

Macroeconomic Theory and Policy

Lecture 22

Financial Market: Role of Financial Market in an Economy

Major Players in a Financial Market

C
E
N
T
R
A
L

B
A
N
K

CATS

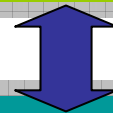
Savers
Households, Corporations and
Government

<http://www.fsa.co.uk>



<http://www.dmo.gov.uk/>

Intermediaries
Banks, Insurance Companies, Building Societies,
Trusts, Stock and Bond Markets



Investors
Small, Medium and Large
Private, Public, Domestic and Foreign

CATS

<http://www.londonstockexchange.com/default.asp>

G
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Role of Financial Sector in the Economy

- Financial sector affect C, I, G and E and M
- C depends on expected value of human and non-human wealth of consumer, lower discount factor raises wealth and C
- I depends on expected profits, which are again given by the discounted stream of expected earnings
- G depends on tax and borrowing, interest rate affects each of them
- Interest rate affect X and M through its effect on the exchange rate

Consumption depends on expected wealth, income and taxes

$$C_t = C\left(W^e, Y_{Lt}^e - T_t^e\right)$$

Human wealth in after tax income over life time

Non-human wealth consists of housing and financial and other assets

$$I = I\left[V\left(\Pi_t^e\right)\right] = I\left[\frac{1}{r + \delta} \Pi\right]$$

Investment depends on expected profit $I_t = I(V(\Pi_t^e))$

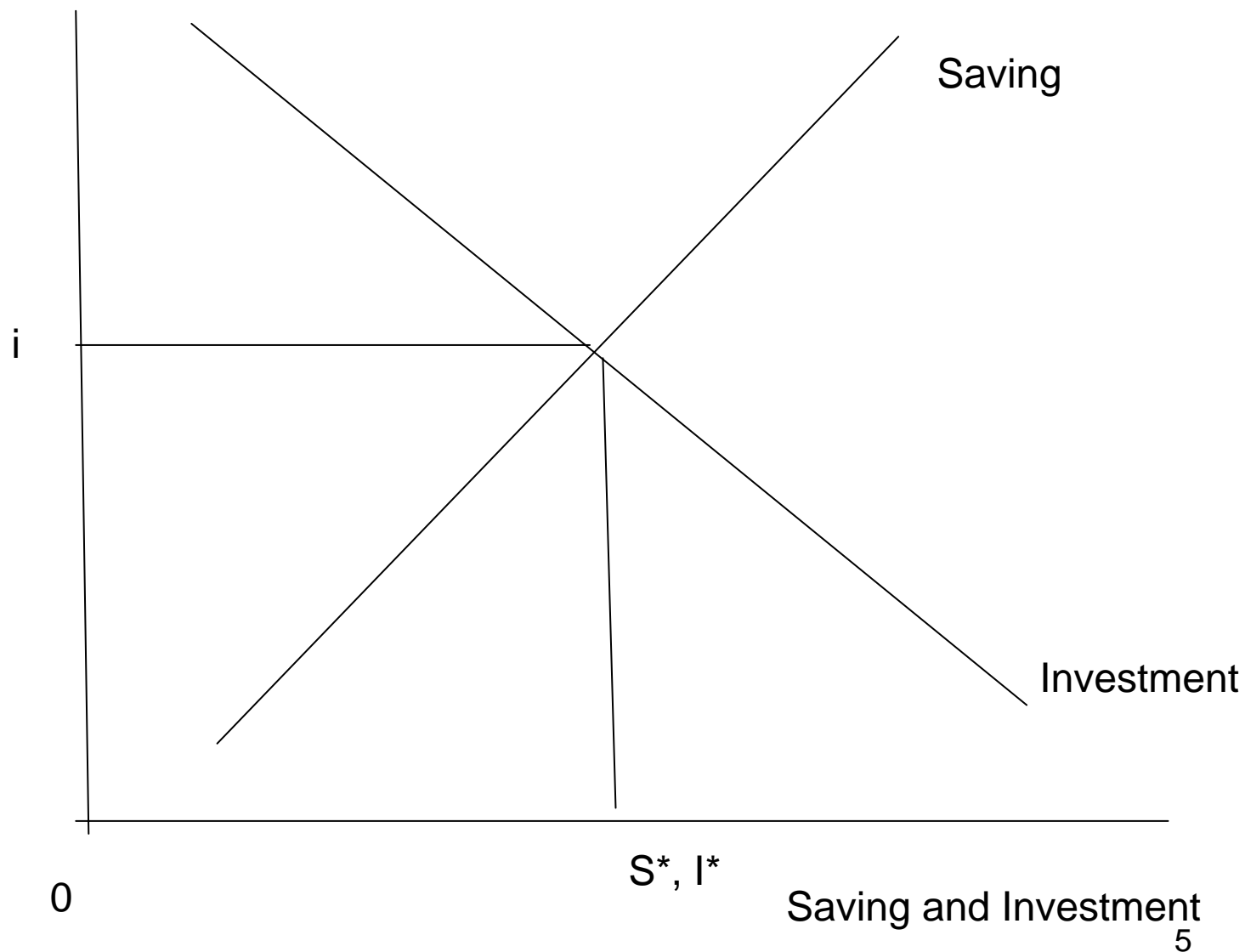
In a simple case assume that $\Pi_{t+1}^e = \Pi_{t+2}^e = \dots = \Pi$ and $r_{t+1}^e = r_{t+2}^e = \dots = r$

The current value of investment project: $V(\Pi_t^e) = \frac{1}{r + \delta} \Pi$

Profit depends upon sales relative to the capital stock

$$\Pi_t = \Pi \left(\frac{Y_t}{K_t} \right)$$

Role of Financial Market in Optimal Saving and Investment



Theories of Saving and Investment

Savings

- Keynesian Model of fixed rate of Saving
- Permanent income and life cycle hypothesis
- Intertemporal Optimisation model of consumption and saving
 - Preference for current consumption
- Impact of expectation on savings
- Empirical estimates of saving functions
 - Income/wealth
 - Interest rate
 - Exchange rates

