Welfare Analysis of Income-Stabilization Policies in a HANK Model with Unemployment Risk

Stefano Grancini[1] **Marcos Poplawski-Ribeiro**[2] Danila Smirnov[2]

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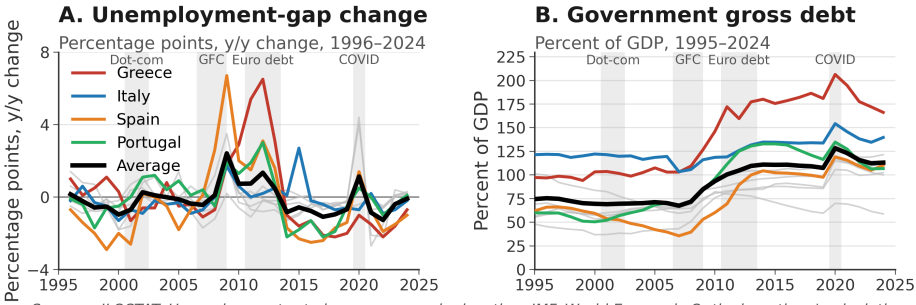
[1]Nova SBE

[2]International Monetary Fund

Recessions hit households unevenly, fiscal space is tight



Sources: ILOSTAT, Unemployment rate by sex, age and education; IMF, World Economic Outlook; authors' calculations.
Note: Panel A gap = unemployment rate of those with basic education (ISCED 1-2) minus those with advanced education (ISCED 5-8); both sexes, age 25+. Black line is the unweighted mean of the nine economies.
Shaded areas mark the dot-com slowdowns and recessions.

The policy question: with limited fiscal space, which income-stabilization instrument delivers the most welfare per unit of fiscal cost — and for whom?

This paper

Setup. HANK–SAM: heterogeneous households, endogenous unemployment and labor supply

Compare three income-stabilization instruments:

φ^{UI}: UI generosity $\quad$ T_{HtM}: Targeted lump-sum $\quad$ T: Universal lump-sum

Two complementary exercises:

- *Temporary* (recession response): each instrument scaled to a 1pp peak rise in B/Y
- *Permanent* (automatic policy): each instrument scaled to increase cost by 1pp of Y

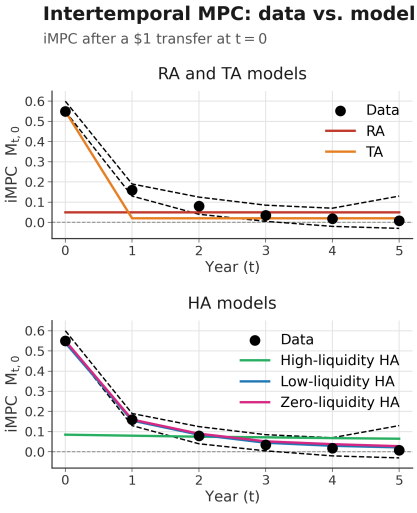
Three contributions:

1. Head-to-head menu comparison under common envelopes, in both exercises
2. Welfare consistently: $U_t = \sum_i D_{i,t}[u(c_{i,t}) - v(n_{i,t})]$ along the full nonlinear transition
3. Distributional incidence and within-group vs. compositional decomposition

Preview. $\varphi^{UI} \succ T_{\mathrm{HtM}} \succ T$ in the recession exercise; and φ^{UI} is the *only* welfare-improving permanent policy — T_{HtM} and T become welfare costs in steady state

Why HANK with unemployment risk

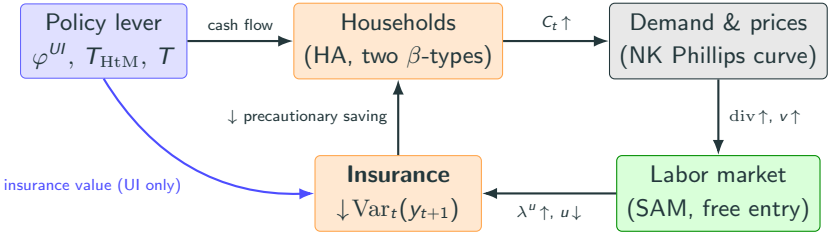
HANK is the right lens: data show high, persistent iMPCs



Note: Dots are empirical (Fagereng-Holm-Natvik); Lines: Auclert-Rognlie-Straub (2024).

