Welfare and Spending Effects of Consumption Stimulus Policies

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Motivation

- Fiscal policies that aim to boost consumption spending in recessions have been tried in many countries in recent decades
- A lot of variation in such policies — may be due to little guidance from traditional macroeconomic models on which policies most effectively...
  - increase output (a 'GDP metric')
  - reduce misery (a 'welfare metric')
- Development of heterogeneous agent (HA) models shows that when heterogeneity (in e.g. wealth, income and/or education) is taken into account, the impact of income shocks depends on *intertemporal marginal propensity to consume* or iMPC
- In addition, availability of rich micro data (e.g. in Norway) provide first credible measures of the iMPC
- **This paper**: Aim to evaluate three consumption stimulus policies in a HA model consistent with data on liquid wealth and *intertemporal* MPCs

Related literature

- **Effects of transitory income shocks**: Parker, Souleles, Johnson and McClelland (2013); Broda and Parker (2014); Fagereng, Holm and Natvik (2021); Ganong, Greig, Noel, Sullivan and Vavra (2022)
- **HA models consistent with high MPCs**: Kaplan and Violante (2014); Auclert, Rognlie and Straub (2018); Carroll, Crawley, Slacalek and White (2020); Kaplan and Violante (2022)
- **State dependent multipliers (ZLB)**: Christiano, Eichenbaum and Rebelo (2011); Eggertson (2011); Ramey and Zubairy (2018); Hagedorn, Manovskii and Mitman (2019)
- **Extended unemployment insurance**: Ganong, Greig, Noel, Sullivan and Vavra (2022); Kekre (2022)
- **Welfare measures in HA models**: Bhandari, Evans, Golosov and Sargent (2021); Dávila and Schaab (2022)

Quantitative Economics

- These are *quantitative* questions: require *quantitative* realism ...
- ... about the differences that make a difference
  - Unemployment is not Calvo! And this makes a big difference quantitatively
  - Distributions of income, wealth
    - Profoundly important for (i)MPCs
  - Differences in unemployment risks
  - Heterogeneity in income growth rates
- Interested in multipliers, but baseline is NOT a HANK model:
  - HANK mechanisms behind multipliers are complex
  - Away from ZLB, multipliers not necessarily much different in recessions
- Robustness Exercise: HANK model

Quantitative Micro Realism

- Idiosyncratic income process: Friedman/Muth (transitory and permanent shocks)

$$\begin{aligned} \mathbf{p} &- \text{'permanent income'} \\ \xi &- \text{'transitory income shock'} \\ \psi &- \text{'permanent income shock'} \end{aligned}$$

$$\begin{aligned} \mathbf{p}_{t+1} &= \Gamma^e \mathbf{p}_t \psi_{t+1} \\ y_{t+1} &= \mathbf{p}_{t+1} \xi_{t+1} \end{aligned}$$

- Γ^e: education-specific income growth
- Evidence for permanent shocks: See Crawley, Holm, and Tretvoll (2024)

Preferences, Beliefs, and Wealth

Infinite horizon model: target wealth depends on 'Growth Impatience' condition:

$$\underbrace{\left(\frac{(\mathsf{R}\,\beta^{e,i})^{1/\gamma}}{\Gamma^{e}\,\mathbb{E}[\psi^{-1}]}\right)}_{\text{'Growth Patience Factor'}} < 1 \tag{1}$$

Degree of impatience (1-GPF) determines *size* of target

- If everybody has same GPF, then target wealth is identical
- Fact: Wealth much more unevenly distributed than permanent income

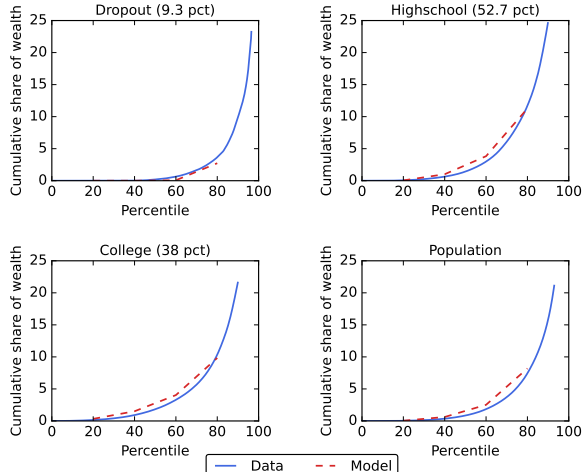
  $\Rightarrow$ need heterogeneity in GPF
- (If GPF ≥ 1, target is ∞)

