Macroeconomics Lecture 4

SGPE Summer School

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Introduction

Consumption

Why is it important to understand what determines consumption?

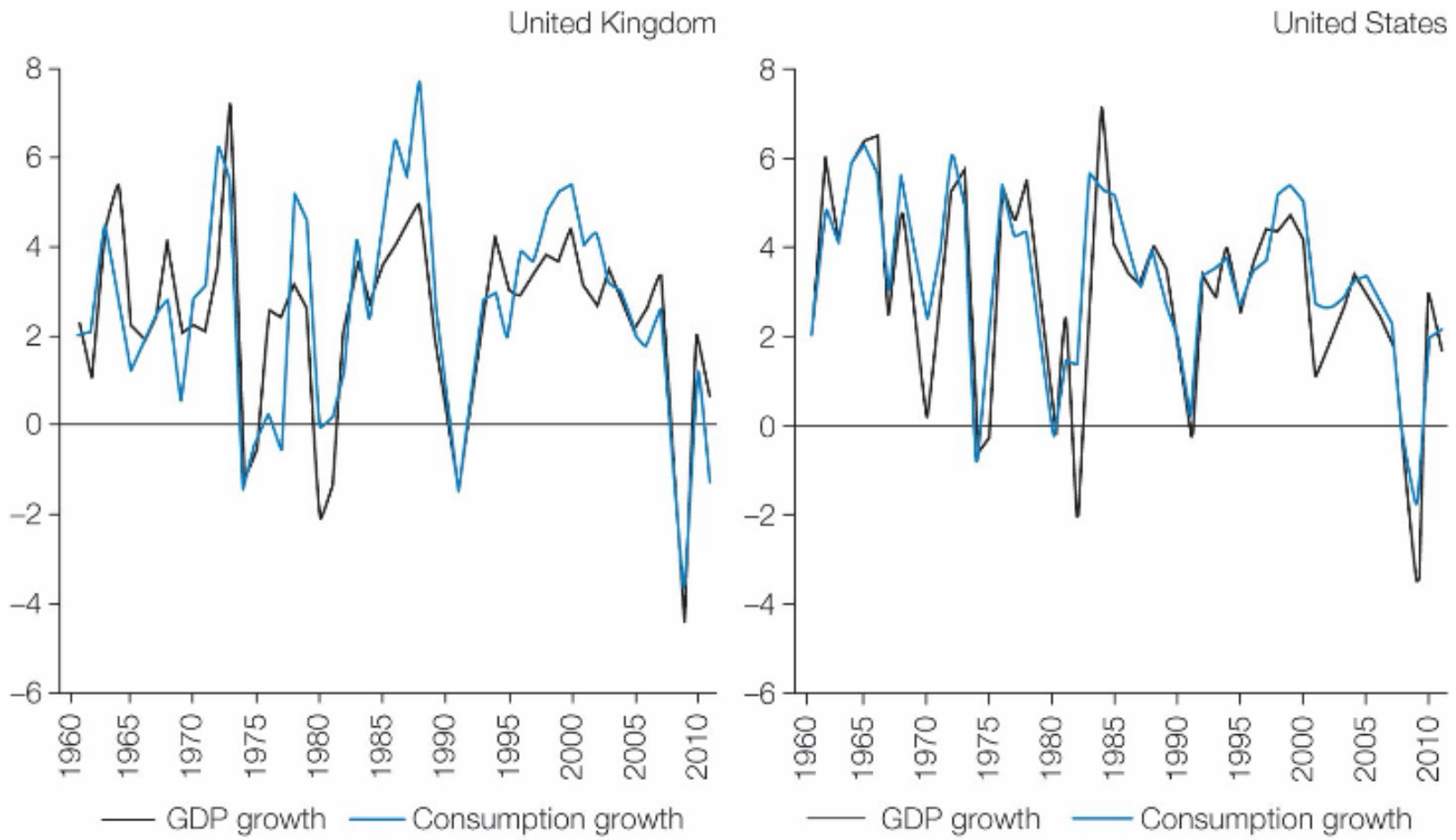
In the long run: Savings affect the capital stock and thereby the long run level of income

In the short run: Consumption is the largest component of demand and it fluctuates about as much (in percent) as GDP.

Ch 4

Consumption

Fig. 4.1 *Consumption and GDP growth*



Consumption

Simple Question

What determines how much a person consumes?

