Household Liquidity Policy

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How can you stimulate aggregate demand?

Fiscal stimulus is conventional tool i.e. deficit funded transfers or spending

- $\uparrow$ disposable resources $\rightarrow \uparrow$ spending
- Why? Liquidity constraints $\rightarrow$ higher MPC $\rightarrow$ higher multiplier

  (Kaplan and Violante, 2014; Fagereng et al., 2021; Carroll et al., 2021; Aguiar et al., 2024)

...but **other tools increase disposable resources**

- Regulations are major source of illiquidity, and they can be changed
- **Household Liquidity Policy (HLP)**: stimulus by regulation, not budget
- Focus: relaxed regulations on individual retirement accounts during COVID–19

  (Schneider and Moran, 2025; Hamilton et al., 2024; Wang-Ly and Newell, 2022; Andersen, 2020)

We build a model to compare these two approaches to stimulus

Research questions

- How does liquidity policy compare to fiscal stimulus in aggregate?
- What are their relative distributional and welfare implications?

Approach: build a theoretical model capturing key implications

Stimulus approach	Implications	Model elements
Fiscal policy	Tax distortions Redistribution	2–asset HA household Fiscal authority & rule
Liquidity policy	$\downarrow$ retirement adequacy	+ OLG 2–stage life–cycle + Present–biased types + Retirement policy

What we find

Aggregate

- Both approaches boost consumption
- Funding channels differ: future taxes v. reduced retirement resources
- Fiscal causes substantially more future distortion

Distributional

- Fiscal: taxes raised from a broad base, including retirees & future generations
- Liquidity: user pays, reducing retirement adequacy for high MPC workers

Welfare

- Majority are better off with liquidity policy: more flexibility & lower taxes
- The minority that prefer fiscal are poorer & more present biased workers

Our contributions

Stimulus policy

- Fiscal stimulus & multipliers with tax distortions
  (Oh and Reis, 2012; Uhlig, 2010; Galí et al., 2007; Ferriere and Navarro, 2024; Galí, 2020; Hagedorn et al., 2019; Auclert et al., 2024; Angeletos et al., 2023)
- Liquidity policy empirical analysis
  (Schneider and Moran, 2025; Hamilton et al., 2024; Kreiner et al., 2019; Wang-Ly and Newell, 2022; Andersen, 2020)

⇒ Theoretical comparison of liquidity policy to fiscal alternative

Retirement policy

- Optimal balance of commitment v. flexibility for present–biased v. unbiased
  (Diamond, 1977; Feldstein, 1985; Beshears et al., 2025; Amador et al., 2006; Moser and Olea de Souza e Silva, 2019)

⇒ Rationalise mandatory DC system design

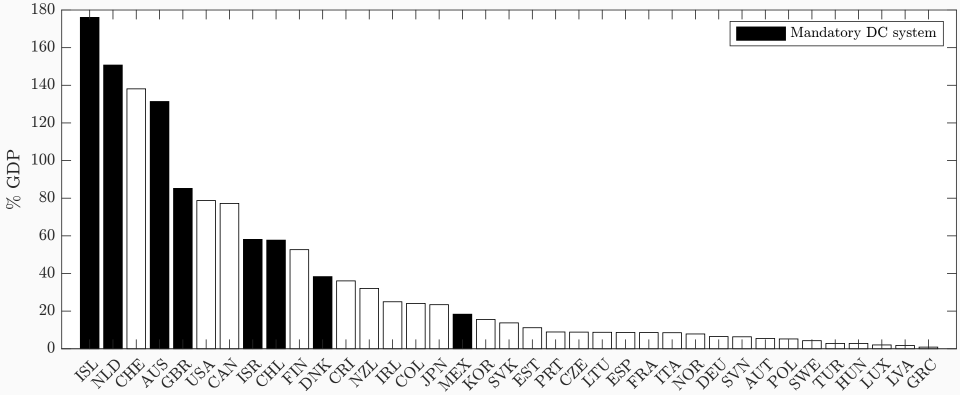
Plan for today

1. Institutional setting
2. Model description
3. Stimulus policy experiments

Institutional setting

Defined Contribution accounts hold substantial assets

Figure 1: Pension system assets, % GDP (OECD, 2024)

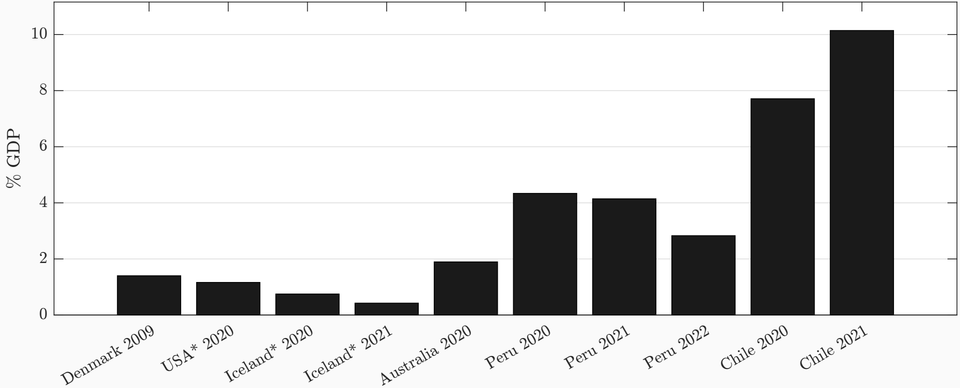


Key regulations: tax concessions, contributions, & withdrawal restrictions (detail)

