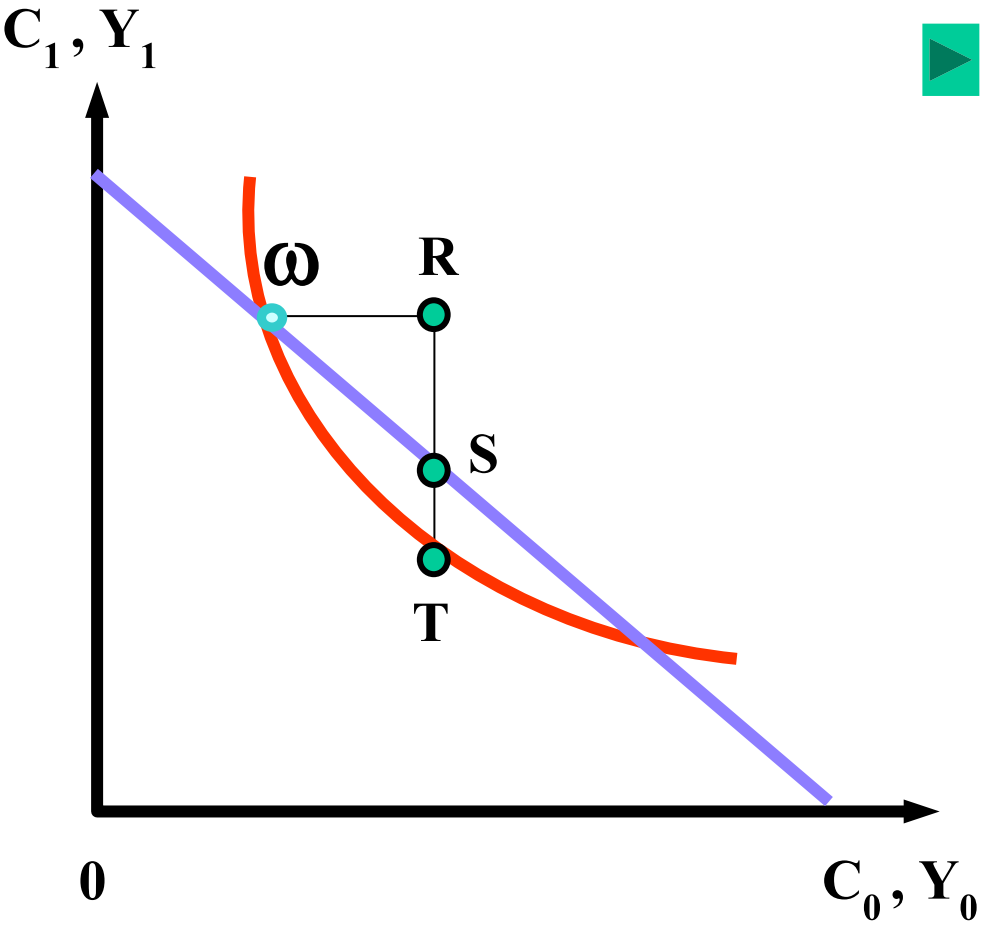


- **From ω, another consumer maximizes his utility at point E_B.**
  - **At point E_B, the slope of the budget line equals to the slope of the indifference curve.**
  - **He must borrow = B and pay back the debt = D in the next period. He generates demand for loan.**

- Willing to give up 1 unit of C_0 in exchange for AB
- but money market offers AC
- should lend money



- Willing to pay up to RT to get 1 more unit of C_0
- but money market asks only RS
- should borrow money



Equilibrium condition

- The consumer maximize utility when

$$|MRTP| = 1 + r$$

- Marginal Rate of Time Preferences: |MRTP| the rate at which consumer is willing to give up C_1 to get 1 additional unit of C_0.
- If $|MRTP| < 1 + r$, the consumer is preparing to accept C_1 less than what the money market offer --> decreases C_0 by lending.
- If $|MRTP| > 1 + r$, the consumer is willing to give up C_1 more than what the money market requires --> increases C_0 by borrowing.

