Consumption Smoothing, Saving, Credit and Insurance

Lecture 6/1: Saving and Permanent Income Hypothesis

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Consumption Smoothing, Risk Management and Poverty Dynamics

- There is temporal uncertainty with respect to the budget constraint. Both prices and incomes vary unpredictably over time.
- Especially, Agricultural sector has relatively price inelastic market demand that leads to high price variability, and agroclimatic shocks that lead to high variability in agggregate local output
- Basic question for policy makers: whether there is need for interventions to stabilize incomes or to provide public safety nets in order to ensure stable consumption and to keep people from falling into poverty traps.
- How people smooth consumption themselves: by saving in cash or in kind, by borrowing, by pooling risk through formal or informal insurance mechanisms, or by diverifying their incomes
- Most obstables for access to financial services: information asummetrics, enforcement problems, and covariate risk

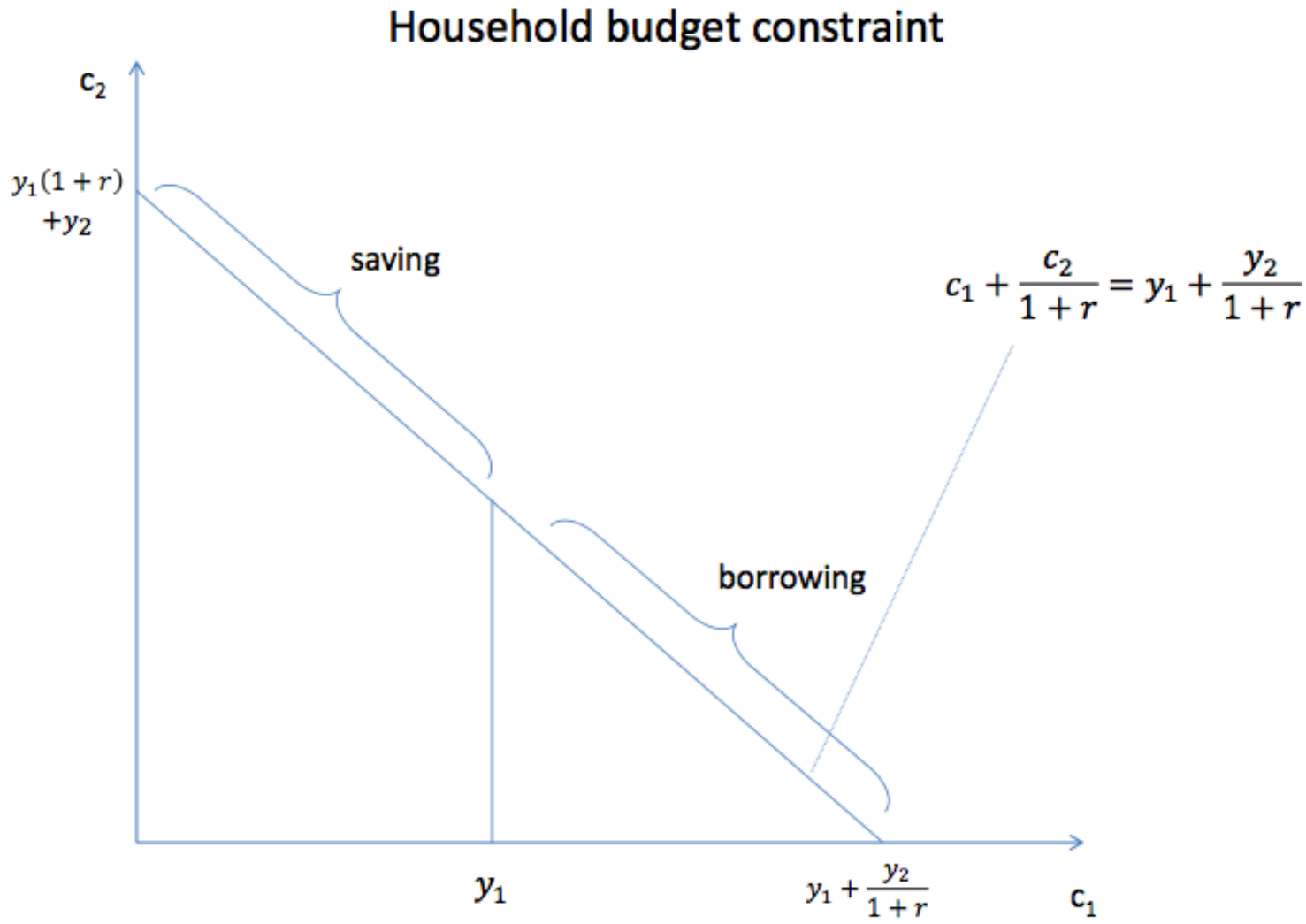
Consumption smoothing & Savings: Theory

- One way to smooth consumption - an individual can use savings to transfer consumption into the future
- Suppose that an individual lives for 2 periods. She earns y_1 in period 1, and y_2 in period 2.
  - In period 1, she can save or borrow, at the interest rate r
  - Her utility over consumption is each period is $U(c_1)$ and $U(c_2)$
  - She discounts future utility at rate β

Consumption smoothing & Savings: Theory

- The individual's maximization problem is:
  $Max_{c_1,c_2} U(c_1) + \beta U(c_2)$
  subject to
  $c_1 = y_1 - S$
  $c_2 = y_2 + (1 + r)S$
- We can combine these two equations to yield the intertemporal budget constraint:
  $c_1 + \frac{c_2}{1+r} = y_1 + \frac{y_2}{1+r}$
  - The first term is the present value of lifetime consumption
  - The second term is the present value of lifetime income