Illiquidity is a design feature, and designs can be changed

Examples of liquidity policy during COVID–19

- Penalty–free early withdrawals (e.g. Chile, Peru, Australia & USA)
- Lower mandatory contributions (e.g. Malaysia & Vietnam)



Model

Model—plan

Households

- Life–cycle & idiosyncratic risk
- Budget constraints
- Present–bias

Government

- Retirement policy
- Fiscal policy

Stationary equilibrium

- Definition
- Calibration
- Aggregate moments

The households—risk

Life–cycle: perpetual youth w/ Poisson transitions (Blanchard, 1985; Yaari, 1965)

$$\text{working life } \rightarrow_{\delta_R} \text{ retirement } \rightarrow_{\delta} \text{ death}$$

Idiosyncratic risk (working life):

- Employment/unemployment transitions with Poisson intensities (λ_f, λ_s)
- Log working–productivity follows Ornstein—Uhlenbeck process

$$d \ln z_t = -a \cdot \ln z_t dt + b \cdot dW_t$$

The households—two accounts

Liquid saving account (b) (detail)

$$\dot{b} = r_b(b)b + (1 - \xi(x)) \cdot y(x) - d - \chi(d, a) + T(x) - \tau_b(x) - (1 + \tau_c)c$$

$$y(x) = (wz, w_U, w_R) \text{ when working, unemployed, or retired}$$

Illiquid retirement account (a)

$$\dot{a} = r_a a + \xi(x)y(x) + d - \tau_a(x)$$

$$a \geq 0$$

Where $x = (b, a, z, \beta)$ represents the vector of household states.

The households—present–biased preferences

Proportion $\eta \in [0, 1]$ of population have **Instantaneous Gratification** preferences

(Laibson, 1997; Harris and Laibson, 2013; Maxted, 2025; Maxted et al., 2024)

$$v^{\beta}(x_t) = \lim_{\Delta \to 0} \max_{(c,d)} u(c)\Delta + \beta \cdot e^{-\rho\Delta}\, \mathbb{E}\left[v^{E}(x_{t+\Delta}(c, d))\right]$$

Compared to rational agent

1. Extra discount on future $\beta < 1$
2. Expectation of future self is 'naive' i.e. $v^{E}(\cdot) = v^{1}(\cdot) \neq v^{\beta}(\cdot)$

Solution: present–biased households front–load consumption (detail)

$$\mathbb{E}\left[\frac{\dot{c}^{\beta}(x)}{c^{\beta}(x)}\right] = \frac{1}{\sigma}[r_b - \rho] - \underbrace{(1+\tau)(1-\beta^{1/\sigma})\frac{\partial c^{\beta}(x)}{\partial b}}_{\text{Bias distortion } (<0)}$$

Retirement accounts and liquidity policy

The government regulates the **illiquid account**:

- Same underlying asset: $r_b = r_a = r$
- Mandatory contributions: ξ
- Withdrawal limit: $d \geq \gamma$
- Tax concession: φ defines tax functions with TTE system (OECD, 2018)

$$\tau_b(x) = \tau\left(rb^+ + (1 - \varphi\xi)wz\right)$$
$$\tau_a(x) = \tau(1 - \varphi)ra$$

...and sets the **state pension** w_R

Fiscal authority and fiscal policy

Deficits funded by borrowing B

$$\dot{B} = \underbrace{G + w_U \pi_U + w_R \pi_R + rB + \int T(x) h(x) dx}_{\text{Spending}}$$

$$- \underbrace{\int \left[\tau_c \cdot c(x) + \tau_b(x) + \tau_a(x)\right] h(x) dx}_{\text{Tax revenues}}$$

Limited by **fiscal rule** (suspended during stimulus)

$$\dot{B} = -\mu \left(B - \bar{B}\right)$$

Stationary equilibrium

Definition: for given prices (w, r) & retirement policy $(w_R, \xi, \gamma, \varphi)$

- Policies & values that solve the household problems
- Stationary measure $h(x)$
- τ_c balances the government budget

Numerical solution

- Discretised state–space with (N_b, N_a, N_z)
- New 'nested–drift' algorithm (Sabet and Schneider, 2024)

Calibrated parameters

External calibration

- General parameters: standard (detail)
- Life–cycle: average 40 year working life & 20 year retirement (OECD, 2023)
- Present–bias types: $\beta \in \{0.5, 1\}$ (Ganong and Noel, 2020; Laibson et al., 2024)
- State pension: $w_R = 0.3$ (detail) (OECD, 2023)

Internal calibration

- Present–bias share: targeting aggregate worker MPC $\Rightarrow \eta = 50\%$
- Mandatory DC system: constrained–optimal $\Rightarrow (\gamma, \xi, \varphi) = (0, 0.08, 0.37)$ (detail)

The calibrated model matches relevant aggregate moments for workers

Moment	Model	Data	Source
Quarterly MPC (**targeted**)	0.22	$[0.15, 0.25]$	Kaplan and Violante (2022)
% HTM	40	41	"
Liquid wealth / lab. income p.a.	1.0	0.6*	"
Fin. wealth / lab. income p.a.	6.4	4.1*	"
Personal saving rate	7%	$[0, 10]\%$	OECD range
Median Δc on retirement	-1%	-3.5%	Aguila et al. (2011)

*From the bottom 95% of the empirical wealth distribution, USA.