We use

- *Ex-ante* heterogeneity in discount factors $\beta^{e,i}$
- Γ^{e} or R would do as well

Consistency With Micro Evidence (1)

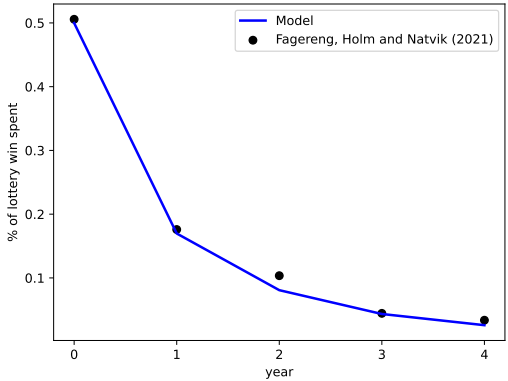
Liquid Wealth from Survey of Consumer Finances (SCF)



- Education groups: $e \in \{\text{"Dropout"}, \text{"Highschool"} \text{ and } \text{"College"}\}$
- Each group has distribution of discount factors $\beta_{e,i}$

Consistency With Micro Evidence (2)

Intertemporal MPC from Fagereng, Holm, Natvik (2021)



Modeling device: 'Splurge' in consumption

Splurge consumption

- Exogenous fraction of income directly consumed
- Model consistent with spending patterns over time after a transitory income shock
- Evidence: High liquid wealth hh also have high MPCs
  - Kueng (2018); Crawley and Kuchler (2023); Graham and McDowall (2024)
- Possible microfoundations:
  - Spending on durables (Browning and Crossley, 2009; Laibson et al., 2022)
  - A form of present bias (Indarte et al., 2024, Maxted et al., 2024)
- Robustness: Model w/o splurge consumption

Evaluation of consumption stimulus policies in the US

- Policies we consider:
  - Stimulus check for $1200 (means-tested)
  - Extension of unemployment benefits from 6 months to 1 year
  - Payroll tax cut by 2% for 2 years
- Motivation:
  - Economic Stimulus Act of 2008 (stimulus checks)
  - Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (UI extension and tax cut)
- Evaluation criteria:
  - Spending multipliers
  - Welfare (only recession-related welfare impact)

Preview of results

- Welfare measure: Extension of UI benefits is the clear winner
  - Targeted at individuals with high MPCs and high recession-related welfare losses
  - But: higher spending may continue after recession is over
- Spending multiplier: Stimulus check has the highest multiplier
  - Not well targeted, but increases income immediately
- Tax cut
  - Poorly targeted and much spending likely to occur after end of recession
- Robustness in a HANK and SAM model
  - Very similar pattern for cumulative multipliers

Model

Household problem

- Idiosyncratic, stochastic income process $\mathbf{y}_{i,t}$
- Estimated splurge factor ς: $\mathbf{c}_{sp,i,t} = \varsigma \mathbf{y}_{i,t}$
- Remaining consumption $c_{opt,i,t}$ is chosen to maximize utility

$$\sum_{t=0}^{\infty} \beta_{e,i}^{t} (1 - D)^{t} \mathbb{E}_0 u(\mathbf{c}_{opt,i,t}). \tag{2}$$

(D: end-of-life probability, u: CRRA utility function)

- Budget constraint, given existing market resources $\mathbf{m}_{i,t}$ and income state, and a no-borrowing constraint:

$$\mathbf{m}_{i,t+1} = R \underbrace{(\mathbf{m}_{i,t} - \mathbf{c}_{sp,i,t} - \mathbf{c}_{opt,i,t})}_{\geq 0 \text{ (no-borrowing constraint)}} + \mathbf{y}_{i,t+1} \tag{3}$$

(R: exogenous gross interest rate)

