Chapter 16: Consumption

Key points:

- The lifecycle theory of consumption
- The permanent income hypothesis

Keynes’ consumption function:

- Properties:
  - A marginal propensity to consume between 0 and 1
    - \(0 < MPC < 1\)
  - A declining average propensity to consume
    - \(APC = \frac{C}{Y}, \frac{\partial APC}{\partial Y} < 0\)
    - Consumption only a function of income (not interest rates!! - big assumption)
    - e.g. something like, \(C = \bar{C} + MPC \times (Y - T)\)
    - e.g. if \(C = 500 + 0.8(Y - T), \ MPC = 0.8 < 1, \) if \(Y = 200, \ T = 0\) then \(APC = \frac{500 + 0.8(200 - 0)}{200} = \frac{660}{200} = 3.3\), whereas if \(Y = 500, \ APC = \frac{500 + 400}{500} = \frac{9}{5} = 1.8\)
  - Empirical Success:
    - Higher income people save more and consume more
      - \(\implies 0 < MPC < 1\)
    - Higher income save a larger fraction of income
      - \(\implies APC = \frac{C}{Y}\) declining in \(Y\), i.e., \(\frac{\partial APC}{\partial Y}\) < 0
      - Changes in \(Y\) explain most of \(C \rightarrow\) not much room for \(r\)
  - Empirical Failures:
    - 1. Secular stagnation
      - b/c \(APC = \frac{C}{Y}, \ \frac{\partial APC}{\partial Y} < 0\), then \(C\) falls and \(S\) ↑ as income grows.
      - The result: The economy would enter a period of low growth as exhaust profitable resources
      - This never happened (though some suggest it is starting to happen now)
    - 2. Kuznets’ data
      - 1869-1940 → growth in income in aggregate, but \(APC\) not change
    - 3. The consumption puzzle
      - Keynes’ consumption function works for households and in the short run - where the \(APC\) declines in income
      - The consumption function doesn’t work well when looking at households over longer periods of time or for the economy in aggregate - where the \(APC\) doesn’t change with income
Solution to Keynes:

- Solve the puzzle using microeconomic theory to explain aggregate consumption
- Intertemporal choice - no longer present income and present consumption

Intertemporal Choice:

- Choose consumption over lifetime
- Can borrow and lend
  - Allows one to move income around over lifetime
  - Lifetime budget constraint - limited by what make in lifetime, not in a given year
- 2-period example:
  - live 2 periods
  - earn income in both: \( Y_1 \) and \( Y_2 \)
  - consume in both: \( C_1 \) and \( C_2 \)
  - borrow or lend between periods at rate \( r \)
  - Think of consumption in each period as different goods:
    - Consumer maximizes utility: \( U(C_1, C_2) \)
    - Subject to lifetime budget constraint:
      - Period 1: \( Y_1 - C_1 = S \)
      - Period 2: \( C_2 = (1 + r)S + Y_2 \)
      - Together: \( C_2 = (1 + r)(Y_1 - C_1) + Y_2 \)
      - Or: \( C_1 + \frac{C_2}{1 + r} = Y_1 + \frac{Y_2}{1 + r} \)
    - Note that future consumption costs less than current because earn rate \( r \) on savings (\( p_1 = 1, p_2 = \frac{1}{1+r} < 1 \), if \( r > 0 \))
    - Note that future income worth less in PV terms because current income allows opp to earn interest
    - This is the lifetime budget constraint- says that agent can consume more in one period or another - just limited to resources over lifetime
  - Once you think of \( C_1 \) and \( C_2 \) as different goods, and see that the ability to borrow/lend at rate \( r \) changes the relative price of present vs future consumption, analysis is just like static, 2-good problem in micro.
  - Budget Constraint:
  - DRAW axes of \( C_1 \) and \( C_2 \) and budget constraint. Note that slope of budget constraint is \(-(1+r)\).
  - Note endowment point and highlight parts of LBC that show savings/borrowing.
  - Preferences:
  - DRAW preferences: IC1, IC2 are indifference curves.
Indifference curves have slope = - marginal rate of substitution (MRS)

\[ MRS = \frac{MU_{C1}}{MU_{C2}} \]

This is the rate at which agent would trade future consumption to obtain consumption today

**Optimization:**

- **DRAW** budget constraint and ICs all together. Show that point of tangency is optimal bundle - puts agent on highest indiff curve.

  - As w/ apples and oranges, utility is maximized by choosing the IC tangent to the BC
  
  - When IC tangent to BC, this means that the both have the same slope.
  
  - Slope IC = - MRS = \(-\frac{MU_{C1}}{MU_{C2}}\)
  
  - Slope BC = - price ratio = - \(\frac{p_1}{p_2}\) = \(-\frac{1}{1 + r}\) = \(-(1 + r)\)
  
  - Thus, at optimum choice of \(C_1\) and \(C_2\), \(\frac{MU_{C1}}{MU_{C2}} = 1 + r\)
  
  - In words, this means that the marginal benefit of trading off \(C_2\) for \(C_1\) in terms of utility (the LHS of the above equality) is equal to the terms of trade of \(C_2\) for \(C_1\) (give by the RHS of the equality above).
  
