CHAPTER FIFTEEN

Consumption

macroeconomics

Chapter overview

This chapter surveys the most prominent work on consumption:

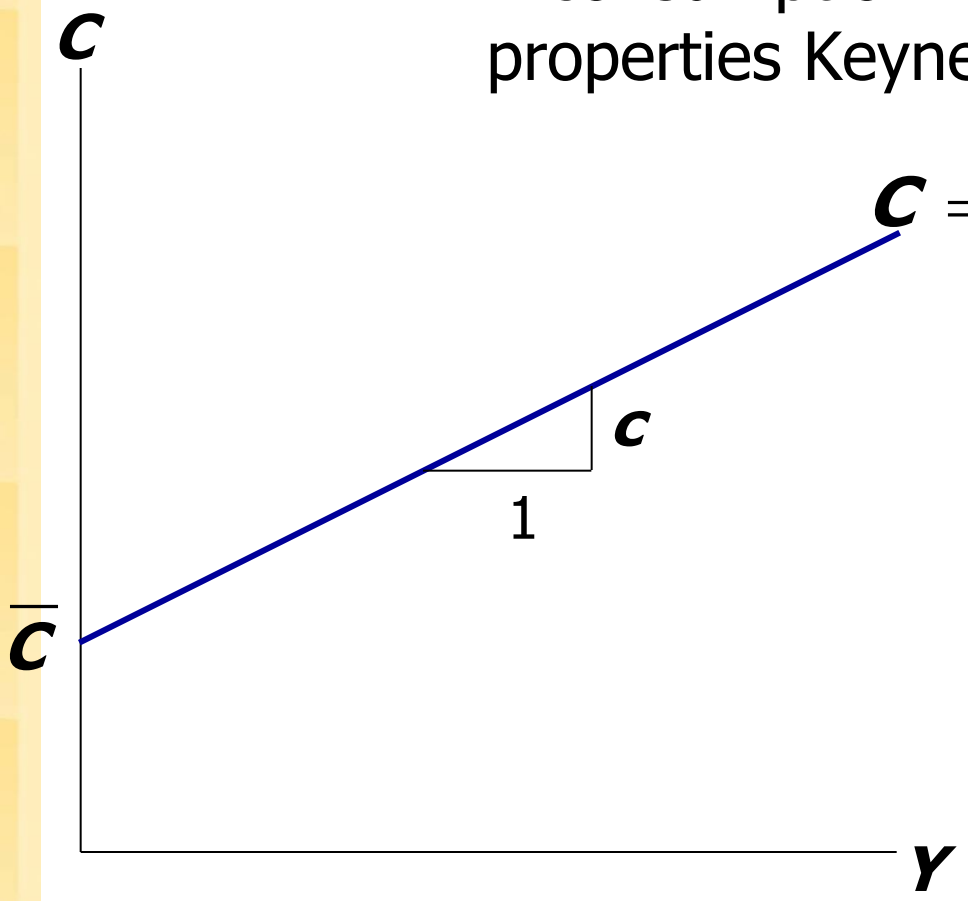
- John Maynard Keynes: consumption and current income
- Irving Fisher and Intertemporal Choice
- Franco Modigliani: the Life-Cycle Hypothesis
- Milton Friedman: the Permanent Income Hypothesis

Keynes's Conjectures

1. $0 < MPC < 1$
2. *APC* falls as income rises
   where *APC*
   = **average propensity to consume**
   = ***C/Y***
3. Income is the main determinant of consumption.

The Keynesian Consumption Function

A consumption function with the properties Keynes conjectured:

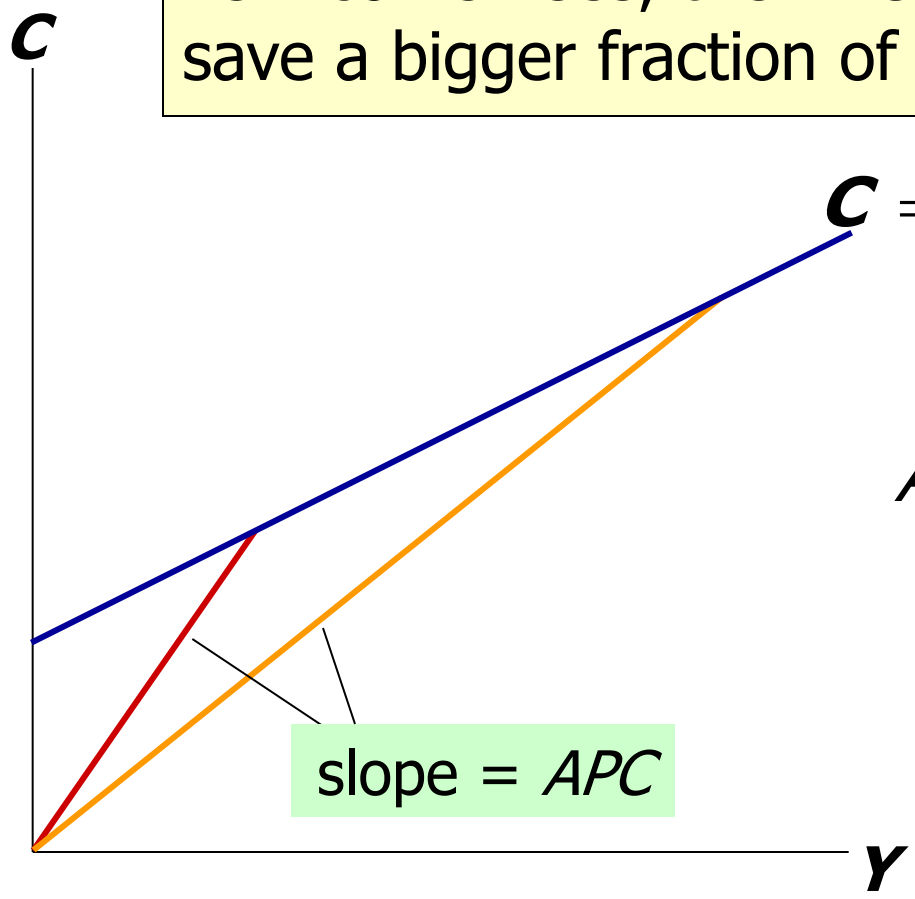


$$C = \overline{C} + cY$$

c = *MPC*
= slope of the consumption function

The Keynesian Consumption Function

As income rises, the APC falls (consumers save a bigger fraction of their income).



