Macroeconomics III: Consumption and Investment

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introduction

- "Consumption is the sole end and purpose of all production; and the interest of the producer ought to be attended to, only so far as it may be necessary for promoting that of the consumer. The maxim is so self-evident that it would be absurd to attempt to prove it. But in the mercantile system, the interest of the consumer is almost constantly sacrificed to that of the producer; and it seems to consider production, and not consumption, as the ultimate end and object of all industry and commerce", Adam Smith, 1776.

the Fisher model:
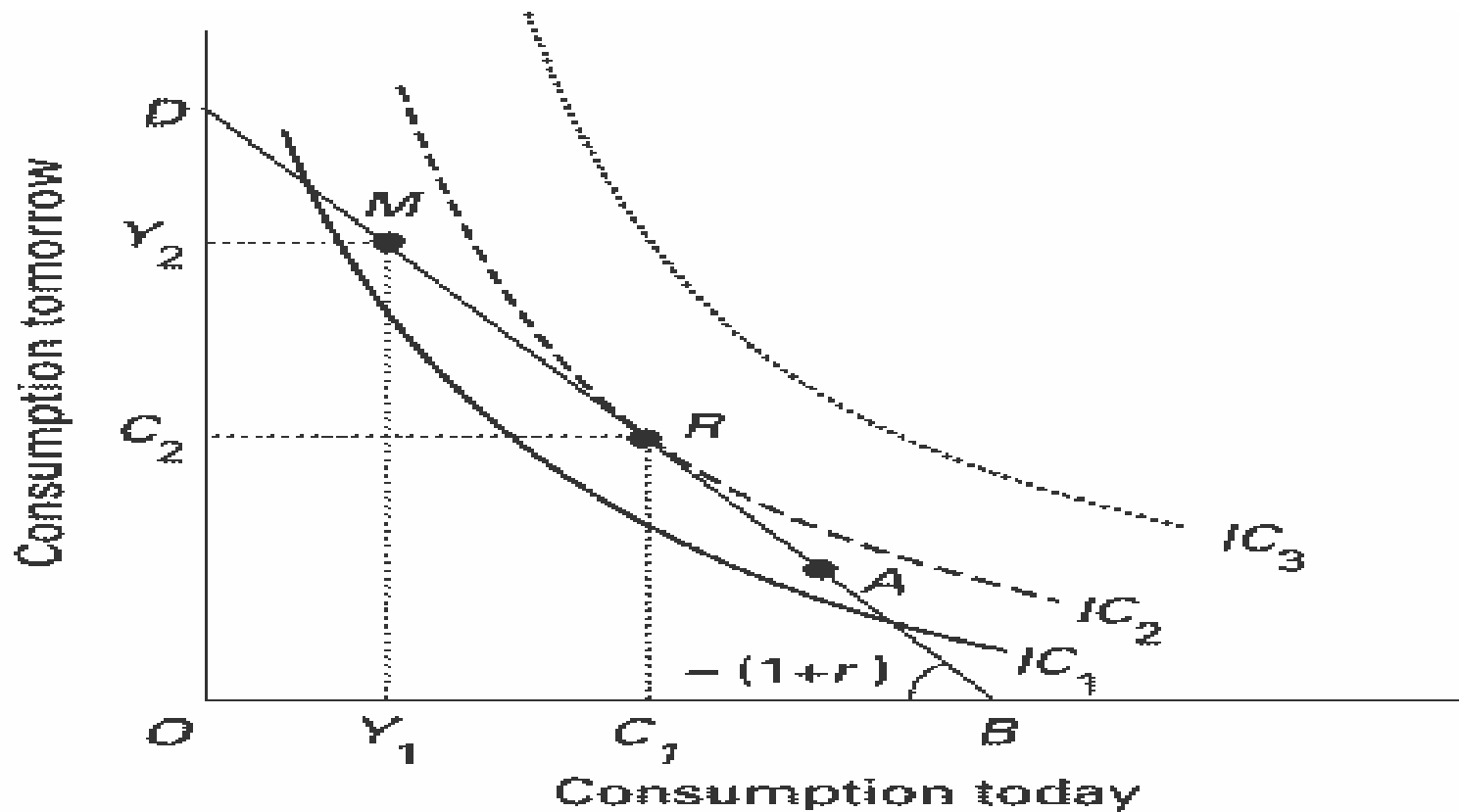 intertemporal consumption trade-offs

Figure 4.2.   Optimal Consumption

Models of Consumption Behavior

- Fisher Model – consumption over time

- Keynesian Model – myopic consumption behavior

- Modigliani's Life-cycle model – forward-looking overall time pattern of consumption