Exercise

- If the loan interest rate is higher than the lending rate, how does the budget line look like?
- The oversea Chinese in the past who came to Thailand with nothing, gradually accumulated their wealth until some became very rich. Yet some of their descendants have turned their inheritance to debts. Use the theory of Intertemporal consumption to explain what might be the difference between the two groups of people?

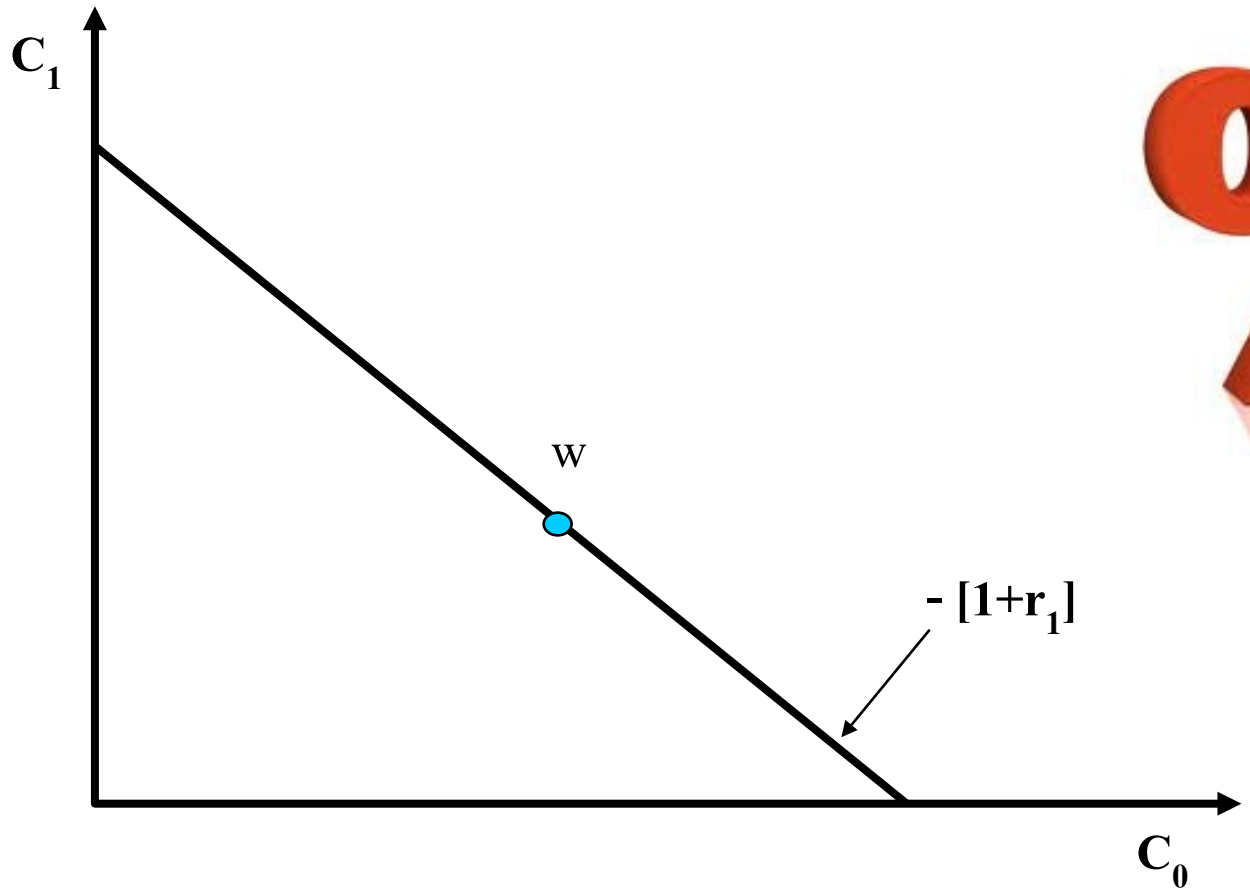
Comparative static analysis

- Changes in endowment
  - increase in Y_0
  - increase in Y_1
  - increase in both Y_0 and Y_1
  - increase in Y_1 but decrease in Y_0