$$APC = \frac{C}{Y} = \frac{\bar{C}}{Y} + c$$

Early Empirical Successes: Results from Early Studies

- Households with higher incomes:
  - consume more
    $\Rightarrow MPC > 0$
  - save more
    $\Rightarrow MPC < 1$
  - save a larger fraction of their income
    $\Rightarrow APC \downarrow$ as $\boldsymbol{Y} \uparrow$
- Very strong correlation between income and consumption
    $\Rightarrow$ income seemed to be the main determinant of consumption

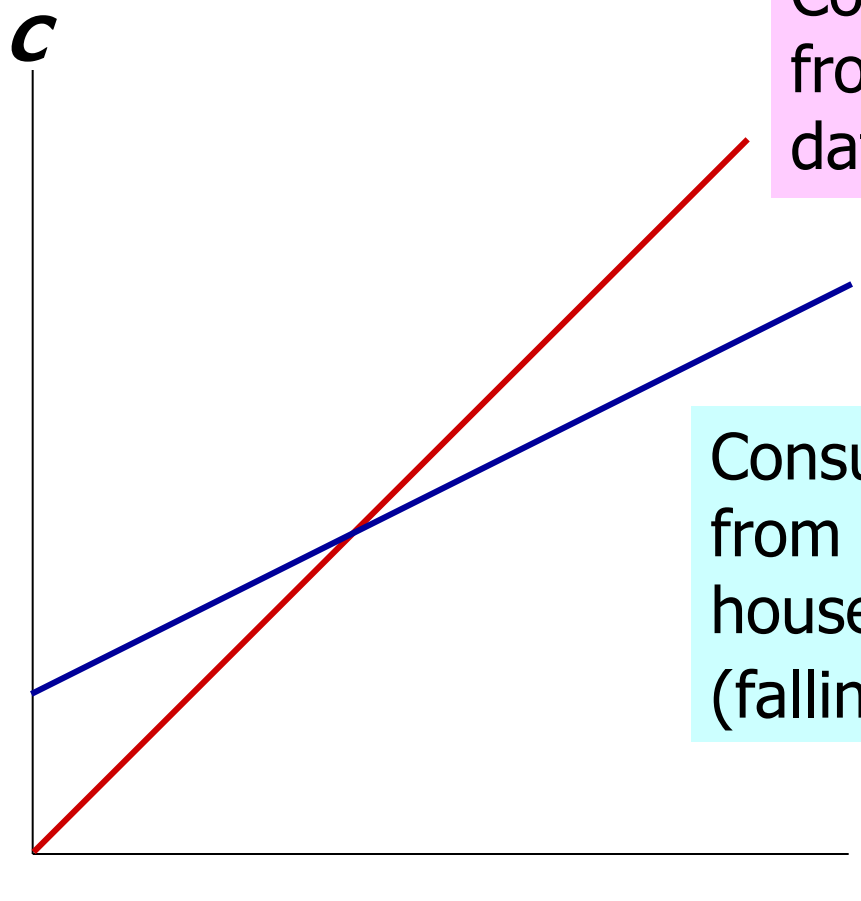
Problems for the Keynesian Consumption Function

Based on the Keynesian consumption function, economists predicted that ***C*** would grow more slowly than ***Y*** over time.

This prediction did not come true:

- As incomes grew, the APC did not fall, and ***C*** grew just as fast.
- Simon Kuznets showed that ***C/Y*** was very stable in long time series data.

The Consumption Puzzle



Consumption function from long time series data (constant *APC*)

Consumption function from cross-sectional household data (falling *APC*)

Irving Fisher and Intertemporal Choice

- The basis for much subsequent work on consumption.
- Assumes consumer is forward-looking and chooses consumption for the present and future to maximize lifetime satisfaction.
- Consumer's choices are subject to an **intertemporal budget constraint**, a measure of the total resources available for present and future consumption

The basic two-period model

- Period 1: the present
- Period 2: the future
- Notation

  Y_1 is income in period 1

  Y_2 is income in period 2

  C_1 is consumption in period 1

  C_2 is consumption in period 2

  $S = Y_1 - C_1$ is saving in period 1

  ($S < 0$ if the consumer borrows in period 1)

Deriving the intertemporal budget constraint

- Period 2 budget constraint:

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

- Rearrange to put C terms on one side and Y terms on the other:

$$(1+r)C_1 + C_2 = Y_2 + (1+r)Y_1$$

- Finally, divide through by $(1+r)$:

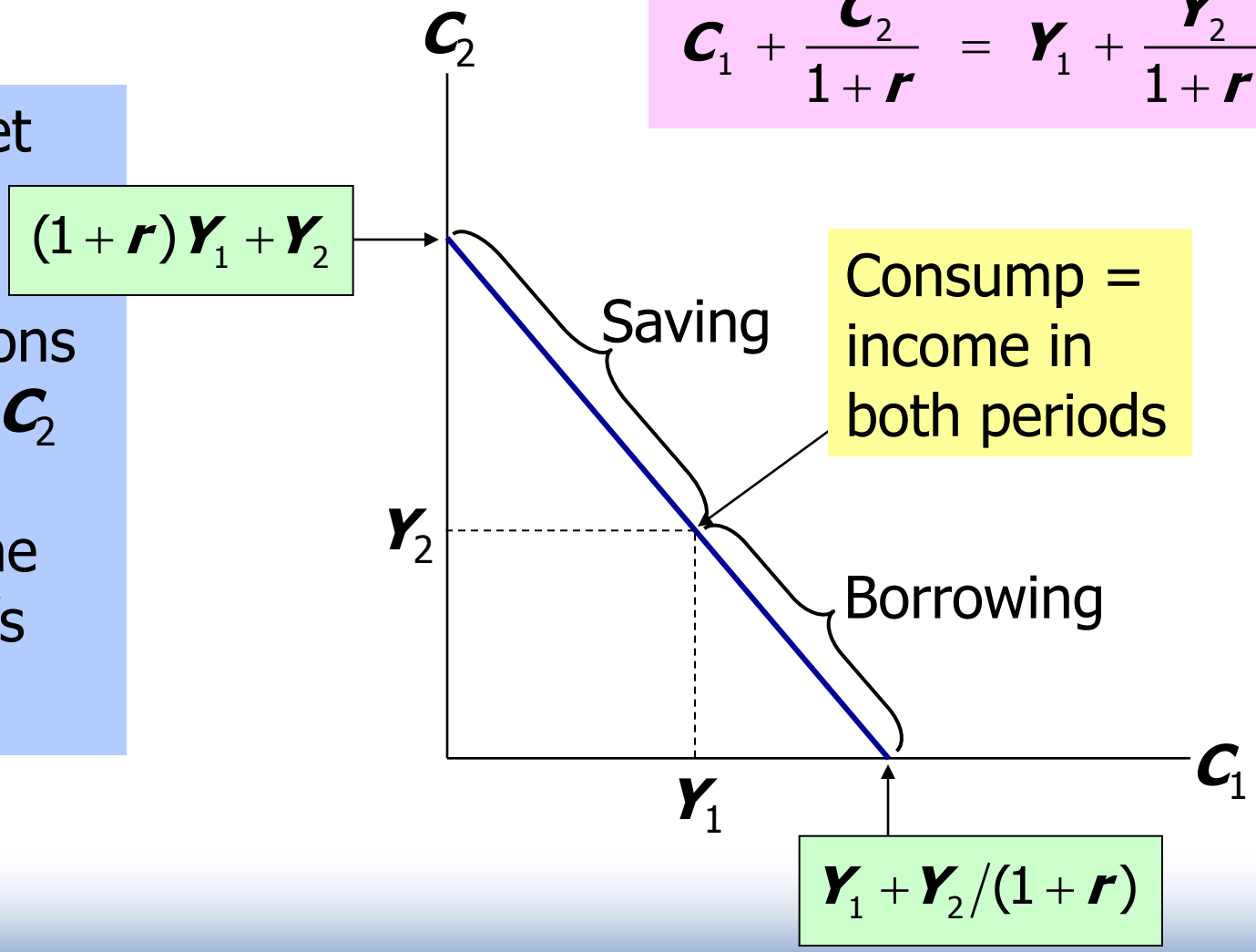
The intertemporal budget constraint

$$\underbrace{C_1 + \frac{C_2}{1+r}}_{\text{present value of lifetime consumption}} = \underbrace{Y_1 + \frac{Y_2}{1+r}}_{\text{present value of lifetime income}}$$

The intertemporal budget constraint

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

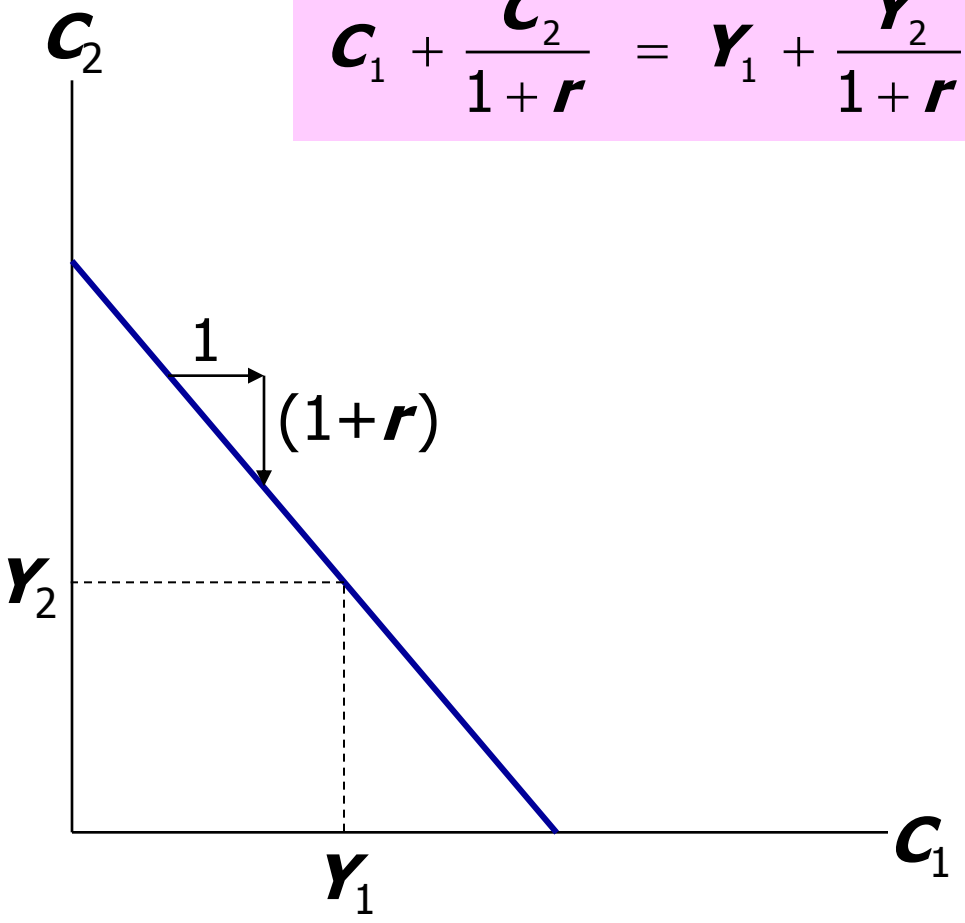
The budget constraint shows all combinations of C_1 and C_2 that just exhaust the consumer's resources.



The intertemporal budget constraint

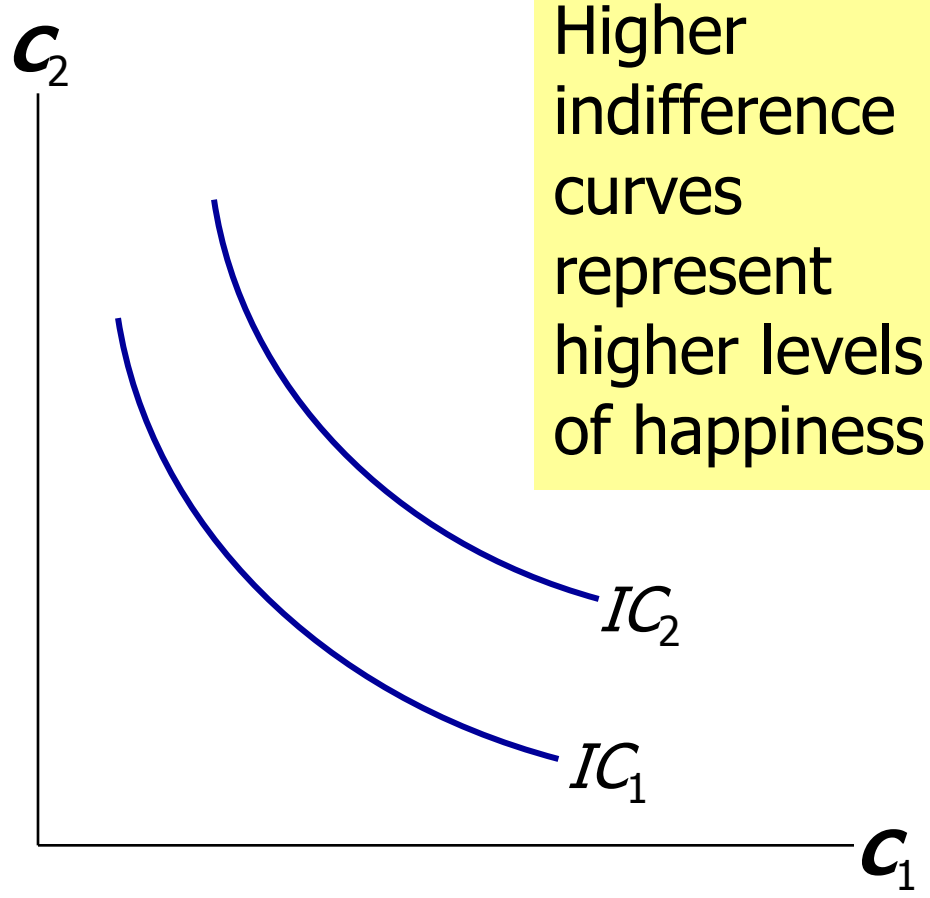
The slope of the budget line equals $-(1+r)$