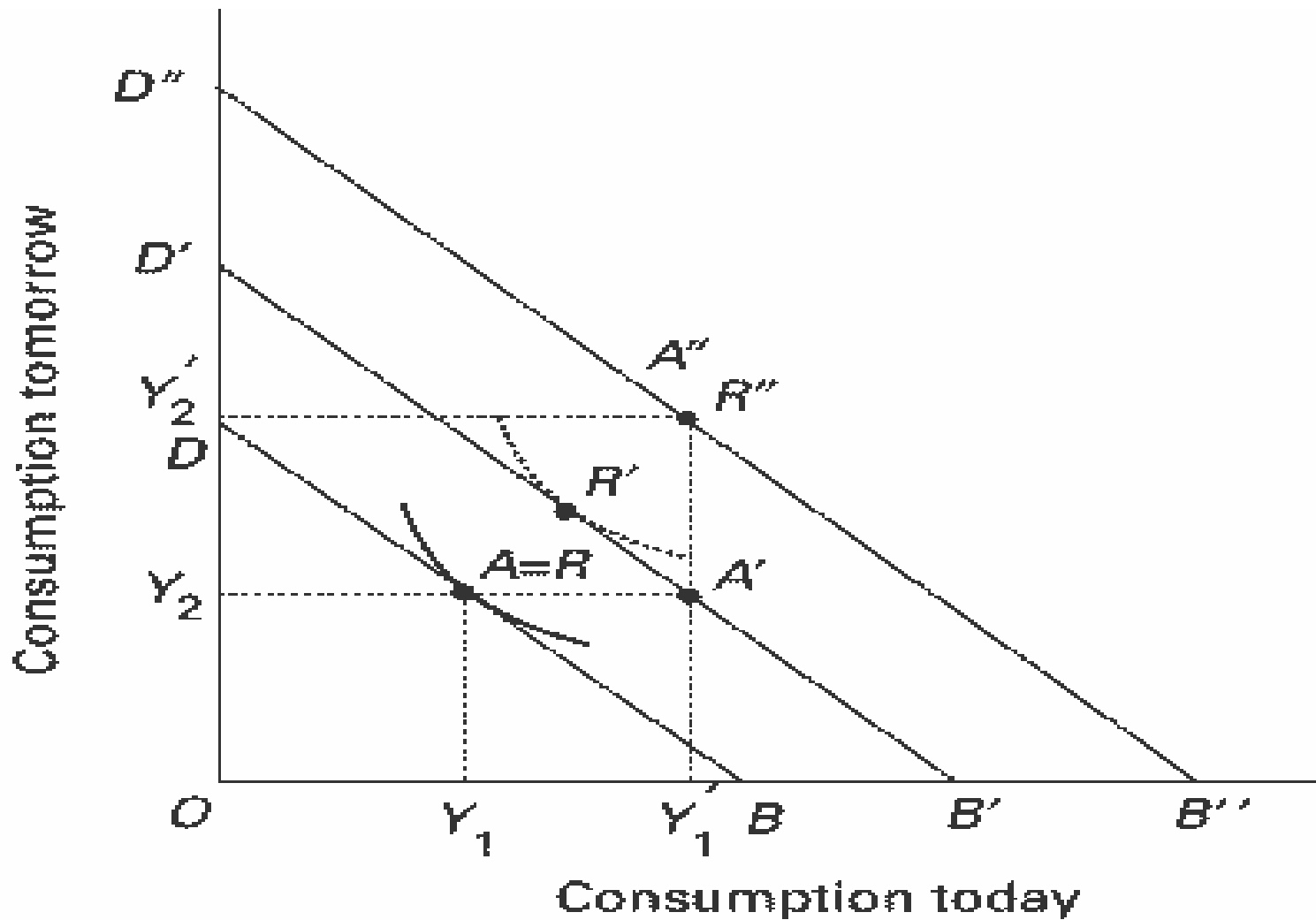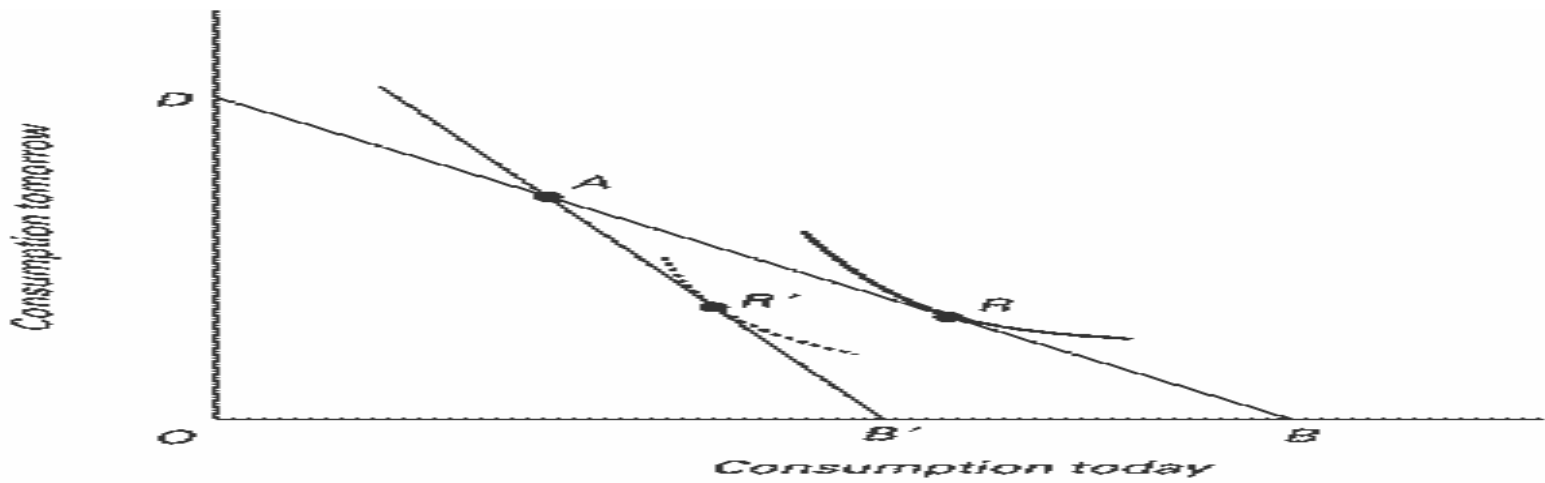- Friedman's Permanent Income model – consumption and shocks
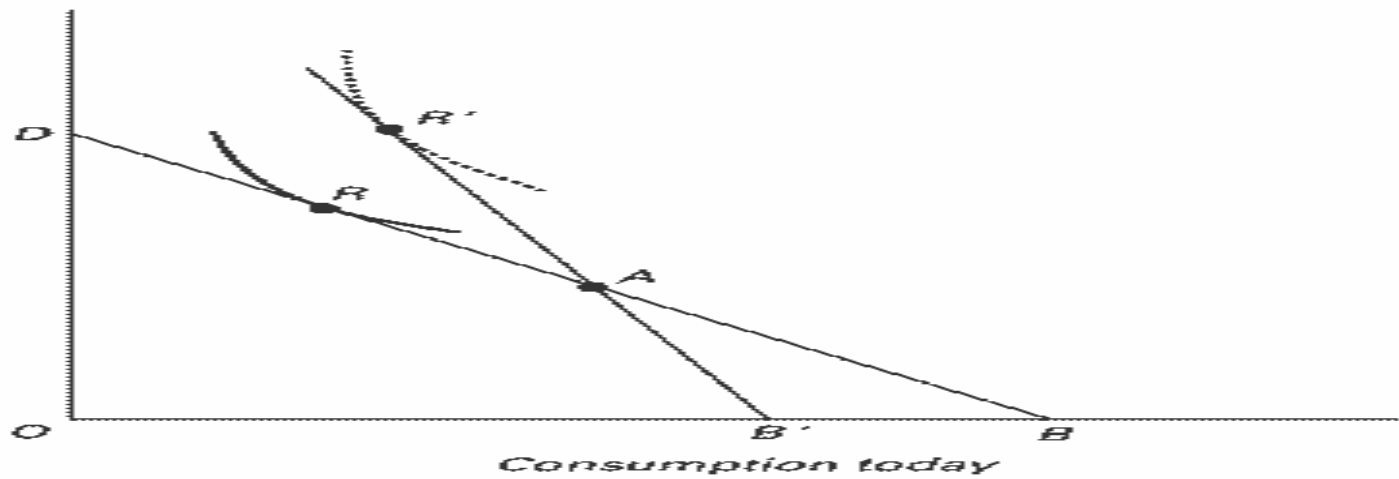
Figure 4.4. Temporary and Permanent Income Changes