(across asset distribution) (effect of retirement policy)

Stimulus Policy

Two approaches to stimulus

Common target outcome:

- 5% boost to household consumption over one–quarter

Different approaches (one–quarter MIT shocks)

- Fiscal policy: working–age transfer (T)
- Liquidity policy: window allowing limited withdrawals ($\gamma < 0$)

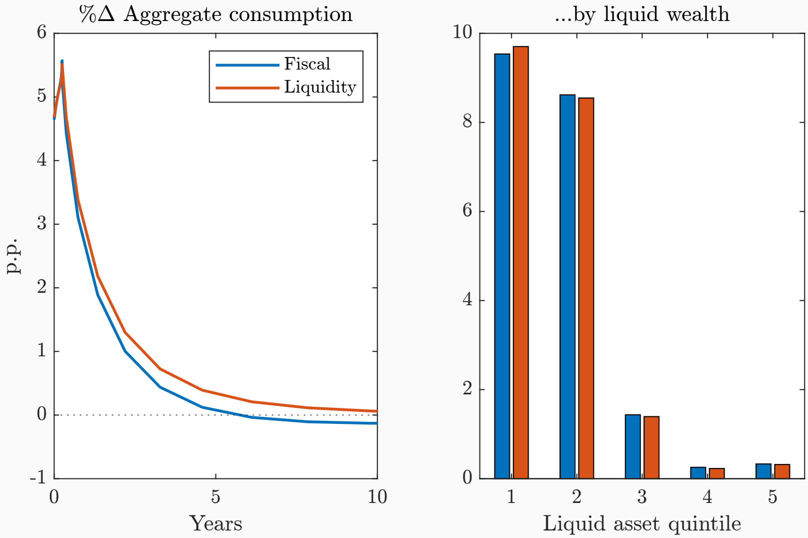
Equivalent size: $T_t^* = 0.0706$ and $\gamma_t^* = -0.0723$ $\forall t \leq 1$ quarter

- Equivalent to $\approx$ \$US$5,000$ per worker
- Compare liquidity programs: AUS Early Release of Super \$AU$20,000$ ($\approx$ \$US14k)
- Compare transfer programs: USA 2020 CARES Act \$US$1,200$ + \$$500$ per child

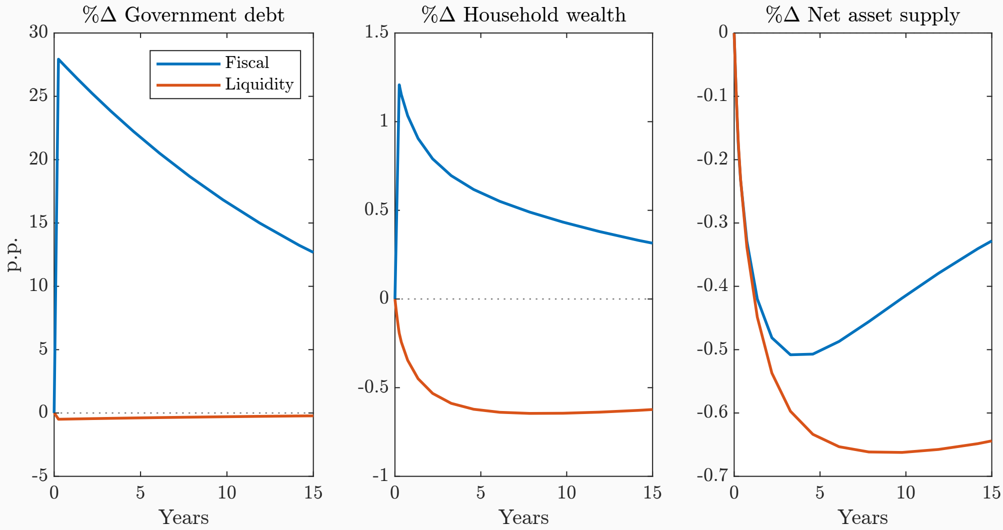
Stimulus Policy

Stimulus in aggregate

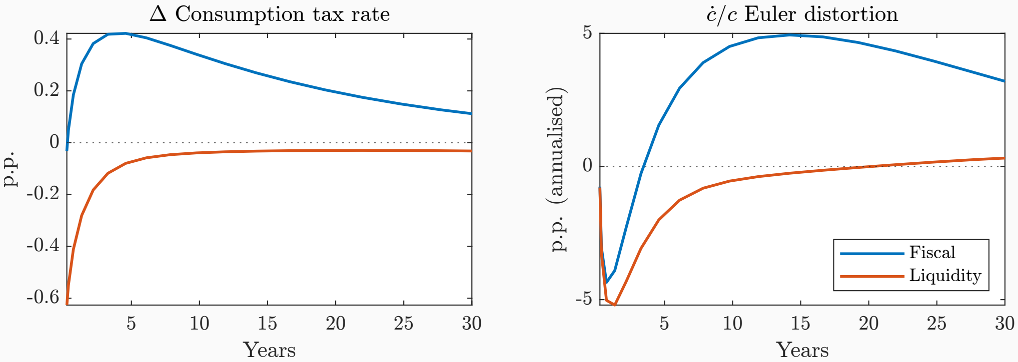
Consumption stimulus is from low-liquidity workers in both approaches