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$



Consumer preferences

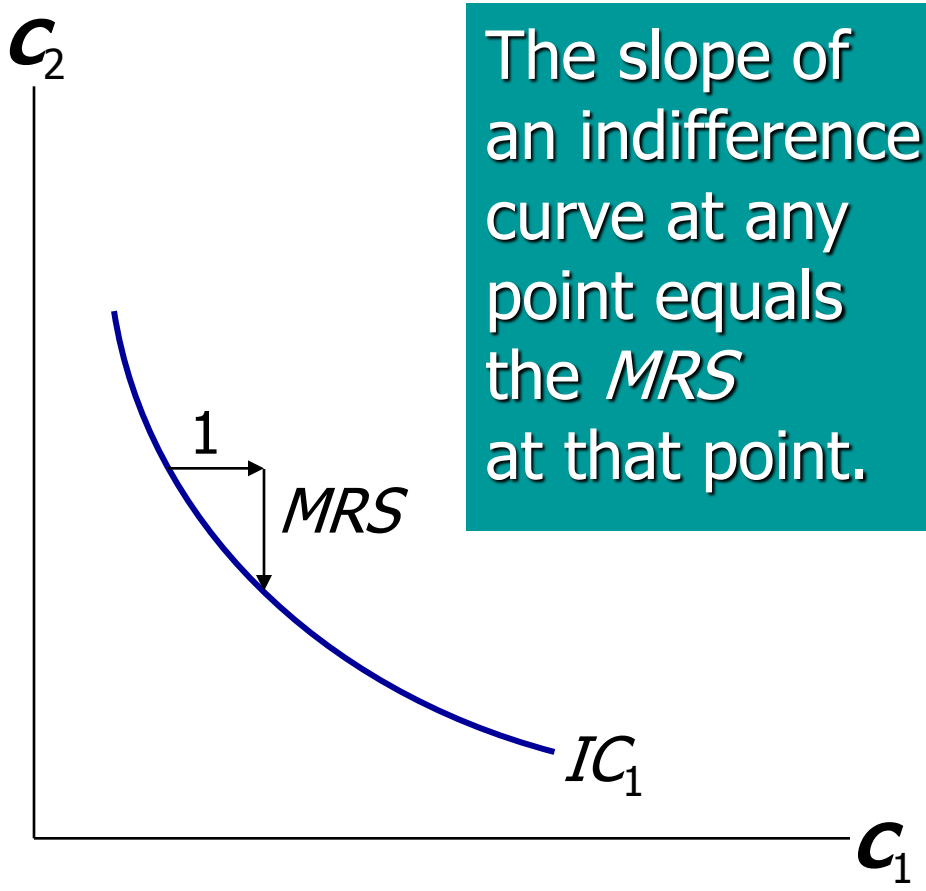
An **indifference curve** shows all combinations of C_1 and C_2 that make the consumer equally happy.



Higher indifference curves represent higher levels of happiness.

Consumer preferences

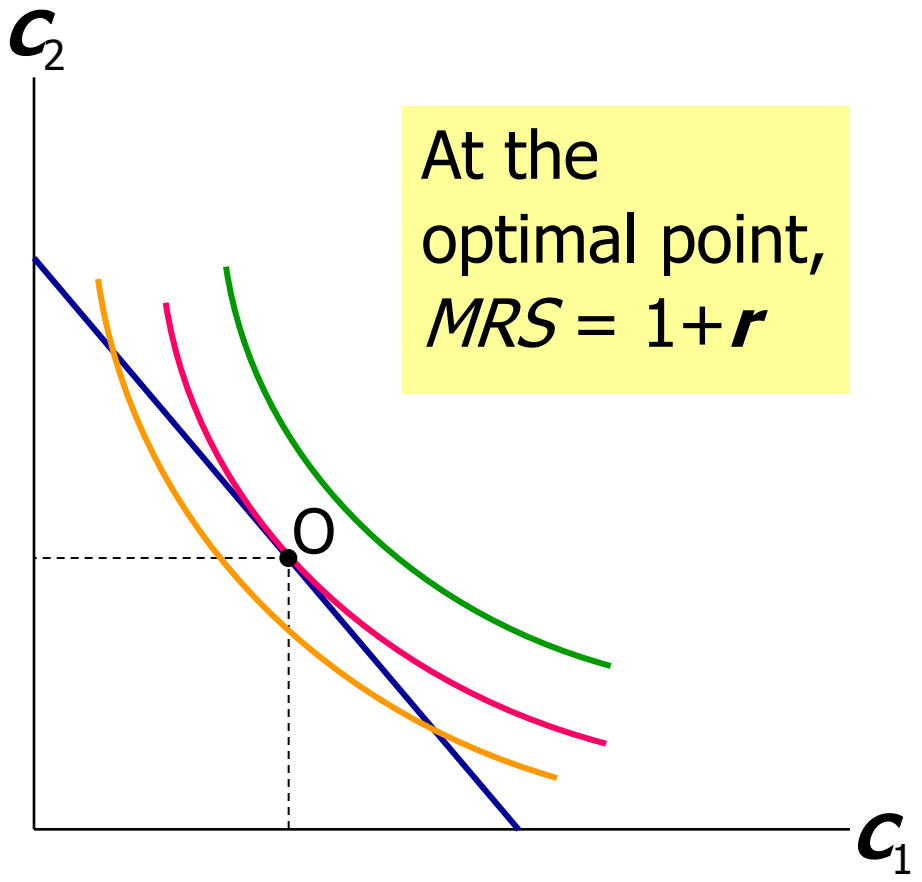
Marginal rate of substitution (*MRS*): the amount of C_2 consumer would be willing to substitute for one unit of C_1.



The slope of an indifference curve at any point equals the *MRS* at that point.

