Progressing into efficiency:

the role for labor tax progression in privatizing social security

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Motivation

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Social security is essentially about insurance:

- old age (between cohorts) & mortality (annuitized)

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- privatization of social security brings efficiency gains,
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Bottom line: shift insurance from retirement to working period →
improve efficiency of social security → raise welfare.

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Stylized theoretical model

Stylized theoretical model: partial equilibrium OLG model

Incomes:

- wage w_t grows at the constant rate γ, $w_t = (1+\gamma)^t$, interest rate $r = \gamma$ and $1 + r = \delta^{-1}$.
- two types $\theta \in \{\theta_L, \theta_H\}$ of measure one, income $y(\theta) = \omega_\theta w_t \ell_t(\theta)$, $\omega_\theta \in \{\omega_L, \omega_H\}$, $\omega_H > \omega_L$,

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Households: live for 2 periods, population is constant

- choose labor, consumption and assets

$$\begin{aligned} \text{first period:} \quad c_{1,t}(\theta) + a_{1,t+1}(\theta) &= (1-\tau)\omega_\theta w_t \ell_t(\theta) - \tau_\ell (1-\tau)\omega_\theta w_t \ell_t(\theta) + \mu_t \\ \text{second period:} \quad c_{2,t+1}(\theta) &= (1+r) a_{1,t+1}(\theta) + b_{2,t+1}(\theta) \end{aligned}$$

- lifetime budget constraint (allows to see the main result)

$$c_{1,t}(\theta) + \frac{c_{2,t+1}(\theta)}{1+r} = RHS_t(\theta) = (1-\tau)\omega_\theta w_t \ell_{1,t}(\theta) - \tau_\ell (1-\tau) w_t \omega_\theta \ell_{1,t}(\theta) + \mu_t + \frac{b_{2,t+1}(\theta)}{1+r}$$

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- GHH preferences: Frisch elasticity + risk aversion

$$U(\theta) = \frac{1}{1-\sigma}\left(c_{1,t}(\theta) - \frac{\phi(1+\gamma)^t}{1+\frac{1}{\eta}} \ell_{1,t}(\theta)^{1+\frac{1}{\eta}}\right)^{1-\sigma} + \beta \frac{1}{1-\sigma} c_{2,t+1}(\theta)^{1-\sigma}$$

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Government:

- needs to finance exogenous level of expenditure $\tilde{g} = g_t/(1+\gamma)^t = \mathit{constant}$,
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- The government budget constraint is

$$g_t + 2 \cdot \mu_t = \sum_{\theta \in \{\theta_L, \theta_H\}} \tau_\ell \cdot (1-\tau)\omega_\theta w_t \ell_t(\theta),$$

whatever funds are left after covering government expenditures are spent on lump-sum grants μ_t.

Stylized theoretical model: partial equilibrium OLG model

Social security

$$\text{Beveridge (full redistribution):} \quad b_{2,t+1}^{BEV}(\theta) = \tau \; \frac{1}{2} \; w_{t+1} \sum_{\theta \in \{L,H\}} \omega_\theta \ell_{1,t+1}(\theta)$$

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RHS of Lifetime Budget

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Efficiency effect

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Reform = Beveridge $\rightarrow$ Bismarck, reduces distortions:

$$\ell_{1,t}^{BIS}(\theta) > \ell_{1,t}^{BEV}(\theta)$$

Welfare $W(\theta) \uparrow \implies$ follows from the envelope theorem.

efficiency effect $\longrightarrow$ labor wedge $\downarrow$, both types: $\ell(\theta) \uparrow$ and $W(\theta) \uparrow$,

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efficiency effect $\longrightarrow$ labor wedge $\downarrow$, both types: $\ell(\theta) \uparrow$ and $W(\theta) \uparrow$, what about redistribution?