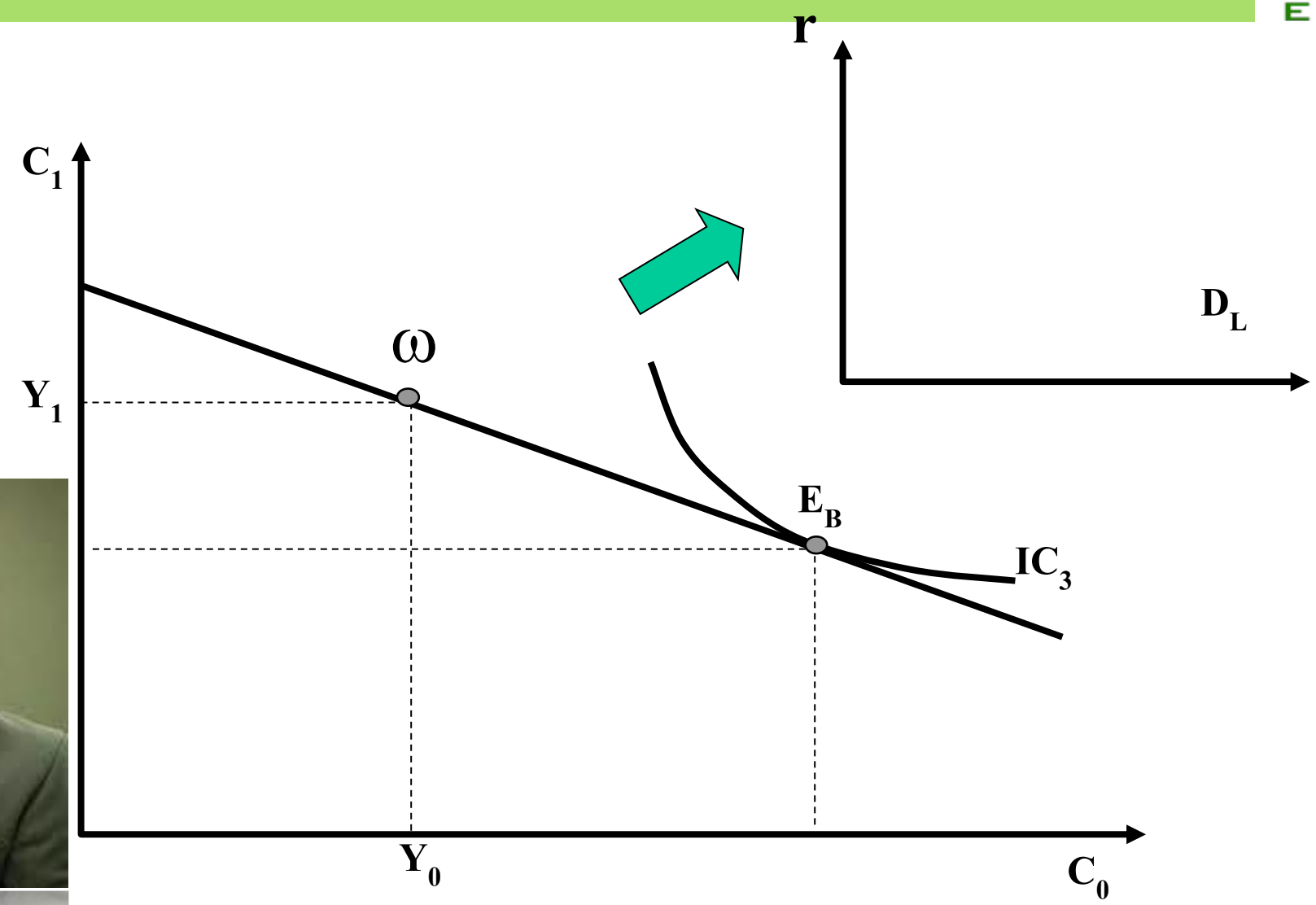
Question: A consumer initially borrows money. Show a new equilibrium with lending when Y_0 is increased.

