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
- Robert Hall: the Random-Walk Hypothesis
- David Laibson: the pull of instant gratification

Keynes's Conjectures

1. 
2. where APC = average propensity to consume = C/Y
3. 
4. 
5. 
6.
The Keynesian Consumption Function

A consumption function with the properties Keynes conjectured:

\[ C = C^0 + c Y \]

\[ c = \text{MPC} \]

\[ = \text{slope of the consumption function} \]

---

The Keynesian Consumption Function

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

\[ \text{APC} = \text{______________} \]

---

Early Empirical Successes: Results from Early Studies

- Households with higher incomes:
  - \( \Rightarrow \text{MPC} > 0 \)
  - \( \Rightarrow \text{MPC} < 1 \)
  - \( \Rightarrow \text{APC} \downarrow \text{as } Y \uparrow \)
- Very strong correlation between income and consumption
  - \( \Rightarrow \text{income seemed to be the main determinant of consumption} \)
Problems for the Keynesian Consumption Function

Based on the Keynesian consumption function, economists predicted that ________

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

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 _______________, 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 ______________
  (\( S < 0 \) if the consumer borrows in period 1)

---

Deriving the intertemporal budget constraint

- Period 2 budget constraint:
  \[ C_2 = Y_2 + (1 + r)S \]
  = ______________

- 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

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

present value of ______________

present value of ______________
The budget constraint shows all combinations of $C_1$ and $C_2$ that just exhaust the consumer’s resources.

The intertemporal budget constraint:

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

Consumption = income in both periods

The slope of the budget line equals $1 + r$.

An indifference curve shows all combinations of $C_1$ and $C_2$ that make the consumer indifferent.

Higher indifference curves represent higher levels of happiness.
Marginal rate of substitution (MRS): the amount of \( C_2 \) consumer would be _______.

So the MRS is the (negative) of the _______.

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

At the optimal point, ___________.

An increase in \( Y_1 \) or \( Y_2 \) shifts the budget line outward.
**Temporary v. permanent**

Temporary rise in income: \( Y_1 \) alone  
Permanent rise in income: \( Y_1 \) and \( Y_2 \) equally

Save part of income: \( \frac{C'}{Y'} \)  
So \( C_2 = Y_2 \)

C moves with \( Y_1 \)  
So \( C_2 = Y_2 \)

**Keynes vs. Fisher**

- Keynes: current consumption depends only on current income
- Fisher: current consumption depends only on ______________;
  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,  
However, it could turn out differently...
How C responds to changes in r

- If consumer is a saver, the rise in r makes him better off, which tends to increase consumption in both periods.
- The rise in r increases the opportunity cost of current consumption, which tends to reduce C₁ and increase C₂.
- Both effects ⇒ ↑C₂.
  Whether C₁ 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 __________ (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 borrowing constraint takes the form:

\[ C_1 + C_2 = Y_1 + Y_2 \]

The budget line with a borrowing constraint.
The borrowing constraint is not binding if the consumer’s optimal \( C_1 \) is __________. 

Consumer optimization when the borrowing constraint is not binding

The optimal choice is at point D. But since the consumer cannot borrow, the best he can do is point E.

Consumer optimization when the borrowing constraint is binding

So under borrowing constraints, current consumption __________. 

Suppose increase in income in period 1

The rise in income to \( Y'_1 \) shifts the budget constraint right. \( C'_1 \) rises with \( Y'_1 \).
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 ________ over the phases of the consumer’s “life cycle,” and saving allows the consumer to achieve smooth consumption.

The basic model:

\[ W = Y = \text{(assumed constant)} \]

\[ R = \text{number of years until retirement} \]

\[ T = \text{lifetime in years} \]

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

Lifetime resources =

To achieve smooth consumption, consumer divides her resources equally over time:

\[ C = \frac{1}{T} W, \text{ or } C = \alpha W + \beta Y \]

where

\[ \alpha = \frac{1}{T} \] is the marginal propensity to consume out of wealth

\[ \beta = \frac{R}{T} \] 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 \( \frac{C}{Y} = \) __________.
- Across households, wealth does not vary as much as income, so high income households __________ than low income households.
- Over time, aggregate wealth and income grow together, causing APC __________.

Numerical Example

- Suppose you start working at age 20, work until age 65, and expect to earn $50,000 each year, and you expect to live to 80.
- Lifetime income = __________.
- Spread over 60 years, so
  \[ C = \] __________.
- So need to save $12,500 per year.
Example continued

- Suppose you win a lottery which gives you $1000 today.
- Will spread it out over all T years, so consumption rises by only $1000/T = $16.70 this year.
- So temporary rise in income has a ________
- But if lottery gives you $1000 every year for the T years, consumption rises by ________

The Permanent Income Hypothesis

due to Milton Friedman (1957)

- The PIH views current income $Y$ as the sum of two components:
  - $Y_P$ (average income, which people expect to persist into the future)
  - $Y_T$ (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:
  $$C = \alpha Y$$
  where $\alpha$ 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 $\text{APC} = \frac{C}{Y}$
- To the extent that high income households have higher transitory income than low income households, the APC will be ______ income households.
- Over the long run, income variation is due mainly if not solely to variation in permanent income, which implies a ________.

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.

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:

- 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

The Psychology of Instant Gratification

- Theories from Fisher to Hall assume that consumers are rational and act to maximize lifetime utility.
- Recent studies by David Laibson and others consider the psychology of consumers.
The Psychology of Instant Gratification

- Consumers consider themselves to be imperfect decision-makers.
  - E.g., in one survey, 76% said they were not saving enough for retirement.
- Laibson: The "pull of instant gratification" explains why people don't save as much as a perfectly rational lifetime utility maximizer would save.

Two Questions and Time Inconsistency

1. Would you prefer
   (A) a candy today, or
   (B) two candies tomorrow?
2. Would you prefer
   (A) a candy in 100 days, or
   (B) two candies in 101 days?

In studies, most people answered A to question 1, and B to question 2.
A person confronted with question 2 may choose B. 100 days later, when he is confronted with question 1, the pull of instant gratification may induce him to change his mind.

Summing up

- Recall simple Keynesian consumption function:
  \[ C = c + \beta Y \]
  where only current income (Y) mattered.
- Research shows other things should be included:
  - expected future income (perm't income model)
  - wealth (life cycle model)
  - interest rates (Fisher model)
  - but current income should still be present (due to borrowing constraints)
- Modern policy analysis models allow for all this.