But funding channels & timing are different



Fiscal policy distorts consumption smoothing more

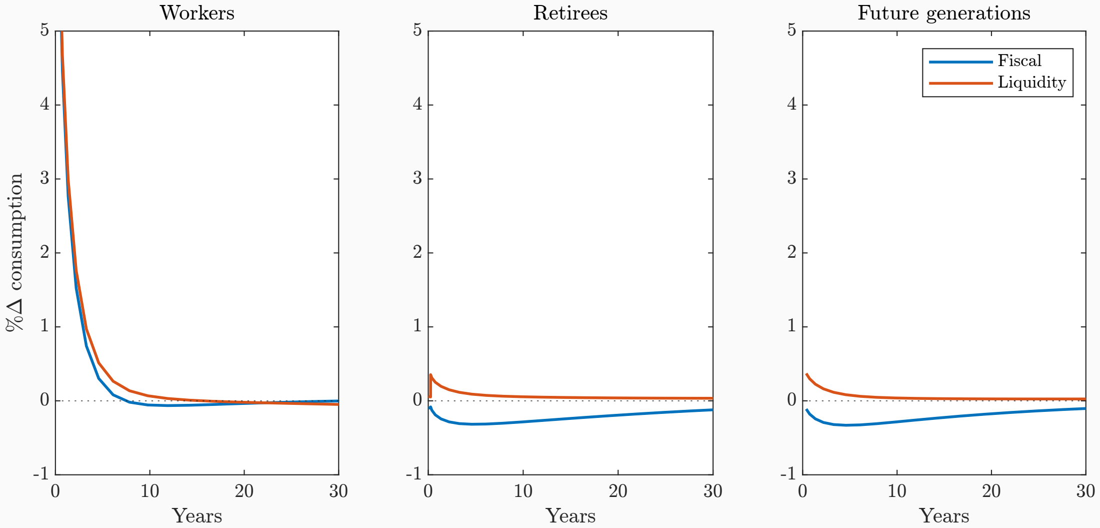


$$\mathbb{E}\left[\frac{\dot{c}^{\beta}(x)}{c^{\beta}(x)}\right] = \frac{1}{\sigma}[r_b - \rho] - (1+\tau_t)(1-\beta^{1/\sigma})\partial_b c_t^{\beta}(x) \underbrace{- \frac{1}{\sigma}\left[\frac{\dot{\tau}}{1+\tau_t}\right]}_{\text{Tax distortion}}$$

Stimulus Policy

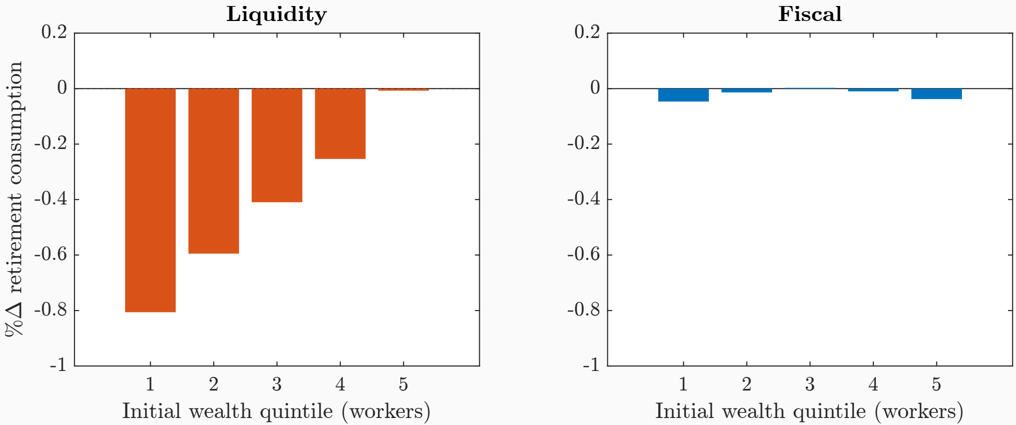
Distributional implications

Fiscal drag is greatest for the retired & future generations



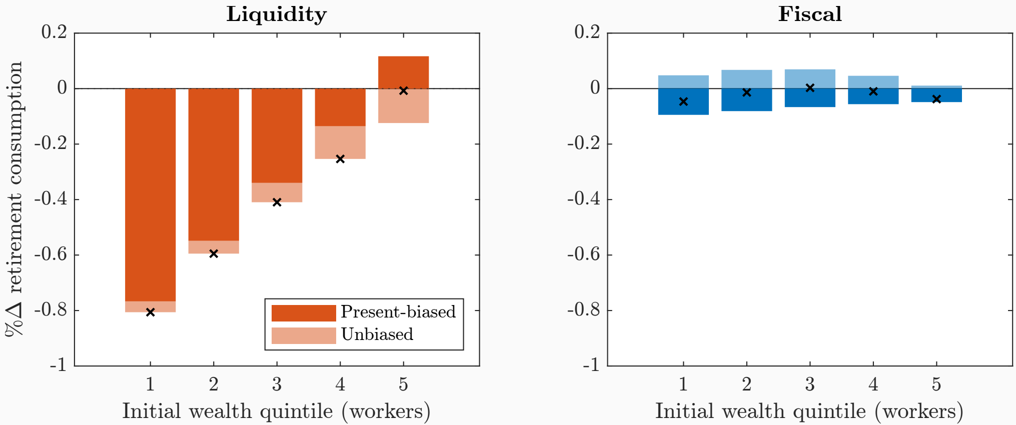
Liquidity policy reduces less–wealthy workers' retirement adequacy

Measure: change in $\mathbb{E}[C]$ upon retirement, for cohort retiring 20 years after stimulus.



Liquidity policy reduces less–wealthy, *biased* workers' retirement adequacy

Measure: change in $\mathbb{E}[C]$ upon retirement, for cohort retiring 20 years after stimulus.