Optimization

The optimal (C_1, C_2) is where the budget line just touches the highest indifference curve.

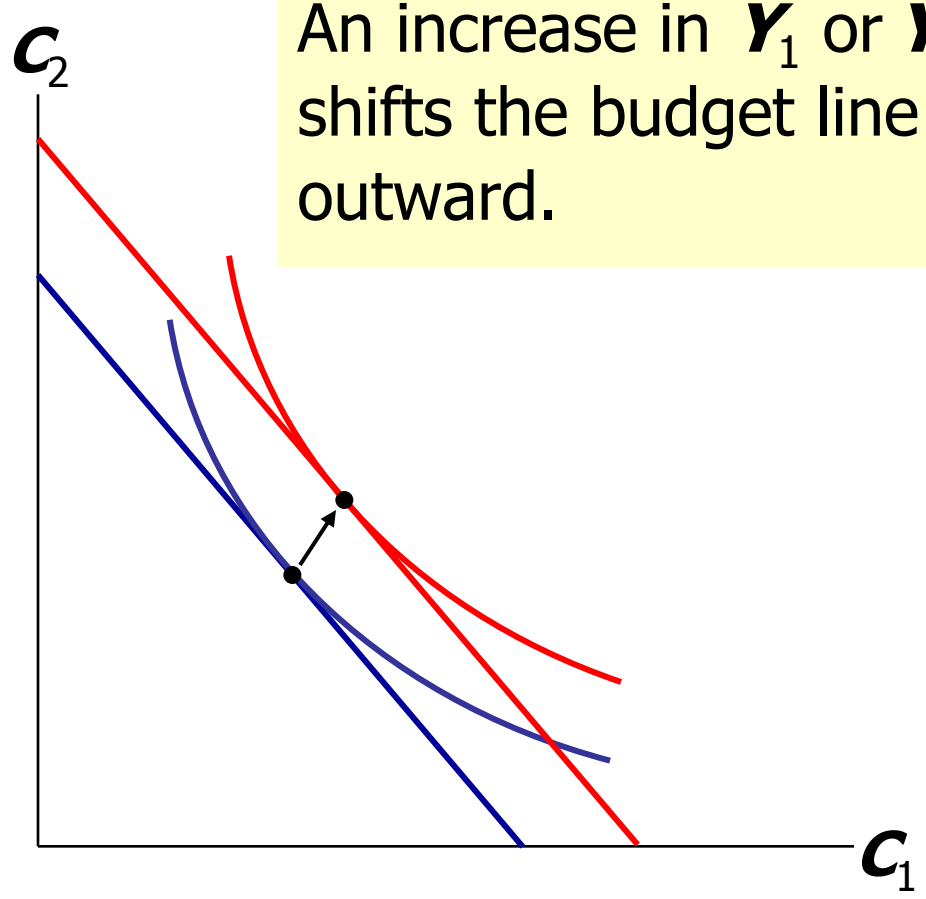


At the optimal point, $MRS = 1+r$

How C responds to changes in Y

Results:
Provided they are both normal goods, C_1 and C_2 both increase,

...regardless of whether the income increase occurs in period 1 or period 2.



An increase in Y_1 or Y_2 shifts the budget line outward.

Keynes vs. Fisher

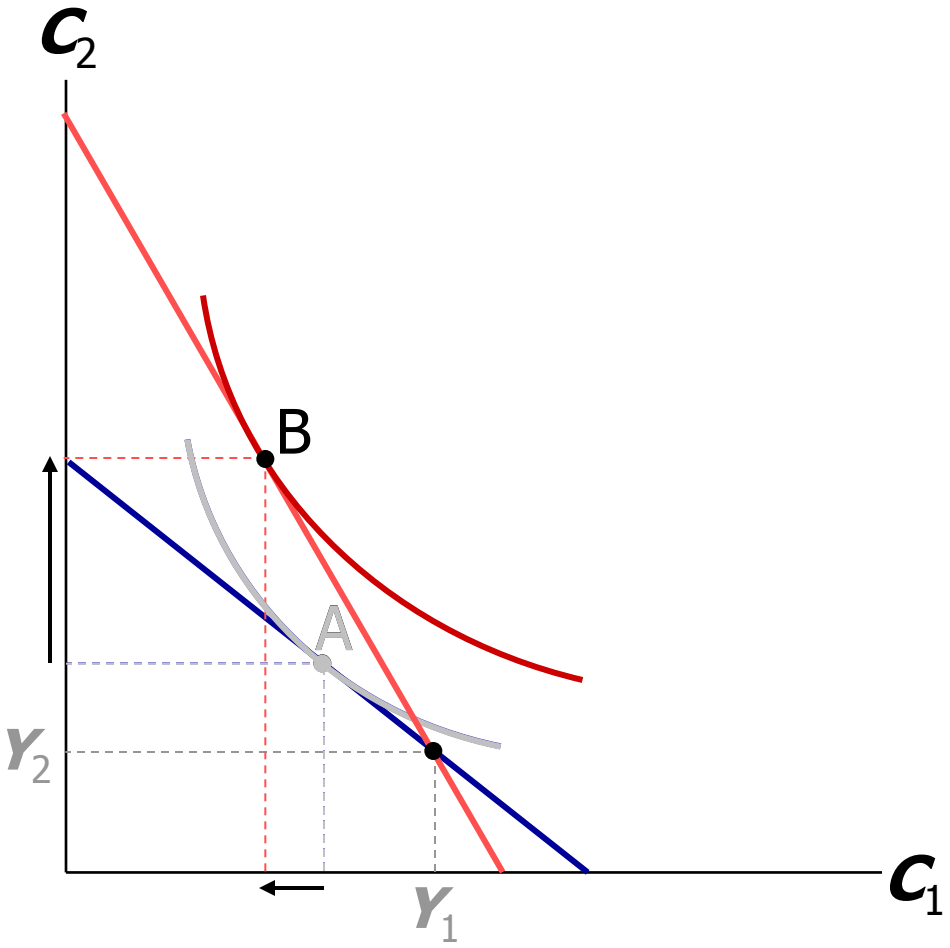
- Keynes:
  current consumption depends only on current income
- Fisher:
  current consumption depends only on the present value of lifetime income;
  the timing of income is irrelevant because the consumer can borrow or lend between periods.

How C responds to changes in r

An increase in r pivots the budget line around the point (Y_1, Y_2).

As depicted here, C_1 falls and C_2 rises.

However, it could turn out differently…



How C responds to changes in r

- income effect
  If consumer is a saver, the rise in r makes him better off, which tends to increase consumption in both periods.
- substitution effect
  The rise in r increases the opportunity cost of current consumption, which tends to reduce C_1 and increase C_2.
- Both effects $\Rightarrow \uparrow C_2$.