Comparative static analysis

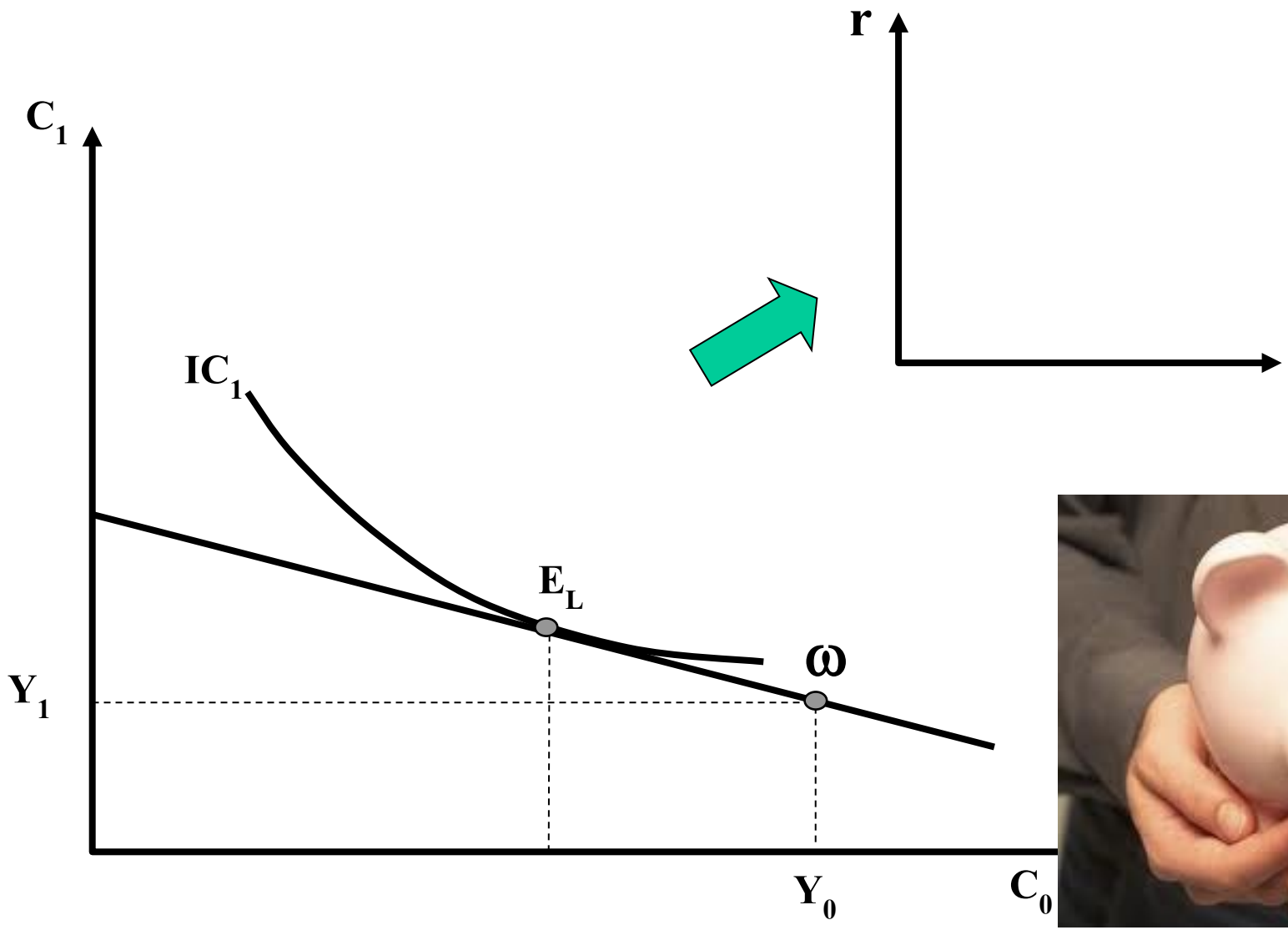
- Changes in the interest rate: r_1 increases



Borrowing case



Lending case



Why does the supply of loan bend backward?

