

# A positive approach towards social security policy: The role of myopic agents

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# Research question

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- ▶ **Motivation**

- ▶ Many individuals fail to behave according to the life cycle models, thus, face inadequate savings while retired.
- ▶ Do people save enough for retirement?
- ▶ Myopia as a justification for social security system: state intervention in determining allocations over time.

- ▶ **Aim**

- ▶ To investigate how myopic individuals will affect the size and the redistribution degree of the pension system by *applying the probabilistic voting model*.

- ▶ **Related work: Cremer et al. (2007, 2008a, 2008b)**

# Key concepts

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- ▶ **Myopia:**
  - ▶ A myopic individual is modeled in a such way that ex ante, with a strong preference for the present, even though, ex post, regret not to have saved enough.
- ▶ **Single-mindedness**
  - ▶ Originates from Mulligan and Sala-i-Martin (1999)
  - ▶ The preferences of groups and their ability to focus on the consumption of goods or issues, enable them to achieve a greater political power, thus, obtain the most favorable policy
- ▶ **Single-mindedness with probabilistic voting model (Paola Profeta 2002)**
  - ▶ Individuals have political preferences, the degree of homogeneity is captured by a density function .
  - ▶ The density function represents a proxy for the political power of a group, since more ideologically homogeneous groups are more politically successful.

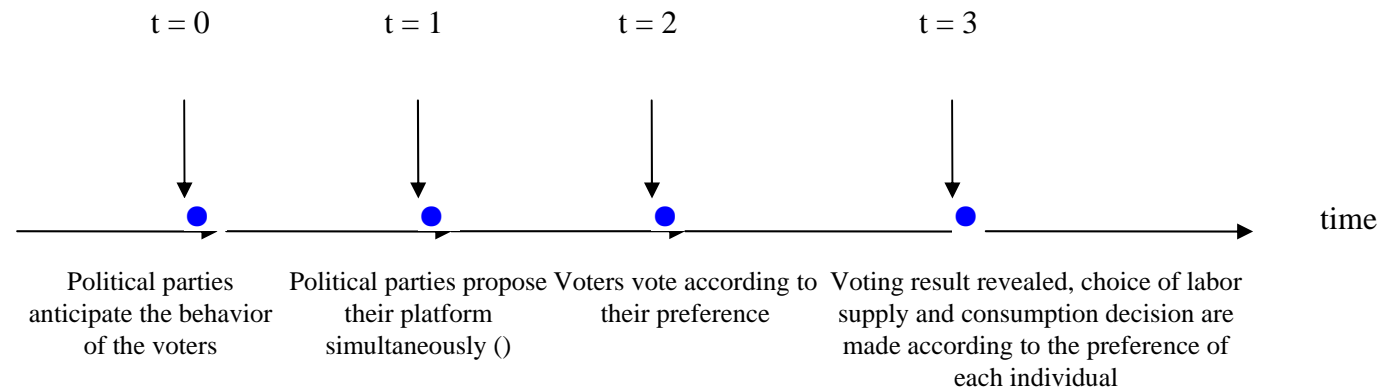
# The baseline model (1)

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## ▶ Main assumption

- ▶ *Standard two-period model*: individuals live for two periods, old and young. They work in the first period and retire in the second period
- ▶ *Generations*: unlinked.
- ▶ *Individual*: make two decisions about labor supply and savings in the first period
- ▶ *Type of agents*: rational agents naturally smooth consumption over time, while myopic agents do not save in the first period
- ▶ *Heterogeneity*: myopia and single-mindedness (ideology)
- ▶ *Two political candidates*: in electoral competition, act simultaneously and do not cooperate.
- ▶ *Policy variables*: payroll tax rate  $\tau$  and redistribution factor  $\alpha$  .

# Timing of the political game



First stage: the political parties anticipate the behavior the far-sighted and the myopic individuals.

Exert votes: they maximize the welfare utility for the society which is a weighted utility function with the utility of both agents.

Later, they propose their platform: a bi-dimensional social security policy with the Bismarckian factor (the contributive rate) and the payroll tax rate.

Afterwards, agents votes according to their true preference.

Last stage: people make choice of their labor and saving decision according to the social security policy.