Redistribution through social security

$$\text{Denote:} \quad PV_t^{Pen}(\theta) = \frac{b_{2,t+1}(\theta)}{1+r} - \tau w_t \omega_\theta \ell_{1,t}(\theta), \quad \text{then:}$$

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Denote: $$PV_t^{Pen}(\theta) = \frac{b_{2,t+1}(\theta)}{1+r} - \tau w_t \omega_\theta \ell_{1,t}(\theta),$$ then:

θ_H gains from less redistribution in social security

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social security redistribution effect $\longrightarrow$ benefits θ_H, harms: θ_L, can θ_L be compensated through taxes?

Redistribution through tax system

1. % Δ in labor supply is equal for both productivity types and increases with η

$$\frac{\ell^{BIS}(\theta) - \ell^{BEV}(\theta)}{\ell^{BEV}(\theta)} = \left(\frac{(1 - \tau_\ell(1-\tau))}{(1 - \tau - \tau_\ell(1-\tau))} \right)^{\eta} - 1 \equiv \xi^{\eta} - 1$$

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Tax system redistribution effect $\longrightarrow$ benefits θ_L at the expense of θ_H, can it fully compensate θ_L for the loss of redistribution in social security?

Key results: Reform social security and extra government revenue $\rightarrow$ lump-sum grants μ

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4. $\exists\ \ \overline{\eta} \in (0, \tilde{\eta})$ s.t. for $\eta > \overline{\eta}$ reform with μ is a Pareto-improving (by continuity of the utility function)

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3. $\exists\ \tilde{\eta}$ s.t. for θ_L HHs redistribution lost in pension system is fully compensated by tax system

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Quantitative model

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Consumers

- **uncertain lifetimes:** live for 16 periods, with survival $\pi_j < 1$
- ex ante heterogeneous productivity + **uninsurable productivity risk**
- consume, work and save based on **CRRA instantaneous utility** function $\frac{1}{1-\sigma}c^{1-\sigma} - \frac{\phi}{1+1/\eta}\ell^{1+1/\eta}$
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Firms and markets

- Cobb-Douglas production function, capital depreciates at rate d
- no annuity, financial markets with (risk free) interest rate

Quantitative model

Government

- Finances government spending G_t, constant between scenarios,
- Balances pension system: $subsidy_t$
- Services debt: $r_t D_t$,
- Collects taxes on capital, consumption, labor, and covers lump-sum grant (progressive labor tax given by Benabou form)

$$G_t + subsidy_t + r_t D_t + M_t \quad = \quad \tau_{k,t} r_t A_t + \tau_{c,t} C_t + Tax_{\ell,t} + \Delta D_t$$

where $\Delta D_t = D_t - D_{t-1}$

Policy experiment: comparative statics

Status quo: current US social security

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- *additional tax revenue* (from increased efficiency) goes into lump-sum grants

Calibration to replicate US economy (2015)

Preferences: instantaneous utility function take CRRA form with

- Risk aversion σ is equal to 2
- Disutility form work ϕ matches average hours 33%
- Frisch elasticity η is equal to 0.8
- Discounting rate δ matches interest K/Y ratio 2.9

Productivity risk and age profiles shock based on Borella et. al (2018):

Pension system

- Replacement rate ρ matches benefits as % of GDP 5.0%
- Contribution rate balances pension system in the initial steady state
- Pension eligibility age at 65