Income process

- Income subject to transitory, unempl. and permanent shocks

$$\mathbf{y}_{i,t} = \begin{cases} \xi_{i,t}\mathbf{p}_{i,t}, & \text{if employed} \\ 0.7\mathbf{p}_{i,t}, & \text{if unemployed for} \leq 2\text{q} \\ 0.5\mathbf{p}_{i,t}, & \text{if unemployed} \geq 2\text{q} \end{cases} \tag{4}$$

($\xi_{i,t}$: trans. shock, p: perm. income)

- "Permanent income": $\mathbf{p}_{i,t+1} = \underbrace{\psi_{i,t+1}}_{\text{perm. shock}} \quad \underbrace{\Gamma_{e(i)}}_{\text{educ.-specific growth}} \quad \mathbf{p}_{i,t}$

- Model is a simplified model of households (no heterogeneity in hh size)
- Replacement rates reflect some degree of hh incurance (Rothstein and Valetta, 2017)

Employment status and recessions

- Emplyoment status is subject to a Markov process
  - Employed consumer: continue being employed or become unemployed
  - Unemployed consumers: receives benefits for two quarters
- Bureau of Labor Statistics: Report unemployment rates by education group
- Recession is given by an MIT shock
  - Unemployment rate doubles in each education group
  - Expected length of unemployment increases from 2 to 4q
  - End of recession occurs as a Bernoulli process calibrated for an avg. rec. length of 6q

Aggregate demand effects

(as in Krueger, Mitman and Perri, 2016)

- Baseline: No feedback from aggregate consumption to income
- Extension: We allow for aggregate demand effects from consumption on income during the recession
- The AD effect is given by

$$AD(C_t) = \begin{cases} \left(\frac{C_t}{\tilde{C}}\right)^{\kappa}, & \text{if in a recession} \\ 1, & \text{otherwise,} \end{cases} \tag{5}$$

  where $\tilde{C}$ is the level of consumption in the steady state.

- Idiosyncratic income in the extension model is then given by

$$\mathbf{y}_{AD,i,t} = AD(C_t)\mathbf{y}_{i,t}. \tag{6}$$

Parameters — by education group

More parameters Policy parameters

Parameters calibrated for each education group			
	Dropout	Highschool	College
Percent of population	9.3	52.7	38.0
Avg. quarterly PI of "newborn" agent ($1000)	6.2	11.1	14.5
Std. dev. of log(PI) of "newborn" agent	0.32	0.42	0.53
Avg. quarterly gross growth rate of PI (Γ_e)	1.0036	1.0045	1.0049
Unemployment rate in normal times (percent)	8.5	4.4	2.7
Probability of entering unemployment (π^e_{eu}, percent)	6.2	3.1	1.8
Probability of leaving unemployment (π_{ue})	0.667	0.667	0.667

- Mincer (1991) and Elsby and Hobjin (2010): Education groups differ in the incidence of unemployment, not its duration

Results

Untargeted moments (1)

Non-targeted moments by wealth quartile

	WQ 4	WQ 3	WQ 2	WQ 1
Percent of liquid wealth (data)	0.14	1.60	8.51	89.76
Percent of liquid wealth (model, baseline)	0.09	0.96	4.55	94.40
Percent of liquid wealth (model, Splurge=0)	0.10	1.07	4.24	94.60
Avg. lottery-win-year MPC (model, incl. splurge)	0.78	0.63	0.44	0.31
Avg. lottery-win-year MPC (model, splurge=0)	0.69	0.53	0.36	0.14

Untargeted moments (2)