Stimulus Policy

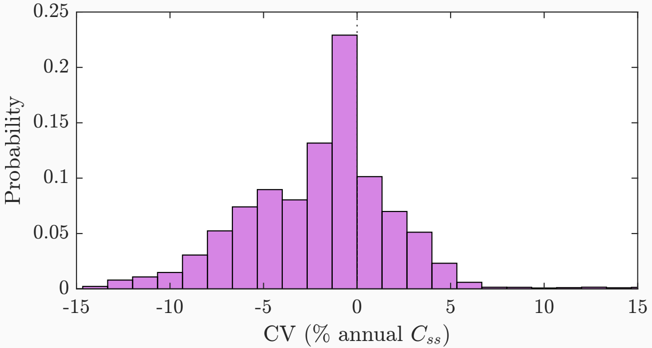
Welfare evaluation

There is a lot of disagreement about which policy is best

Define: long–run CV for implementing liquidity instead of baseline fiscal

$$\underbrace{\hat{v}(b+CV(x), a, z, \beta; 0, \gamma^*)}_{\text{Liquidity}} = \underbrace{\hat{v}(b, a, z, \beta; T^*, 0)}_{\text{Fiscal}}$$

$CV(x) > 0 \Rightarrow$ fiscal $\succ$ liquidity



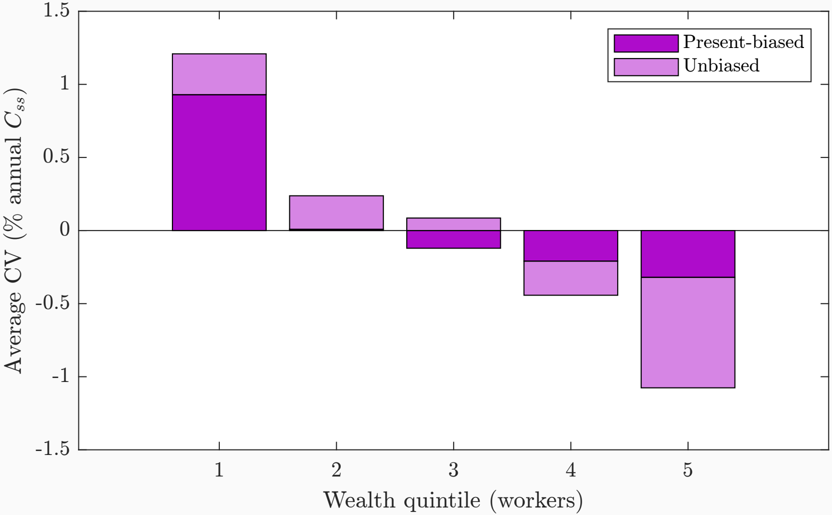
Retirees and unbiased workers prefer liquidity to fiscal policy

Table 1: Average CV (% annual C_{ss})

	Long–run	Present–biased
Workers	-0.1	-0.4
Biased	$+0.6$	$+0.0$
Unbiased	-0.8	-0.8
Retired	-4.2	-4.1
Total	-1.6	-1.7

Note: Positive CV $\Rightarrow$ fiscal $\succ$ liquidity

Among workers, fiscal policy is preferred by the poor & biased



Liquidity policy is more popular, but more regressive

Aggregation	Measure	Fiscal	Liquidity
Vote for liquidity	70%		✓
Average C.V. for liquidity	-2% annual C_{ss}		✓
Average welfare difference	0.3	✓	

Recap results

- No–one likes paying taxes; those that pay more prefer liquidity policy
- ...which concentrates stimulus funding on a smaller, more vulnerable group
- ...who could be compensated cheaply if efficient transfers were possible

Robustness: fiscal rule symmetry & severity, targeting, magnitude, contributions.

Conclusion

What we've seen

- New framework bringing together HA macro and public literatures
- Mandatory DC with tax concessions as constrained optimal (see paper)
- Liquidity policy is effective and more popular, but more regressive, than fiscal

Related work:

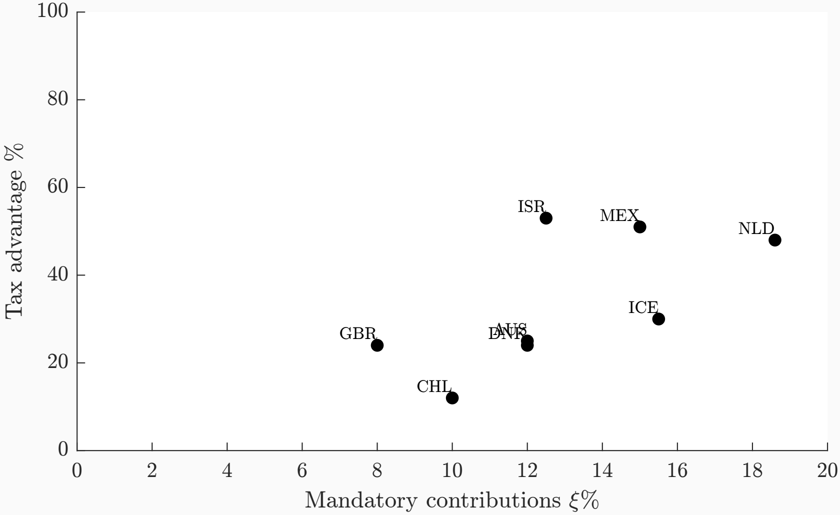
- How important was self–control for early withdrawal? (Schneider and Moran, 2025)
- General equilibrium impacts of retirement and liquidity policy?