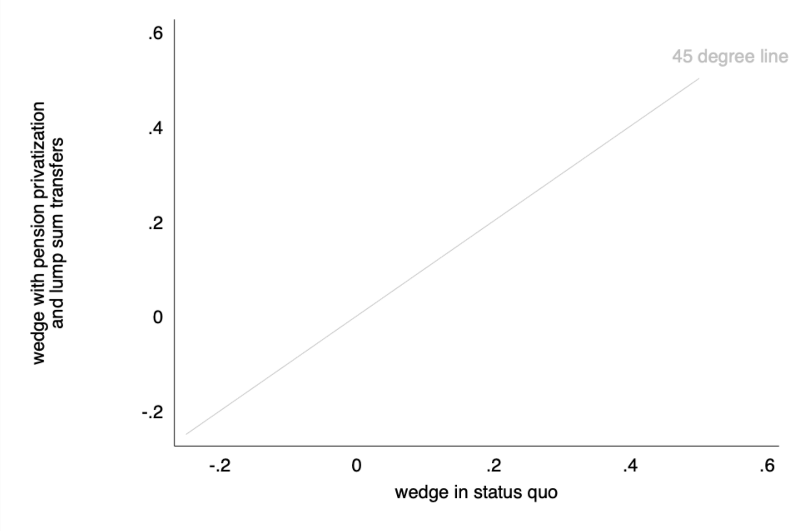
Taxes $\{\tau_c, \tau_k, \tau_\ell\}$ match revenue as % of GDP {2.8%, 5.4%, 9.2%}

Depreciation rate d based on Kehoe & Ruhl (2010) equal to 0.06

Population survival probabilities based on UN forecast

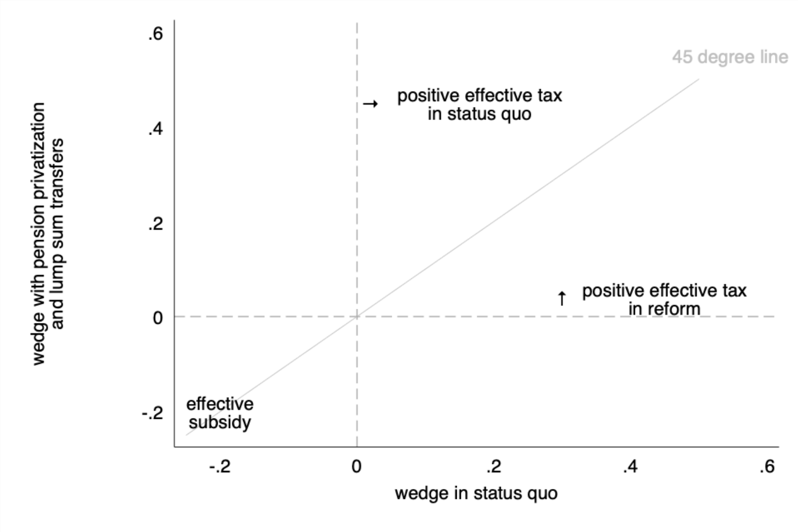
Results

Distortion for $\eta = 0.8$



labor wedge formula

Distortion for $\eta = 0.8$



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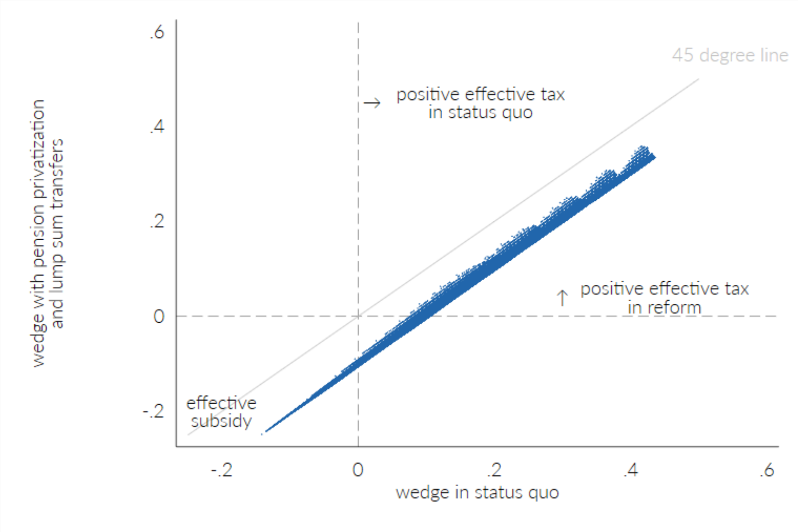
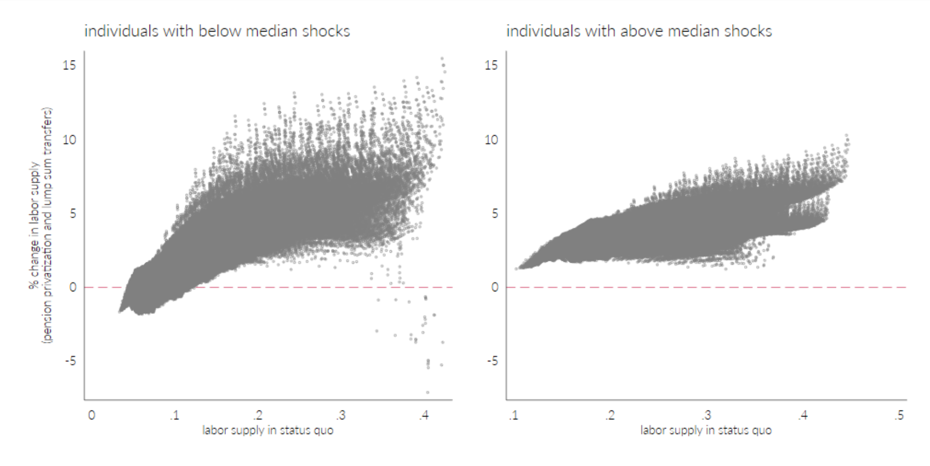