## The baseline model (2)

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- ▶ Model setting

- ▶ The preference for the far-sighted agent:

$$U_F = u(x_F) + u(d_F) = u(c_F - l_F^2/2) + u(d_F)$$

- ▶ The preference for the myopic agent:

$$U_M = u(x_M) = u(c_M - l_M^2/2)$$

- ▶ The utility function is twice continuously differentiable, satisfy:

$$u' > 0, \quad u'' < 0$$

- ▶ The wage level is uniform:  $w=1$ .
  - ▶ The proportion of the far-sighted is  $\lambda^F$ , while the myopics  $\lambda^M = 1 - \lambda^F$ .
  - ▶ The pension system is represented by a payroll tax rate  $\tau$  and the Bismarckian factor  $\alpha$ ,  $p_i = \tau(\alpha w_i l_i + (1 - \alpha) Ewl)$
  - ▶  $Ewl$  is the average before-tax income.

# The baseline model (3)

- The individual's problem

- An individual maximize his utility given by the first and second period consumption, which will be denoted by  $x$  and  $d$ .

$$\max_{l_i, s_i} u(x_i) + u(d_i) = \max_{l_i, s_i} u(w(1 - \tau)l_i - s_i - l^2/2) + \delta_i u(s_i + p_i)$$

$$s.t. s_i > 0$$

$$w = 1$$

- Where  $\delta_i = 1$  if far-sighted,  $\delta_i = 0$  if myopic
- The pension benefits is composed of a contribution component and a redistribution component.

$$p_i = \tau[\alpha w l_i + (1 - \alpha)E w l]$$

$$E w l = w l_F E \lambda_F + w l_M E(1 - \lambda_M)$$

$$\lambda_F \sim U [0, 1], \lambda_M \sim U [0, 1]$$

# The baseline model (4)

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- ▶ The individual's problem

- ▶ *The optimal level of labor supply for the far-sighted and the myopic are obtained respectively:*

$$l_F = w(1 - \tau) + \tau\alpha w$$

$$l_M = w(1 - \tau)$$

- ▶ ***The far-sighted agents who save see the link between pension and labor income, so their labor supply is not distorted. While the myopic individuals only focus on the instant gratification, labor supply is distorted.***
- ▶ *Next step, so as to study the determination of  $(\tau, \alpha)$  through the voting procedure. We start to look into the political party's problem.*



## The baseline model (5)

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- ▶ Political party's problem

- ▶ *Two parties with two candidates, A and B.*
- ▶ *Before the election, each party commit to a social security policy platform  $P^A$  and  $P^B$ , maximize the expected number of voters.*
- ▶ *As for a voter  $j$  in group  $i$ , he votes for party A iff:*

$$V^I(P^A) + \sigma^{jI} + \delta > V^I(P^B)$$
$$\sigma^{jI} \sim U \left[-\frac{1}{\phi^I}, \frac{1}{\phi^I}\right], \quad \delta \sim U \left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right]$$

- ▶ *The term  $\sigma^{jI} + \delta$  reflects voter  $j$ 's ideological preference for party A.  $\sigma^{jI}$  reflects his idiosyncratic ideological bias towards A while  $\phi^I$  is the density of the bias. High value means a very homogenous group, with little variation in ideological bias inside group  $i$ .*
- ▶ *The swing voters in each group is defined as*

$$\varepsilon^{s,i} = V^I(P^B) - V^I(P^A) - \delta$$

## The baseline model (6)

- ▶ Political party's problem: maximize its share of votes.

$$\max E\left\{ \sum_{i=F,M} \lambda^i \phi^I [V^I(P^A) - V^I(P^B)] \right\}$$

- ▶ Solving the model:

$$Foc\{\tau\}: \sum_{i=F,M} \lambda^i \frac{d\phi^I}{d\tau} \phi^I [V^I(P^A) - V^I(P^B)] + \sum_{i=F,M} \lambda^i \phi^I \frac{dV^I}{d\tau} = 0$$

$$Foc\{\alpha\}: \sum_{i=F,M} \lambda^i \frac{d\phi^I}{d\alpha} \phi^I [V^I(P^A) - V^I(P^B)] + \sum_{i=F,M} \lambda^i \phi^I \frac{dV^I}{d\alpha} = 0$$