Investment

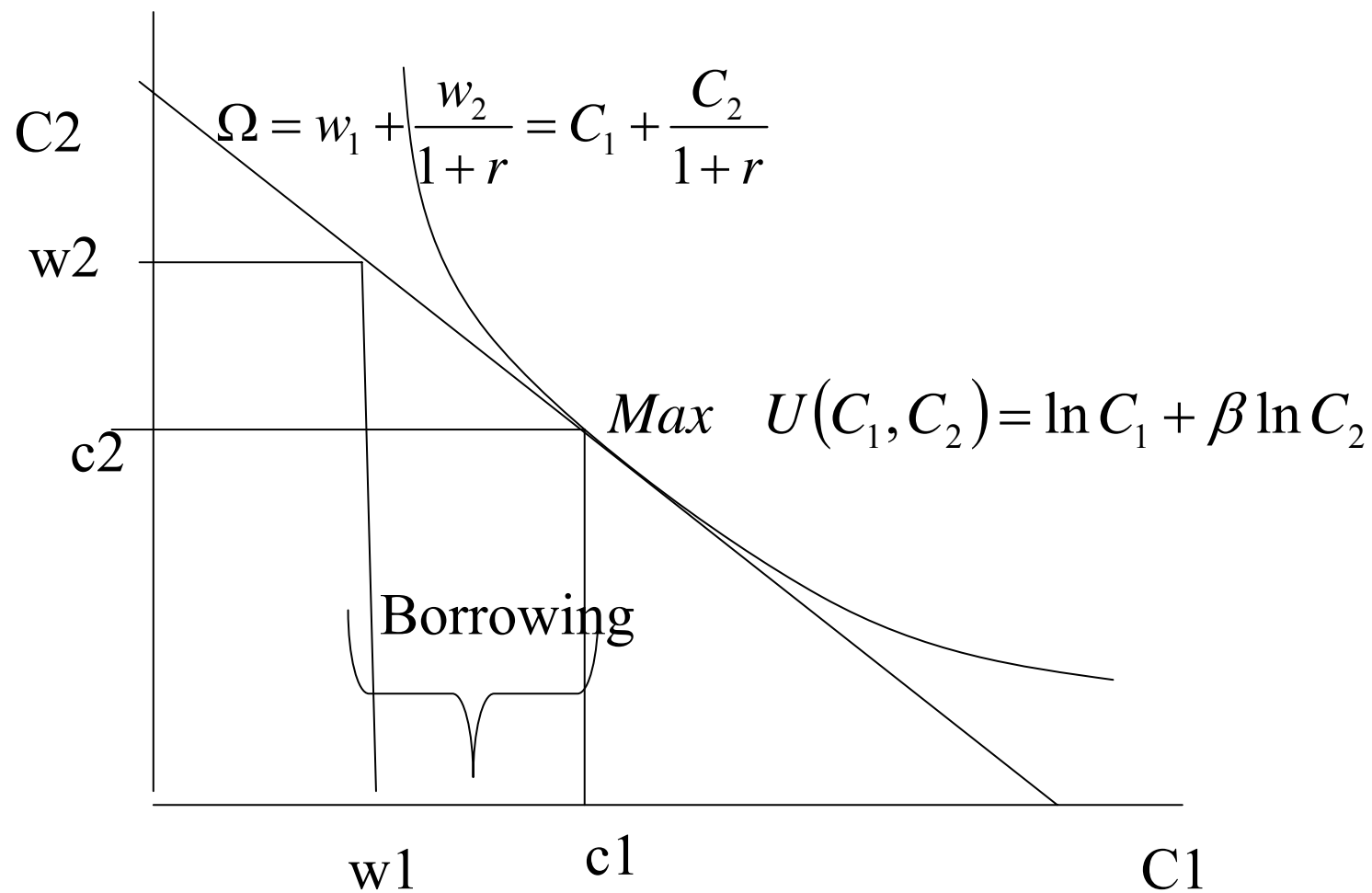
- Profit maximisation and Marginal productivity theory of investment
 - Tobin's q
 - Acceleration principle

Why investment is very volatile?