- **Data:** impact MPC ≈ 0.5, decays gradually
- **RA misses level; TANK misses persistence**
- **HANK matches both**
- **Implication for us:** *who* receives the dollar matters *and* matters for several years $\Rightarrow$ menu of instruments will rank non-trivially

The mechanism in one picture



All three policies fire the orange *cash-flow* channel (top loop)

Only UI fires the blue *insurance* channel: by lowering income risk in the bad state, it raises consumption *for the currently employed too*

This second channel is the source of UI's dominance and the reason TANK with exogenous MPC types can't reproduce the ranking

Model ingredients

Monthly HANK–SAM, calibrated to the US

Households (two β-types, CRRA in c and l; $a \geq 0$, $e \in \{E, U\}$, l endogenous for employed):

- Period utility $u(c_t) - v(l_t)$; $\sigma = 2$; v convex (Frisch elasticity $\eta = 1$)
- **Hand-to-mouth** (30%): $\beta = 0$, $a' \equiv 0$, impact MPC near 1 — *proxy for liquidity-constrained, cash-flow-sensitive* households
- **Buffer-stock** (70%): $\beta = 0.940^{1/12}$, choose $a' \geq 0$ via Euler
- Endogenous, distribution-driven MPC; high-MPC mass Θ_t rises in downturns

Labor market. Search and matching with free entry; wage $w_t = \bar{\omega}\, p_t^x$ (no bargaining); unemployment evolves through λ_t^u and δ_t. Steady-state $u^{ss} = 0.0625$

Government. Consol bond, UI outlays, transfers, labor taxes. **Tax-smoothing** ω**:** baseline $\omega = 0.05$ *(automatic stabilizer on the revenue side: τ_t falls when u_t rises)*

Monetary policy. Taylor rule, coefficient 1.5, zero-inflation target

Macro effects under a common envelope

Three levers, one fiscal envelope

Two normalizations, two exercises.

- Temporary (recession): $\max_t \Delta(B_t/Y^{ss}) = 1\%$
- Permanent (steady state): $\Delta(\text{tax revenue})/Y^{ss} = 1\%$

Unemployment insurance (φ^{UI})

- Cash flow to *high-MPC unemployed*
- **Insurance:** lowers $\mathrm{Var}_t(y_{t+1})$ for employed
- Strongest labor-market feedback

Targeted transfers T_{HtM}

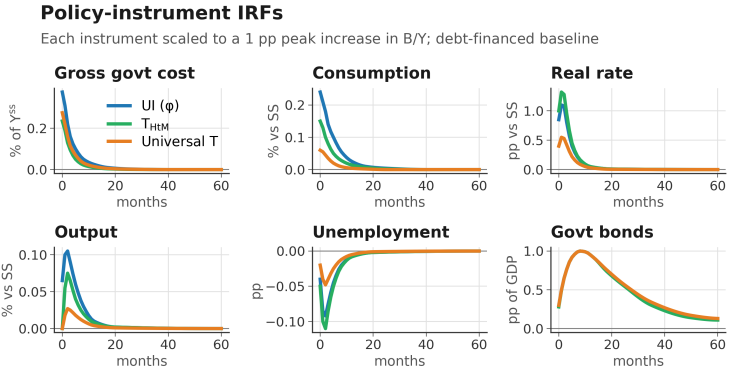
- Cash to *high-MPC* liquidity-constrained
- No insurance — doesn't move $\mathrm{Var}_t(y_{t+1})$
- Strong impact, fades faster

Universal transfers T

- Same lump sum to all (Diluted by low-MPC)
- No insurance
- Weakest per unit

Welfare ranking and implementability ranking coincide: φ^{UI} dominates on both

IRFs: how the three policies propagate



- UI: largest, most persistent C and Y response; fastest improvement in λ_t^u and u_t: both channels firing
- T_{HtM}: large impact C, fades faster (cash-flow only)
- T: smallest per unit, diluted across low-MPC households

Welfare results

Why HANK-consistent welfare matters

Standard shortcut: compute $u(\bar{C}_t, \bar{L}_t)$ on aggregate consumption

What we do instead:

