# 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)

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

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

- $\Gamma^e$: 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

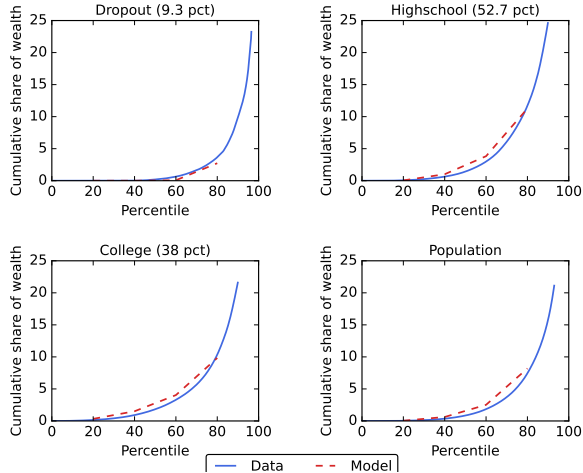
  $\Rightarrow$ need heterogeneity in GPF
- (If GPF $\geq 1$, target is $\infty$)

We use

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

# Consistency With Micro Evidence (1)

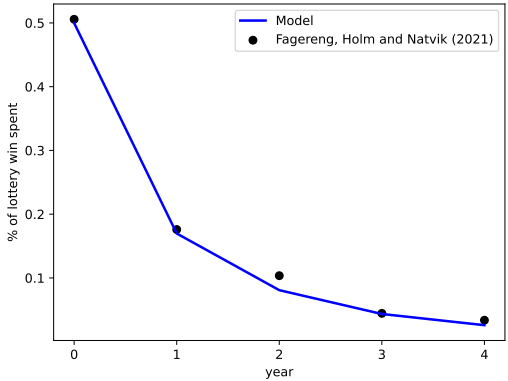
Liquid Wealth from Survey of Consumer Finances (SCF)




- 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 $\varsigma$: $\mathbf{c}_{sp,i,t} = \varsigma \mathbf{y}_{i,t}$
- 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 ($1000) | 6.2 | 11.1 | 14.5 |
| Std. dev. of log(PI) of "newborn" agent | 0.32 | 0.42 | 0.53 |
| Avg. quarterly gross growth rate of PI ($\Gamma_e$) | 1.0036 | 1.0045 | 1.0049 |
| Unemployment rate in normal times (percent) | 8.5 | 4.4 | 2.7 |
| Probability of entering unemployment ($\pi^e_{eu}$, percent) | 6.2 | 3.1 | 1.8 |
| Probability of leaving unemployment ($\pi_{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)

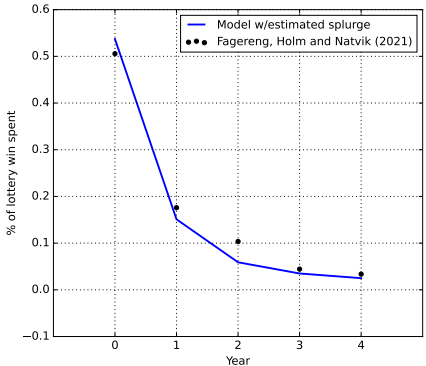



Figure: Share of lottery win spent

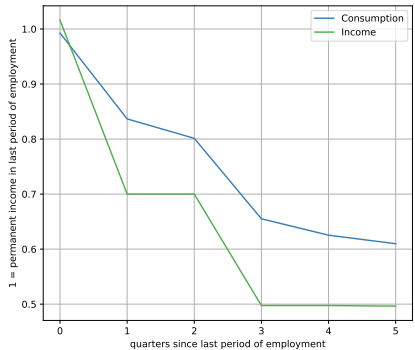
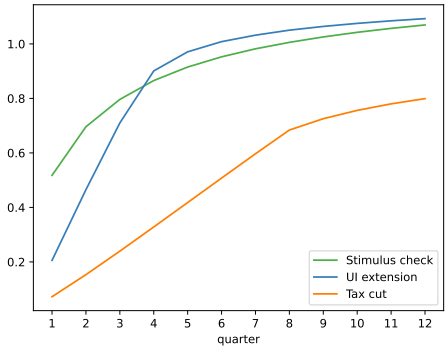



Figure: Spending upon expiry of UI benefits

- 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

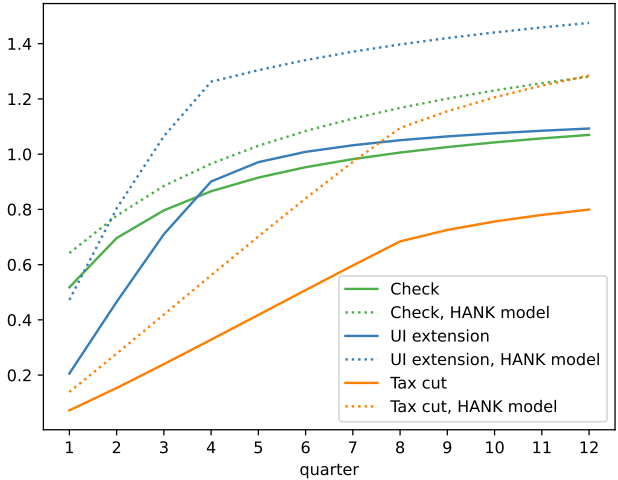



Figure: HA w/AD effects + HANK and SAM

# 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 $Rec, AD \in \{0, 1\}$

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

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

- 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

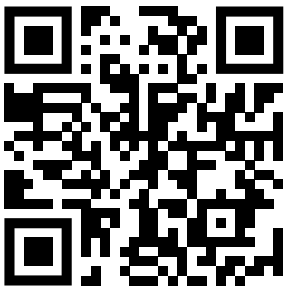
- $AD = 1$: Stimulating spending during recession increases measure for all policies

# 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 | $\gamma$ | 2.0 |
| Splurge | $\varsigma$ | 0.306 |
| Survival probability, quarterly | $1 - D$ | 0.994 |
| Risk free interest rate, quarterly (gross) | $R$ | 1.01 |
| Standard deviation of transitory shock | $\sigma_\xi$ | 0.346 |
| Standard deviation of permanent shock | $\sigma_\psi$ | 0.0548 |
| Unemployment benefits replacement rate (share of PI) | $\rho_b$ | 0.7 |
| Unemployment income w/o benefits (share of PI) | $\rho_{nb}$ | 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 | $\kappa$ | 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 |

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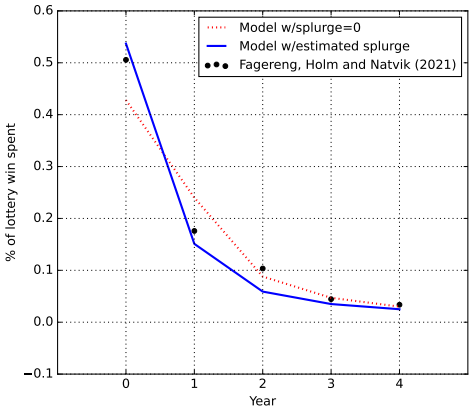
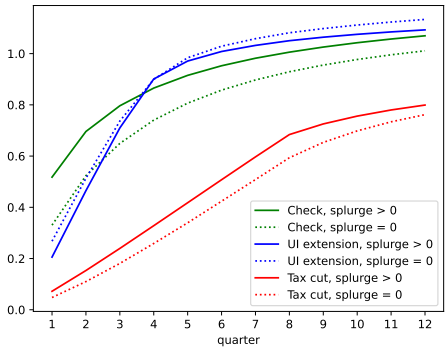
# Robustness: Model w/o splurge consumption




| | 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) |