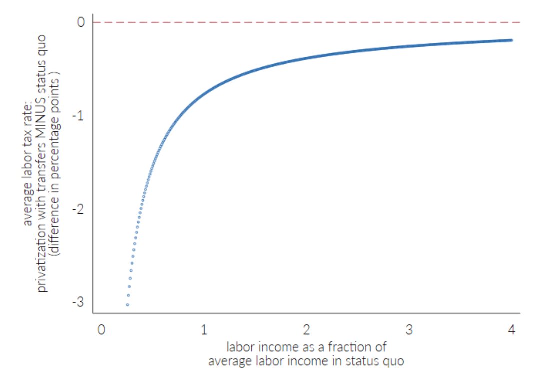
Labor supply reaction for $\eta = 0.8$

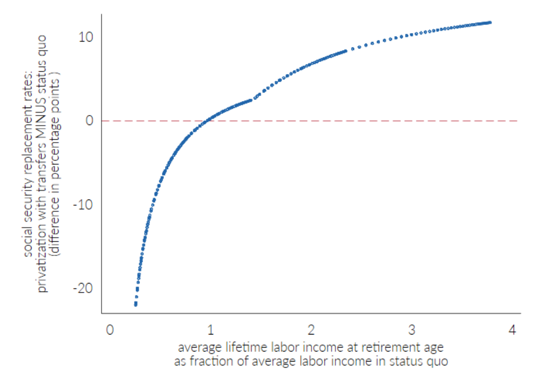


Average $\Delta\ell \uparrow$ 2.6% for HHs below median and 3.0% above median

Heathcote et al. (2008) argue for $\uparrow$ for high-productivity and $\downarrow$ for low-productivity.