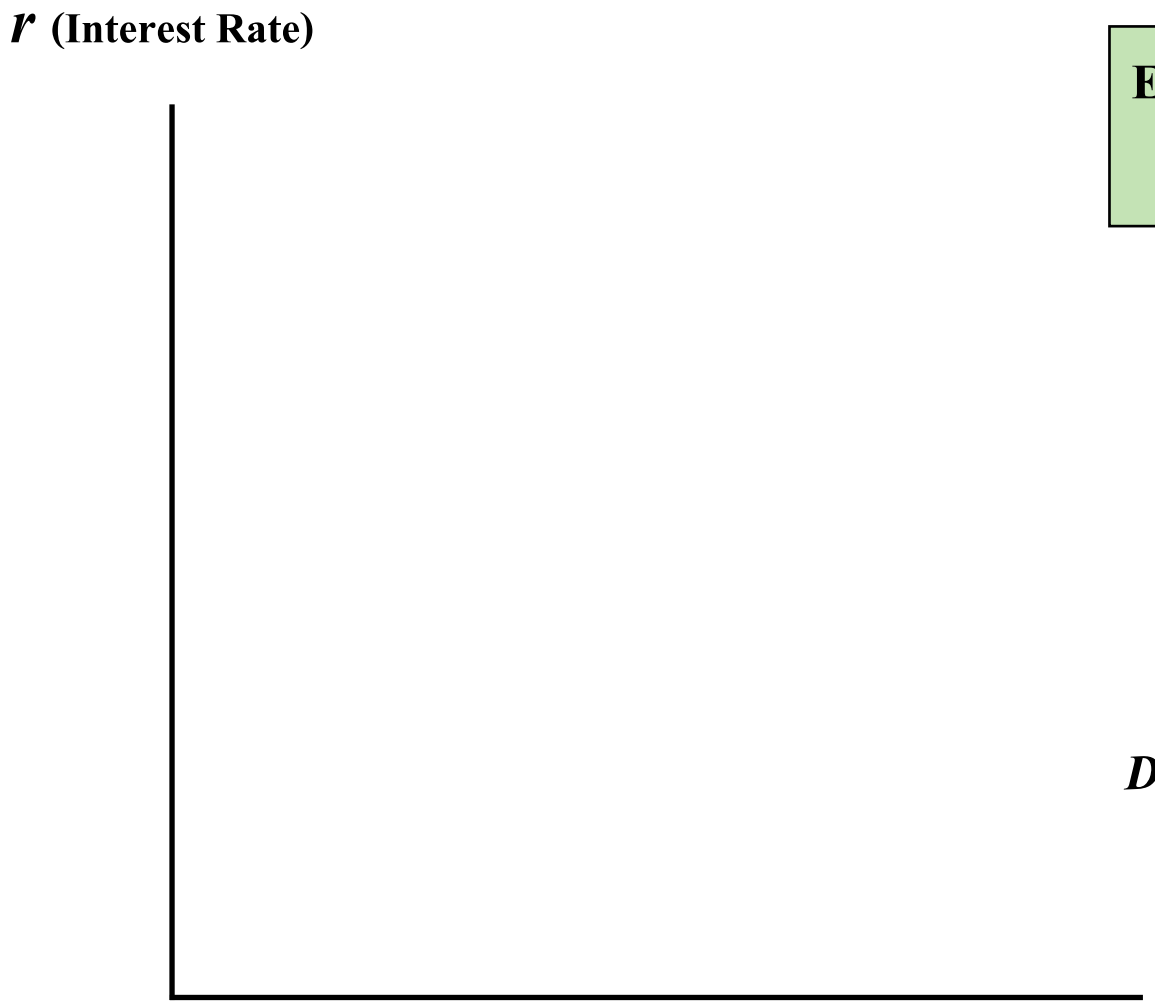
When r increases,

- the opportunity cost of C_0 increases, substitute C_0 with C_1; C_0 decreases causing L to increase --> Substitution effect
- income increases, C_0 increases (since it is normal) causing L to decrease --> Income effect
- When Income effect is stronger, S_L bend backward

How are Interest Rates Determined?