(a) Student Crusoe (borrower)

(b) Professional athlete Crusoe (lender)

Figure 4.5.   The Effect of an Increase in the Interest Rate
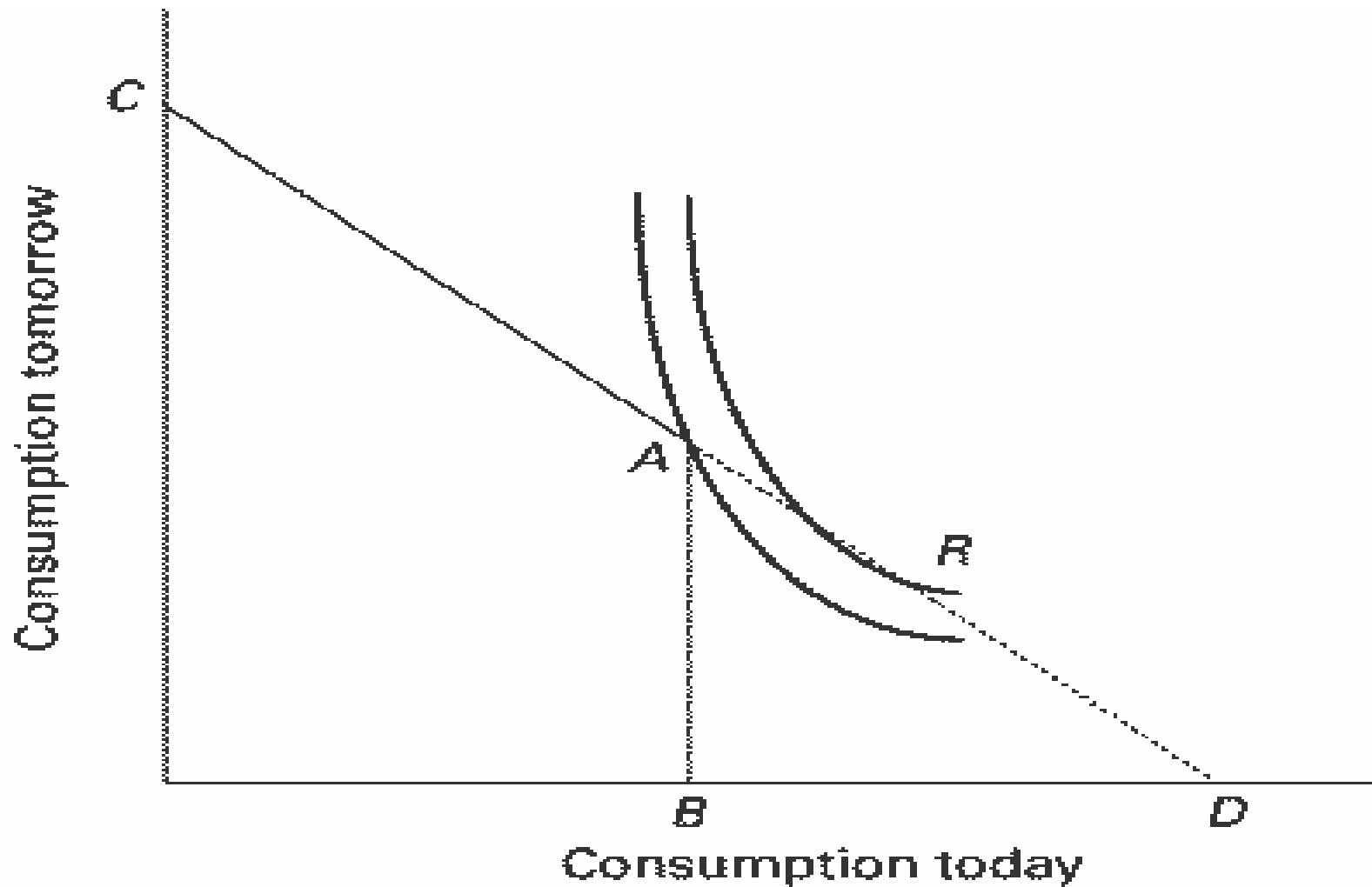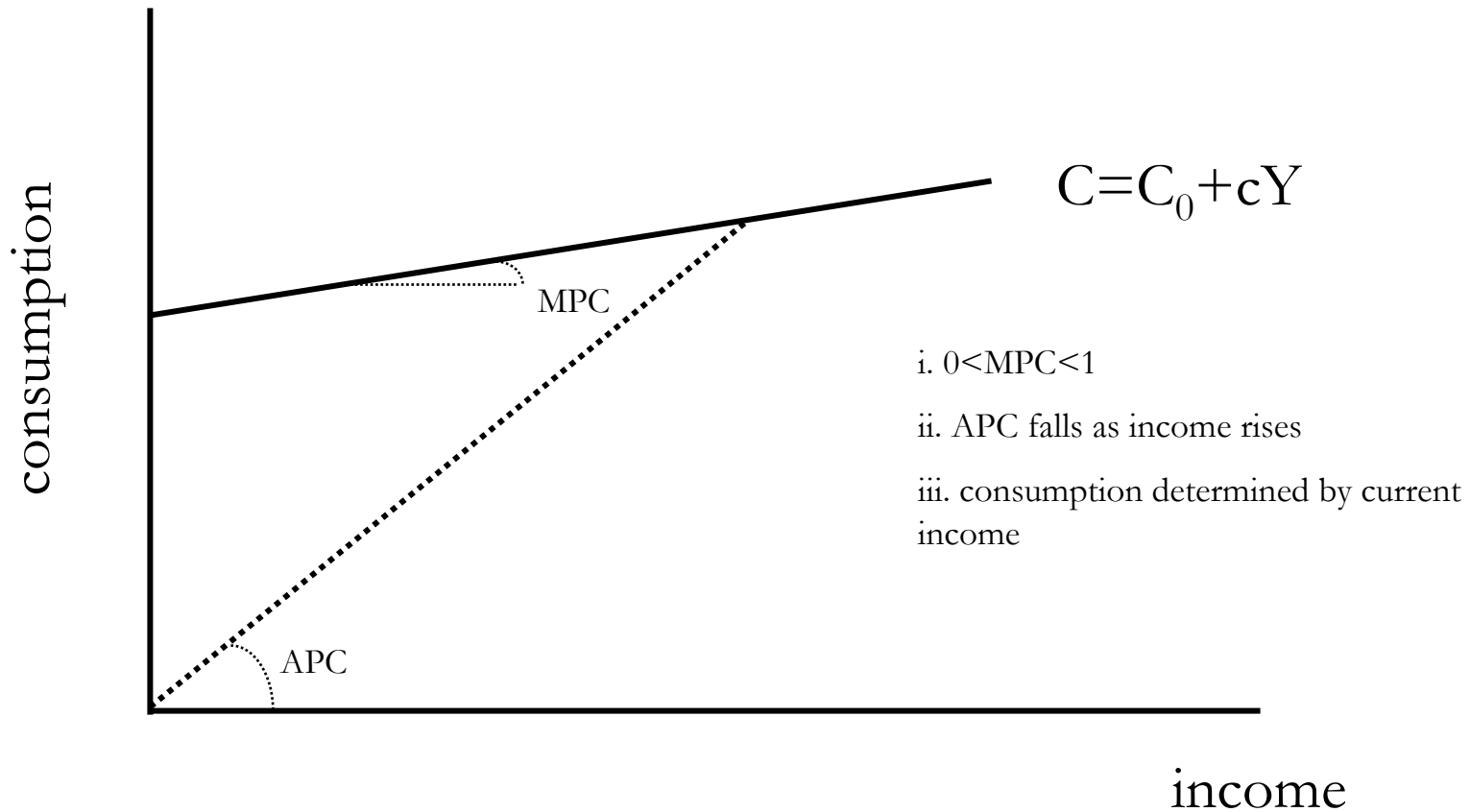
Figure 4.12.   Credit Constraints