Taxes and pensions changes





Distribution of welfare effects for $\eta = 0.8$

Under the veil of ignorance consumption equivalent increases by 0.3%

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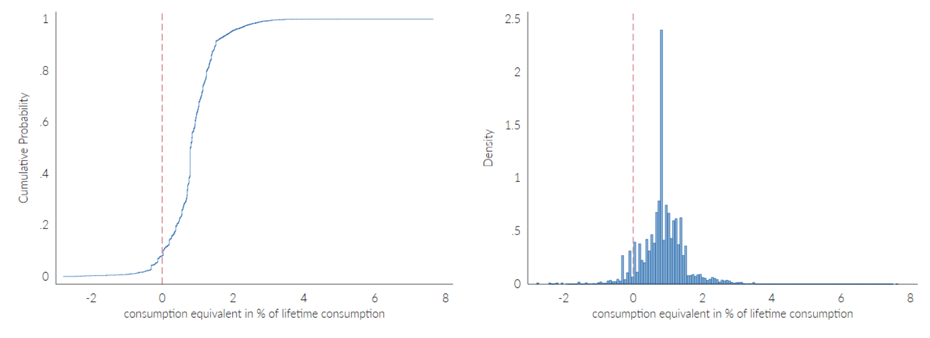
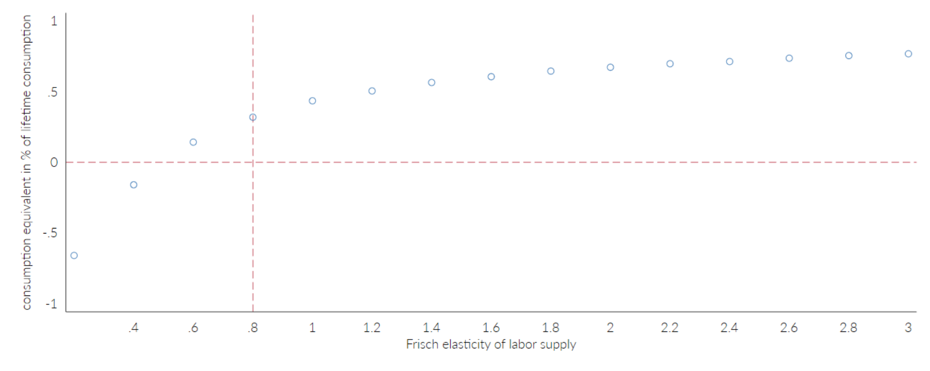
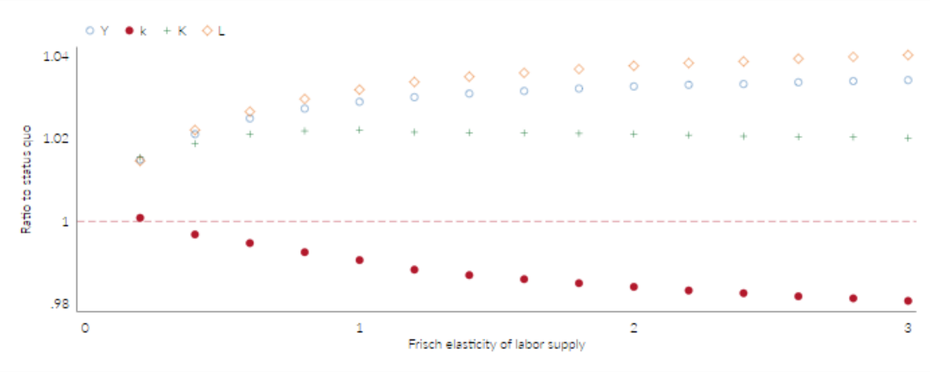
Ex post almost universal gains (90%).