  - Another way to write this equation is that \(MU_{C1} = (1 + r)MU_{C2}\). Which means that the marginal utility per present value dollar spent on \(C_1\) (the LHS) equals the marginal utility per present value dollar spent on \(C_2\) (the RHS).

**Implications:**

- \(C_1\) and \(C_2\) depend on \(Y_1, Y_2,\) and \(r\)

- lifetime (not present) income matters for consumption decisions

- \(r\) matters for consumption

  - \(\uparrow r\) may increase or decrease income

  - Depends if consumer is a net borrower (decreases cons) or net saver (increases cons)

- Borrowing constraints matter

  - If constrained, present income will matter

**Life-cycle theory of consumption:**

- Franco Modigliani’s attempt to solve the Consumption Puzzle

- Person has wealth and earns income until retirement

- People like to consumption smooth

  - The preference for smoothing consumption is related to risk aversion and the concept of diminishing marginal utility

  - Use example where achieve perfect smoothing \(\rightarrow\) consume same in all periods of life

    - Initial wealth = \(W\), \(R\) years of working life, \(Y\) income per year working, \(T\) years in life

    - \(\Rightarrow C = \frac{W + RY}{T}\), where \(C\) is consumption in each period

    - \(\Rightarrow C = \frac{W}{T} + \frac{R}{T}Y\)

    - If everyone has this function, then economy-wide consumption given by:

      - \(C = \alpha W + \beta Y\)

      - \(\alpha = \) marginal propensity to consume out of current wealth

      - \(\beta = \) marginal propensity to consume out of current income

      - **DRAW** consumption function with intercept \(\alpha W\) and slope \(\beta\)

      - Note: This looks a lot like Keynes’ consumption function
A function like this solves the Consumption Puzzle

\[ APC = \frac{C}{Y} = \alpha \frac{W}{Y} + \beta \]

- Short run: Year over year (or person over person); \( W \) doesn’t change quickly, so \( \uparrow Y \Rightarrow \downarrow APC \)
- Long run: Over time, \( W \uparrow \) if \( Y \uparrow \Rightarrow \frac{W}{Y} \) not change with \( Y \uparrow \Rightarrow APC \) not change when \( Y \uparrow \)

Other implications:
- Savings rate changes over lifetime
- e.g. earn $50k per year (\( Y \)), $100k initial wealth (\( W \)), \( r = 0 \), work 20 years, retire 20 yrs
- DRAW graph with time on horiz axis, dollars on vertical. Show consume 27.5k each year for life = (50x20+100)/40. Save 50k-27.5k while working. Dissave 27.5k per year when retired.

The Permanent-Income Hypothesis:
- Milton Friedman’s solution to the Consumption Puzzle
- Current income has a permanent and temporary (transitory) component:
  - So income is not pre-determined, but is uncertain
  - \( Y = Y^P + Y^T \)
  - e.g. salary + bonus
- Consumers want to smooth consumption, so consumption decisions should depend largely on permanent income
  - \( \Rightarrow \) consumption some fraction of permanent income: \( C = \alpha Y^P \)
  - \( \alpha \) = fraction of permanent income consumed each year
- Implications:
  - \( APC = \frac{C}{Y} = \frac{\alpha Y^P}{Y} \)
  - recall, \( Y = Y^P + Y^T \)
  - So if \( Y^T \uparrow \Rightarrow Y \uparrow \Rightarrow APC \downarrow \)
- How a function like this solves the consumption puzzle:
  - Get \( \frac{\partial APC}{\partial Y} < 0 \) in the short run because transitory changes in income do not affect consumption
  - Over a longer period of time, transitory changes average out, so \( APC = \frac{\alpha Y^P}{Y} \) and \( APC \) is constant

The Random-Walk Hypothesis:
- Robert E. Hall (Stanford)
- Consumers are forward looking, so base consumption on expectations of future income
- Combine this with the Permanent Income Hypothesis, \( Y = Y^P + Y^T \)
- Implications:
  - Consumption follows a random-walk (i.e., all changes in consumption are unpredictable)
Only unexpected policy changes influence consumption. Policy changes have effects as soon as they change expectations (i.e., before they are implemented).

**Behavioral Economics:**
- Use psychology to predict economic behavior.
- Drop assumptions about strict rationality, forward-lookingness.
- E.g., time inconsistent preferences:
  - $100 today vs $101 tomorrow
    * Most take $100 today.
  - $100 in 100 days vs $101 in 101 days
    * Most take $101.
  - $\Rightarrow$ people may not be saving as much as they’d like to (when they look backwards in time, they wish they’d have saved more).
- Other things that alter the standard consumption functions we’ve looked at here:
  - Habit formation (todays cons depends on yesterday’s).
  - Reference dependent preferences (care about cons relative to peer group).

**Summary:**
- Keynes: Consumption = $f(Y)$
- Others: Consumption = $f(Y, W, r, \text{future income, expectations, psychology, borrowing constraints,...})$