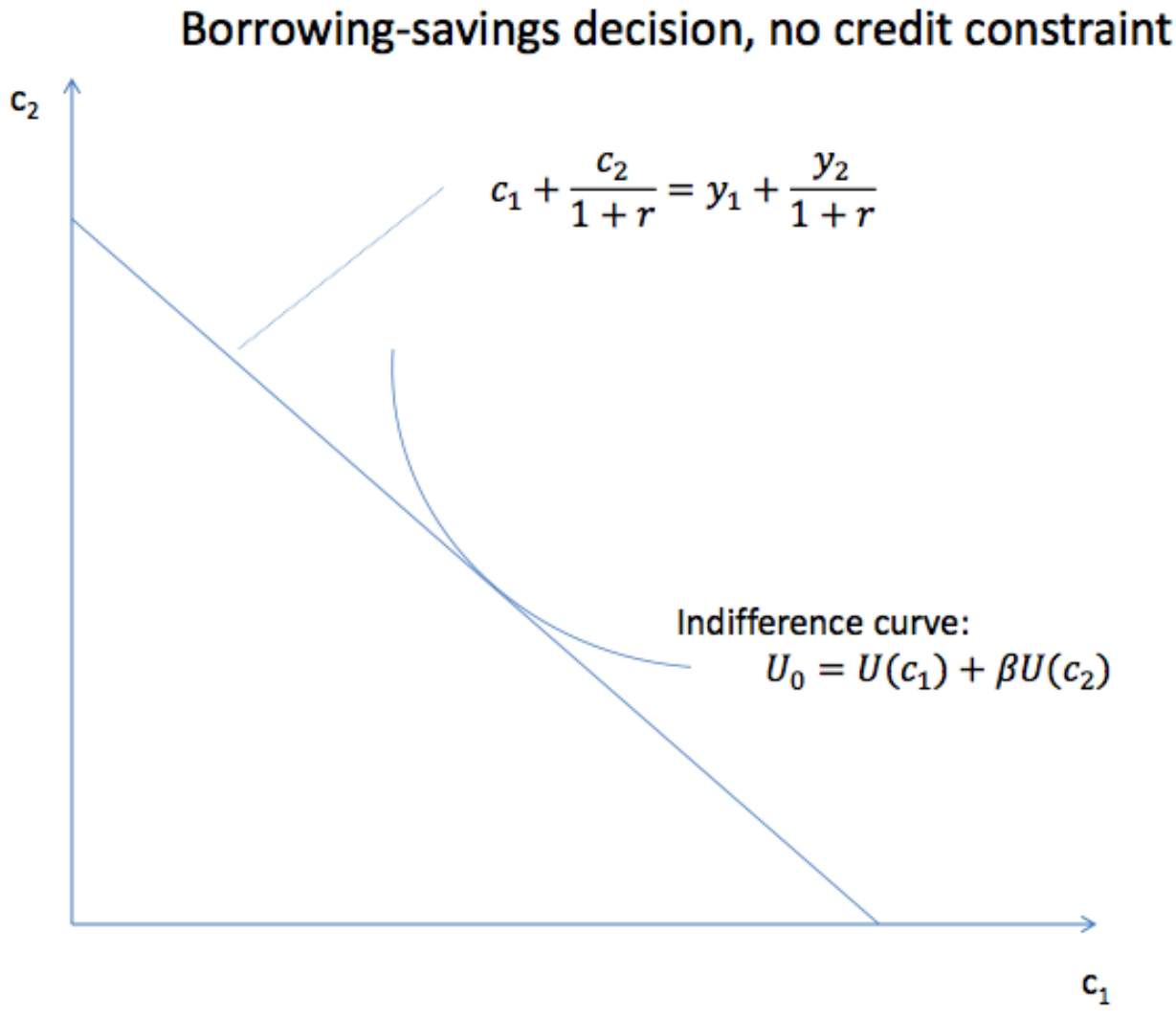
Consumption smoothing & Savings: Theory



Consumption smoothing & Savings: Theory

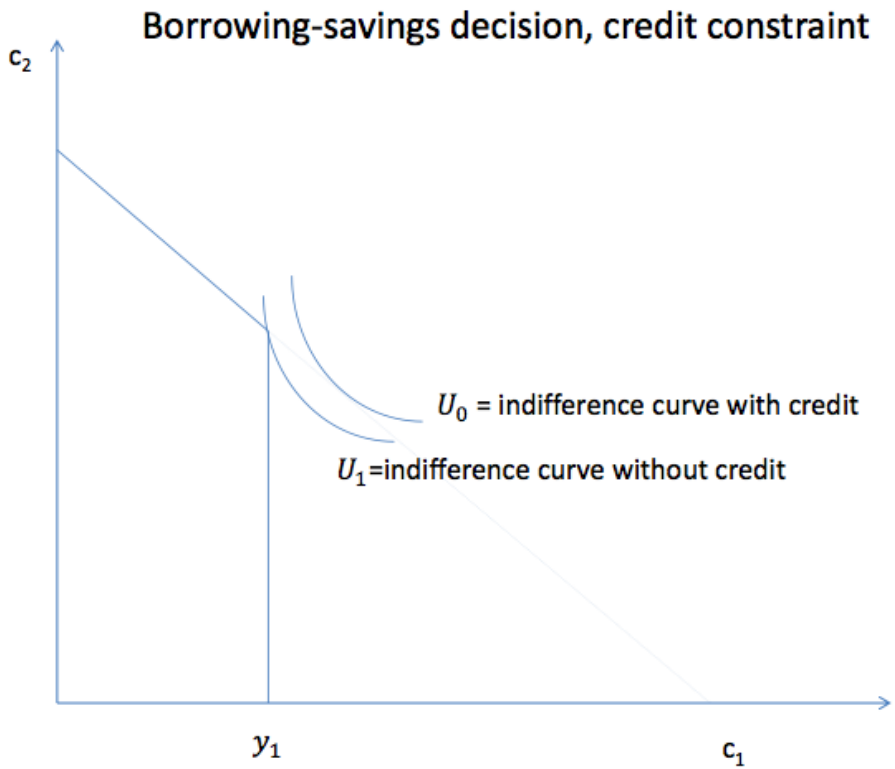
- The solution to this problem is that:
  $\frac{U'(c_1)}{U'(c_2)} = \beta(1+r)$
- One implication: if $\beta(1+r) = 1$, then
  $U'(c_1) = U'(c_2) \Rightarrow c_1 = c_2$
- This is called "the permanent income hypothesis": consumption is constant over the life cycle, regardless of the distribution of income.
- Thus, permanent income (income earned over the entire life cycle) matters, rather than income in an individual period.

