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The commitment value of funding pensions

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HIGHLIGHTS

- We study time consistent pension contribution rules when governments can renege on past promises.
- Funding public pensions can act as a commitment device.
- Fully funding may be a preferable policy when interest rates are lower than the growth rate of population.
- Second best tax policies are less likely to be reneged on with funded pensions than under a PAYG system.

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ABSTRACT

This paper studies how funding public pensions can improve policy outcomes when short-sighted governments cannot commit. We focus on sustainable plans, where optimal nonlinear pensions are not reneged on by sequential governments. Funding pensions is a commitment mechanism. It implies lower contributions than does the second best policy, which reduces temptation to over-redistribute later and to misuse revealed private information. Funding may be preferable even if the population growth rate is higher than the rate of return on assets. Second best optimal policies are also more likely to be renegotiation proof under fully funded pensions.

1. Introduction

Publicly managed pension plans are subject to political risks (Diamond, 1994, 1996). Even benevolent governments may be tempted to engage in excess redistribution among retirees using pension wealth. Because of this, some have argued that funding and privatizing public pensions could reduce political risks.

Recent literature in dynamic optimal taxation, among which Farhi et al. (2012), has shown that commitment is especially relevant in dynamic non-linear optimal tax problems, in which the fiscal schedule must induce individuals to reveal private information about themselves. If the policy maker can improperly use revealed information and renege on its promises, the optimal policy may be significantly altered and capital should be taxed progressively. Doing so reduces income inequality in the optimum. Sequentially, governments thus have fewer incentives too misuse households' private information to over-redistribute. Farhi et al. (2012) study sustainable equilibria à la Chari and Kehoe (1990) that are perfect Bayesian and that can be sustained by a trigger-type reaction by the households following a governmental deviation.

We extend their analysis to show how the institutional structure of public pensions, whether fully funded or unfunded, may help or harm policy outcomes when commitment is assumed away. We use a simple, overlapping generations model, with an infinite repeated game between successive governments and generations. An initial social planner who sets contribution levels and the redistributive characteristics of the public pension plan must ensure that successive short-sighted governments do not have an incentive to renege later on.

Our results formalize the idea that funding pensions may be used as a commitment mechanism. When it is, the optimal response to a lack of commitment is to reduce aggregate

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pension contributions in order to reduce next period's temptation. With unfunded plans, immediate temptation to over redistribute involves higher contributions than in the second best plan, and significantly less inequality. We use numerical examples to show that optimal second best policies are more likely to be sustainable under funded pensions. Due to their pre-commitment value, funded pensions may be preferable to pay-as-you-go schemes even when the rate of return on financial assets is smaller than the growth rate of the population.

2. Model

Consider an overlapping generations version of Stiglitz (1982) where individuals live for two periods of equal duration. In the first half of their lives they supply labor, consume, are taxed and contribute to a public pension fund. In the second half they are retired and live off public pension benefits. The timing of retirement is exogenous and population grows at a fixed rate $\eta > 0$. Thus, at each period $t = 0, 1, \ldots$ one generation of workers cohabits with one generation of retirees. The constant ratio of workers to retirees is therefore $1 + \eta$. There is a constant proportion n_i of type-i agents, where types are denoted by $i = 1, 2$. There is an underlying linear production technology according to which a type-i worker who supplies ℓ_t^i units of labor faces a hourly market wage rate w_i with $w_1 < w_2$. Gross incomes are defined as $y_t^i \equiv w_i \ell_t^i$. All individuals have identical, time separable utility functions:

$$U(c_t^i, \ell_t^i, d_{t+1}^i) = u(c_t^i) - z(y_t^i/w_i) + \beta u(d_{t+1}^i) \tag{1}$$

where c_t^i, $y_t^i/w_i \equiv \ell_t^i$ and d_{t+1}^i are respectively the consumption level of a worker born at t, the worker's labor supply and the worker's consumption when old at $t + 1$. Instantaneous consumption utility u is strictly increasing, strictly concave and obey the limiting condition $u'(0) = \infty$. The utility cost of supplying labor (z) is strictly increasing and strictly convex with $z'(0) = 0$ and $z''(\ell) > 0, \forall \ell$. The utility function satisfies the single-crossing condition since the marginal cost of earning gross revenue satisfies $z'(y)/w_2 < z'(y)/w_1, \ \forall y$.