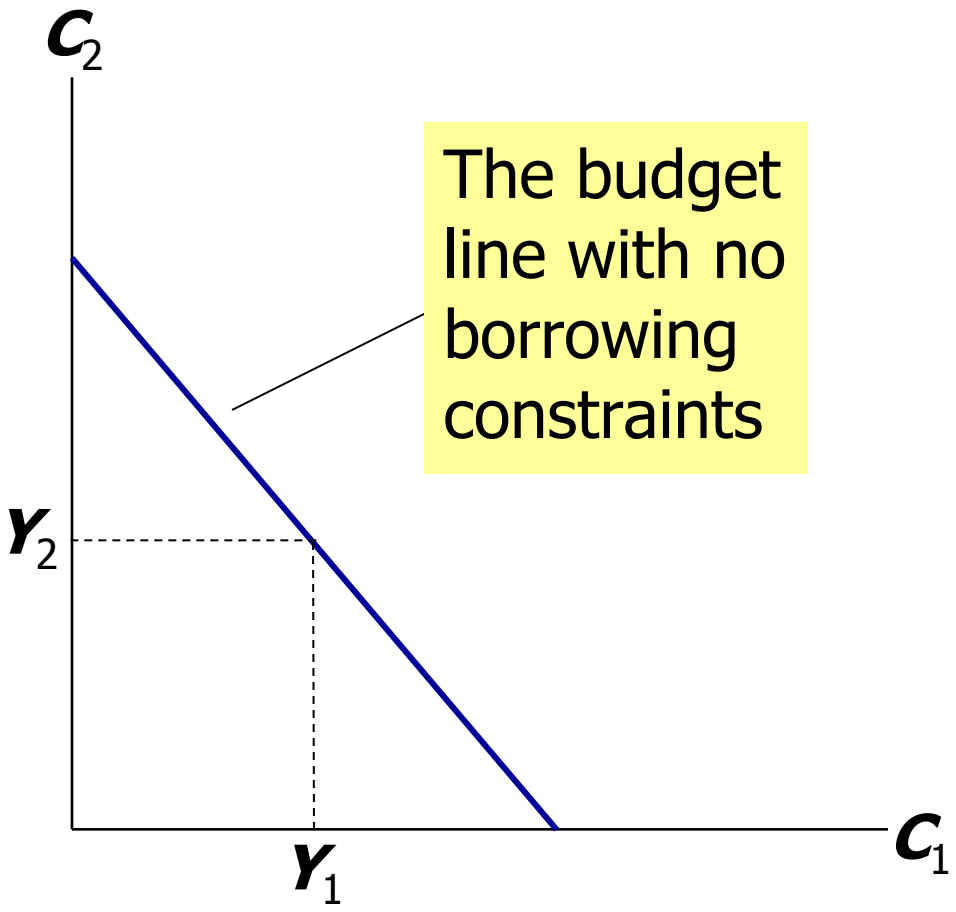
  Whether C_1 rises or falls depends on the relative size of the income & substitution effects.

Constraints on borrowing

- In Fisher's theory, the timing of income is irrelevant because the consumer can borrow and lend across periods.
- Example: If consumer learns that her future income will increase, she can spread the extra consumption over both periods by borrowing in the current period.
- However, if consumer faces **borrowing constraints** (aka "liquidity constraints"), then she may not be able to increase current consumption

  and her consumption may behave as in the Keynesian theory even though she is rational & forward-looking