Saving = disposable income – consumption

We study a consumer's choice between consumption today and consumption in the future (saving)

We study a consumer who lives for two periods

We study a consumer who lives forever

We derive a consumption function that we can use in our macroeconomic model

Fisher Model

- The consumer lives for two periods, period 1 and 2
- The consumer's income from work is Y_1^l and Y_2^l
- The consumer's assets in the beginning of the periods are: 0 and A_2
- A_2 is the is the assets at the beginning of period 2 – before interest is paid out
- The consumer does not leave any bequest

Fisher Model Con't

In period 1 the consumer chooses between consuming now and saving so as to consume more next period

Real interest between the periods is r

Saving $A_2 = Y_1^l - C_1$

Consumption next period $C_2 = Y_2^l + A_2 + rA_2$

Substitute expression for A_2 above

Fisher Model Con't

$$C_2 = Y_2^l + (1+r)(Y_1^l - C_1) = Y_2^l + (1+r)Y_1^l - (1+r)C_1$$

Consumption in period 2 depends on income in period 1 and 2 and how much was consumed in period 1.

If the consumer consumes one more unit in period 1, he/she must decrease consumption by $1+r$ units in period 2.

$1+r$ is the price of consumption today in terms of consumption in the future.

Intertemporal Budget Constraint

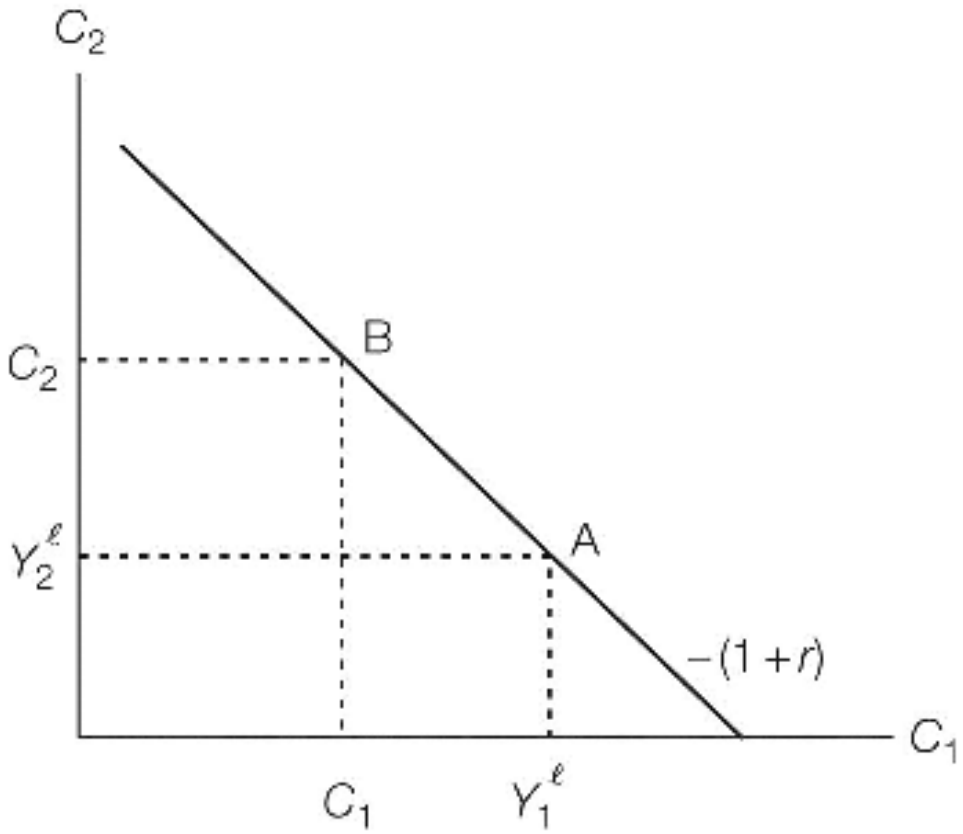
This can be rewritten:

$$\underbrace{C_1 + \frac{C_2}{1+r}}_{\text{PV of consumption}} = \underbrace{Y_1^l + \frac{Y_2^l}{1+r}}_{\text{PV of income}}$$

he consumer's (intertemporal) budget restriction

IBC Graph

Fig. 4.2 *The lifetime budget constraint*



Utility Function

How does the consumer choose between consumption in period 1 and consumption in period 2?