- ▶ Substitute every variable, we obtain the optimal  $(\tau, \alpha)$ .

$$\tau = \frac{\lambda^M \phi^M [u'(x_M) - u'(d_M)]}{\lambda^M \phi^M \{u'(x_M) - u'(d_M)[2 - \alpha(1 - \alpha)]\} - \lambda^F \phi^F u'(x_F)(1 - \alpha)}$$

$$\alpha = 1/2 + \frac{\lambda^F \phi^F u'(x_F)}{2\lambda^M \phi^M u'(d_M)}$$

# Results (1)

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## ▶ The Choice of $\alpha$ in homogenous societies

- ▶ *Proposition 1: When the society is consisted with fully rational agents, the optimal Bismarckian factor is 1 which implying a totally contributive pension scheme. When the Society is fully with myopic agents, the optimal Bismarckian factor is 1/2.*

——Fully far-sighted:

- ▶ *When all the agents are fully rational, people's labor supply has not been distorted by the pension system. Everybody can smooth their consumption perfectly between the two periods. There is no need for redistribution concern.*
- ▶ *No myopia in the society, the political candidates does not need to perform such a paternalistic role to exert votes from myopic group.*

——Fully myopia:

- ▶ *The myopic agents are aware that the far-sighted agents provide a higher labor supply, thus, try to obtain the highest contribution rate so as to exert more transfer from the far-sighted agents.*

## Results (2)

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- ▶ The Choice of  $\tau$  in homogenous societies
  - ▶ *Proposition 2: In the case of purely rational society, the optimal payroll tax rate is 0. When the Society is fully myopia, the optimal payroll tax rate is expressed as:*

$$\tau = \frac{u'(d_M) - u'(x_M)}{u'(d_M) - \frac{7}{4}u'(x_F)}$$

——Fully far-sighted:

- ▶ *When all the agents are fully rational, far-sighted individuals do not need a public pension system to force them to save for retirement, they naturally smooth their consumption between two period on their own. Thus, the most preferred payroll tax rate is 0.*

——Fully myopia:

- ▶ *This case is more complex to explain, surely it's positive as long as the myopic individuals is under a consumption inconsistency over two periods.*

## Results (3)

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- ▶ The optimal Bismarckian factor in the mixed society

$$\alpha = 1/2 + \frac{\lambda^F \phi^F u'(x_F)}{2\lambda^M \phi^M u'(d_M)}$$

- ▶ **Proposition 3:** Denote  $\theta = \lambda^F / \lambda^M$ ,  $\beta = \phi^F / \phi^M$ , thus, we can write the political power ratio between the far-sighted group and the myopic group  $k = \theta\beta$ , which is determined by the size ratio and the political homogeneity ratio between each group. Therefore, we found that when

$$\frac{\lambda^F \phi^F u'(x_F)}{2\lambda^M \phi^M u'(d_M)} \geq \frac{1}{2} \quad \Rightarrow \quad k \geq \frac{u'(d_M)}{u'(x_F)}$$

- ▶ Intuition: political power from the far-sighted the redistribution desire from myopic agents

## Results (4)

- ▶ The optimal payroll tax rate in the mixed society

$$\tau = \frac{\lambda^M \phi^M [u'(d_M) - u'(x_M)]}{\sum \lambda^i \phi^i [u'(d_i) - u'(x_i)] + (1-\alpha) [\lambda^M \phi^M (d_M) + \lambda^F \phi^F u'(d_F)] + \alpha^2 \lambda^M \phi^M u'(d_M)}$$

Consumption smoothing term

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The standard consumption smoothing weight