the Keynesian consumption function

consumption

$C = C_0 + cY$

MPC

APC

i. $0 < MPC < 1$

ii. APC falls as income rises

iii. consumption determined by current income

income

the consumption puzzle

consumption

income

long-run consumption function (constant APC)

short-run consumption function (falling APC)
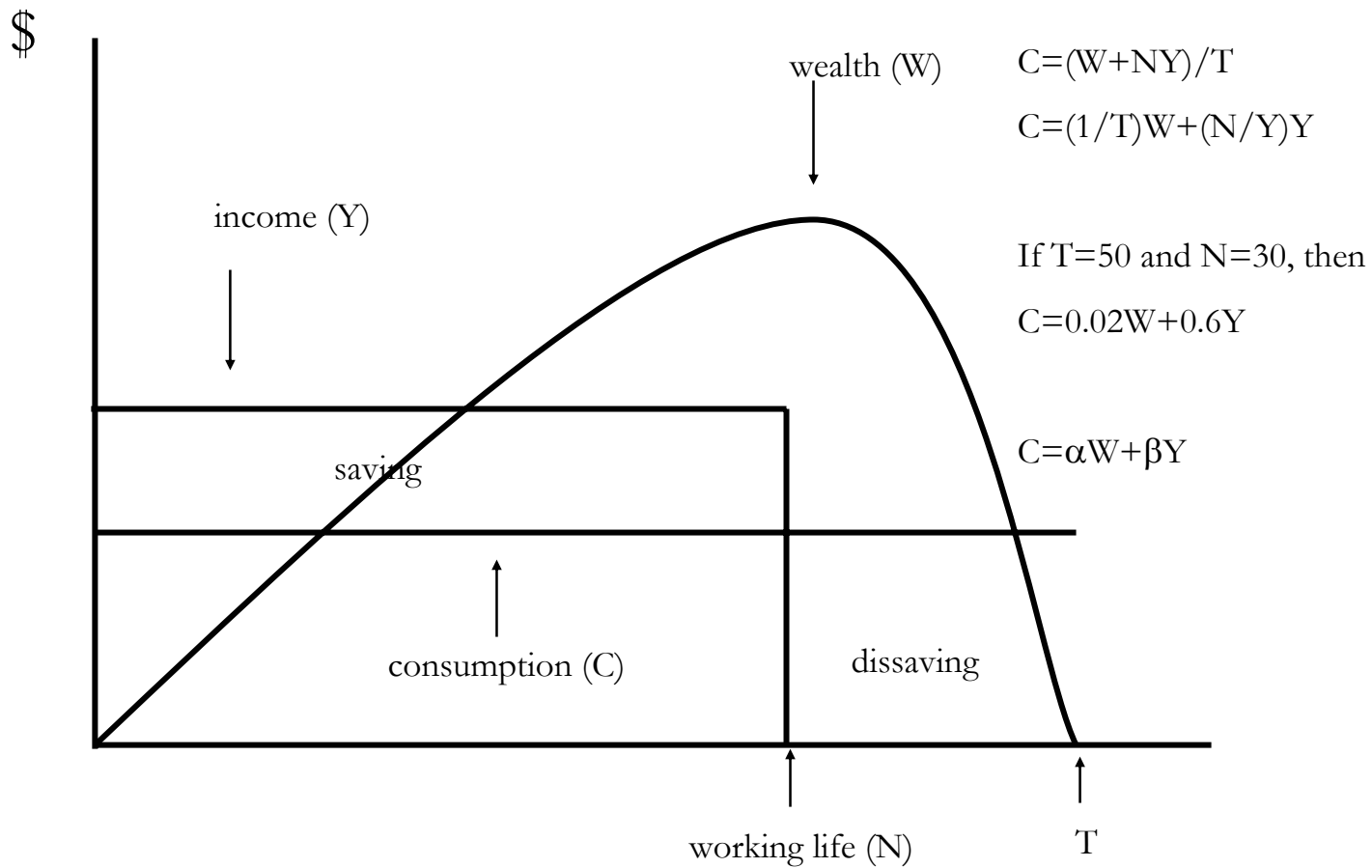
PostWar empirical research discovered that in the long-run, the APC was nearly constant, but in the short-run it was falling. This prompted plenty of further work!