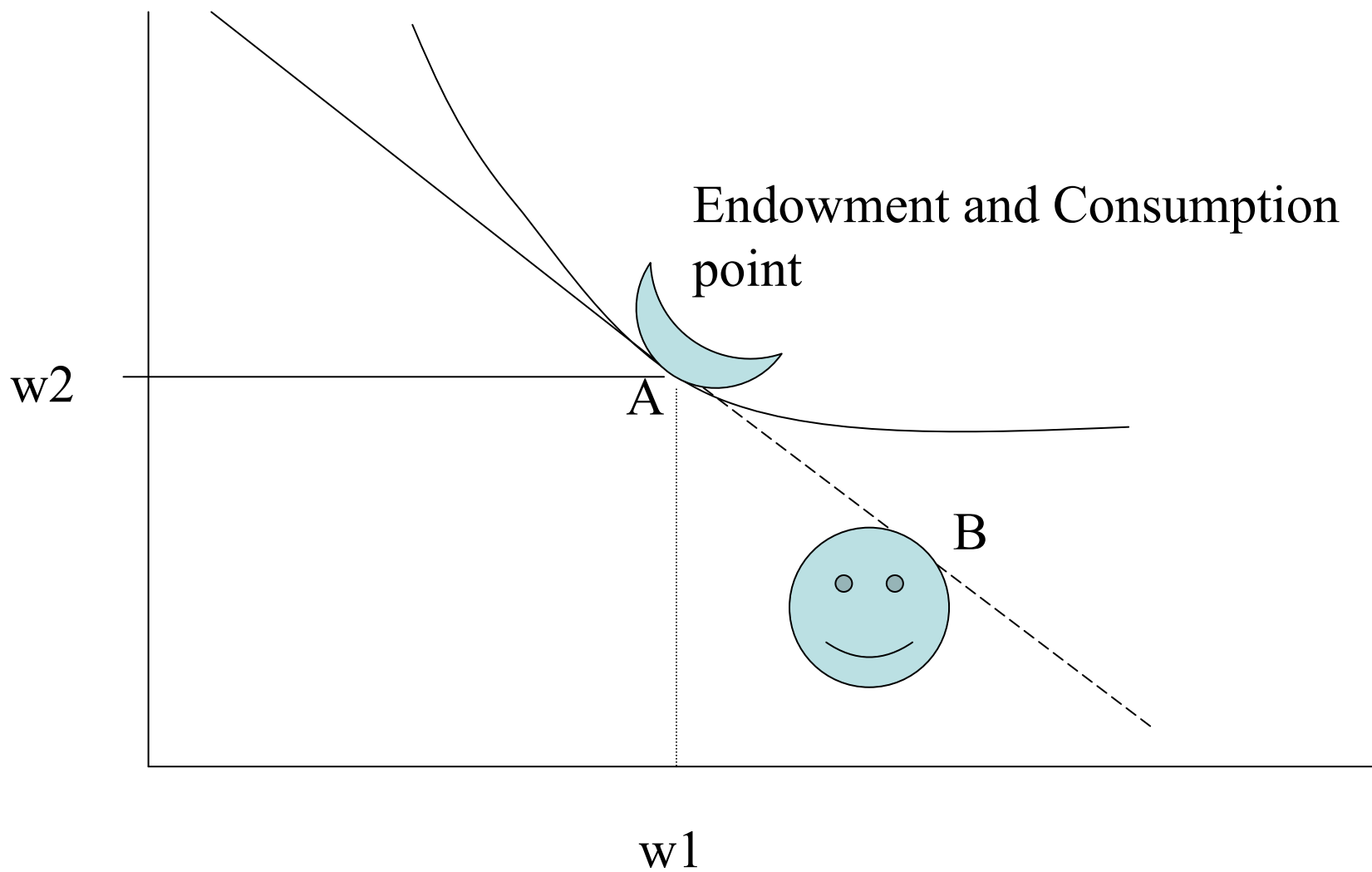
Impact of expectation on investment

- Determinants of investment in empirical studies:
 - Interest rate
 - Tax credits
 - Growth rate of the economy
 - External demand factors