Utility function: $U(C_1) + \frac{U(C_2)}{1+\rho}$

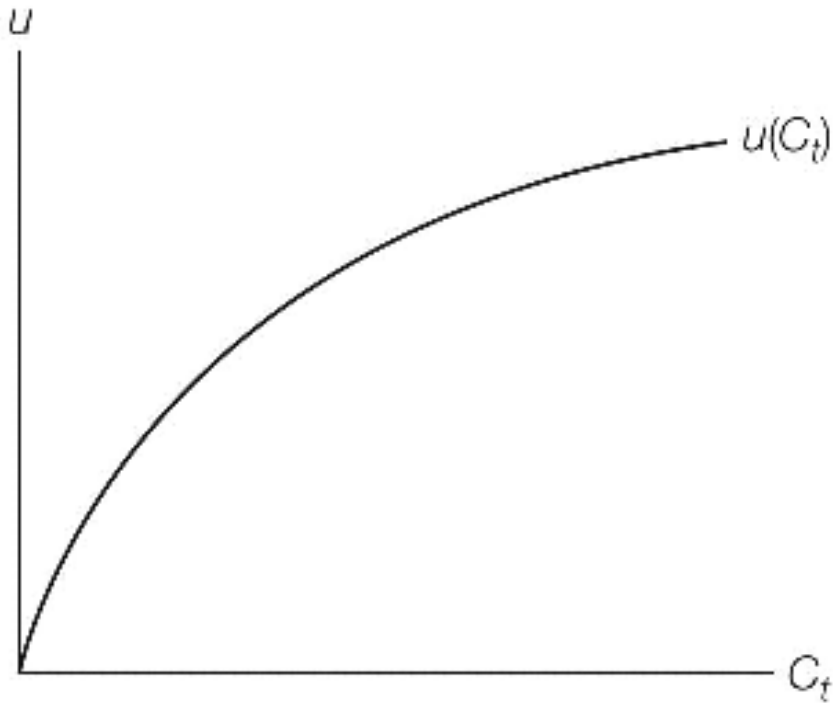
Assumptions:

- More consumption yields greater utility: $U'(C_1) > 0$
- Marginal utility is decreasing:$U''(C) < 0$

The consumer wants to smooth consumption over time

Utility Function Graph

Fig. 4.3 *The utility function*



Discount rate

What is ρ?

- The subjective discount rate: ρ tells us how much the consumer values the future
- High ρ means that the consumer is impatient and cares a little about the future
- We expect that ρ, that is, the consumer values consumption today higher than consumption in the future

Optimal consumption

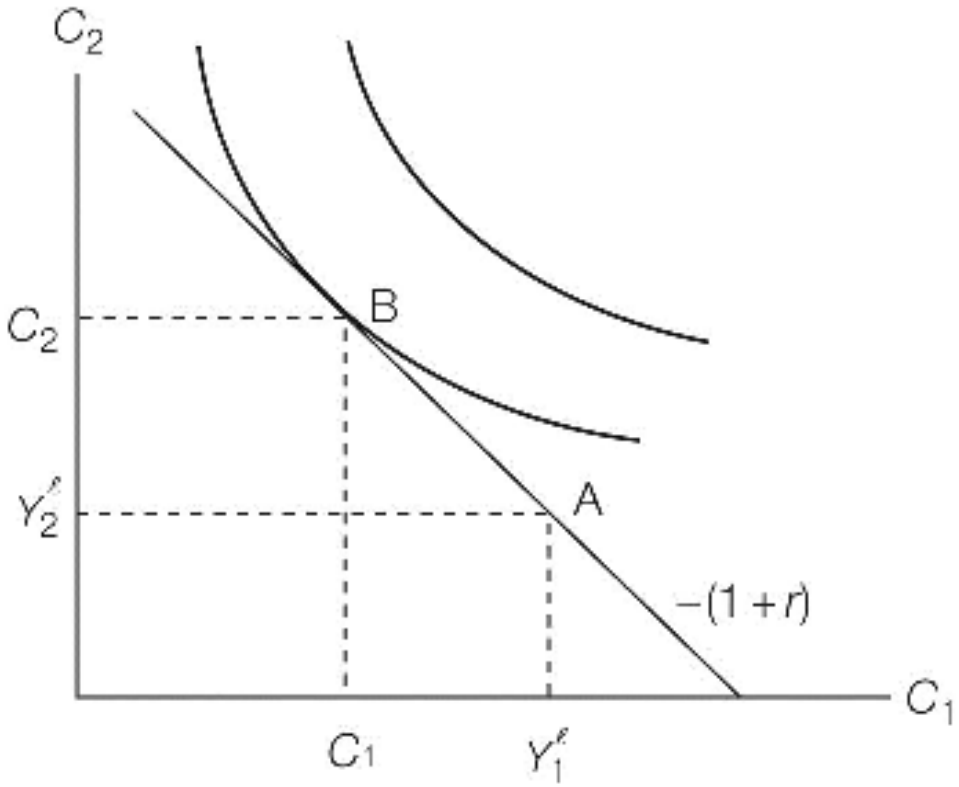
Optimal choice of consumption: Marginal rate of substitution (MRS) should be equal to the relative price between consumption today and consumption in the next period:

$$\frac{U'(C_1)}{U'(C_2)/(1+\rho)} = \frac{P_t}{P_t/(1+i_t)} = 1 + r$$

Ratio of MU= ratio of prices

Optimal Consumption Graph

Fig. 4.4 *The choice between consumption today and consumption in the next period*



Comparative Statics

Effect of an increase in interest for a net saver:

- Substitution effect: higher interest makes it more favourable to save, which gives lower consumption now and higher consumption in the future
- Income effect: higher interest makes the consumer wealthier, which gives higher consumption both now and in the future

The subjective discount rate and consumption:

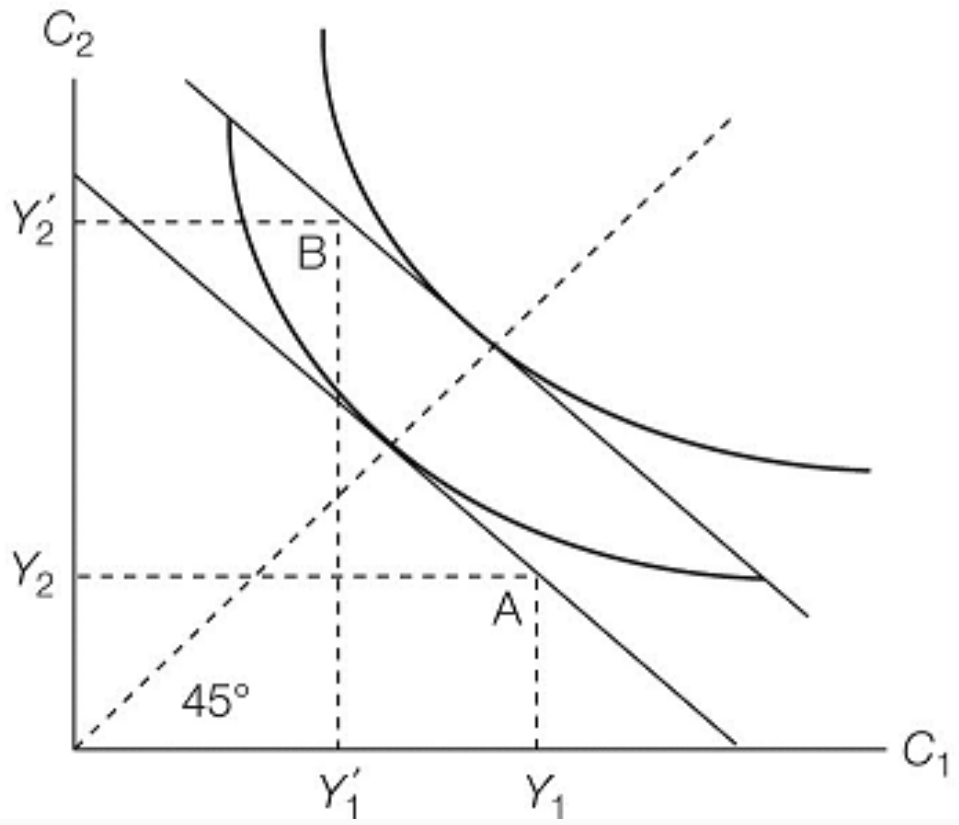
At optimum: $\frac{U'(C_1)}{U'(C_2)} = \frac{1+r}{1+\rho}$

- $\rho = r$: the consumer wants to consume the same amount in both periods
- $\rho > r$: the consumer wants to consume more now than later:

$$U'(C_1) < U'(C_2) \implies C_1 < C_2$$

Equal Consumption

Fig. 4.5 *Consumption choice when the subjective rate of discount equals the real interest rate*



An extended model

Consumer who lives forever

Lifetime utility:

$$U^(C_t) + \frac{U(C_{t+1})}{1+\rho} + \frac{U(C_{t+2})}{(1+\rho)^2} + \dots$$

We assume that the consumer knows future incomes and interest rates and makes a consumption plan for all future periods