the life-cycle hypothesis

$

income (Y)

wealth (W)

$C=(W+NY)/T$

$C=(1/T)W+(N/Y)Y$

If T=50 and N=30, then

$C=0.02W+0.6Y$

saving

$C=\alpha W+\beta Y$

consumption (C)
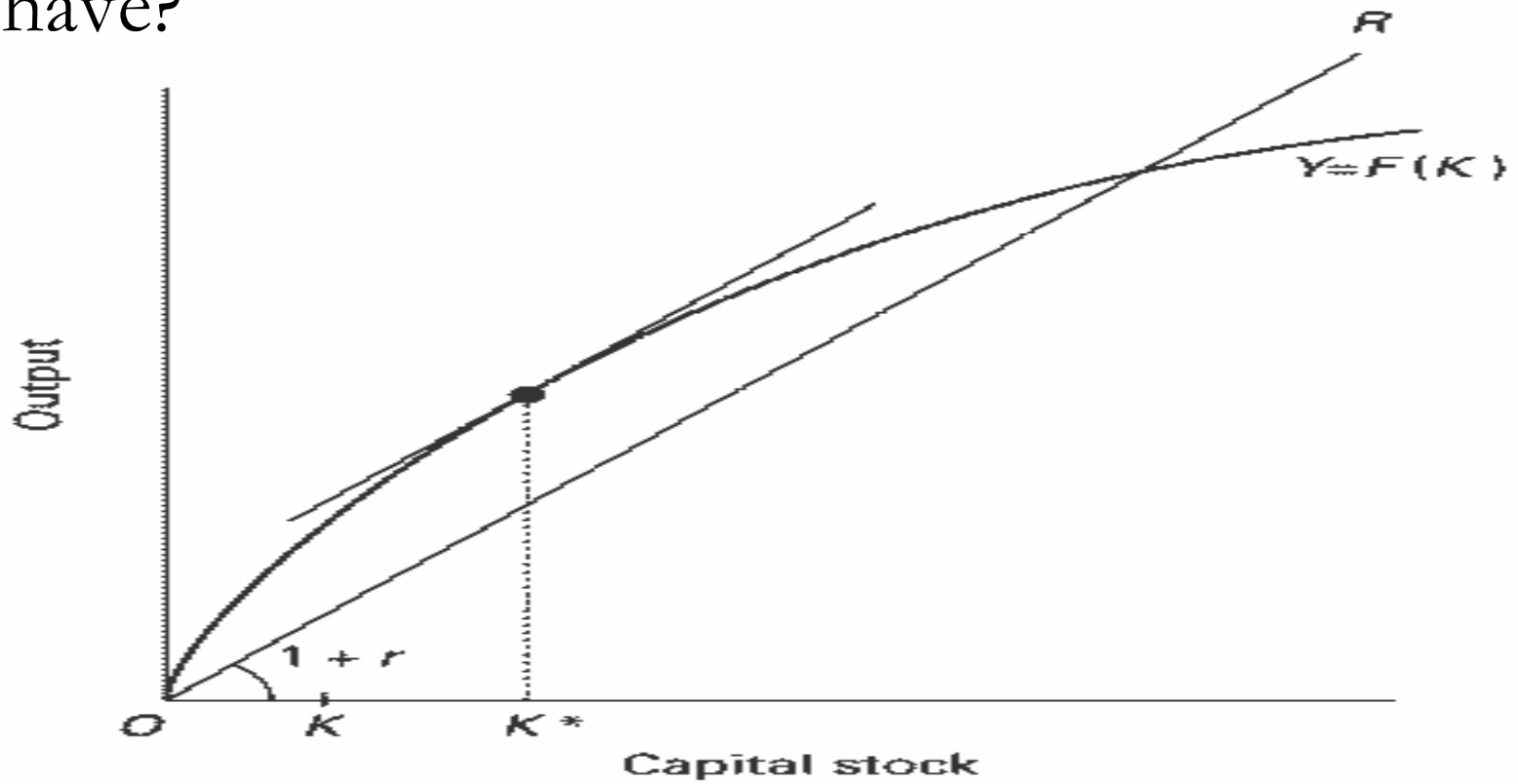
dissaving

working life (N)

T

the permanent income hypothesis

- Income consists of permanent and transitory components, $Y=Y^P+Y^T$.
- Transitory income does not persist, for example, if there is a harsh frost a farmer may earn less because her crops were affected.
- Permanent income is persistent, for example, someone with a degree will typically earn more than a high-school dropout.
- Consumption depends upon permanent income, $C=\alpha Y^P$,
- but some of the variation in income is transitory and households with high transitory income do not have higher consumption,
- therefore, years of high income should be years of low APC (the short-run consumption function has a falling APC).
- In the long-run, when permanent income is the dominant factor, one observes a constant APC (the long-run consumption function has a constant APC).

rational expectations and consumption

- Forward looking consumers may have rational expectations about their permanent incomes.

