

ECON 7010 - MACROECONOMICS I

Fall 2015

Notes for Lecture #5

Today- HH Problem:

- 2-period deterministic HH Problem
- 2-period HH Problem with stochastic income

Household optimization

- What is dynamic?
 - savings; state=wealth, control=consumption/future wealth
 - expenditures on durables; state=stock of durables, control=purchase of durables
 - human capital accumulation; state=education, control=continue in program/go to college
 - family size/structure; state=divorce/#adults/#kids, controls=?
 - health; state=health, control=exercise/smoke/health expenditures
 - employment status; state=employed or unemployed, control=search when unemployed
- We'll look at savings first and derive some important macro results concerning the HH's problem.
- We'll also have our first look at how these theoretical models tie into empirical analysis.
- While our focus is on savings first, you should be able to see how these results generalize.

2-period Household Problem

- Non-stochastic case: $\max(c_0) + \beta u(c_1)$, s.t. $c_0 + \left(\frac{c_1}{R_0}\right) = \underbrace{y_0 + \left(\frac{y_1}{R_0}\right) + A_0}_{I = \text{present value of lifetime income}}$
 - endowment y_t in period $t = 0, 1 \rightarrow$ labor income
 - endowment of A_0 from previous generation \rightarrow non labor income
 - $\underbrace{R_0 \text{ is return}}_{\text{market gross real rate of return}}$ on borrowing/lending
 - FOC: $u'(c_0) = R_0 \beta u'(c_1)$
 - draw graph with period 0 and period 1 consumption on each axis. Show that if $\beta R_0 = 1$ then indifference curve tangent at 45 degree line (because only way marginal utilities equal is if consumption in each period equal)
- Stochastic Income Case
 - y_0 known before choosing saving
 - y_1 not known until period 1
 - $\max_{c_0} E_{y_1|y_0} \{u(c_0) + \beta u(\underbrace{R_0(A_0 + y_0 - c_0) + y_1}_{c_1})\}$
 - * Show step where we pass expectations through
 - * FOC: $u'(c_0) = \beta R_0 E_{y_1|y_0} u'(c_1)$

- * $\beta R_0 = 1 \Rightarrow u'(c_0) = E_{y_1|y_0} u'(c_1)$ does not imply $u'(c_0) = u'(c_1)$
- Example: Highlight $\frac{\partial c_0}{\partial y_0}$ (how does consumption vary as income varies)
 - $u(c) = a + bc - \left(\frac{d}{2}\right) c^2$ (a, b, d) are parameters
 - first order process for y_t
 - * $y_1 = \rho y_0 + \tilde{\varepsilon}_1$, ρ is a parameter - it parameterizes the persistence of the income process
 - * We assume $E\tilde{\varepsilon}_1 = 0$, thus we know $E(y_1) = E\{\rho y_0 + \varepsilon_1\} = E\rho y_0 + E\varepsilon_1 = \rho y_0$
 - $\beta R_0 = 1$ assumption
 - How rewrite $u'(c_0) = \beta R_0 E_{y_1|y_0} u'(c_1)$ with the above assumptions?
 - * $b - dc_0 = E_{y_1|y_0} \{b - d(R_0(A_0 + Y_0 - c_0) + y_1)\}$
 - * can solve this for c_0 : $c_0 = R_0(A_0 + y_0 - c_0) + \underbrace{E_{y_1|y_0} y_1}_{=\rho y_0 \text{ from above}}$ - b/c with linear function we can pull the expectations operator through
 - * $\Rightarrow c_0 = \frac{R_0 A_0 + R_0 y_0 + \rho y_0}{1 + R_0}$
 - * $\Rightarrow c_0 = \frac{R_0 A_0 + y_0 (R_0 + \rho)}{1 + R_0}$
 - $\Rightarrow \frac{\partial c_0}{\partial y_0} = \frac{R_0 + \rho}{R_0 + 1} > 0 \Rightarrow \rho \uparrow \Rightarrow \frac{\partial c_0}{\partial y_0} \uparrow$
 - if ρ close to 1, means high earnings now imply high earning later - persistence. So consume more as y_0 increase because income increase is more permanent (if $\rho = 1$ consumption increases dollar for dollar with income because a permanent increase in income)
 - This is exactly Milton Friedman's Permanent Income Hypothesis.
 - * This theory sought to explain the "consumption puzzle"
 - * The puzzle was the the Keynesian consumption function models could not explain the empirical fact that the average propensity to consume ($\frac{C}{Y}$) falls as income rises in the short run, but is flat as income rises when looking over longer time periods.
 - * The PIH proposes that consumption responds more to permanent income changes than transitory changes. Thus you get a falling APC in the short run because consumption doesn't change so much for transitory increases in income. But these transitory shocks average out in the long run - so in the long run, consumption is a function of permanent income.