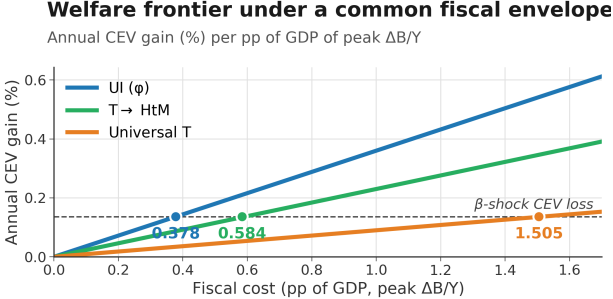
$$U_t = \sum_i D_{i,t}\, u(c_{i,t}, l_{i,t}), \qquad W = \sum_{t=0}^{T-1} \beta_y^t\, U_t.$$

Aggregate utility over the *endogenous cross-section* along the full nonlinear transition. CEV: solve for g such that $W_1 = W_0(g)$

Why this matters. u is concave $\Rightarrow$ aggregating consumption *first* understates marginal utility in the low-c tail. In recessions, mass shifts to high-MPC, low-c households, where marginal utility is highest

$u(\bar{C}_t, \bar{L}_t)$ systematically understates the insurance value of policy. We don't want to assume away the very channel the paper studies

Recession exercise: welfare results



Note: Each ray plots CEV gain per policy unit (one unit = 1 pp peak increase in B/Y). Intersections with the dashed line give the fiscal cost to offset the demand-shock loss.

	CEV gain per pp of GDP	**Fiscal cost** pp to offset shock
UI (φ^{UI})	**0.36**	**0.378**
T_{HtM}	0.23	0.584
Universal T	0.09	1.505

Ranking: $\varphi^{UI} \succ T_{\mathrm{HtM}} \succ T$

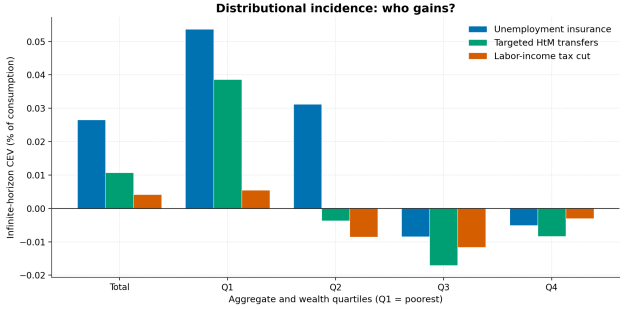
UI is $\sim$4$\times$ more cost-effective than T

Why UI dominates — the two channels combine:

- *Cash flow* to high-MPC unemployed (shared with T_{HtM})
- *Insurance* that lowers $\mathrm{Var}_t(y_{t+1})$ — raises consumption of the **employed** too
- Strongest feedback through dividends $\rightarrow$ vacancies $\rightarrow$ tightness $\rightarrow$ job-finding

Distribution

Distributional incidence: who gains?



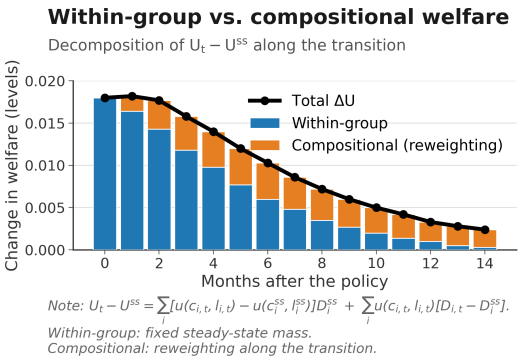
- UI: largest gain in $Q2$: near-HtM buffer-stock households with an intertemporal margin *Insurance lowers their precautionary saving the most*
- T_{HtM}: concentrated on $Q1$ (poorest, mostly HtM)
- Universal T: small and diffuse; near zero in top quartiles

UI is not just a transfer to the unemployed, it's an insurance to the precariously employed

Within-group vs. compositional welfare effects (UI)

Decomposition:

$$U_t - U^{ss} = \underbrace{\sum_i [u(c_{i,t}, l_{i,t}) - u(c_i^{ss}, l_i^{ss})]\, D_i^{ss}}_{\text{within-group}} + \underbrace{\sum_i u(c_{i,t}, l_{i,t})\, [D_{i,t} - D_i^{ss}]}_{\text{compositional}}$$



- **On impact:** *within-group* dominates: direct cash flow + lower precautionary saving among near-HtM buffer-stock
- **Over time:** *compositional* component grows: distribution shifts back as job-finding improves and unemployment recedes
- Persistence in aggregate welfare comes from *both* channels

Permanent policy

From temporary stabilization to permanent automatic policy

A natural question. What if these instruments are made permanent automatic stabilizers, not one-off recession responses?