- That is, they should not make systematic mistakes about their future incomes, $Y_t = E_{t-1}(Y^P_t) + u_t$

- Since they only make random errors about their incomes, their consumption should be predictable on average:

  - Changes in consumption should therefore be unpredictable and consumption should follow a **random walk**, $C_t = C_{t-1} + e_t$.

- Since consumers are forward-looking, only unanticipated (that is, random) policy changes will affect their consumption
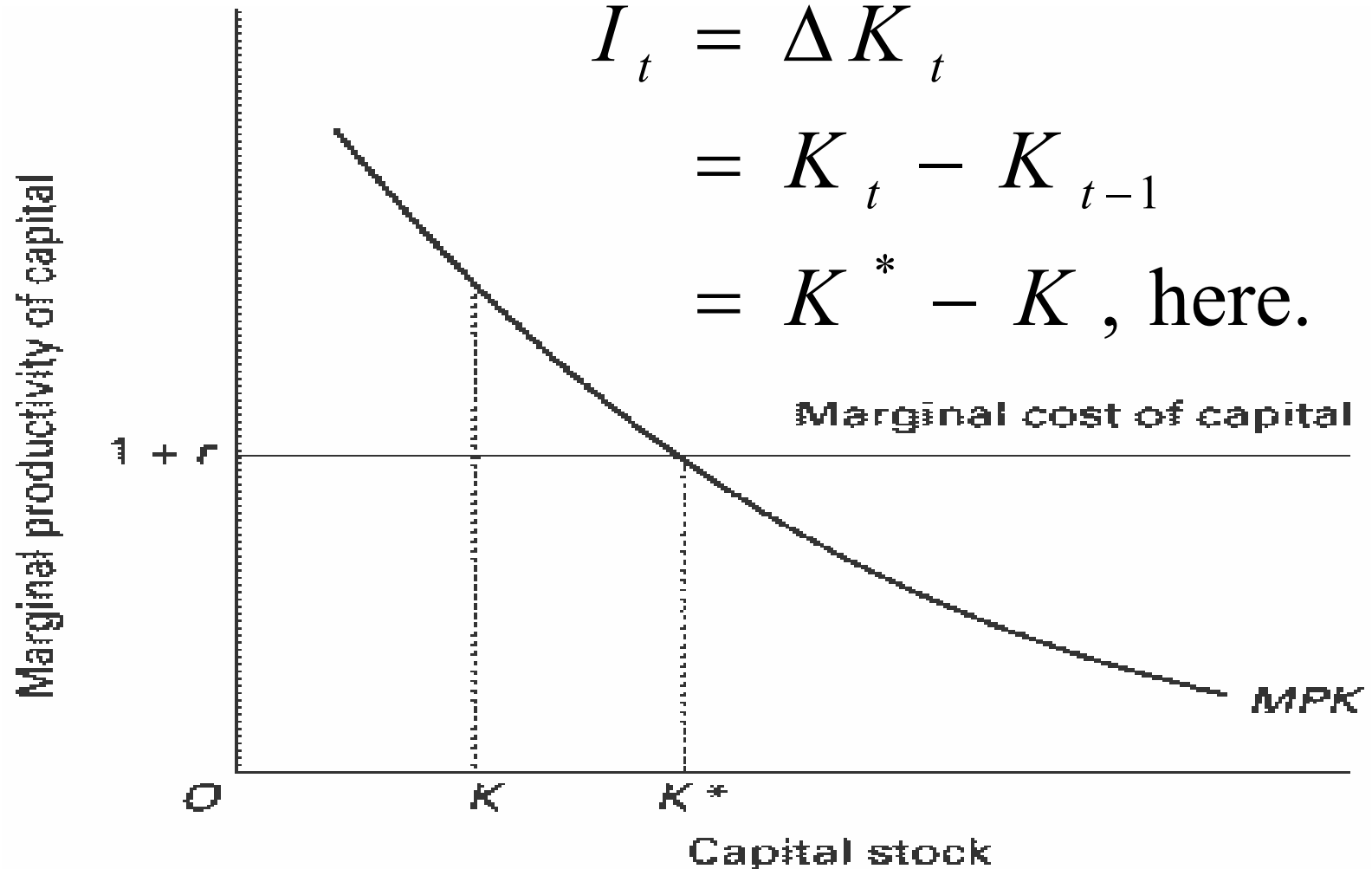
investment theory – how much capital to have?

Figure 4.14. (a) The Optimal Capital Stock

$$I_t = \Delta K_t$$

$$= K_t - K_{t-1}$$

$$= K^* - K, \text{ here.}$$

Marginal cost of capital

MPK

Marginal productivity of capital

$1 + r$

O K K^*

Capital stock

(b)