Two Period Model of Consumption and Saving

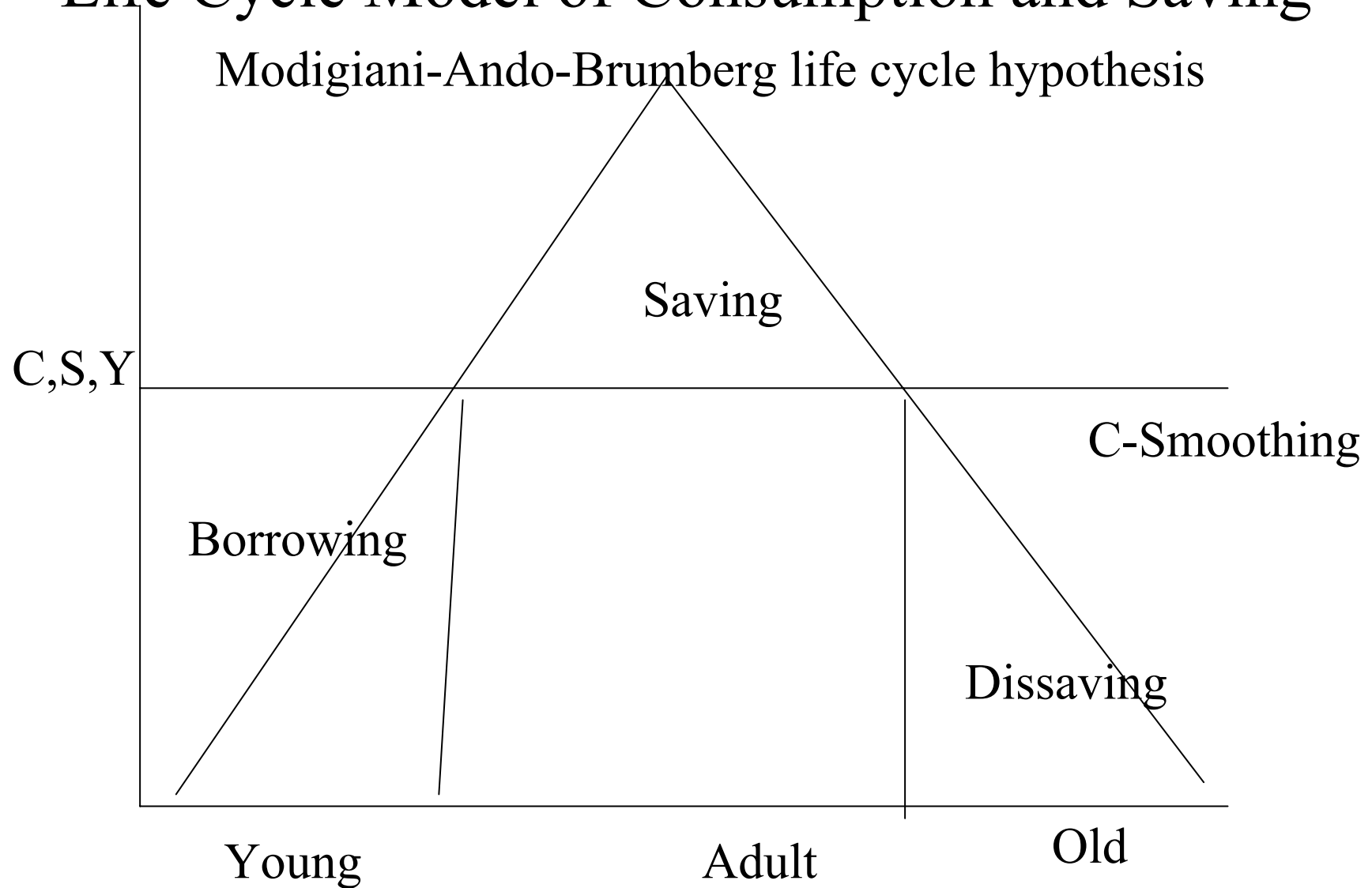


Consumption Choices with the Borrowing Constraints



Life Cycle Model of Consumption and Saving

Modigliani-Ando-Brumberg life cycle hypothesis

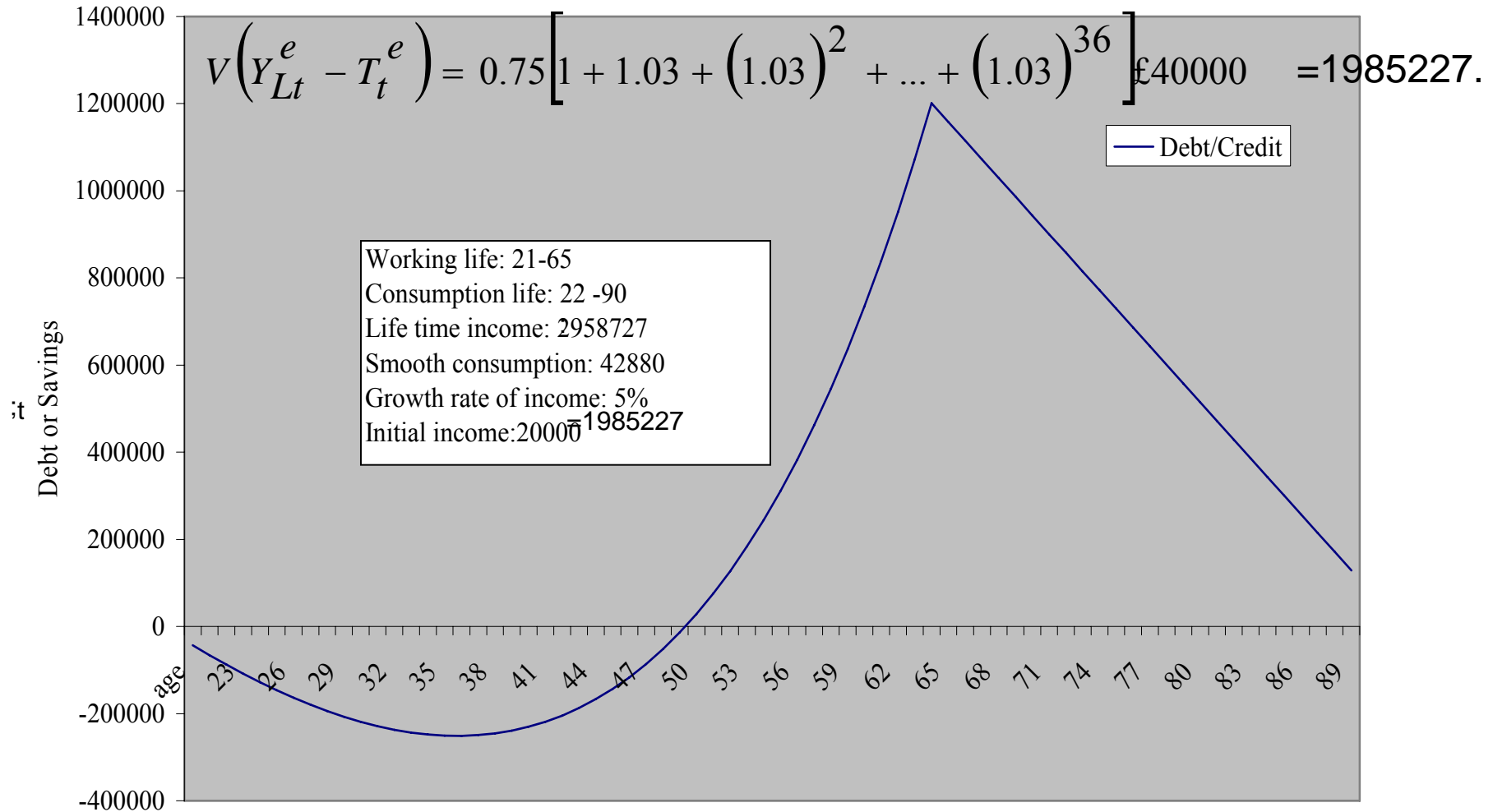


Smooth consumption and erratic income over life