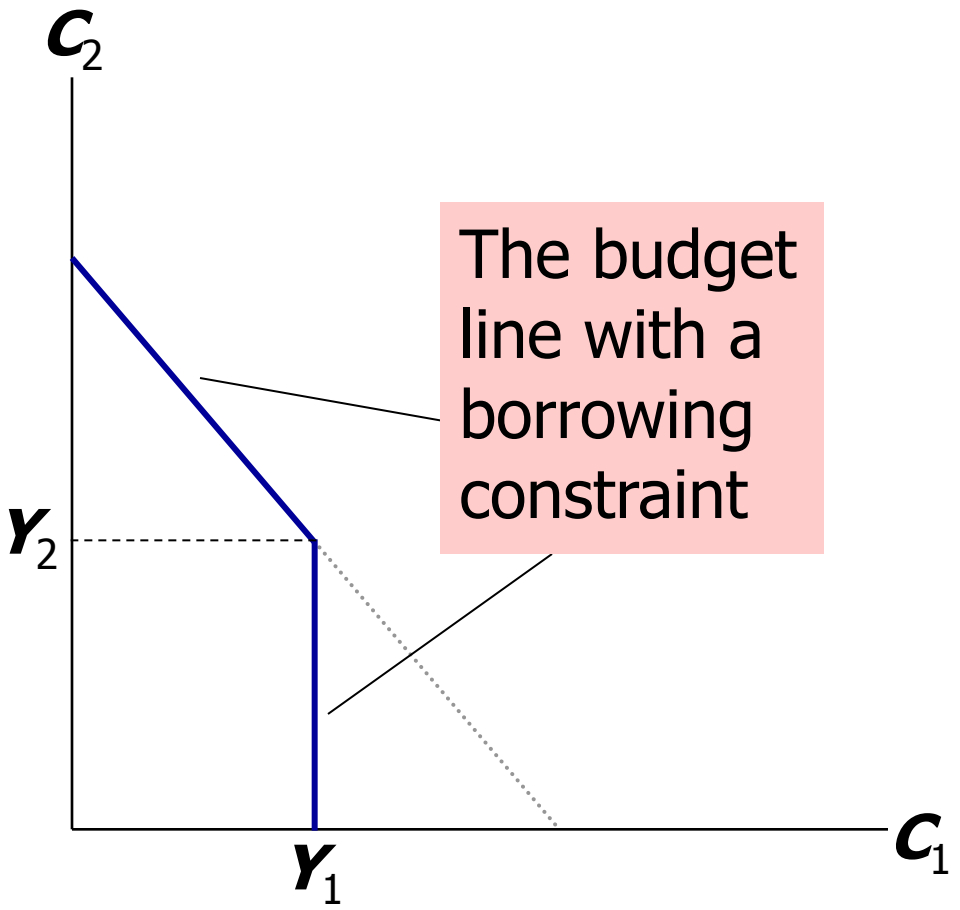
Constraints on borrowing



Constraints on borrowing

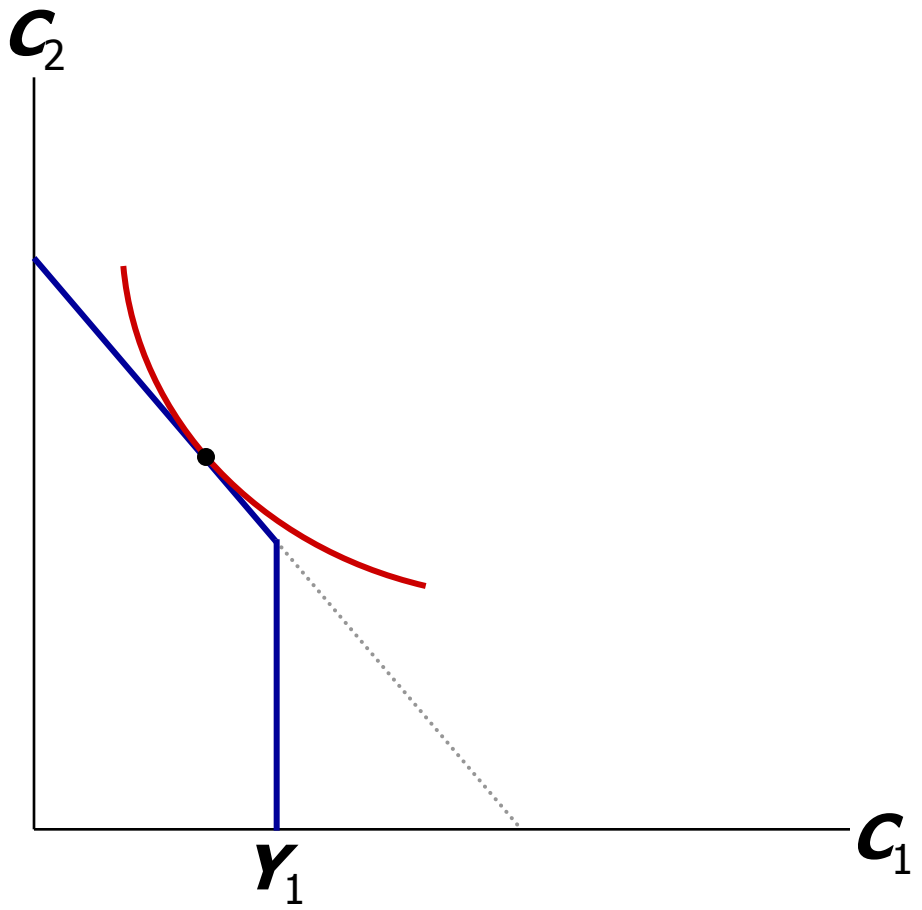
The borrowing constraint takes the form:

$$C_1 \leq Y_1$$



Consumer optimization when the borrowing constraint is not binding

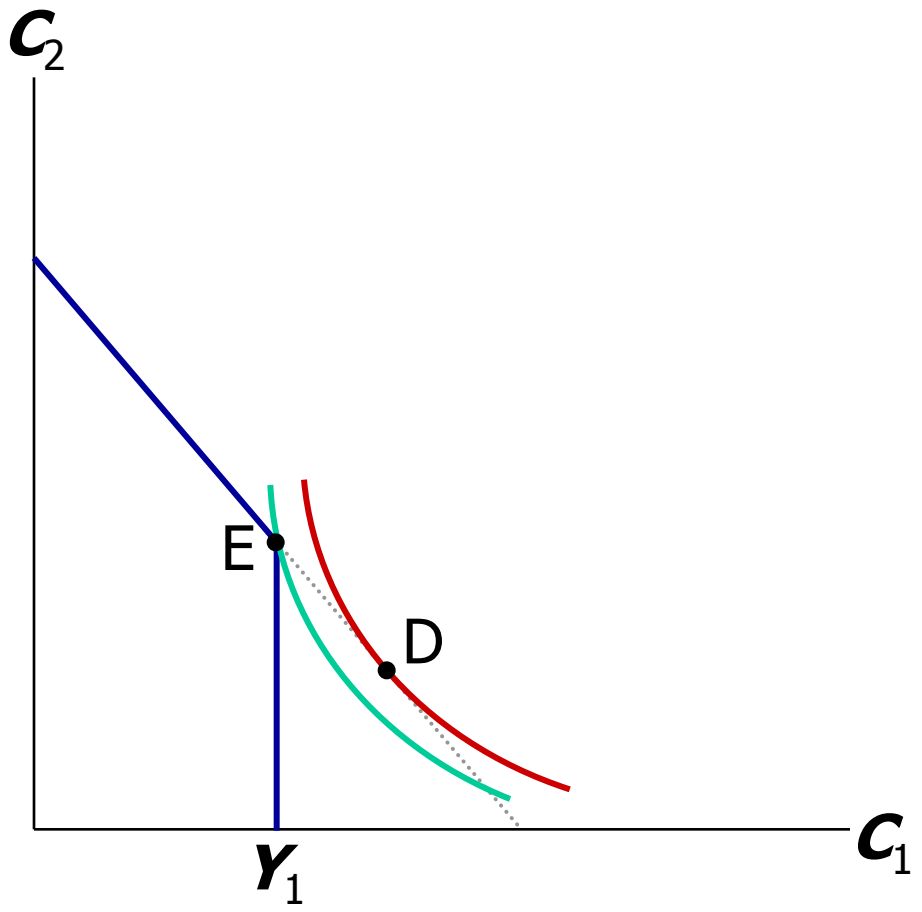
The borrowing constraint is not binding if the consumer's optimal C_1 is less than Y_1.



Consumer optimization when the borrowing constraint is binding

The optimal choice is at point D.

But since the consumer cannot borrow, the best he can do is point E.



The Life-Cycle Hypothesis

- due to Franco Modigliani (1950s)
- Fisher's model says that consumption depends on lifetime income, and people try to achieve smooth consumption.
- The LCH says that income varies systematically over the phases of the consumer's "life cycle,"
  and saving allows the consumer to achieve smooth consumption.

