Time Inconsistency and Social Security

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Paper Introduction I

Goal of Paper

- To address the problem of individuals with varying levels of ability undersaving for retirement, and to propose a solution.

"Undersaving"

- Individuals not saving enough for retirement during their working years, though they are financially able.
- Assumption: There exists a minimum standard of living (sustainability level) that is the same for all individuals.
- Does not refer to individuals unable to save enough during their working years.

Paper Introduction II

Consequences of Undersaving

- Government forced to provide for individuals in retirement that it did not plan on providing for when young.
- Results in inefficient resource allocation.
- Individuals become reliant on government during retirement, leaving few alternatives if the government can't provide.

Causes of Undersaving

Time Inconsistent Preferences vs. **Time Inconsistent Tax Policy**

- Most research on Social Security and undersaving has focused on time inconsistent preferences.
- Paper's Value added: The first to consider undersaving as arising from time inconsistent tax policy.

The Model Setup I

2 Period OG - Agents

Individuals

- Work and earn income in period 1 and are retired in period 2.
- Derive utility from consumption and leisure in both periods.
- Are born with varying skill levels, which is private information (drawn from a known distribution).
- Have identical preferences.
- Can save income from period 1 at a risk-free interest rate for consumption in period 2.

Government

- Only role is to insure a minimum standard of living to individuals in each period.
- Taxes labor income in period 1 and distributes transfer payments in period 2.
- Specifies a mandatory first period savings rate applied to individuals.

The Model Setup II

2 Period OG - Notation

Individuals

- $U(c_1, c_2, \ell) = \log c_1 + \beta \log c_2 - \theta\ell$
  - c_1 : Period 1 consumption
  - c_2 : Peroid 2 consumption
  - ℓ : Labor
  - θ : Scalar: $\theta > 0$.
  - β : Discount factor: $0 < \beta < 1$.
- Denote the skill level of an individual as z drawn from distribution $\Gamma(z)$ (i.i.d. across individuals).
- Gross Interest rate $R = \frac{1}{\beta}$ and savings (assets) denoted as $a > 0$.
- Assumption: Individuals get large disutility if there are other agents consuming below an established minimum level, $\underline{c}$

Government

- Chooses tax policy $\tau(z\ell)$ (Can be positive or negative)
- Chooses transfer policy $s(z\ell, a) \geq 0$.
- Specifies mandatory savings rate $\varphi \in [0, 1]$
- Exists to insure everyone consumes at least $\underline{c}$

i.e. $c_n(z) \geq \underline{c} \;\; \forall z \in [\underline{z}, \infty)$ and $n = 1, 2$

$\underline{z}$: normalized to be ability level of an individual who would earn $\underline{c}$ in the absence of government programs.

Young Agent's Problem

Maximize Utility

Each agent maximizes utility at the beginning of period 1 by choosing c_1, ℓ, and a given the government tax policy $\tau(z\ell)$, mandatory saving rate φ, and benefit policy $s(z\ell, a)$.

Formally:

$$\max_{c_1,\ell,a} \log c_1 + \beta \log c_2 - \theta\ell$$

$$\begin{aligned} s.t. \quad c_1 &= (1-\varphi)z\ell - \tau(z\ell) - a \\ c_2 &= R\left[a + \varphi z\ell\right] + s(z\ell, a) \\ a &> 0 \end{aligned}$$

Government Planning Problem

Minimize Total Transfers

$$\min_{\tau(z\ell),s(z\ell,a)} \int_{\underline{z}}^{\infty} \left[\max\{0, -\tau(z\ell)\} + \beta s(z\ell, a)\right] d\Gamma(z)$$

$$s.t. \quad \int_{\underline{z}}^{\infty} \tau(z\ell) d\Gamma(z) = \beta \int_{\underline{z}}^{\infty} s(z\ell, a) d\Gamma(z) \quad \text{(GBC)}$$

$$c_n(z) \geq \underline{c} \quad \forall z \in [\underline{z}, \infty) \text{ and } n = 1, 2$$

And Individuals maximize utility given government policy.

Government with Commitment

Consumption, labor, savings allocations for each individual: $c_1(z), c_2(z), \ell(z), a(z)$ together with government policies: $\tau(z\ell), \varphi, s(z\ell, a)$ s.t.

1. Each individual maximizes utility given government policies.
2. Government policies $\tau(z\ell), \varphi, s(z\ell, a)$ minimize total transfers s.t. GBC, minimum consumption condition, and maximization of each individual.

Minimal-transfer equilibrium 2

Government without Commitment

Consumption, labor, savings allocations for each individual: $c_1(z), c_2(z), \ell(z), a(z)$ together with government policies: $\tau(z\ell), \varphi, s(z\ell, a)$ s.t.