Income, Saving and Outstanding Asset or Debt in Life Cycle Model

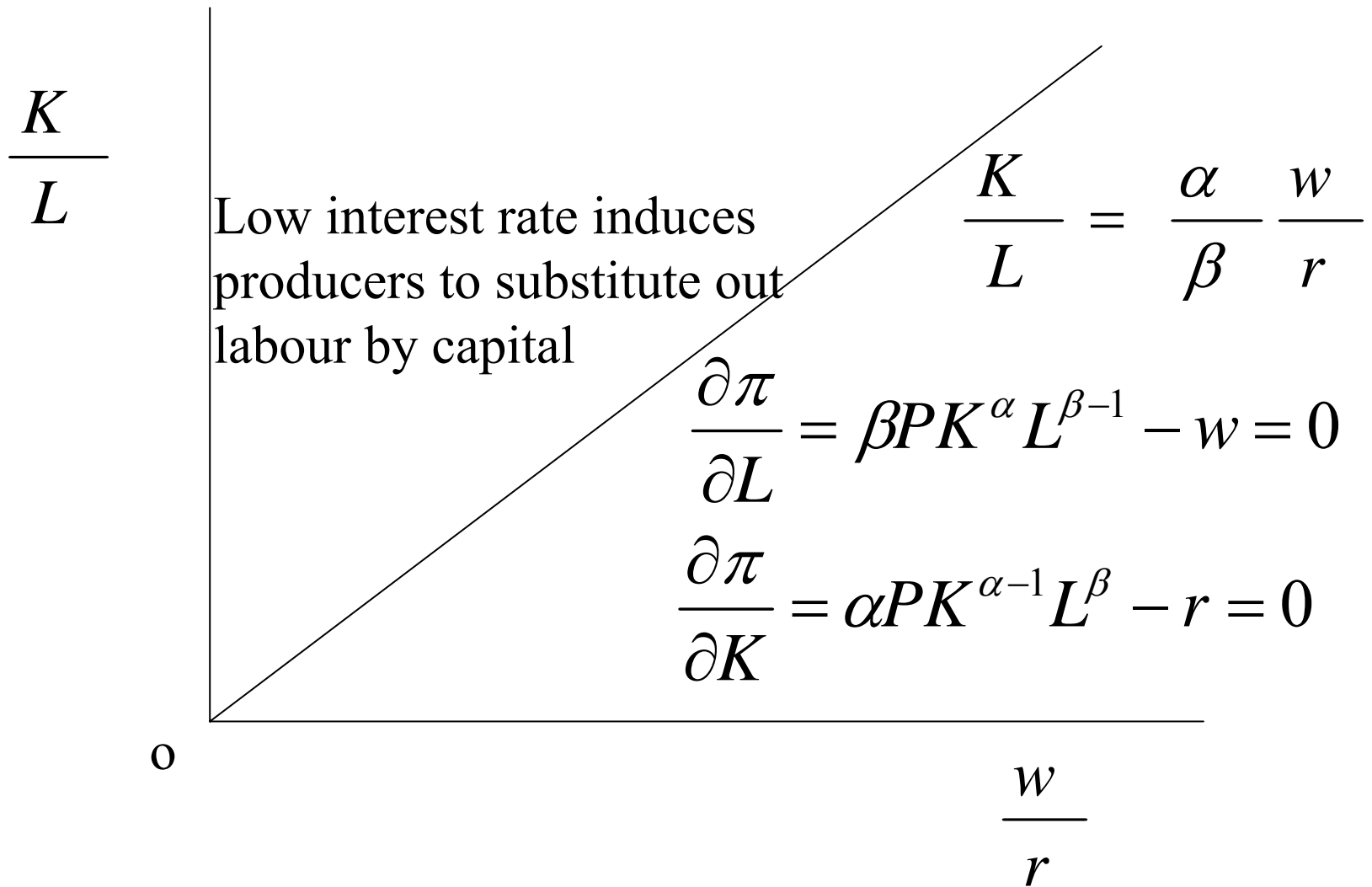
Debt and Savings in Life Cycle Model

$$S = 1 + X + X^2 + \dots + X^n = \frac{1 - X^{n+1}}{1 - X}$$

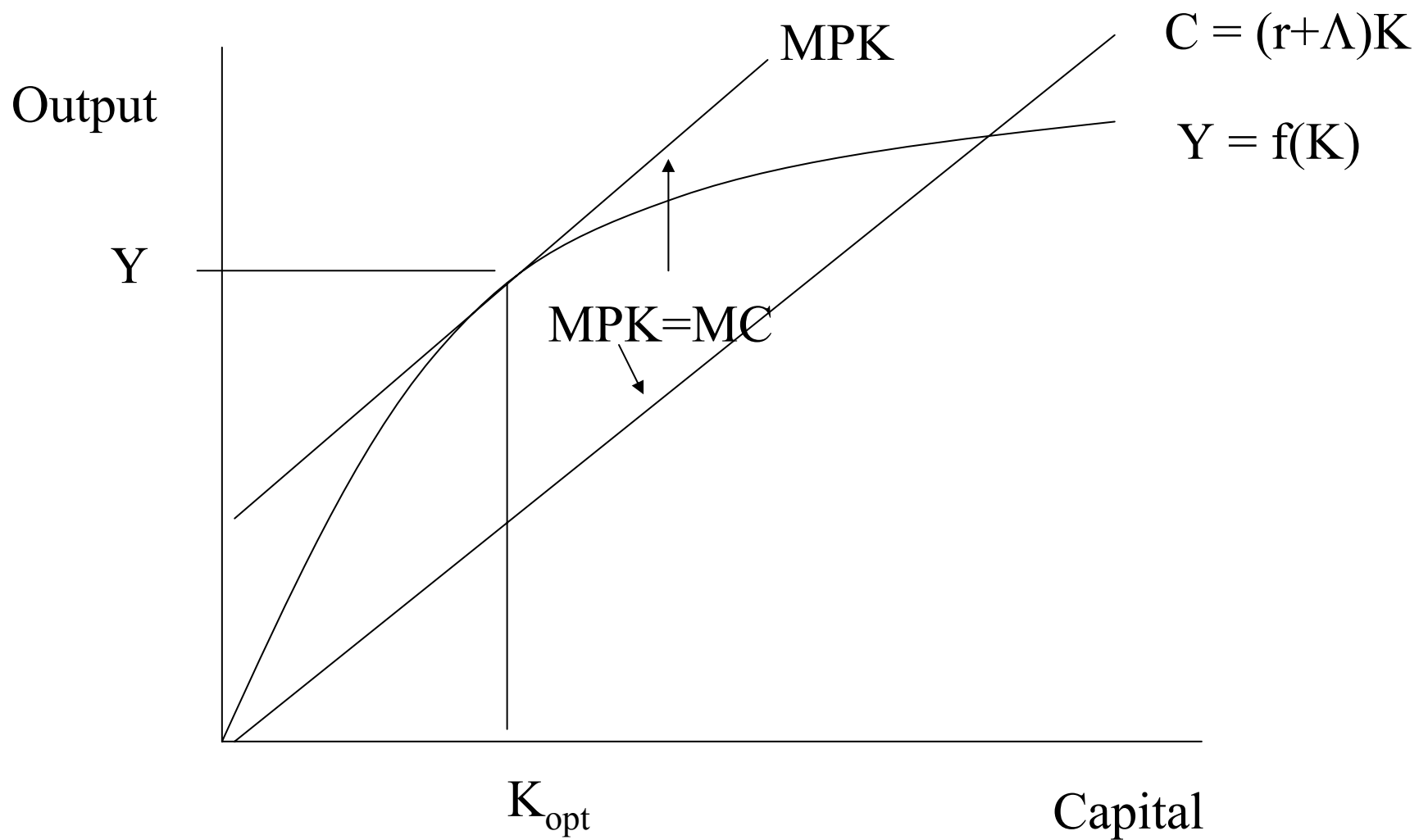


$$V(Y_{Lt}^e - T_t^e) = (1 - t) \left[1 + (1 + g) + (1 + g)^2 + \dots + (1 + g)^{36} \right] Y_0$$