Different exercise, different envelope

- *Recession exercise* (previous slides): $\max_t \Delta(B_t/Y^{ss}) = 1\%$ — peak-debt envelope
- *Permanent exercise* (this slide): $\Delta(\text{tax revenue})/Y^{ss} = 1\%$ — steady-state cost envelope

Steady-state closure:

- τ^{ss} balances the consolidated government budget at policy level
- r^{ss} clears the asset market (household savings = bond supply)
- Households re-optimize fully knowing the policy is permanent: savings, hours, and HtM status all adjust

Welfare rankings agree

Temporary stabilization vs. permanent policy

Policy	Recession exercise CEV gain, 1pp peak $\Delta B/Y$	Permanent exercise CEV gain, 1pp SS tax revenue
UI (φ^{UI})	**+0.36**	**+ 0.75**
Targeted T_{HtM}	+0.23	− 0.06
Universal T	+0.09	− 0.13

Three takeaways:

- **UI closes a real frictional inefficiency** — uninsured unemployment risk. The welfare gain is structural, not driven by recession timing
- T_{HtM} **and** T **are pure redistribution in SS.** The binding cost is the labor-tax distortion, common to both. Targeting still helps, but household anticipation neutralizes most of it
- **Recession stabilization** $\neq$ **permanent automatic policy.** UI is uniquely both. Discretionary transfers valuable in downturns; case for making permanent much weaker

Conclusion

Conclusion

What we do. HANK–SAM endogenous unemployment and labor; head-to-head comparison of UI, targeted, and universal transfers under a *common* envelope; welfare measured consistently

Main result. $\varphi^{UI} \succ T_{\mathrm{HtM}} \succ T$
UI dominates because *cash flow + insurance + strongest labor-market feedback*

Distributional. UI helps the *near-HtM precariously employed* most (Q2); T_{HtM} helps the poorest (Q1); universal T diffuse

Policy

- **In recessions:** all three help; prioritize φ^{UI} for biggest welfare-per-fiscal-cost
- **Beyond stabilization:** only UI is welfare-improving as *permanent* stabilizer (closes the unemployment-risk wedge). Permanent T_{HtM} and T dominated by labor-tax distortion
- **Build out UI as potent automatic stabilizer; treat T_{HtM} as recession-response tools, not permanent policy; reduce T as inefficient**

Appendix

Appendix: literature placement

HANK transmission of fiscal policy. Kaplan & Violante (2014), McKay & Reis (2016), Kaplan–Moll–Violante (2018), Auclert (2019), Auclert–Rognlie–Straub (2021), Bayer et al. (2019)

Search-and-matching (DMP). Mortensen & Pissarides (1994), Pissarides (2000), Shimer (2005), Hagedorn & Manovskii (2008)

Optimal UI and macro stabilization. Chetty (2006), Landais–Michaillat–Saez (2018), Kroft & Notowidigdo (2016), Hagedorn–Manovskii–Mitman (2015), Kolsrud et al. (2018), Ganong & Noel (2019)

Closest paper: Broer, Druedahl, Harmenberg & Öberg (2021, 2024). Embed unemployment risk and search frictions in HANK; study fiscal stabilization

What we add: (i) head-to-head comparison under a *common* fiscal envelope; (ii) HANK-consistent welfare along the nonlinear transition; (iii) distributional incidence and within-group vs. compositional decomposition

Appendix: household problem

Type $i \in \{\text{HtM}, \text{BS}\}$. CRRA in consumption only:

$$V^E_{i,t}(a) = \max_{c,l,a'} \frac{c^{1-\sigma}}{1-\sigma} - \frac{l^{1+\gamma}}{1+\gamma} + \beta_i \, \mathbb{E}_t[V_{i,t+1}(a', e_{t+1}) \,|\, e_t = E], \qquad a' \geq 0$$