Figure 4.14.   (b) The Optimal Capital Stock

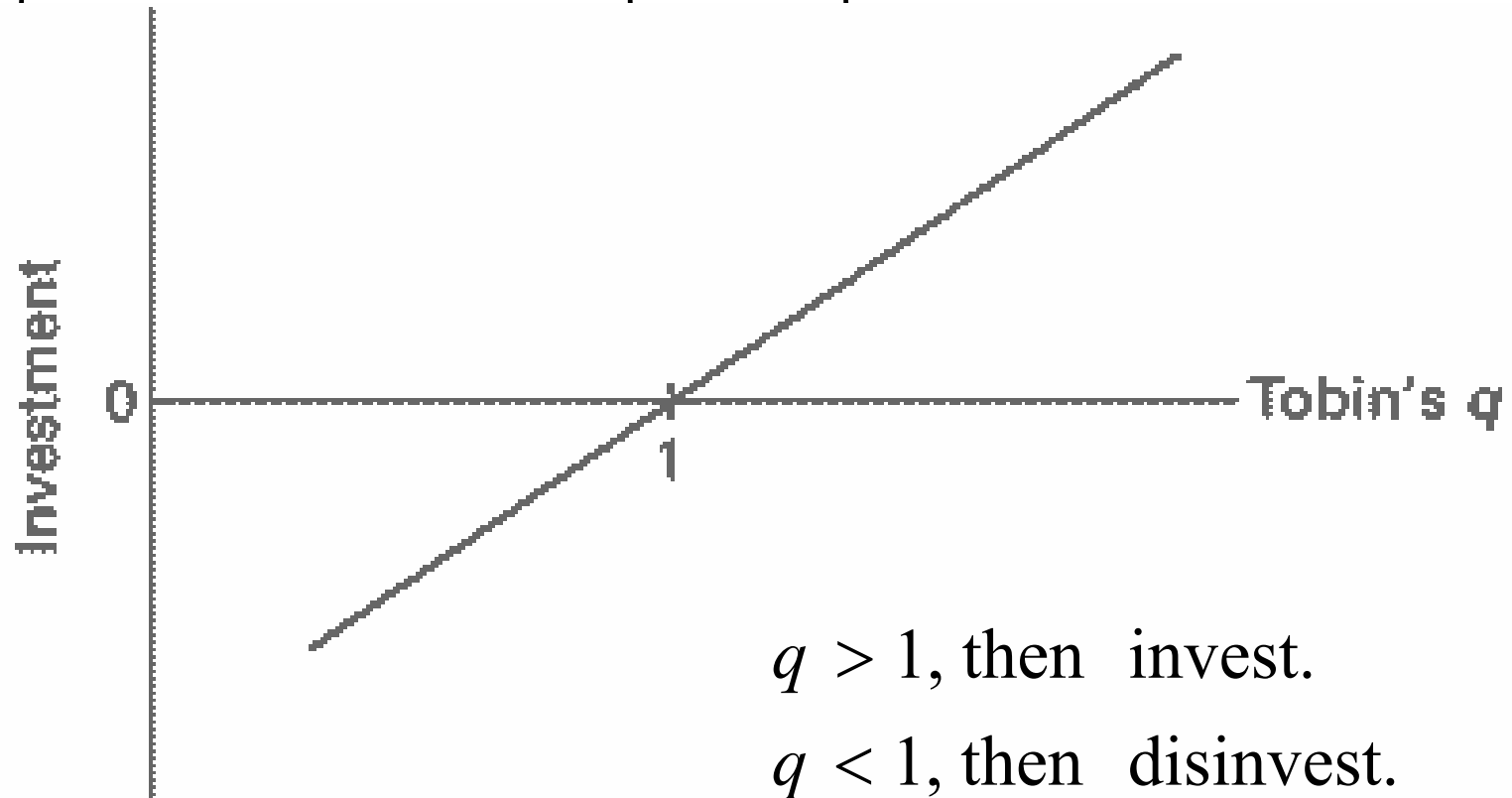# the user cost of capital and the accelerator

the user cost of capital

- how much will the firm have to pay to rent a unit of capital for one period of time?

- the user cost of capital is the interest rate plus the depreciation rate minus price inflation in capital goods, $UCC = r + \delta - \Delta p$

the accelerator

- suppose the capital stock is proportional to the expected output level, $K^* = vY$

- when Y rises from Y_1 to Y_2, firms must invest, $I = K_2^* - K_1^* = v(Y_2 - Y_1) = v\Delta Y$

- since v is between 2 and 3 (that is, the capital stock is 2 or 3 times larger than output), investment is much more volatile than output

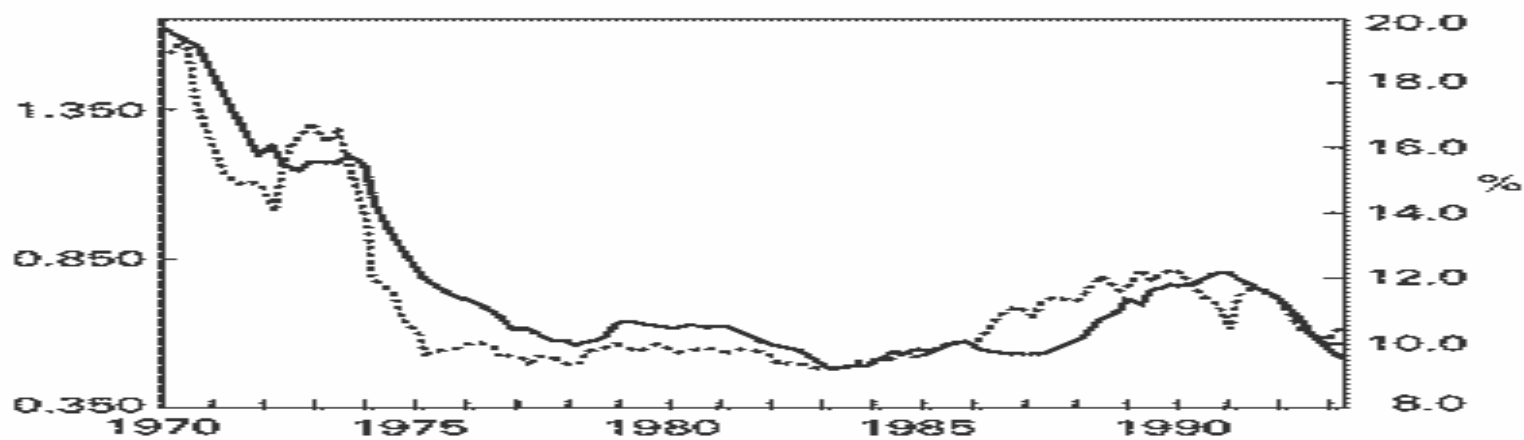q =market value of capital/replacement cost

$q > 1$, then invest.
$q < 1$, then disinvest.