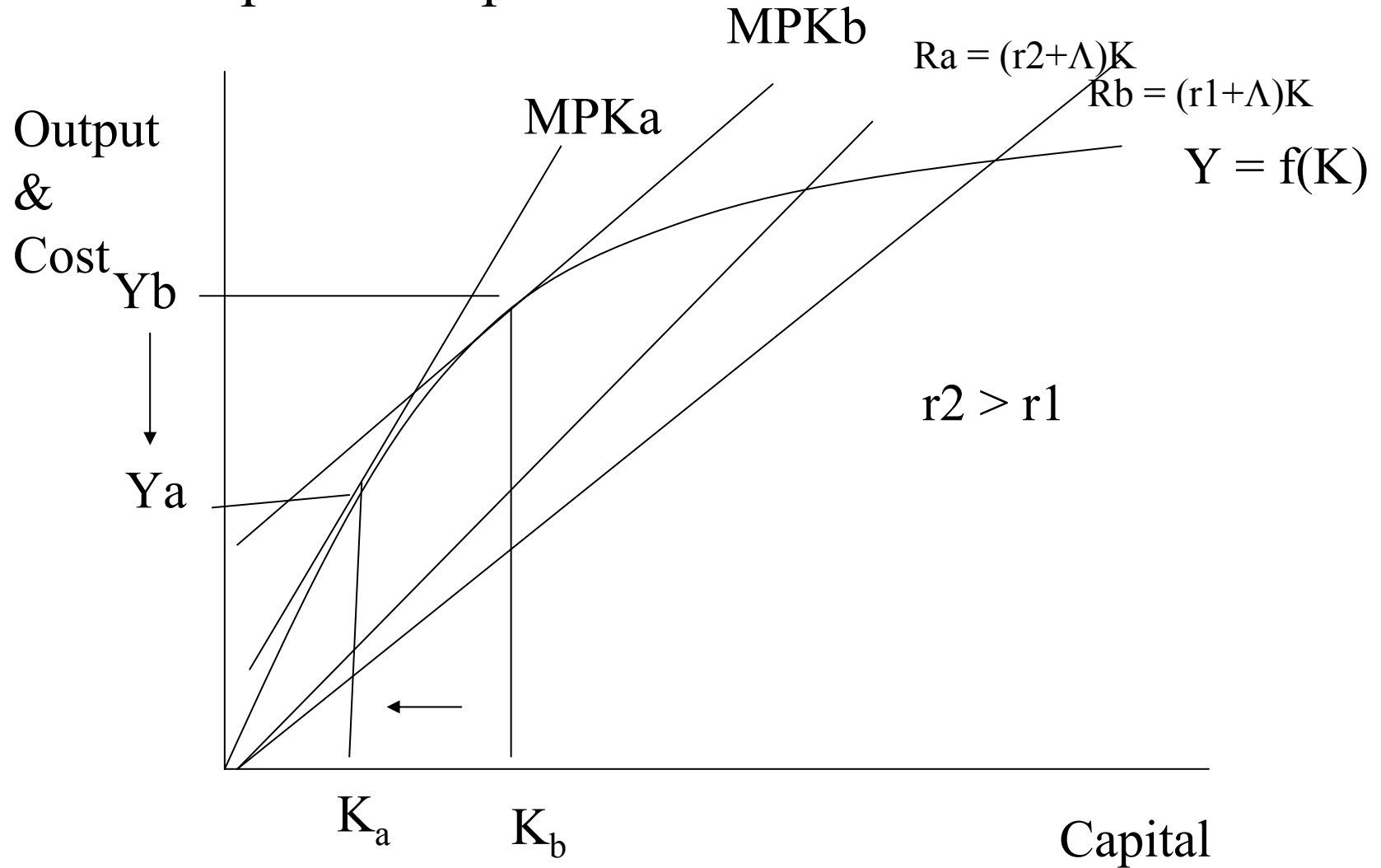
$$\pi = PK^\alpha L^\beta - wL - rK$$



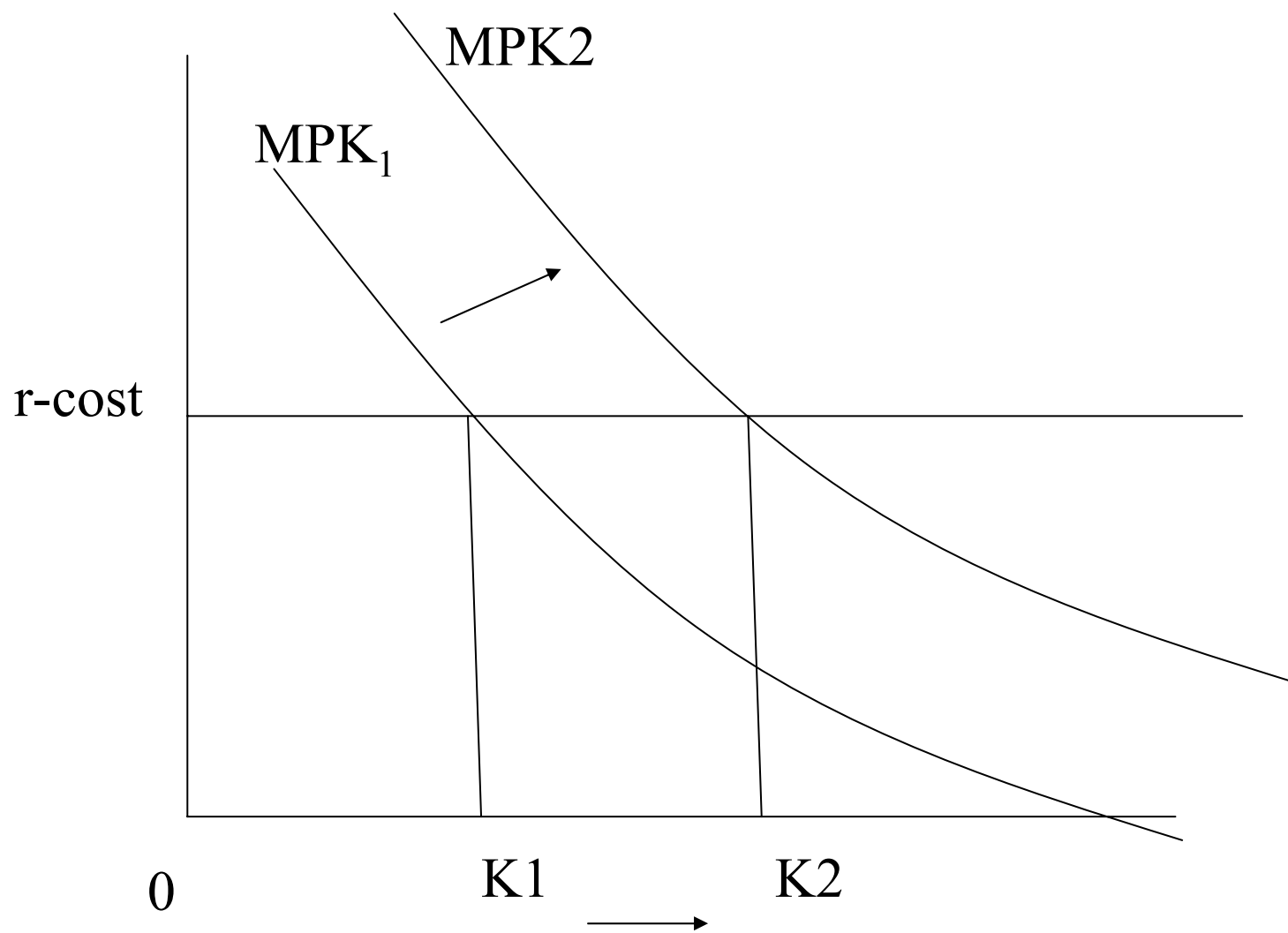
Optimal Capital Stock for a Firm



Impact of Increase in the Interest rate on the Optimal Capital Stock for a Firm



Impact of Technological Advancement in the Capital Stock



Marginal Productivity Theory of Investment - calculations

Output and Capital Accumulation

$$Y = F(K) \text{ and } K_t = K_{t-1}(1 - \delta) + I_t$$

Investment

$$I \left[V \left(\Pi_t^e \right) \right] = I \left[\frac{1}{1+r_t} \Pi_{t+1}^e + \frac{1}{(1+r_t)(1+r_t^e)} (1-\delta) \Pi_{t+1}^e + \dots + \right]$$

and $\Pi_t = \Pi \left(\frac{Y_t}{K_t} \right)$

Optimal investment