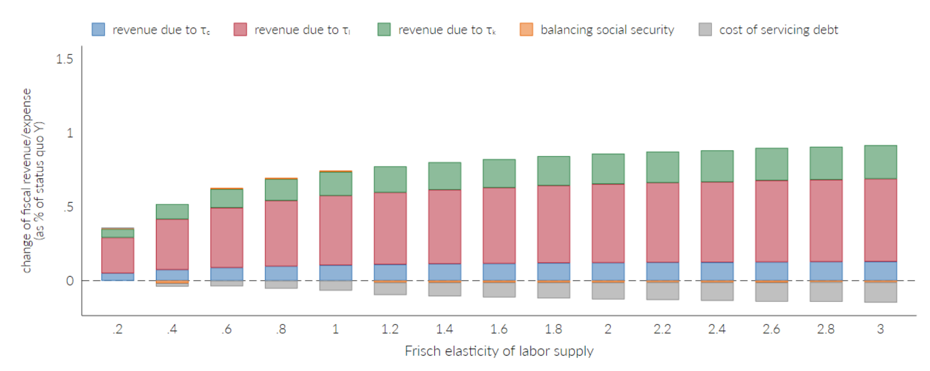
Welfare effect across η



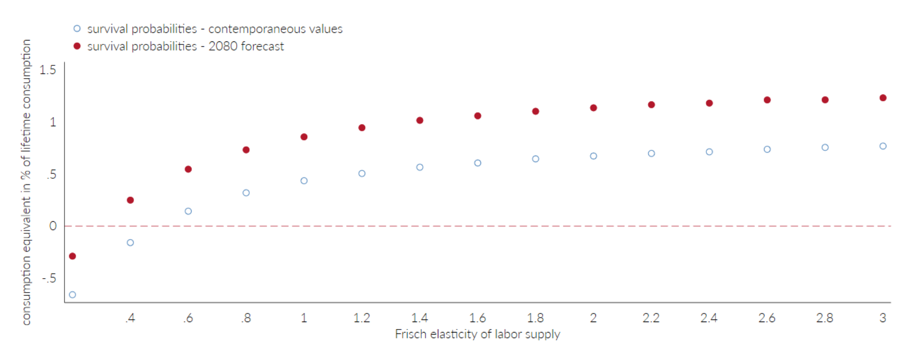
Macroeconomic adjustment across η



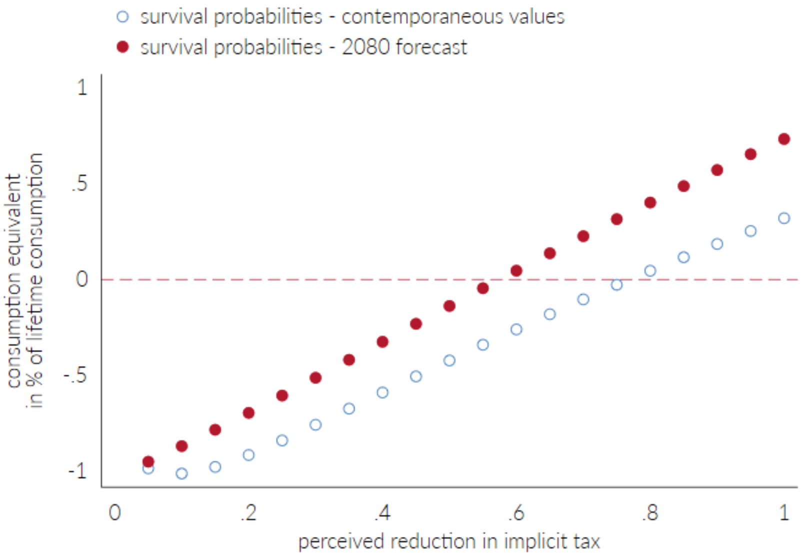
Fiscal adjustment across η



Longevity makes the reform beneficial for even less responsive labor markets



Half-internalizing the reform is sufficient to deliver welfare gains ($\eta = 0.8$)



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3. With rising longevity, the potential welfare gains are higher.
4. Important role for response of labor to the features of the pension system

Questions or suggestions?

Thank you!

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Labor wedge as measure of distortion

With marginal labor income tax denoted as $\mathcal{T}'(y_{j,t}(s_{j,t}))$

$$\phi \ell_{j,t}(s_{j,t})^{\frac{1}{\eta}} = \frac{c_{j,t}(s_{j,t})^{-\sigma}}{1+\tau_c} \left[1 - (1-\tau)\mathcal{T}'(y_{j,t}(s_{j,t})) - \tau(1-\upsilon_{j,t})\right] w_t \omega_{j,t}(s_{j,t}),$$

Which gives the formula for wedge:

$$\vartheta_{j,t}(s_{j,t}) = \frac{(1-\tau)\mathcal{T}'(y_{j,t}(s_{j,t})) + \tau(1-\upsilon_{j,t}) - 1}{1+\tau_c} + 1.$$

Chari et al (2007), Berger et al (2019) and Boar and Midrigan (2020), Cociuba and Ueberfeldt (2020)

back to results