ECON 3510 - Intermediate Macroeconomic Theory

Fall 2015

Mankiw, *Macroeconomics, 8th ed.*, Chapter 16

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 $S \uparrow$ 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 $\rightarrow$ 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: $Y_1 - C_1 = \underbrace{S}_{\text{savings}}$
    - Period 2: $C_2 = \underbrace{(1+r)S}_{\text{earn return } r \text{ on savings}} + Y_2$
    - Together: $\Rightarrow C_2 = (1+r)(Y_1 - C_1) + Y_2$
    - Or: $\Rightarrow C_1 + \underbrace{\frac{C_2}{1+r}}_{\text{PV of future cons}} = Y_1 + \underbrace{\frac{Y_2}{1+r}}_{\text{PV of future income}}$
    - 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 C1 and C2 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 = - $\frac{p_1}{p_2} = -\frac{1}{\frac{1}{1+r}} = -(1+r)$
  - 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 → 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:
    - $C = \alpha W + \beta Y$
    - α = marginal propensity to consume out of current wealth
    - β = marginal propensity to consume out of current income
    - DRAW consumption function with intercept αW and slope β
    - 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 $\uparrow Y \Rightarrow \downarrow \frac{W}{Y} \Rightarrow \downarrow APC$
    - 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
  - $Y = \underbrace{Y^P}_{\text{perm income}} + \underbrace{Y^T}_{\text{temp income}}$
  - 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: $C = \alpha Y^P$
  - α = 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 $APC = \frac{\alpha Y^P}{Y^P}$ 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 = $f(Y, W, r,$ future income, expectations, psychology, borrowing constraints,...)