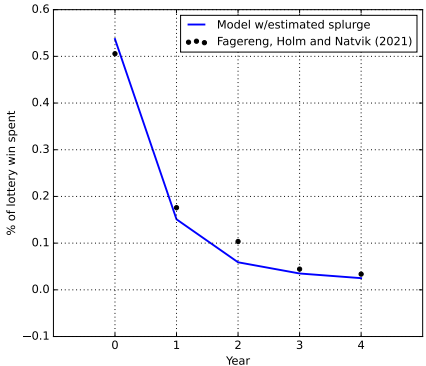


Figure: Share of lottery win spent

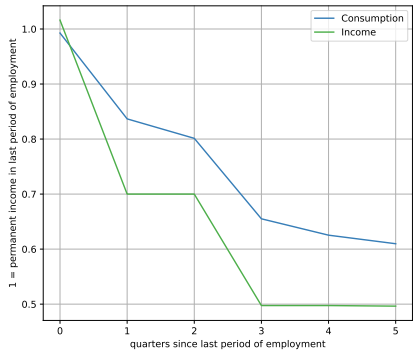
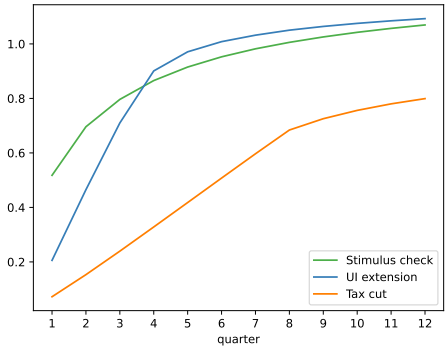


Figure: Spending upon expiry of UI benefits

- Ganong and Noel (2019): UI expiry $\Rightarrow$ drop of 12 percent (month)
- Our model $\Rightarrow$ drop of 18 percent (quarter)

Multipliers

$$M_t^P = \frac{\text{NPV of induced consumption up to } t}{\text{NPV of the cost of the policy}}$$



	Stimulus check	UI extension	Tax cut
10y-horizon Multiplier (no AD effect)	0.85	0.89	0.83
10y-horizon Multiplier (AD effect)	1.20	1.18	0.95
Share of policy expenditure during recession	100.0%	80.6%	57.6 %

Robustness: Multipliers in a HANK and SAM model — Setup

- Evaluate the policies in a relatively standard HANK and SAM model (Du, 2024)
- New Keynesian: Monopolistic competition + sticky prices
- Search and matching: Random search, labor market tightness affects job finding and vacancy filling probabilities
- Government policy: Monetary and fiscal rules
- Fiscal multipliers through an intertemporal Keynesian cross mechanism

  However: No state dependence
- Solution method $\Rightarrow$ cannot evaluate effects starting in a deep recessionary state

  This also implies that we cannot use our welfare measure

Robustness: Multipliers in a HANK and SAM model — Results

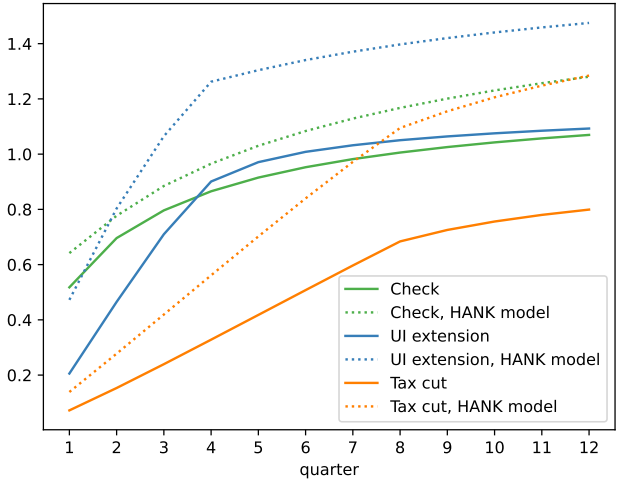


Figure: HA w/AD effects + HANK and SAM

Welfare measure

- Aim: Welfare measure does not reflect benefits of redistribution in "normal" times
- Want: Utility-based measure of benefits of implementing a policy in a recession
- Welfare weights: $u'(\mathbf{c}_{it,normal})$
- Measure for a given *policy* with $Rec, AD \in \{0, 1\}$

$$\mathcal{W}(\text{policy}, Rec, AD) = \frac{1}{\mathcal{N}} \sum_{i=1}^{N} \sum_{t=0}^{\infty} \frac{1}{R^t} \frac{u(\mathbf{c}_{it,policy,Rec,AD}) - u(\mathbf{c}_{it,none,Rec,AD})}{u'(\mathbf{c}_{it,normal})} \tag{7}$$

$$\mathcal{N} = NPV(\text{policy}, Rec, AD)$$

- Normal times: $\mathcal{W}(\text{policy}, 0, 0) = 1$ (for $\Delta \mathbf{c}_{it} \approx 0$)