Budget (employed):

$$c + a' = (1 + r_t)\, a + (1 - \tau_t)\, w_t \, l + \text{div}_t + \text{tr}_t$$

Budget (unemployed):

$$c + a' = (1 + r_t)\, a + y^{UI}_t + \text{div}_t + \text{tr}_t, \qquad y^{UI}_t = \varphi^{UI} \, w_t \, u_t$$

HtM ($\beta = 0$): $a' \equiv 0$, c_t = current resources $\Rightarrow$ impact MPC $\to 1$
BS ($\beta = 0.940^{1/12}$): standard Euler equation

Appendix: SAM block

Matching and flows:

$$\lambda_t^u = A\,\theta_t^{1-\alpha}, \quad \lambda_t^v = A\,\theta_t^{-\alpha}, \quad \theta_t = \tfrac{v_t}{S_t}, \quad u_t = u_{t-1} - S_t\lambda_t^u + \delta_t(1-u_{t-1})$$

Job value, free entry, wage:

$$J_t = (p_t^x - w_t) + \beta_f(1-\delta_{t+1})J_{t+1}, \quad \kappa = \lambda_t^v\,J_t, \quad w_t = \bar{\omega}\,p_t^x$$

Output and dividends: $Y_t = TFP_t\,(1-u_t), \quad \mathrm{div}_t = Y_t - w_t\,L_t\,(1-u_t)$

Appendix: government, monetary policy, market clearing

Consol-bond budget:

$$(1+\delta_q q_t)B_{t-1} + \Phi_t + G_t + \mathrm{tr}_t = \tau_t[w_t\, L_t\,(1-u_t) + \chi^{UI}_{\mathrm{tax}}\Phi_t] + q_t B_t$$

Tax rule: $\tau_t = \omega\hat{\tau}_t + (1-\omega)\tau^{ss}$ with $\hat{\tau}_t$ the budget-balancing rate

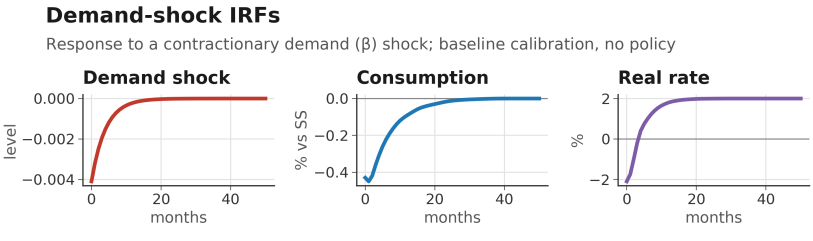
Taylor rule: $1 + i_t = (1+i^{ss})\left(\frac{1+\pi_t}{1+\pi^{ss}}\right)^{1.5}$

Clearing: $Y_t = C^{hh}_t + G_t, \quad q_t B_t = A^{hh}_t$

Appendix: calibration (US, monthly)

Parameter	Value	Source / target
CRRA, σ	2	Standard
CRRA, γ	1	Standard
HtM share, Θ	0.30	Avg. quarterly MPC ≈ 0.40
HtM discount, β_{HtM}	0	Modeling device
BS discount, β_{BS}	$0.940^{1/12}$	Asset clearing at $r^{ann} = 2\%$
Separation rate, δ^{ss}	0.02	BLS JOLTS
Job-finding, $\lambda^{u,ss}$	0.30	BLS JOLTS
Tightness, θ^{ss}	0.60	Hagedorn–Manovskii (2008)
Matching elasticity, α	0.60	Petrongolo–Pissarides (2001)
Implied u^{ss}	0.0625	6.25%
Demand elasticity, ε	6	Markup $\approx 20\%$
Rotemberg cost, φ	600	Price stickiness
Taylor coefficient, δ_π	1.5	Taylor (1993)
Steady-state tax, τ^{ss}	0.30	OECD Taxing Wages
UI replacement, φ^{UI}	0.50	DoL/CBO; Kekre (2023)
Smoothing, ω baseline	0.05	Debt-financed on impact
Shock persistence, ρ	0.80	

Appendix: demand-shock IRFs (no policy)



Note: Monthly model. IRFs are deviations from the deterministic steady state (annual real rate at 2%).
Source: authors' calculations.