The Life-Cycle Hypothesis

- The basic model:

  W = initial wealth

  Y = annual income until retirement (assumed constant)

  R = number of years until retirement

  T = lifetime in years

- Assumptions:
  - zero real interest rate (for simplicity)
  - consumption-smoothing is optimal

The Life-Cycle Hypothesis

- Lifetime resources = $W + RY$
- To achieve smooth consumption, consumer divides her resources equally over time:

$$C = (W + RY)/T, \text{ or}$$

$$C = \alpha W + \beta Y$$

where

$\alpha = (1/T)$ is the marginal propensity to consume out of wealth

$\beta = (R/T)$ is the marginal propensity to consume out of income

Implications of the Life-Cycle Hypothesis

The Life-Cycle Hypothesis can solve the consumption puzzle:

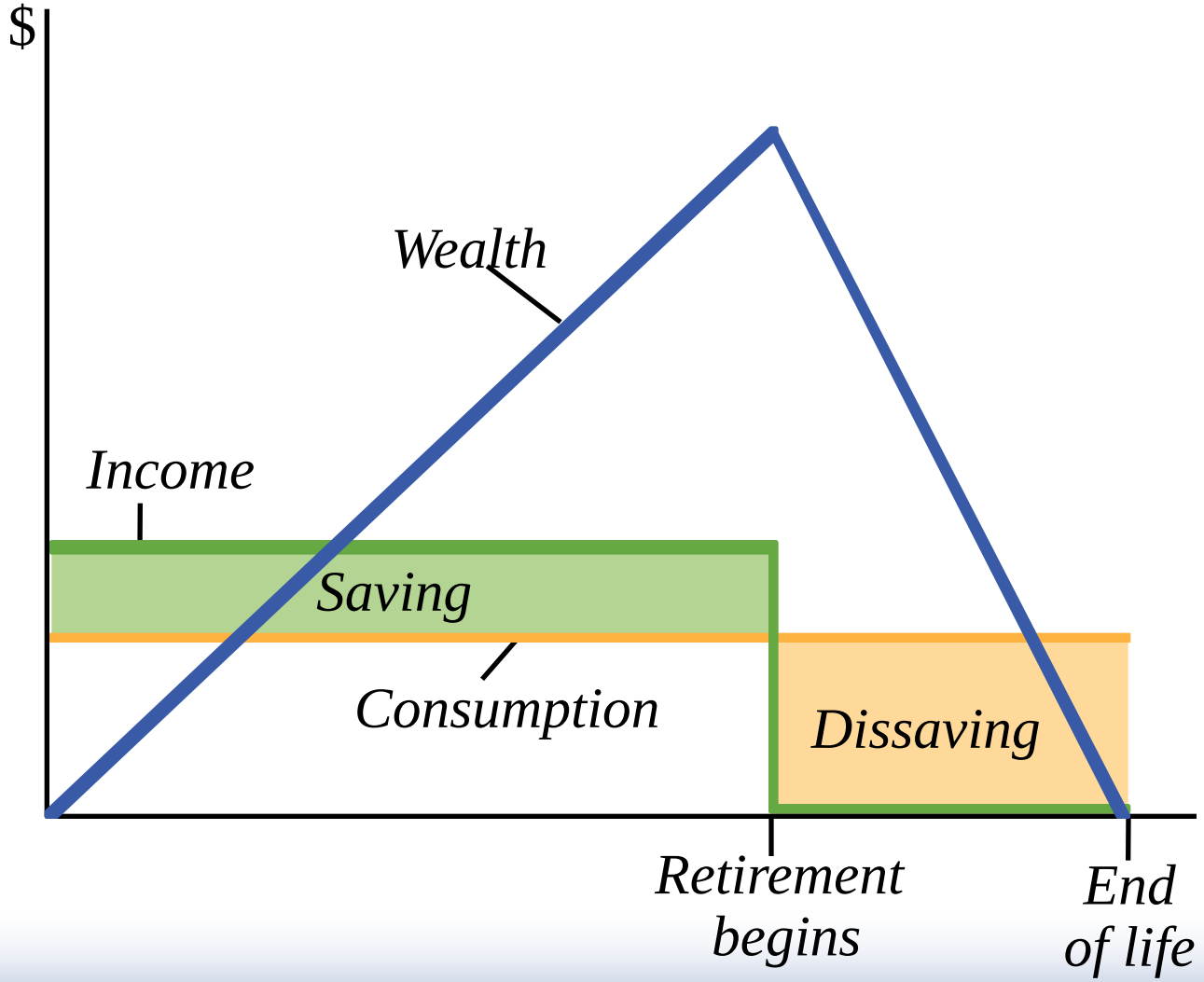
- The *APC* implied by the life-cycle consumption function is

$$C/Y = \alpha(W/Y) + \beta$$

- Across households, wealth does not vary as much as income, so high income households should have a lower APC than low income households.
- Over time, aggregate wealth and income grow together, causing APC to remain stable.

Implications of the Life-Cycle Hypothesis

The LCH implies that saving varies systematically over a person's lifetime.



The Permanent Income Hypothesis

- due to Milton Friedman (1957)
- The PIH views current income Y as the sum of two components:

  permanent income Y^P
  (average income, which people expect to persist into the future)

  transitory income Y^T
  (temporary deviations from average income)

The Permanent Income Hypothesis

- Consumers use saving & borrowing to smooth consumption in response to transitory changes in income.
- The PIH consumption function:

$$C = \alpha Y^{P}$$

where α is the fraction of permanent income that people consume per year.

The Permanent Income Hypothesis

The PIH can solve the consumption puzzle:

- The PIH implies

$$APC = \boldsymbol{C/Y} = \alpha \boldsymbol{Y^P/Y}$$

- To the extent that high income households have higher transitory income than low income households, the APC will be lower in high income households.
- Over the long run, income variation is due mainly if not solely to variation in permanent income, which implies a stable *APC*.

PIH vs. LCH

- In both, people try to achieve smooth consumption in the face of changing current income.
- In the LCH, current income changes systematically as people move through their life cycle.
- In the PIH, current income is subject to random, transitory fluctuations.
- Both hypotheses can explain the consumption puzzle.

Summing up

- Keynes suggested that consumption depends primarily on current income.
- Recent work suggests instead that consumption depends on
  - current income
  - expected future income
  - wealth
  - interest rates
- Economists disagree over the relative importance of these factors and of borrowing constraints and psychological factors.

Chapter summary

1. Keynesian consumption theory
   - Keynes' conjectures
     - *MPC* is between 0 and 1
     - *APC* falls as income rises
     - current income is the main determinant of current consumption
   - Empirical studies
     - in household data & short time series: confirmation of Keynes' conjectures
     - in long time series data: *APC* does not fall as income rises

Chapter summary

2. Fisher's theory of intertemporal choice
   - Consumer chooses current & future consumption to maximize lifetime satisfaction subject to an intertemporal budget constraint.
   - Current consumption depends on lifetime income, not current income, provided consumer can borrow & save.
3. Modigliani's Life-Cycle Hypothesis
   - Income varies systematically over a lifetime.
   - Consumers use saving & borrowing to smooth consumption.
   - Consumption depends on income & wealth.

Chapter summary

4. Friedman's Permanent-Income Hypothesis
   - Consumption depends mainly on permanent income.
   - Consumers use saving & borrowing to smooth consumption in the face of transitory fluctuations in income.