

# Problem: Pensions and Probabilistic Voting

## Problem [Chapter 6 / Exercise 3, P&T (2000)]

Consider the model of section 6.2. There are three generations: young, middle-aged, and old. The population grows at rate  $n$ . The government finances a pension scheme with lump-sum transfer  $f$  to the old generation with a proportional tax,  $\tau$ , on labor. The government budget constraint is

$$f = \sum_{i^Y} \tau l^{i^Y} (1+n)^2 + \sum_{i^M} \tau l^{i^M} (1+n). \quad (1)$$

The subjective discount rate  $\beta$  equals the real interest rate  $\rho$ , and all individuals may save assets at the real interest rate. A young individual  $i$ 's lifetime utility from the pension scheme is

$$\omega^{i^Y} = U(c^{i^Y}) + \frac{U(c^{i^M})}{(1+\beta)} + \frac{c^{i^O}}{(1+\beta)^2} + V(x^{i^Y}) + \frac{V(x^{i^M})}{(1+\beta)}, \quad (2)$$

and a young individual's intertemporal budget constraint is

$$c^{i^Y} + \frac{c^{i^M}}{(1+\beta)} + \frac{c^{i^O}}{(1+\beta)^2} = l^{i^Y} (1-\tau) + \frac{l^{i^M} (1-\tau)}{(1+\beta)} + \frac{f}{(1-\beta)^2}. \quad (3)$$

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There are two political candidates,  $A$  and  $B$ , who try to maximize votes by choosing an election platform consisting of a tax to finance the pension scheme.

Individual  $i$  receives utility  $\sigma^i$  from other policies if candidate  $B$  is elected. The preference parameter,  $\sigma^i$ , is uniformly and symmetrically distributed around zero with densities  $\phi^Y, \phi^M, \phi^O$  for the young, middle-aged, and old, respectively.

The individuals choose labor and their consumption path given the tax rate.  $W^{iY}(\tau)$  denotes a young individual's utility of tax rate, given optimal savings and labor decisions.

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- a) Suppose that there is a vote on the pension system in every period and that there is no commitment. Write the equation determining the equilibrium level of pensions. Compare this with the equilibrium level of pensions in the median-voter model.
- b) Suppose that there is commitment, so that an enacted pension scheme will remain in place forever. Write the equation determining the equilibrium tax rate.