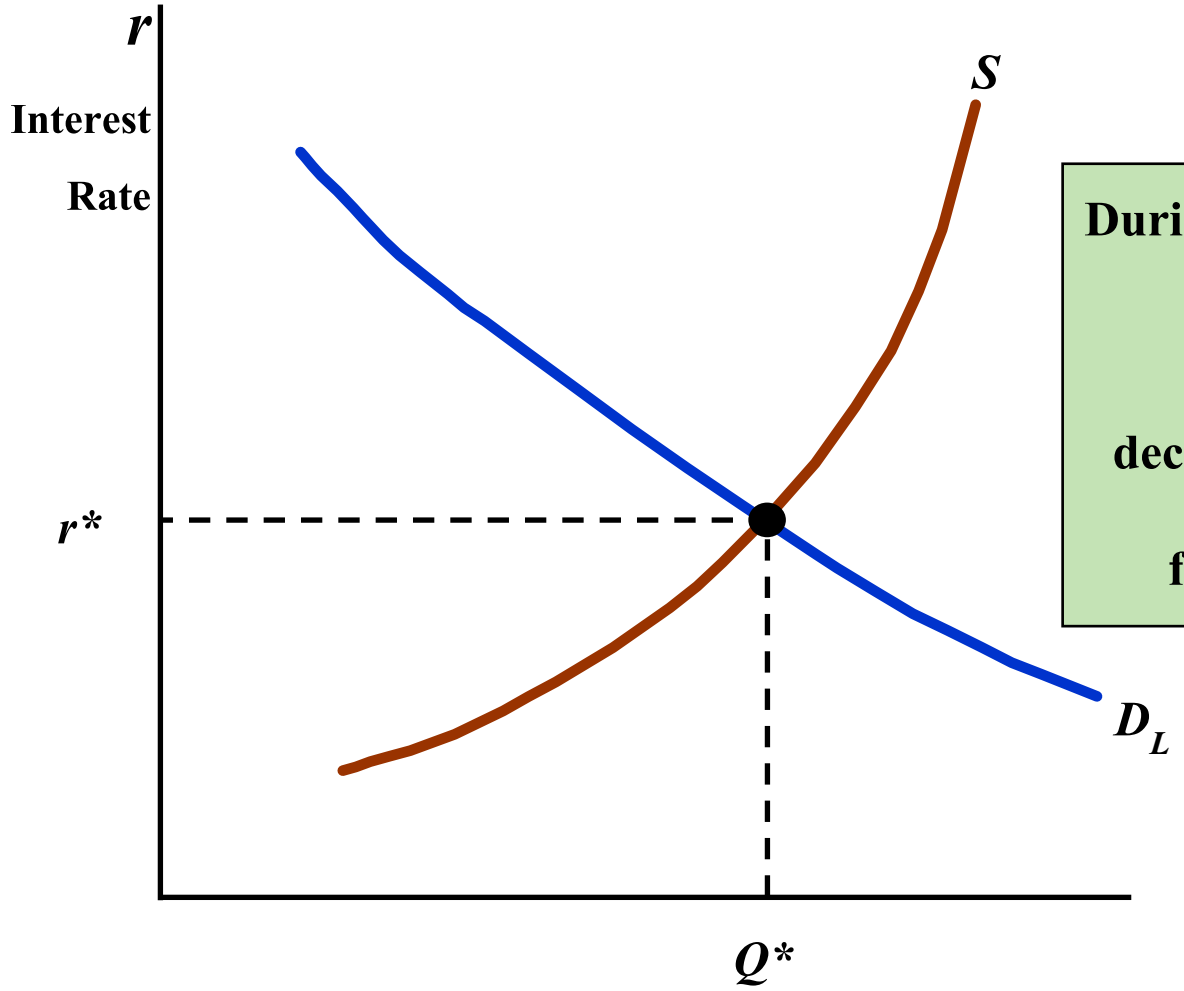
- For households, the higher the interest rate, the greater the cost of consuming
  - Less willing to borrow
  - Demand is declining function of interest rate
- Firms invest in project when NPV > 0
  - Higher interest rate means lower NPV
  - Demand is downward sloping
- Total demand for loanable funds is sum of household demand and firm demand