Welfare results

	Stimulus check	UI extension	Tax cut
$\mathcal{W}(\text{policy}, Rec = 0, AD = 0)$	0.96	0.85	0.99
$\mathcal{W}(\text{policy}, Rec = 1, AD = 0)$	0.99	1.82	0.98
$\mathcal{W}(\text{policy}, Rec = 1, AD = 1)$	1.34	2.11	1.10

- Normal times: Welfare of UI extension < 1 due to concavity of $u(\cdot)$

  Relatively large change in $\mathbf{c}_{it}$ for small number of households

- $AD = 0$: Benefit of UI extension since recession increases unemployment $\Rightarrow$ increased marginal utility for affected households

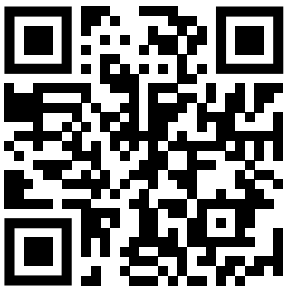
- $AD = 1$: Stimulating spending during recession increases measure for all policies

Conclusion: Comparing the policies

- Comparison of three consumption stimulus policies in a HA model consistent with data on the distribution of liquid wealth and intertemporal MPCs
- Welfare measure: UI extension is the clear bang-for-the-buck winner
- The stimulus check is less well targeted, but...
  - is transferred immediately ensuring that money arrives when it is most valuable
  - is more easily scaled up to provide more stimulus
- The tax cut is both poorly targeted and may yield substantial spending after the recession is over
- Framework can be used to evaluate other candidate policies

Thank you for your attention!

- Access the paper, presentation slides and code at: https://github.com/llorracc/HAFiscal



Appendix

Parameters — same for all types

Parameter	Notation	Value
Risk aversion	γ	2.0
Splurge	ς	0.306
Survival probability, quarterly	$1 - D$	0.994
Risk free interest rate, quarterly (gross)	R	1.01
Standard deviation of transitory shock	σ_ξ	0.346
Standard deviation of permanent shock	σ_ψ	0.0548
Unemployment benefits replacement rate (share of PI)	ρ_b	0.7
Unemployment income w/o benefits (share of PI)	ρ_{nb}	0.5
Avg. duration of unemp. benefits in normal times (quarters)		2
Avg. duration of unemp. spell in normal times (quarters)		1.5
Consumption elasticity of aggregate demand effect	κ	0.3

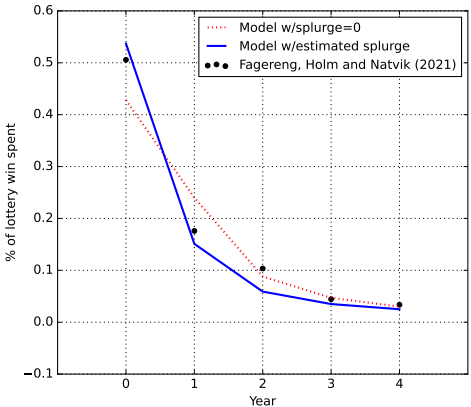
Go back

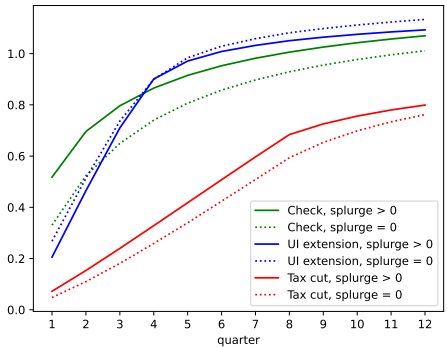
Parameters describing the policies

Parameters describing policy experiments	
Parameter	Value
Change in unemployment rates in a recession	$\times 2$
Expected unemployment spell in a recession	4 quarters
Average length of recession	6 quarters
Size of stimulus check	\$1,200
PI threshold for reducing check size	\$100,000
PI threshold for not receiving check	\$150,000
Extended unemployment benefits	4 quarters
Length of payroll tax cut	8 quarters
Income increase from payroll tax cut	2 percent
Belief (probability) that tax cut is extended	50 percent

Go back

Robustness: Model w/o splurge consumption





	Stimulus check	UI extension	Tax cut
$\mathcal{W}(\text{policy}, Rec = 1, AD = 1)$	1.27(1.34)	2.12(2.11)	1.09(1.10)