CHAPTER 16

Consumption

MACROECONOMICS SIXTH EDITION

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PowerPoint® Slides by Ron Cronovich

In this chapter, you will learn…

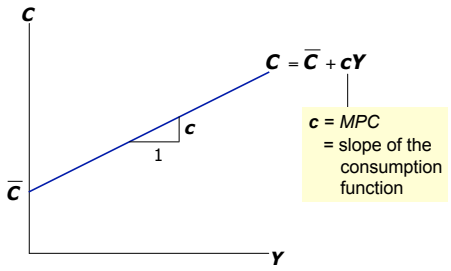
an introduction to the most prominent work on consumption, including:

- John Maynard Keynes: consumption and current income
- Irving Fisher: intertemporal choice
- Franco Modigliani: the life-cycle hypothesis
- Milton Friedman: the permanent income hypothesis
- Robert Hall: the random-walk hypothesis

Keynes's conjectures

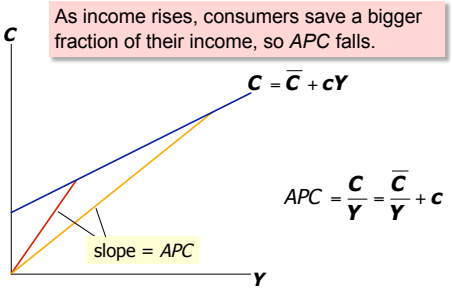
1. $0 < MPC < 1$
2. **Average propensity to consume** (APC) falls as income rises. ($APC = C/Y$)
3. Income is the main determinant of consumption.

The Keynesian consumption function



The Keynesian consumption function

As income rises, consumers save a bigger fraction of their income, so APC falls.



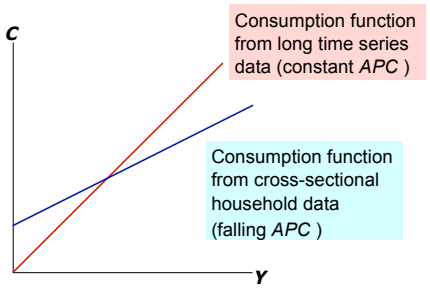
Early empirical successes: Results from early studies

- Households with higher incomes:
  - consume more, ⇒ $MPC > 0$
  - save more, ⇒ $MPC < 1$
  - save a larger fraction of their income, ⇒ APC ↓ as Y ↑
- Very strong correlation between income and consumption:
  - ⇒ 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, *APC* did not fall, and ***C*** grew at the same rate as income.
  - Simon Kuznets showed that ***C*/*Y*** was very stable in long time series data.

The Consumption Puzzle



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, Y_2 = income in period 1, 2

  C_1, C_2 = consumption in period 1, 2

  $S = Y_1 - C_1$ = 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 terms:

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

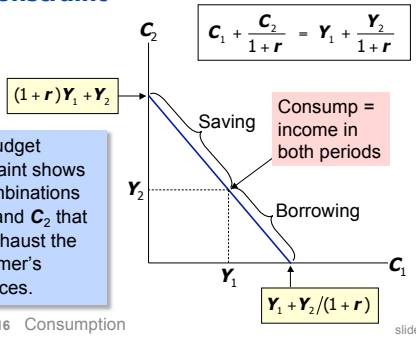
- Divide through by $(1+r)$ to get…

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

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

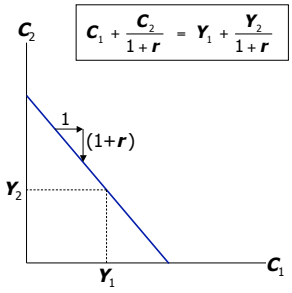


The budget constraint shows all combinations of C_1 and C_2 that just exhaust the consumer's resources.

The intertemporal budget constraint

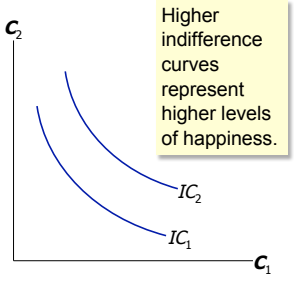
$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

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



Consumer preferences

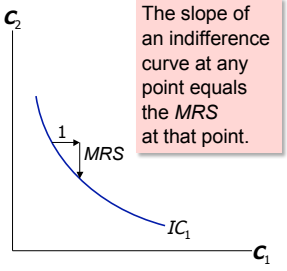
An **indifference curve** shows all combinations of C_1 and C_2 that make the consumer equally happy.



Higher indifference curves represent higher levels of happiness.