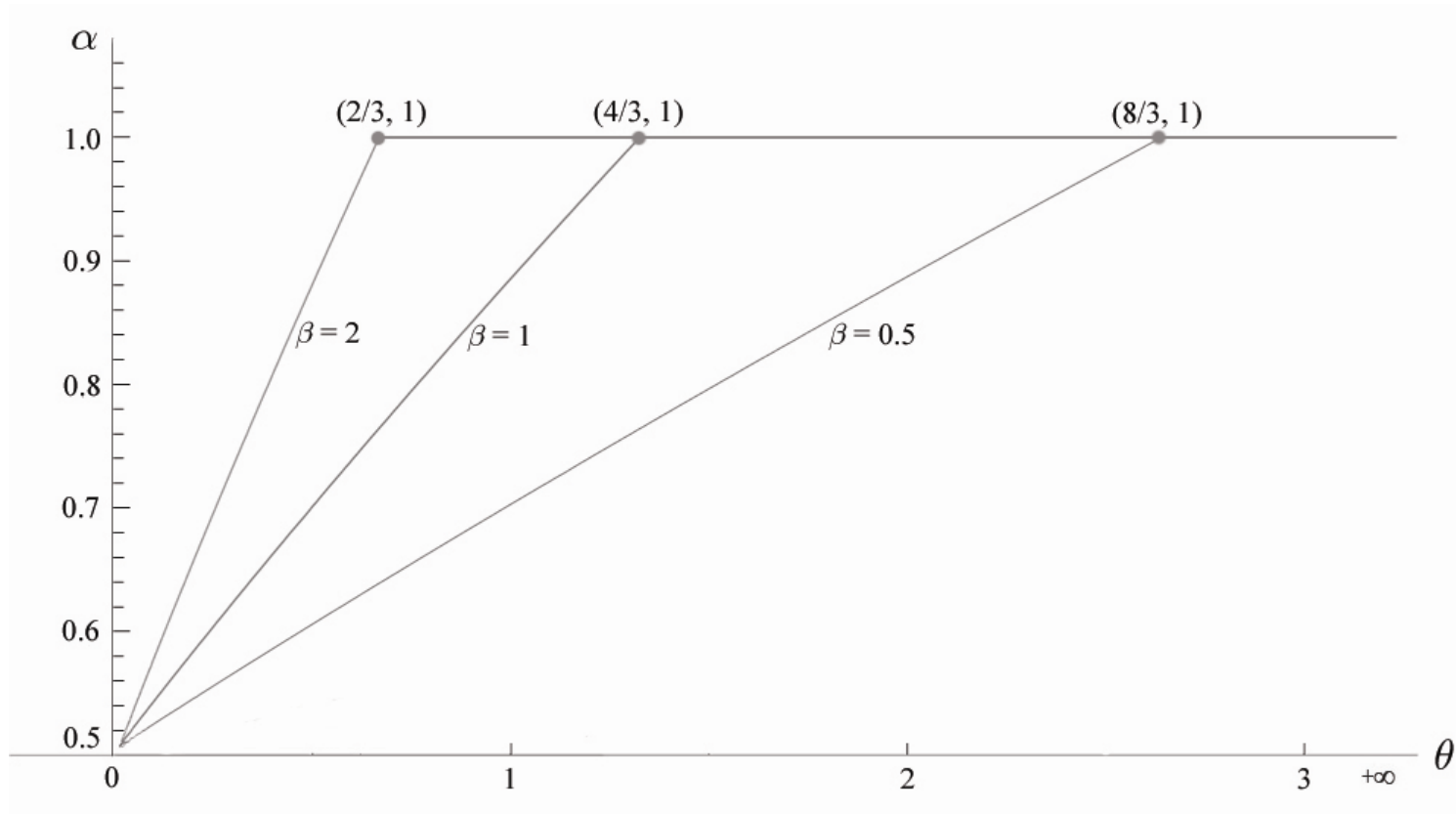
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Marginal utility of the second period consumption for both agents weighted by the redistribution degree of the social system

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Marginal utility of the Second period consumption for the myopic group with an extra weight

# Numerical example: The logarithmic case



$\theta$  is the size ratio between far-sighted and the myopic group.  $\beta$  represents the political homogeneity ratio between far-sight and the myopic group.

# Conclusion and next step

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## ▶ Conclusion

- ▶ The role of myopia in the feedback effect of social security on single-mindedness.
- ▶ *Homogenous society*: a purely far-sighted society prefer a total contributive pension system, a purely myopia prefer a redistributive pension system.
- ▶ *Mixed society case*: the most preferred contributive parameter is determined by the size of each group and the redistribution desire from the myopic agents, the most preferred payroll tax rate determined by 4 effects, the role of myopic agents is ambiguous.
- ▶ *Numerical example*: the political power of each group is determined by its size and its political homogeneity.

## ▶ Further work: Empirical test



# Reference

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▶ Thank you!