Appendix

Examples of DC systems (return)

DC systems	USA	AUS	UK
Name	401(k) & IRA	Superannuation	Employer plan & SIPP
Tax concessions	EET	TTE	EET
Contributions	Voluntary	Mandatory 11% & Vol.	Default 8% & Vol.
Illiquidity	10% penalty	Frozen	55% penalty
State pension	Scales with contributions	Means tested	Flat

Mandatory contributions are usually paired with tax concessions (return)



Detailed functions (return)

Adjustment cost function allows for convex & linear costs, where χ_1 is withdrawal penalty. Delivers analytical policy functions (Kaplan et al., 2018).

$$\chi(d,a) = \chi_0 d^+ + \chi_1 d^- + \frac{\chi_2}{2}\frac{d^2}{a}$$

Soft borrowing constraint makes borrowing possible, but irrational. Keeps rational agents away from state–constraints (Lee and Maxted, 2023; Maxted, 2025).

$$r_b(b) = \begin{cases} r_b & b \geq 0 \\ r_b + \omega & b < 0 \text{ where } \omega >> 0 \end{cases}$$

Policies with present–biased preferences (return)

Problem: completely naive consumers

$$v^{\beta}(x_t) = \lim_{\Delta \to 0} \max_{(c,d)} u(c)\,\Delta + \beta \cdot e^{-\rho\Delta}\,\mathbb{E}\left[v\left(x_{t+\Delta}\left(c,d\right)\right)\right]$$

Solution (Maxted, 2025): present–biased households front–load consumption

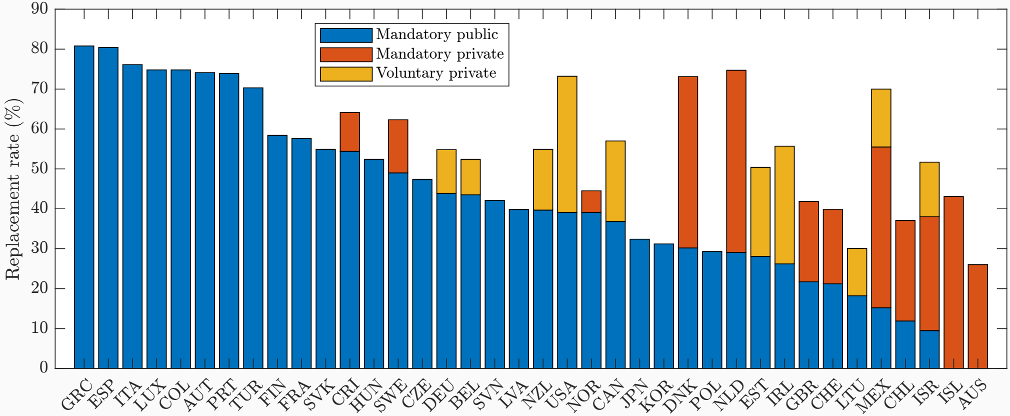
$$c^{\beta}(x) = \beta^{-\frac{1}{\sigma}} \cdot c(x) \quad \text{and} \quad v^{\beta}(x) = \beta \cdot v(x) \quad \text{and} \quad d^{\beta}(x) = d(x)$$

$$\mathbb{E}\left[\frac{\dot{c}^{\beta}(x)}{c^{\beta}(x)}\right] = \frac{1}{\sigma}[r_b - \rho] - \underbrace{(1+\tau_c)\left(1-\beta^{\frac{1}{\sigma}}\right)\partial_b c^{\beta}(x)}_{\text{Bias distortion}}$$

Calibrated parameters (return)

Parameter	Symbol	Baseline calibration	Source
Retirement intensity	δ_R	1/160	40 year av. work–life
Death intensity	δ	1/80	OECD (2023)
Sep. & find. intensity	(λ_s, λ_f)	(0.0587,1.2)	Shimer (2005) & BLS
Log–income process	(ρ_z, σ_z^2)	(0.9136,0.0426)	Floden and Lindé (2001)
Risk aversion	σ	2	Standard
Discount rate	ρ	0.0025	Carroll et al. (2017)
Present–bias	(β_L, β_H)	(0.5,1)	Ganong and Noel (2020)
Present–bias share	η	0.5	Target MPC $\in [0.15, 0.25]$
Risk–free real rate	r	0.0051	2% p.a.
Borrowing penalty	ω	0.4024	500% p.a.
Wage	w	0.25	Numeraire
Unemployment benefit	w_U	0.1	Shimer (2005)
Income tax	τ	25%	OECD average
Consumption tax	τ_c	12%	Budget balance
Government spending	G	0.0238	G/GDP = 15%
Steady state debt	$\bar{B}$	0.1589	Debt/GDP = 25%
Fiscal rule	μ	0.0128	Galí (2020)
Adjustment costs	(χ_0, χ_1)	$(0, 0.001)$	Trivial

Mandatory DC systems are backed by less generous state pensions (return)



Source: OECD (2023)

Optimal mandatory DC system (return)

Welfare

- Criterion: expected 'long–run' value $\hat{v}(x)$, for prospective newborns (detail)
  (O'Donoghue and Rabin, 2006; Bernheim and Taubinsky, 2018; Naik and Reck, 2024)

$$W(\xi, \varphi) = \mathbb{E}_{(\boldsymbol{z},\beta)}[\hat{v}(\mathbf{0}, \mathbf{0}, \boldsymbol{z}, \beta; \xi, \varphi)]$$

- Planner balances (i) commitment v. flexibility, and (ii) present–biased v. rational