C falls on impact; Y drops with sticky prices; u rises with a lag; real rate falls; debt rises by the tax-smoothing rule. Magnitude of the CEV loss anchors the welfare-frontier exercise

Appendix: insurance channel of UI (analytics)

Euler with risk: $c_t^{-\sigma} = \beta(1 + r_{t+1})\,\mathbb{E}_t[c_{t+1}^{-\sigma}]$. Second-order expansion around $\bar{c}_{t+1} = \mathbb{E}_t[c_{t+1}]$:

$$\mathbb{E}_t[c_{t+1}^{-\sigma}] \approx \bar{c}_{t+1}^{-\sigma}\left(1 + \tfrac{1}{2}\sigma(\sigma+1)\,\mathrm{Var}_t\!\left(\tfrac{c_{t+1}}{\bar{c}_{t+1}}\right)\right)$$

$\Rightarrow$ Higher future consumption risk lowers c_t (precautionary saving)

UI lowers income variance. With job-loss prob. p_t and replacement φ^{UI}:

$$\mathrm{Var}_t(y') = p_t(1-p_t)\,[1-\varphi^{UI}]^2 (w')^2, \qquad \partial\,\mathrm{Var}_t(y')/\partial\varphi^{UI} < 0$$

$\Rightarrow$ c_t rises *even for currently employed* households

Universal/ad hoc transfers do not insure: adding T' to both states leaves $\mathrm{Var}_t(y')$ unchanged $\Rightarrow$ no precautionary-saving margin

Appendix: solution method

Steady state. EGM for household block; calibrate (A, κ) to hit $(\delta^{ss}, \lambda^{u,ss}, \theta^{ss})$; solve household, labor, and government blocks jointly until asset clearing and budget hold

Transition (perfect foresight). Given a shock sequence, stack paths; iterate:

1. Backward pass: household policies via EGM
2. Forward pass: simulate distribution D_t
3. Close static blocks (NKPC, free entry, government budget, asset market)
4. Broyden quasi-Newton update

Envelope normalization. Bisection on policy amplitude until $\max_t \Delta(B_t/Y^{ss}) = 0.01$

Welfare. Aggregate node-level utilities along the full transition; CEV by bisection on g

Appendix: steady-state distribution

Group	Share	Comment
HtM – Employed	0.2813	$\beta = 0$, $e = E$
HtM – Unemployed	0.0188	$\beta = 0$, $e = U$
Buffer-stock – Employed	0.6562	$\beta = 0.940^{1/12}$, $e = E$
Buffer-stock – Unemployed	0.0437	$\beta = 0.940^{1/12}$, $e = U$
Total	**1.0000**	
u^{ss}	**0.0625**	6.25%
Avg. quarterly MPC	≈ 0.40	Johnson–Parker–Souleles (2006)

$q^{ss}B^{ss}/Y^{ss} \approx 0.215$: liquid-bond holdings consistent with US share of liquid assets

Appendix: Robustness; ranking is unchanged across financing arrangements

Fiscal cost (pp of GDP) to offset the demand-shock welfare loss

Policy	UI untaxed		UI taxed	
	$\omega = 0.05$	$\omega = 0.20$	$\omega = 0.05$	$\omega = 0.20$
UI generosity (φ^{UI})	**0.378**	**0.346**	**0.618**	**0.443**
Targeted T_{HtM}	0.584	0.514	1.114	0.883
Universal T	1.505	1.630	2.485	2.775

- **Qualitative ranking unchanged** across all four cases: UI dominates throughout
- Faster tax adjustment ($\omega\uparrow$) helps the two targeted instruments; hurts universal T (taxes claw back broad transfers)
- Taxing UI weakens its insurance value $\Rightarrow$ higher cost across the board, but ranking holds

Appendix: limitations and extensions

Limitations.

- No behavioral search response to UI; no eligibility/take-up margins
- Demand-driven recession only; one envelope definition
- Wage fixed share of p_t^x; no capital accumulation

Extensions in progress.

- Supply-side shocks (productivity, persistent separations, AI-related disruptions)
- Endogenous wage setting; finer labor-supply margin
- Cross-country comparisons of UI design and transfer infrastructures