Borrowing-savings decision, no credit contraint



Saving - Credit constraints

- Suppose that an individual cannot borrow. This implied that he faces the additional constraint:
  $c_1 \leq y_1$
- This can hurt overall utility if income is very low in y_1 relative to y_2



Permanent vs. Transitory incomes

- Suppose that y_1 and y_2 can be broken up into a permanent and a transitory component:
  $y_1 = y_1^T + y^P$
  $y_2 = y_2^T + y^P$
- In period 1, we observe shocks to transitory income (y_1^T) and permanent income (y^P)
- With complete insurance markets, consumption will be determined solely by expected permanent income, not by stochastic current income.
  - Any excess (shortfall) in current income, relative to permanent income, will be (dis)saved so as to smooth consumption over the full time horizon.

Permanent vs. Transitory incomes

- What is the marginal propensity to consume (MPC) in each period from each type of shock?
  - MPC = the fraction of the income that is consumed
- If $\beta(1+r)=1$, then $c_1 = c_2$
  - Consumption is expected to be stable over time
  - An increase in permanent income by $\triangle y^P$ will increase consumption in each period by $\triangle y^P$
  - Implication: consumption should be constant over time and equal to mean income, or permanent income
  - A permanent change in income will yield a MPC of 1
  - This implies that the marginal propensity to save (MPS) will be 0

Permanent income hypothesis

- Basic strategy in empirical investigation of the permanent income hypothesis (PIH):
- Consumption is a function of permanent and transitory incomes, along with other independent variables:
  $c_t = \alpha + \delta y_t^P + \gamma y_t^T + \theta Z_t + \varepsilon_t$
- Strict test for the PIH: $H_0 : \delta = 1$ and $\gamma = 0$ vs. $H_a : \delta < 1$ or $\gamma > 0$
- General results: positive correlation (less than one) of consumption with transitory income and a sub-unit correlation of consumption with permanent income

Permanent income hypothesis

- As long as a greater share of transitory income than permanent income is saved, then households are indeed smoothing consumption relative to income
- Weak form test for the PIH: $H_0 : \delta = \gamma$ vs. $H_A : \delta > \gamma$ (test for incomplete consumption smoothing)
- Typical findings: in favor of the alternative hypothesis
- There is evidence of consumption smoothing relative to stochastic incomes (transitory incomes) in most data sets.

Permanent income hypothesis

- The estimation specification is potential biased due to endogeneity and/or correlated measurement errors that arise from trying to come up with reasonable measure for y^P and y^T
  - y^T will be determined simultaneously with consumption, thereby producing spurious correlation
- Choosing an instrument for y^P and y^T that is not a determinant of consumption
  - Instrument for y^P: education, value of initial asset holdings, long-run rainfall averages
  - Instrument for y^T: deviation of rainfall from long-run local average, deviations from expected harvest period profits

Testing the permanent income hypothesis

Paxson (1992)

- Paxson(1992) tests the implications of this model using data from rural Thai households
- Cross-sectional surveys taken in 1975/76, 1981, and 1986
- Measure of permanent income:
  - Landholdings
  - Demographic composition of the household (age/sex/education of household members)
- Measure of temporary income:
  - Deviations from mean rainfall in the household's region, in each quarter of the past year
  - Rainfall in any given quarter is plausibly random, and is not serially correlated, so that deviations from means in one quarter do not translate into deviations in subsequent quarters

Testing the permanent income hypothesis

- Hypothesis: Marginal propensity to save out of transitory income should be higher than MPS out of permanent income (weak form)
- Two-step estimation strategy:
- Regress income on predictors of permanent and transitory income
  $Y_{irt} = \beta_t + \beta_r + X^P_{irt}\beta_1 + X^T_{irt}\beta_2 + \epsilon_{irt}$
  - Y_{irt} = income of household i in region r in year t
  - β_t and β_r are controls for time and region
  - X^P_{irt} = components of permanent income
  - X^T_{irt} = components of transitory income

Testing the permanent income hypothesis

- Predict $\hat{Y}^P_{irt}$ using estimated coefficients $\hat{\beta}_1$
- Predict $\hat{Y}^T_{irt}$ using estimated coefficients $\hat{\beta}_2$
- Then use these predicted components of income in the equation:
  $S_{irt} = \alpha_0 + \alpha_1 \hat{Y}^P_{irt} + \alpha_2 \hat{Y}^T_{irt} + u_{irt}$
  - where S_{irt} is savings in household i in region r in year t
- See Table 4 in Paxson(1992)
- MPS are not exactly 0 and 1, but the relative magnitudes are consistent with the theory