1. Each individual maximizes utility given government policies.
2. Given the government's second period benefit policy, $s(z\ell, a)$, the first period policy, $\tau(z\ell), \varphi$, minimizes total transfers s.t. GBC, minimum consumption condition, and maximization of each individual.

Note: $$\begin{cases} s(z\ell, a) = \underline{c} - R\left(a + \varphi z\ell\right) & \text{if } R\left(a + \varphi z\ell\right) \leq \underline{c} \\ 0, & \text{otherwise} \end{cases}$$

Individuals anticipate government's second period benefit policy and take this into consideration when making labor supply and savings decisions. They perceive government's policy announcement in period 1 as a non-credible threat.

Main Proposition

Equilibrium Allocations

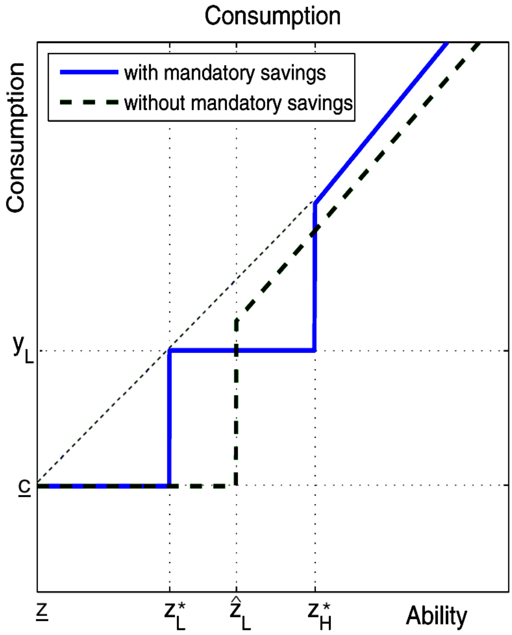
The government without commitment can attain the allocation the government with commitment would implement if and only if it uses a mandatory savings program.

With commitment, solving both the problem of individuals and the government planning problem gives allocations:

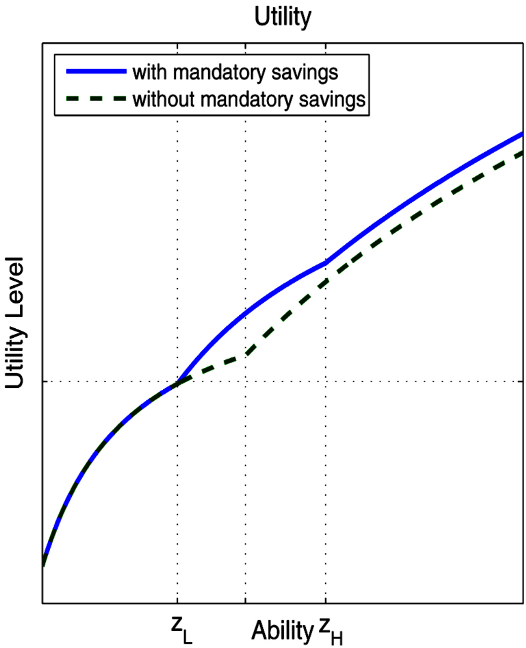
$$(c^*(z), \ell^*(z)) = \begin{cases} \left(\underline{c}, \frac{1+\beta}{\theta}\frac{\underline{z}}{z}\right), & \text{for } \underline{z} \le z \le z_L^* \\ \left(\frac{z_L^*}{\theta}, \frac{1+\beta}{\theta}\frac{z_L^*}{z}\right), & \text{for } z_L^* < z \le z_H^* \\ \left(\frac{(1-\tau^*)z}{\theta}\frac{1+\beta}{\theta}\right), & \text{for } z > z_H^* \end{cases}$$

Without commitment, solving both the problem of individuals and the government planning problem gives allocations:

$$\left(\widehat{c}(z), \widehat{\ell}(z)\right) = \begin{cases} \left(\underline{c}, \frac{1+\beta}{\theta}\frac{\underline{z}}{z}\right), & \text{for } \underline{z} \le z \le \widehat{z}_L \\ \left(\frac{(1-\widehat{\tau})z}{\theta}\frac{1+\beta}{\theta}\right), & \text{for } z > \widehat{z}_L \end{cases}$$



Consumption
with mandatory savings
without mandatory savings
Consumption
y_L
c
z
z*_L
ẑ_L
z*_H
Ability


Utility
with mandatory savings
without mandatory savings
Utility Level
z_L
Ability
z_H