Figure 4.16. The q-Theory of Investment

Figure 4.17. The Rate of Investment and Tobin's q, 1970:1–1993:2; (c) USA and (d) Japan (Source: Bloch and Coeuré, 1994)

Present value of MPK, costs of capital (vertical axis)

q_1 .... A

q_2 .... B

Marginal cost of investment

MPK_2

MPK_1

$(I/K)_2$ $(I/K)_1$

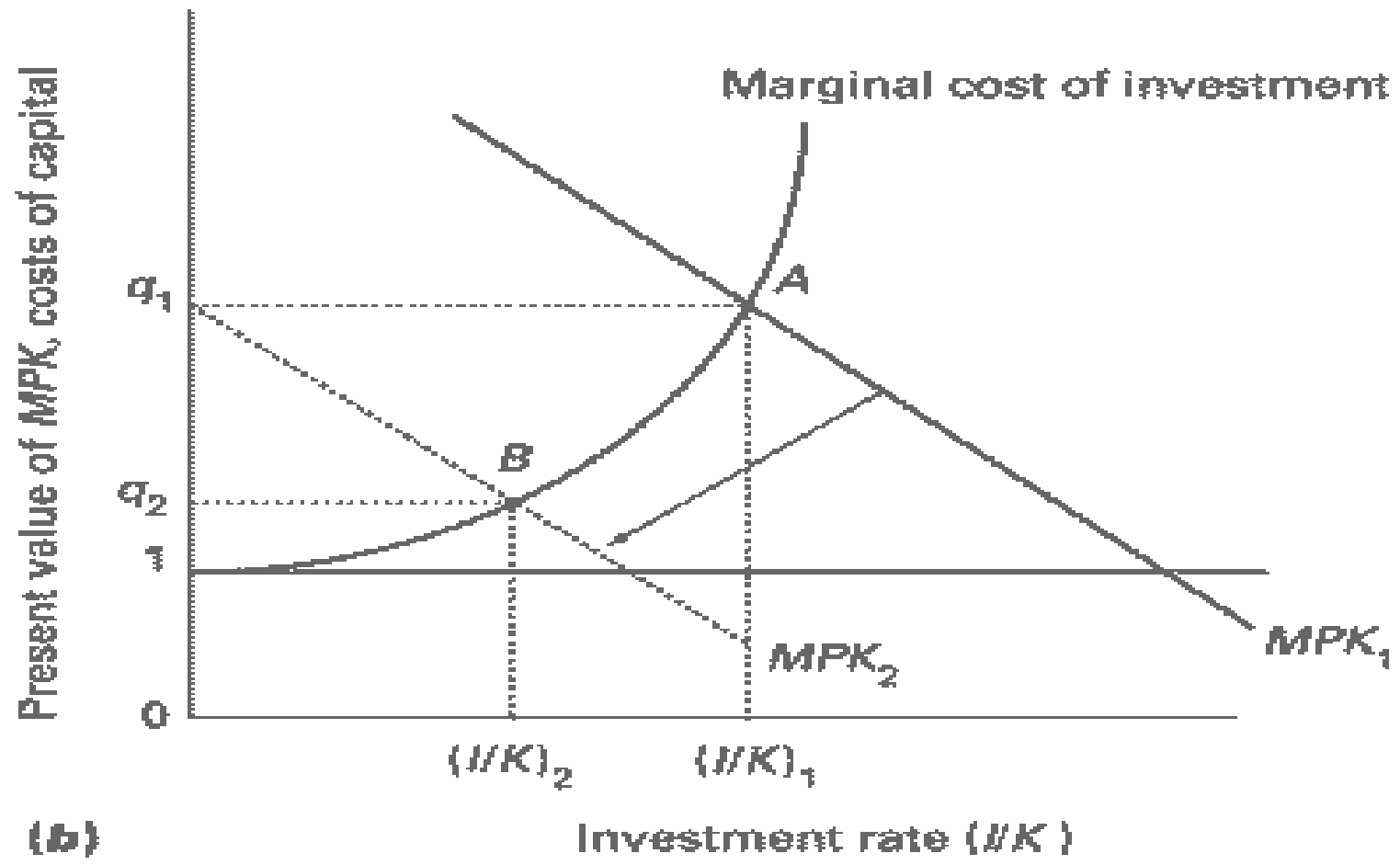**Investment rate (I/K)** (horizontal axis)

0

(b)

Figure 4.18. (b) Tobin's q

investment and irreversibility

- When adjustment costs are symmetric, uncertainty does not affect investment;
  - But sometimes it is more costly to reduce the physical capital stock than to increase it (asymmetry leads to irreversibility).
- When investment is irreversible, there is an **option value** to waiting rather than investing:
  - If a firm does not invest, it retains the possibility of keeping its capital stock low.
  - If it invests, it commits itself to a high capital stock.

how is investment financed?

- Firms can finance their investment either through retained profits, or by issuing equity (shares) or debt (bonds and bank loans).

- In practice, firms in the UK and the US are somewhat more reliant on equity finance and firms in Europe and Japan somewhat more reliant on debt finance.
    - Modigliani-Miller theorem says should be indifferent between equity and debt finance. In practice, not true.

- However, across all major economies, the majority of investment is financed from retained earnings.

- Therefore it is likely that investment will be sensitive to current cashflow, and possibly also to the value of collateral (since this is used to issue debt).

summary

- Consumption and investment account for a large proportion of GDP: in the USA, about 65% and 15% respectively. Investment fluctuations are a large component of business cycle movements.

- Rational consumers attempt to smooth consumption over time, borrowing in bad years and saving in good ones. Consumption is driven by wealth, the present discounted value of future incomes, real interest rates, and current income (through credit constraints).

- Young consumers typically borrow, older consumers save, reflective of life-cycle concerns.

- The optimal capital stock equates the marginal productivity of capital to the marginal cost of capital. The optimal capital stock rises when real interest rates fall or when there is technological progress.

- Because of adjustment costs, firms do not move to their optimal capital stocks immediately.

- Investment depends upon the real interest rates, Tobin's q (future profits), current profits (due to cashflow and credit constraints, and which may depend upon nominal interest rates), and the value of collateral.