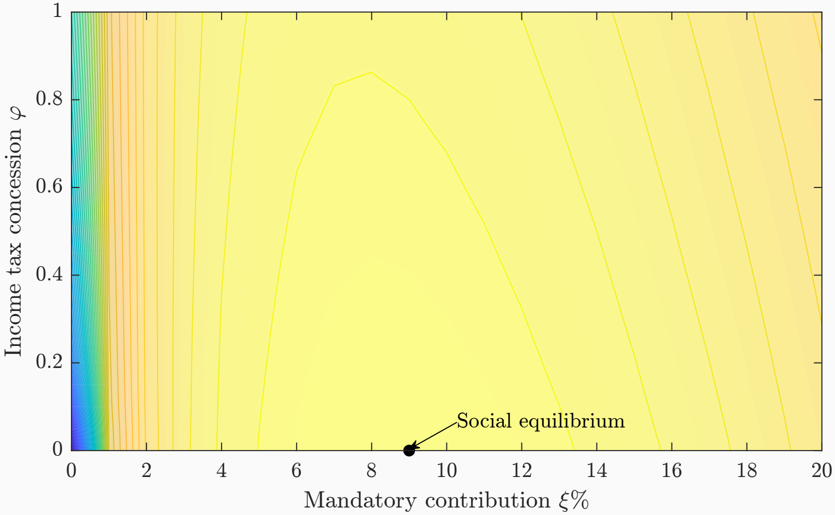
Social equilibrium: policy maximises welfare

$$(\tilde{\xi}, \tilde{\varphi}) = \arg\max_{\xi,\varphi} W(\xi, \varphi)$$

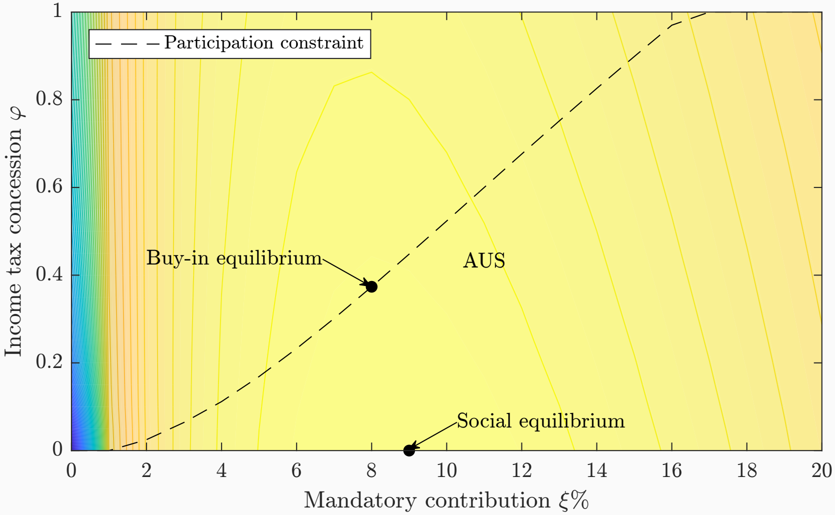
Buy–in equilibrium: policy maximises welfare in a pooling–at–birth equilibrium

$$(\xi^*, \varphi^*) = \arg\max_{\xi,\varphi} W(\xi, \varphi) \text{ s.t. } \hat{v}(\mathbf{0}, \mathbf{0}, \boldsymbol{z}, \beta; \xi^*, \varphi^*) \geq \hat{v}(\mathbf{0}, \mathbf{0}, \boldsymbol{z}, \beta; \mathbf{0}, \mathbf{0}) \; \forall \, (\boldsymbol{z}, \beta)$$

Social equilibrium cannot explain tax concessions (return)



Tax concessions build buy–in $(\xi^*, \varphi^*) = (0.08, 0.37)$ (return)



Stationary welfare definitions (return)

Welfare definition

$$W(\xi, \varphi) = \mathbb{E}[\hat{v}(0, 0, z, \beta; \xi, \varphi)]$$

Where long–run value anticipates but does not adopt bias

$$\hat{v}(x_t; \xi, \varphi) = \mathbb{E}\left[\int e^{-\rho(s-t)} u\left(c(x_s; \xi, \varphi)\right) ds\right]$$

Social equilibrium

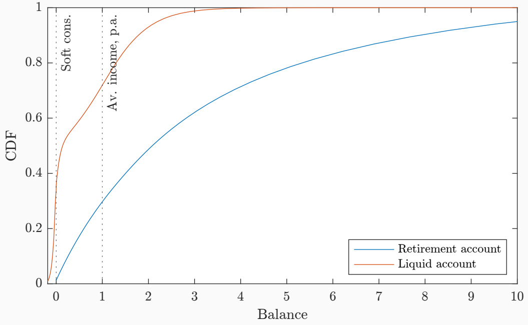
$$(\tilde{\xi}, \tilde{\varphi}) = arg \max_{\xi, \varphi} W(\xi, \varphi)$$

Buy–in equilibrium

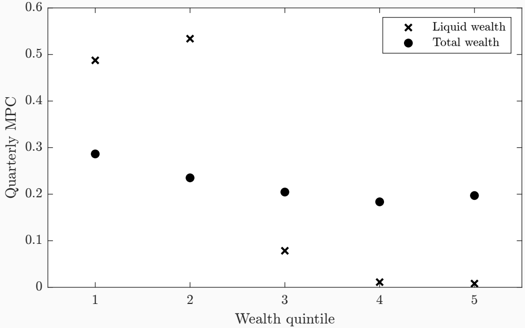
$$(\xi^*, \varphi^*) = arg \max_{\xi, \varphi} W(\xi, \varphi) \text{ s.t. } \hat{v}(0, 0, z, \beta; \xi^*, \varphi^*, \tau_c) \geq \hat{v}(0, 0, z, \beta; 0, 0, \tau_c) \; \forall z, \beta$$

The model matches relevant aggregate moments (return)