$$MPK \cong \left[r + \delta + \pi^K \right] P_1^k$$

Marginal Productivity and the User Cost of Capital

$$\Pi = \frac{F(K)}{(1+r)} - P_1^k K + \frac{(1-\delta)P_2^K K}{1+r}$$

$$\frac{\partial \Pi}{\partial K} = \frac{F'(K)}{(1+r)} - P_1^k + \frac{(1-\delta)P_2^K}{1+r} = 0$$

$$\text{or } MPK = (1+r)P_1^k - (1-\delta)P_2^K$$

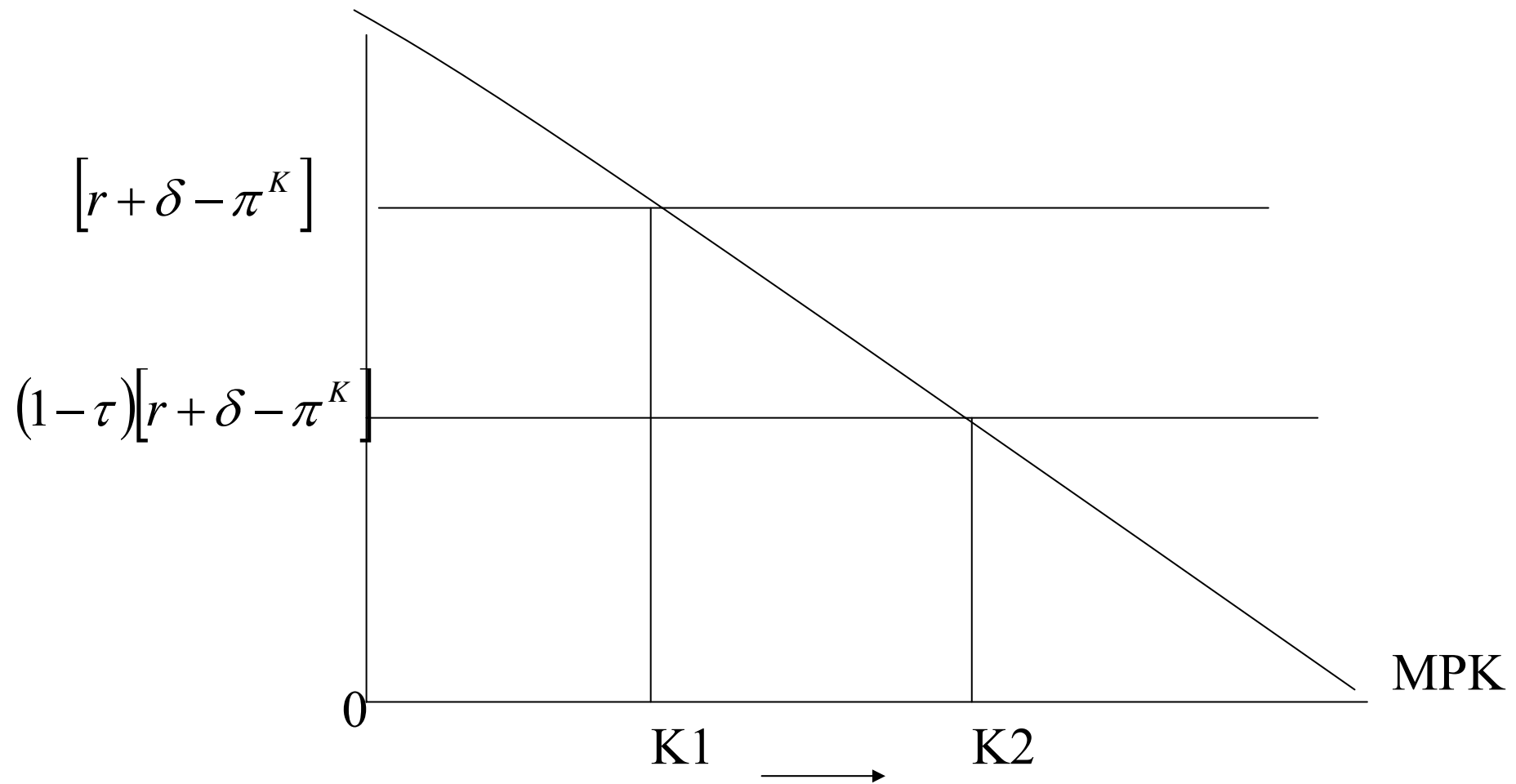
$$MPK = \left[(1+r) - (1-\delta)(1 + \pi^K) \right] P_1^k, \text{ where}$$

$$\pi^K = \frac{P_2^K}{P_1^K} - 1 \text{ is the capital gain. } \delta\pi^K \cong 0$$

$$MPK \cong \left[r + \delta - \pi^K \right] P_1^k$$

Role of Investment Tax Credit in Promoting Investment

Why Manufacturers Lobby for a Tax Credit?