Consumer preferences

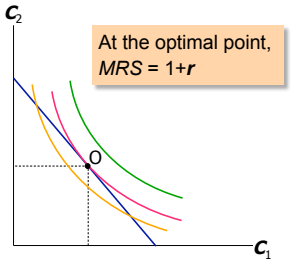
Marginal rate of substitution (*MRS*): the amount of C_2 the consumer would be willing to substitute for one unit of C_1.



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

Optimization

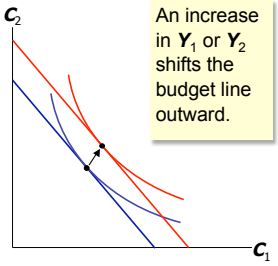
The optimal (C_1, C_2) is where the budget line just touches the highest indifference curve.



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.*



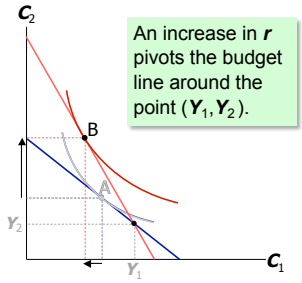
An increase in Y_1 or Y_2 shifts the budget line outward.

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*

As depicted here, C_1 falls and C_2 rises.
However, it could turn out differently…



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

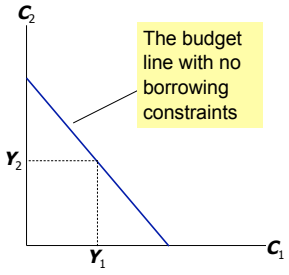
How *C* responds to changes in *r*

- **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: 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

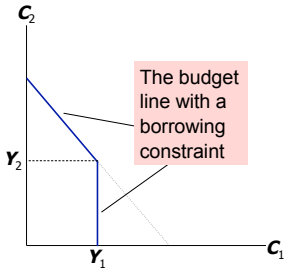


The budget line with no borrowing constraints

Constraints on borrowing

The borrowing constraint takes the form:

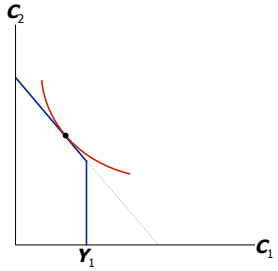
$C_1 \leq Y_1$



The budget line with a borrowing constraint

Consumer optimization when the borrowing constraint is not binding

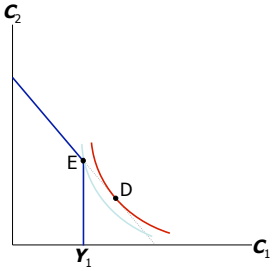
The borrowing constraint is not binding if the consumer's optimal C_1 is less than Y_1.



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:
  $C = (W + RY)/T$, 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

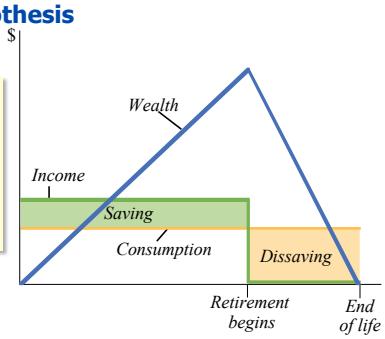
Implications of the Life-Cycle Hypothesis

The LCH can solve the consumption puzzle:

- The life-cycle consumption function implies
  $APC = C/Y = \alpha(W/Y) + \beta$
- Across households, income varies more than wealth, 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)
- $Y = Y^P + Y^T$

where

Y = current income

Y^P = **permanent income**
average income, which people expect to persist into the future

Y^T = **transitory income**
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
  $APC = C/Y = \alpha Y^P/Y$
- If high-income households have higher transitory income than low-income households, *APC* is 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

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

The Random-Walk Hypothesis

- due to Robert Hall (1978)
- based on Fisher's model & PIH, in which forward-looking consumers base consumption on expected future income
- Hall adds the assumption of **rational expectations**, that people use all available information to forecast future variables like income.

The Random-Walk Hypothesis

- If PIH is correct and consumers have rational expectations, then consumption should follow a **random walk**: changes in consumption should be unpredictable.
  - A change in income or wealth that was anticipated has already been factored into expected permanent income, so it will not change consumption.
  - Only unanticipated changes in income or wealth that alter expected permanent income will change consumption.

Implication of the R-W Hypothesis

If consumers obey the PIH and have rational expectations, then policy changes will affect consumption *only if they are unanticipated.*

Summing up

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

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 of subject to an intertemporal budget constraint.
   - Current consumption depends on lifetime income, not current income, provided consumer can borrow & save.

Chapter Summary

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.

Chapter Summary

5. Hall's random-walk hypothesis
   - Combines PIH with rational expectations.
   - Main result: changes in consumption are unpredictable, occur only in response to unanticipated changes in expected permanent income.