A social planner ranks allocations $\phi_t \equiv \{c_t^i, y_t^i, d_t^i\}_{i=1}^2, \ \forall t$ using a welfarist social welfare function:

$$W_0 = \sum_{t=0}^{\infty} \delta^t \left(\sum_{i=1}^{2} n_i \left[u(c_t^i) - z(y_t^i/w_i) + \beta u(d_{t+1}^i) \right] \right) \tag{2}$$

where $\delta = (1+\eta)/(1+\rho)$ is the inter-generational discount factor, and $\rho > \eta$ is the intergenerational discount rate. We emphasize the effects of (un)funding pensions on optimal policies by writing the feasibility constraints as follows:

$$\sum_i n_i c_t^i = \sum_i n_i y_t^i - b_t \tag{3a}$$

$$\sum_i n_i d_t^i = (1-\alpha)(1+\eta) b_t + \alpha(1+r) b_{t-1}. \tag{3b}$$

where b_t is the aggregate pension contributions of the generation born at t.

By (3a) aggregate consumption of workers equals aggregate gross income minus pension contributions. By (3b) aggregate consumption of retirees depends on $\alpha \in \{0, 1\}$, which captures whether public pensions are unfunded fully funded. Following the taxonomy of Lindbeck and Persson (2003), in an unfunded plan ($\alpha = 0$) aggregate benefits are financed by a specific tax on the generation currently working. A fully funded plan ($\alpha = 1$) has them financed by the returns on previously accumulated pension assets. For simplicity, assume that these savings yield the fixed rate of return r, as one would find in a small open economy.[1] Note that a fully funded pension plan need not be actuarially fair at the individual level because individual benefits are not necessarily proportional to one's own contributions (Feldstein and Liebman, 2002; Lindbeck and Persson, 2003). Note finally that α is taken as an institutional feature. Since it is fixed, it is highly costly to reform on short notice. It captures the stylized fact that pension contribution rates are more frequently adjusted than the fundamental structure of public pension plans, which requires in-depth reform, more time and more policy debates to implement than simply changing contribution rates.

2.1. Full commitment benchmark

Choosing an optimal allocation is equivalent to designing a nonlinear tax system across workers and retirees. Suppose that at $t = 0$ the social planner can once and for all promise future allocations that satisfy the feasibility constraints. He maximizes (2) by choosing $\phi_t, \ \forall t$ subject to (3a) and (3b).[2] Unsurprisingly, concave utility of consumption (or aversion to inequality) prescribes $c_t^1 = c_t^2$, $d_t^1 = d_t^2$, and $y_t^1 < y_t^2 \ \forall t$. All individuals have identical consumptions, but type-2s are invited to work more (Mirrlees, 1971; Stiglitz, 1982).

As is well known since Mirrlees (1971), such an allocation is not incentive compatible. If only gross incomes y_t^i can be observed instead of types, type-2 workers will mimic type-1s. Second best optimality is therefore restricted to incentive compatible allocations that satisfy

$$u(c_t^1) - z(y_t^1/w_2) + \beta u(d_{t+1}^1) \leq u(c_t^2) - z(y_t^2/w_2) + \beta u(d_{t+1}^2), \quad \forall t. \tag{4}$$

Full commitment implies that the social planner commits to allocations before private information is revealed by households. The second best allocation satisfies $c_t^1 < c_t^2$ and $d_t^1 < d_t^2$ with $y_t^1 < y_t^2$. The fact that interests us the most is that consumption smoothing is preserved:

$$\begin{cases} u'(c_t^i)/u'(d_{t+1}^i) = \beta(1+r) & \text{if } \alpha = 1 \\ u'(c_t^i)/u'(d_t^i) = \beta(1+\rho) & \text{if } \alpha = 0. \end{cases} \tag{5}$$

2.2. Sequential governments

Suppose now that the *social planner* initially promises allocations $\phi_t, \ \forall t$. Each allocation must be incentive compatible and feasible. Lagrange multipliers $\theta_t, \ \mu_t$, and λ_t are assigned to Eqs. (4), (3a) and (3b). However, the social planner does not have the final say. Sequential governments can later re-optimize and change allocations insofar as they are feasible. We model them in the spirit of Farhi et al. (2012), where three motives induce sequential governments to renege. First, they already know retirees' types and may seek to set $d_t^1 = d_t^2$. Second, they may weigh generations differently than does the initial social planner. Third, accumulated assets are perceived as an inelastic tax base that can be redistributed at no immediate efficiency cost. The objective function of a time t government is

$$W_t = \pi \beta u(d_t) + (1-\pi) \sum_i n_i [u(c_t^i) - z(y_t^i/w_i) + \beta u(d_{t+1})] \tag{6}$$

[1] Ruling out intermediary cases $0 < \alpha < 1$ discards issues of convergence and allows us to directly analyze steady states, without overshadowing the intuition this paper seeks to convey.

[2] The first-order conditions of all Lagrangian problems are produced in the Appendix A.