Supply and Demand for Loanable Funds Determines Interest Rates



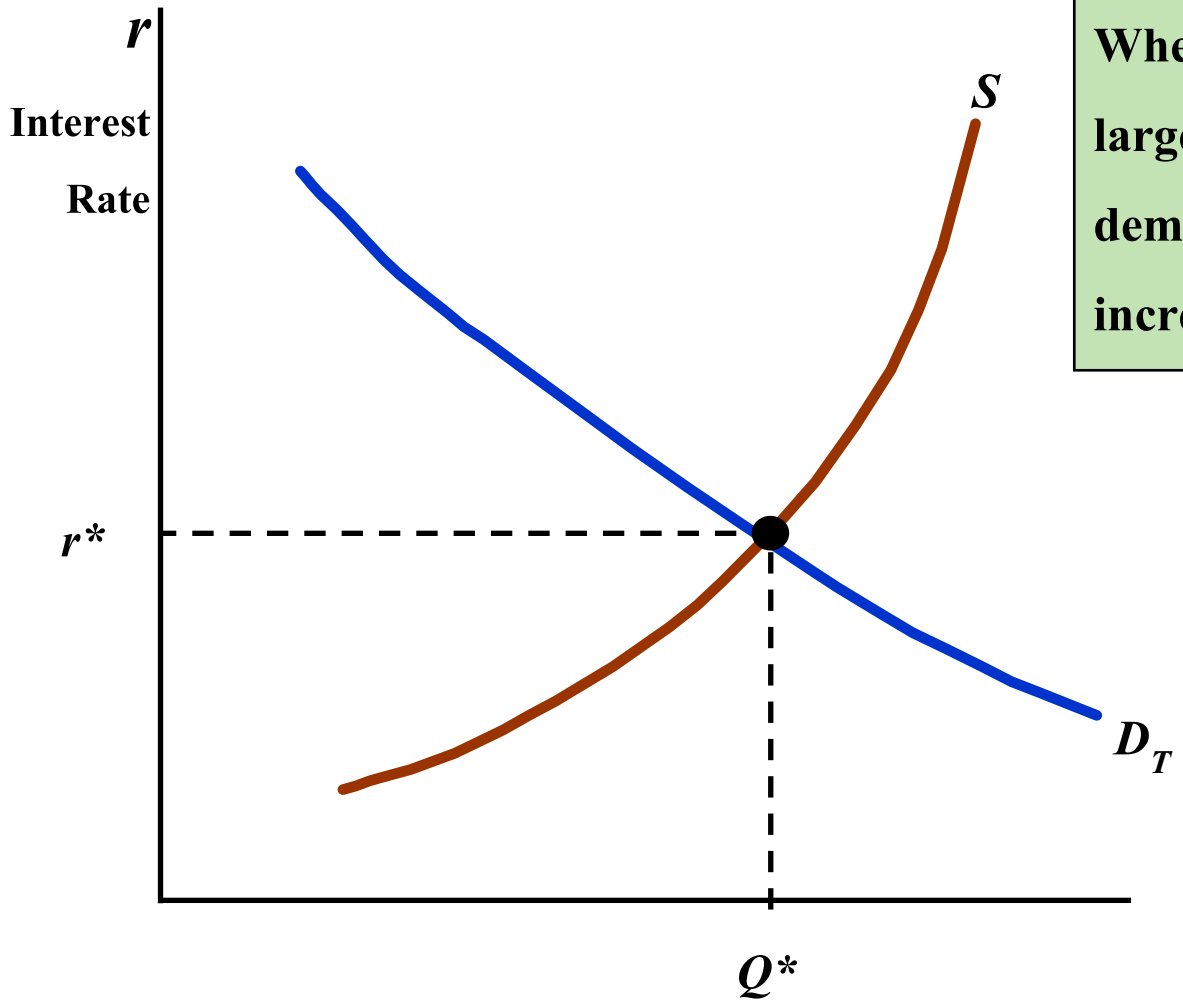
Equilibrium interest rate is r*.