Optimal Capital Stock for the Car Company

The user cost of capital

$$i + \delta - \pi^K = 6\% + 3\% - 3\% = 6\%$$

Marginal product of capital:

$$F'(K_1) = \alpha K^{\alpha-1} = 0.75 K^{0.75-1}$$

Optimal Investment condition

$$P.F'(K_1) = P_1^k (i + \delta - \pi^k) \Rightarrow$$

$$8000(0.75)K^{0.75-1} = 2000(6\% + 3\% - 3\%) \Rightarrow$$

$$8.(0.75)K^{-0.25} = 2(6\%); \quad 6K^{-0.25} = 2(6\%) \Rightarrow$$

$$K^{0.25} = \left(\frac{3}{0.06}\right) \quad K = (50)^4 = 6.25 \text{ million}$$

A Simple Illustration of the Multiplier Accelerator Theory of Investment

Consumption function: $C_t = c_0 + c_1 Y_t$

National income identity: $Y_t = C_t + I_t$

Investment Multiplier: $\frac{\partial Y}{\partial I} = \frac{1}{1 - c_1}$

Investment is Change in Capital Stock $I_{n,t} = K_t^d - K_{t-1}$

Capital stock is multiple of output: $K_t = \alpha Y_t; \alpha > 0$.

$$I_{n,t} = \alpha Y_t - \alpha Y_{t-1} = I_{n,t} = \alpha (\Delta Y_t)$$

Accelerator: $\alpha = \frac{I_{n,t}}{\Delta Y_t}$

Multiplier Acceleration effect on Output: $\Delta Y = \frac{\alpha (\Delta Y)}{1 - c_1}$

Interest Rate, Factor Substitution and Income Distribution

$$Y_t = A_t K_t^\alpha L_t^\beta \quad \frac{rK}{Y} + \frac{wL}{Y} = 1$$

$$\alpha = \frac{rK}{Y} = \frac{\alpha K^{\alpha-1} L^\beta \cdot K}{Y} \quad \beta = \frac{wL}{Y} = \frac{\beta K^\alpha L^{\beta-1} L}{Y}$$

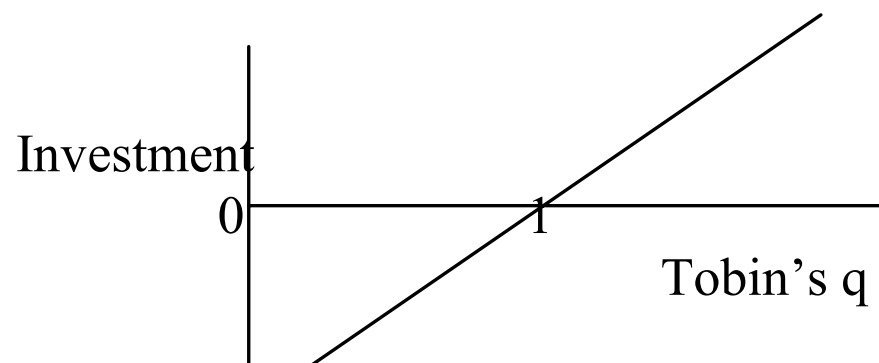
$$\sigma = \frac{\frac{\Delta(K/L)}{K/L}}{\frac{\Delta(w/r)}{w/r}} = \frac{\frac{\Delta(K/L)}{K/L}}{\frac{\Delta\left(\frac{\beta A K^\alpha L^{\beta-1}}{\alpha A K^{\alpha-1} L^\beta}\right)}{\frac{\beta A K^\alpha L^{\beta-1}}{\alpha A K^{\alpha-1} L^\beta}}} = \frac{\frac{\Delta(K/L)}{K/L}}{\frac{\Delta(K/L)}{K/L}} = 1$$

Tobin's q-theory and Investment

Tobin's q theory $q = \frac{\text{Market value of installed capital}}{\text{replacement cost of installed capital}}$

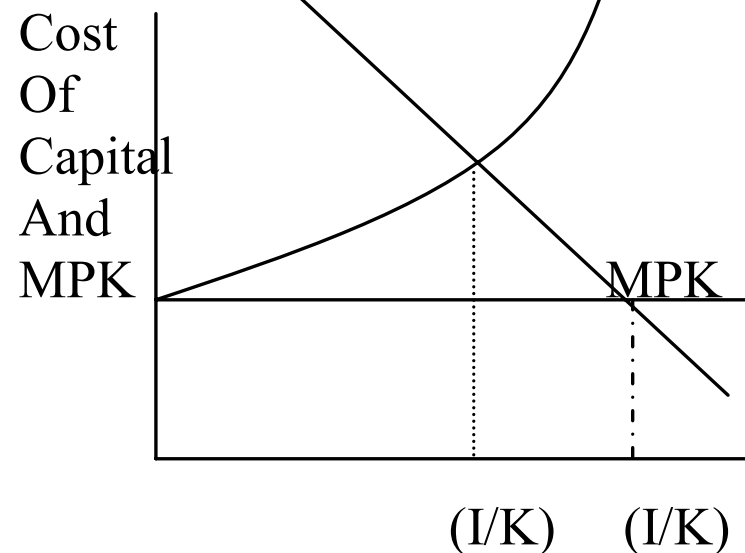
Tobin's q is the ratio of market value of capital stock to its replacement cost and can be stated as:

$$q = \frac{MPK}{(1+r)} / P^k$$



Tobin's q with installation cost:

$$q = \frac{MPK}{(1+r)} / P^k = (1 + \phi) \text{ Marginal cost}$$



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