Budget restriction:

$$A_{t+1} = Y_t^l + (1+r_t)A_t - C_t$$

Optimum condition:

$$\frac{U'(C_t)}{U'(C_{t+1})/(1+\rho)} = 1 + r_{t+1}$$

Consumption Function

Let us first look at an economy without growth where $\rho = r$

Income and interest are expected to be constant for all time: $Y_t^l = Y^l$ and $r_t = r$

The consumer wants consumption to be constant, which means that assets are constant: $A_t = A_{t+1} = \ldots$

Sustainable level of consumption: $C_t = Y^l + rA_t$

Consumption Fnc. Compact Form

More general consumption function:

$$C = C(Y, Y^e, A, r)$$

Consumption is determined by:

- Current income Y (+)
- Expected future income Y^e (+)
- Real interest rate r (probably -)
- Assets A (+)

Consumption function in the book

A specific consumption function is derived in the book:

$$C = C(Y, Y^e, r, A) = \frac{\bar{r}[Y + A] + Y^e}{\frac{1+r_{t+1}}{1+\rho} + \bar{r}}$$

The effect of a temporary increase in income or an increase in assets is small: it is optimal to consume only the interest rate on what you get!

The effect of a permanent increase in income is close to one

MPC

How much does consumption increase with an increase in income? MPC

Size of MPC is affected by:

- Whether the increase in income is temporary or permanent
- Whether the consumers face credit restrictions

Empirical estimates indicate that MPC is 0.3 – 0.6 but how large it is should depend very much on expectations

Equilibrium interest rate

Equilibrium interest rate: The real interest which is such that aggregate demand is equal to the natural level of production

Knut Wicksell: ‘the natural rate of interest ’

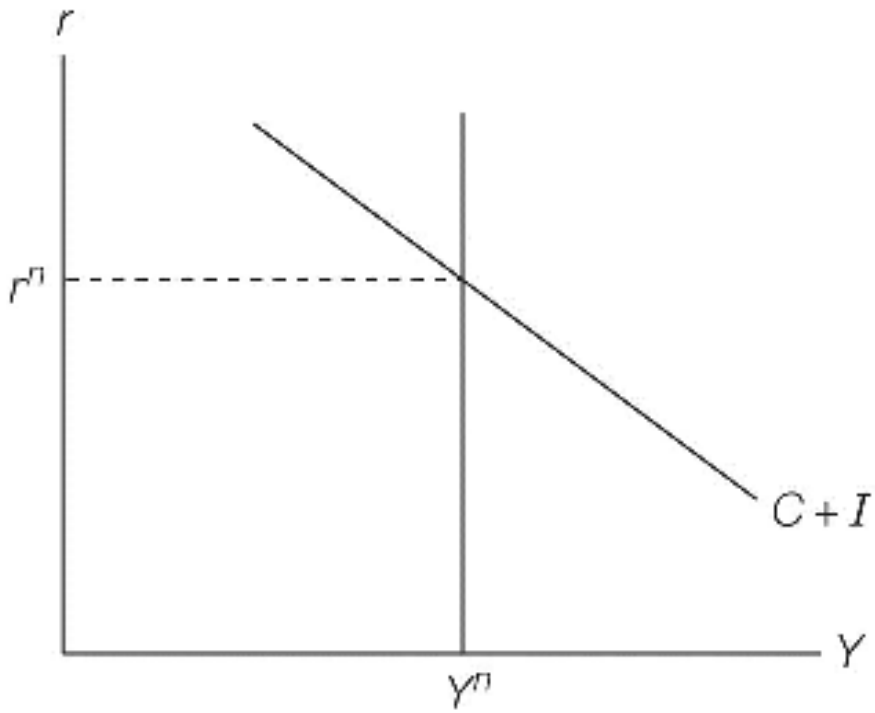
Question: How is the natural rate of interest determined?

The natural rate of interest

$$Y^n = C(Y, Y^e, r, A) + I(r, Y^e, K)$$

where $Y^n = F(K, E(1 - u^n)L)$

Fig. 4.7 *Aggregate demand, long-run aggregate supply, and the natural rate of interest*



Movement of interest rate

How does the interest rate reach its equilibrium level?

- Flow of funds interpretation:
  - Savings function: $S(Y, Y^e, r, A) = Y - C(Y, Y^e, r, A)$
  - Equilibrium condition: $S(Y^n, Y^e, r, A = I(r, Y^e, K)$
  - If desired I higher than S when $Y = Y^n$ demand for loans exceeds supply and interest rate increases
- Monetary policy: if demand is higher than Y^n there will be inflation and the central bank will raise the interest rate

Questions?