Changes In The Equilibrium



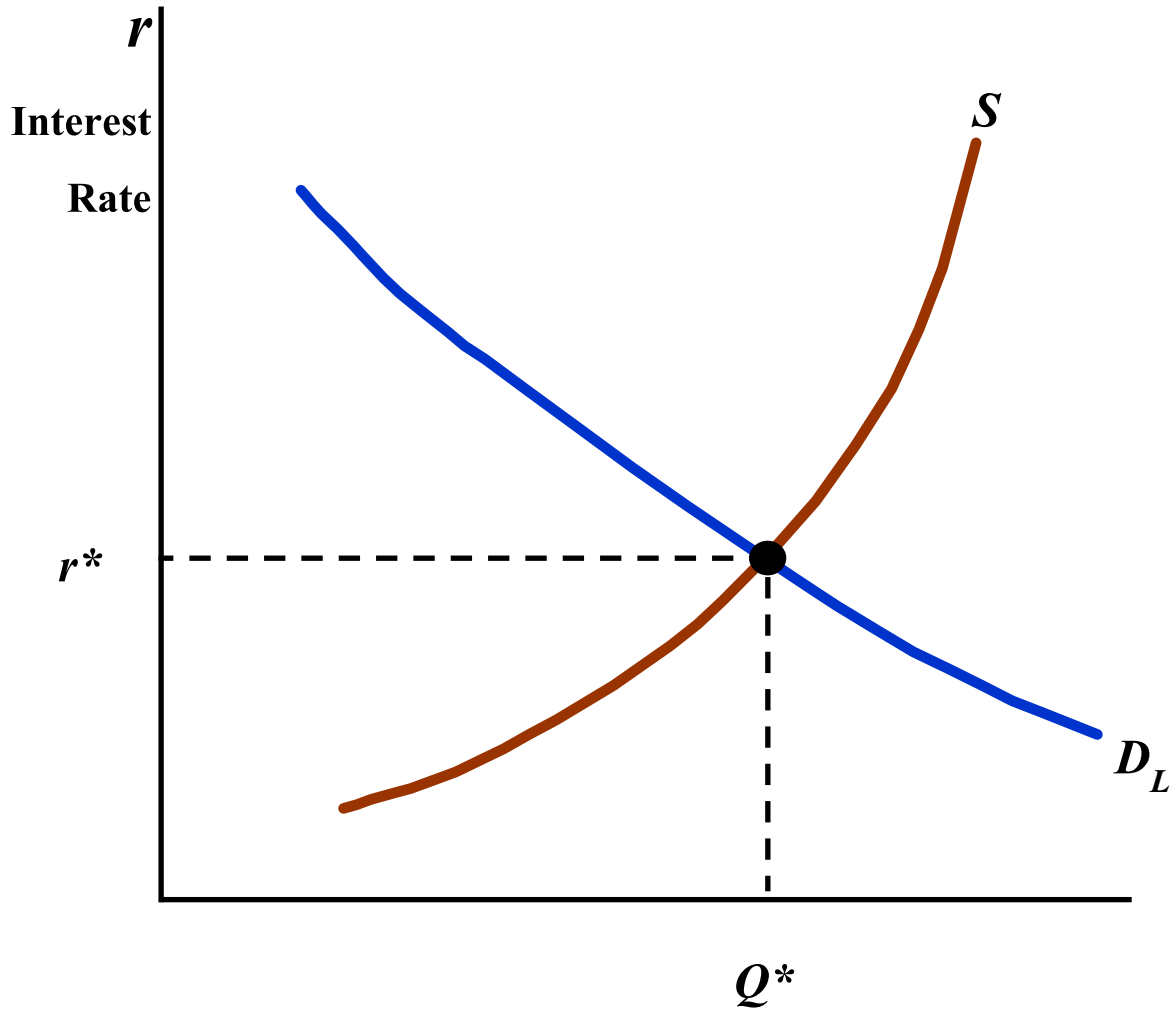
During a recession interest rates fall due to a decrease in the demand for loanable funds.

Changes In The Equilibrium



When the government runs large budget deficits the demand for loanable funds increase.

Changes In The Equilibrium



When the Central Bank increases the money supply, the supply of loanable funds increases.

Quantity of Loanable Funds