(a) Wealth distribution



(b) Quarterly MPC

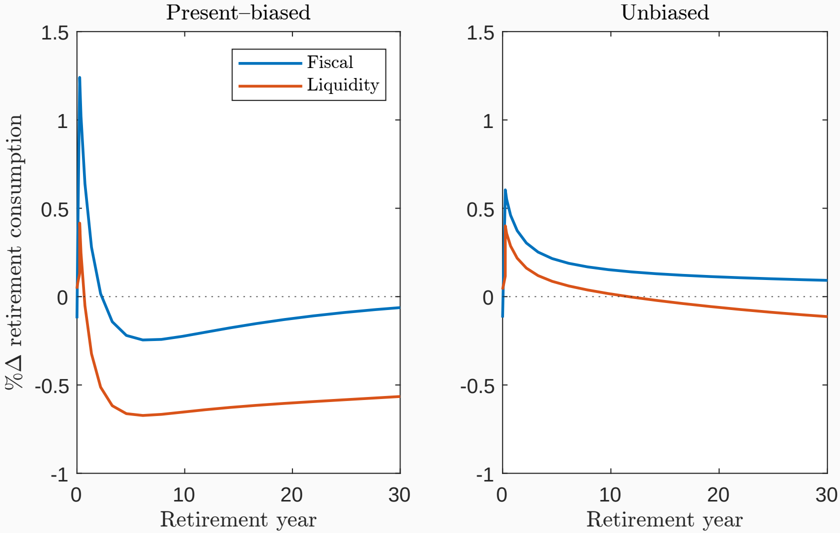


Improved adequacy for biased types, by constraining unbiased (return)

	With*out* mandatory saving	With mandatory saving
Average saving rate (% earnings)		
Present–biased	4	22
Unbiased	16	24
Median $\%\Delta C$ at retirement		
Present–biased	-27	16
Unbiased	-13	-12

Liquidity policy alters retirement adequacy similarly across cohorts (return)

Measure: change in $\mathbb{E}[C]$ upon retirement, for different cohort retirement years.

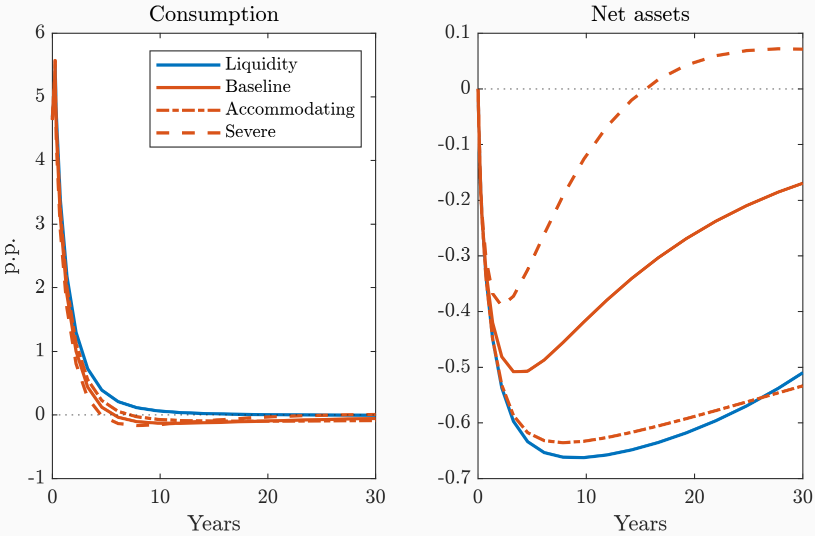


Sensitivity to fiscal rule (return)

Table 2: CV to prefer liquidity policy (% annual C_{ss})

	Baseline	Asymmetric	Consolidating	Accommodating
Total	-1.6	-0.1	-2.1	-0.8
Workers	-0.1	$+1.6$	-0.5	$+0.8$
Biased	$+0.6$	$+1.9$	$+0.2$	$+1.3$
Unbiased	-0.8	$+1.3$	-1.1	$+0.2$
Retired	-4.2	-3	-4.8	-3.5

Sensitivity to fiscal rule (return)



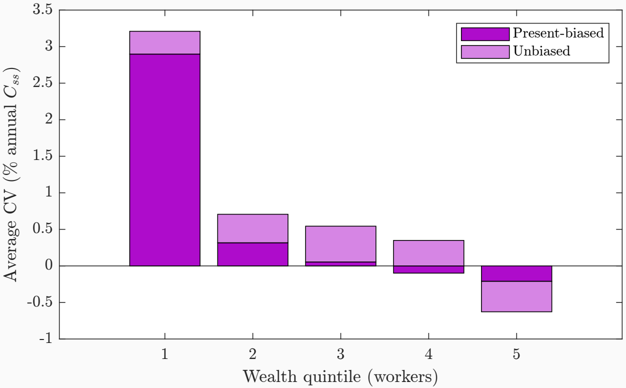
Sensitivity to fiscal stimulus design (return)

Table 3: CV to prefer liquidity policy (% annual C_{ss})

	Baseline	Un–targeted	2.5% impulse	7.5% impulse	Lower ex–ante ξ
Total	-1.6	-2.1	-0.8	-2.6	1.4
Workers	-0.1	-4.9	-0.1	-0.1	4.1
Biased	*0.6*	*-3.9*	*0.2*	*0.8*	*5.9*
Unbiased	*-0.8*	*-5.9*	*-0.4*	*-1.0*	*2.3*
Retired	-4.2	2.8	-2.0	-7.0	-3.4

Sensitivity to retirement policy design (return)

Stimulus comparison under buy–in equilibrium when social welfare defined over whole population $(\xi, \varphi) = (\mathbf{0.04}, \mathbf{0.12})$.



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