Time-Inconsistent Preferences, Borrowing Costs, and Social Security

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Discussion by Yang Jiang

Summary

- Individuals have time-inconsistent preferences
  - Hyperbolic discounting
- Social security can act as a commitment device
- Assumption about credit markets
  - Complete ✓
  - Totally missing ✓
  - Borrowing is costly (credit spreads) ?

Summary

- Individuals have time-inconsistent preferences
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  - Borrowing is costly (credit spreads) ✓

Model

- Credit spreads

$$r(k(t)) = \begin{cases} r_B, & \text{if } k(t) < 0, \\ r_S, & \text{if } k(t) > 0, \end{cases}$$

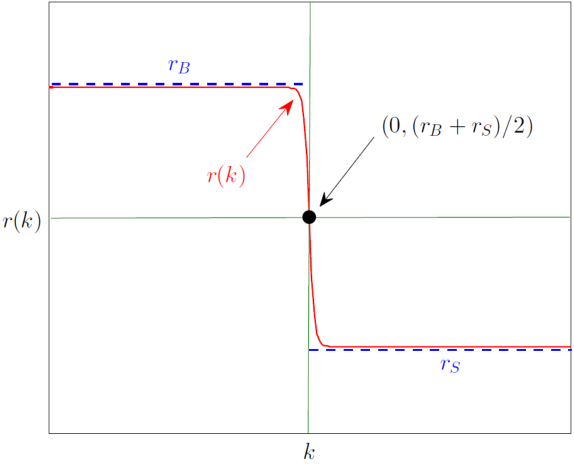
  where $r_B \geq r_S$.

- Approximation

$$r(k(t)) \approx r_S - \frac{r_S - r_B}{1 + exp[\psi k(t)]},$$

  where ψ is a large, positive scaler.

Model



Model

- Consumer Optimization Problem

$$\max_{c(\upsilon)} : \int_t^{\bar{T}} F(\upsilon - t)u[c(\upsilon)]d\upsilon,$$

subject to

$$\frac{dk(\upsilon)}{d\upsilon} = r(k(\upsilon))k(\upsilon) + y(\upsilon) - c(\upsilon),$$

$$y(\upsilon) = \begin{cases} (1-\tau)w, & \text{for } \upsilon \in [t, T], \\ b, & \text{for } \upsilon \in [T, \bar{T}], \end{cases}$$

$$r(k(t)) = r_S - \frac{r_S - r_B}{1 + exp[\psi k(t)]},$$

$$k(t) \text{ given}, k(\bar{T}) = 0.$$

Welfare

Theorem

*Of the full spectrum of credit spreads ranging from zero (perfect credit markets) to infinity (missing credit markets), a fully-funded social security arrangement is irrelevant **only** at the knife edge of perfect credit markets.*

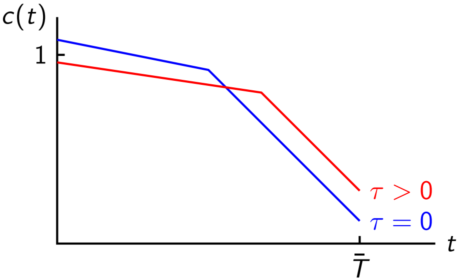
Welfare Metric

$$g(\tau) \equiv \sqrt{\int_0^{\bar{T}} [c^*(t|\tau) - c_0(t)]^2 dt},$$

$$\Delta g \equiv \frac{g(0) - g(\tau)}{g(0)}.$$

Comment

- From the Theorem to Welfare:
  - Theorem



  - A credit spread $r_B > r_S$ is sufficient to alter the distribution of consumption over the life cycle, but it doesn't guarantee a welfare improvement.

Comment

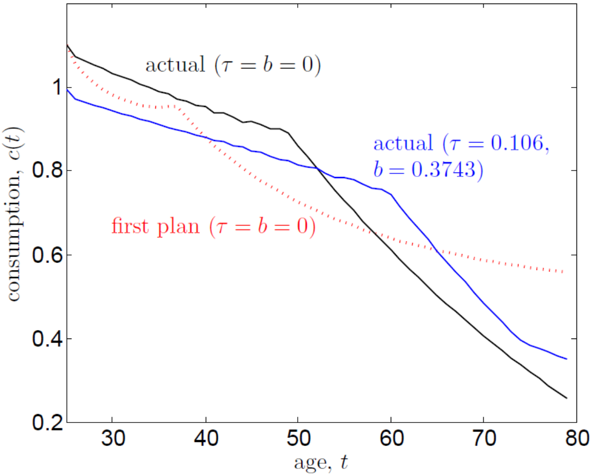
- From the Theorem to Welfare (ctd):
  - Welfare Metric
    Small discount rate which values the consumption in old age.
  - All that we need is $\rho_w < \rho_c$. In the paper we have:

$$\rho_w < \rho_c \Leftarrow \begin{cases} \rho_c = \beta \upsilon - t > 0, \ \upsilon \ \in (t, \bar{T}] \\ \rho_w = 0, \end{cases}$$

since

$$\begin{cases} F_c = \frac{1}{1+\rho_c} = \frac{1}{1+\beta(\upsilon - t)}, \ \upsilon \in [t, \bar{T}] \\ F_w = \frac{1}{1+\rho_w} = 1. \end{cases}$$

Comment



actual ($\tau = b = 0$)
actual ($\tau = 0.106$, $b = 0.3743$)
first plan ($\tau = b = 0$)
consumption, $c(t)$
age, t
1
0.8
0.6
0.4
0.2
30
40
50
60
70
80

Comment

- The result is driven by two key assumptions:
  - Social security acts as a commitment device, which requires that the credit market is not complete so that individuals cannot perfectly undo the effects of social security by transacting in their private accounts
  - The discount rate used in measuring the welfare must be smaller than the discount rate used in making consumption choices, so that old age consumption are highly valued *ex post*.
- Is the assumption of Time-inconsistent Preference relevant?
- Is there a fundamental difference between a positive credit spread and missing credit market?

Minor Comments

- In the robustness check, Δg is negative for some parameter values. Can you explain the intuition behind it?
- How do you explain the kinks in the consumption path? Is it sensitive to the initial wealth (e.g. $k(0) > 0$)?
- As the tax rate τ increases, the consumption path moves farther away from the first plan, which is welfare reducing by measuring with Euclidean distance. Is it a upper bound for τ such that social security is welfare improving?
- Please explain the discount function $F(v - t)$ in the model description rather than in the numerical examples.