Aggregate Implications of Microeconomic Consumption Behavior

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In a model with ‘serious’ heterogeneity:

- Fiscal Policy Can Be Much More Powerful than in RA model
  - austerity has much bigger medium-term effects
- Monetary Policy Mechanism Is Radically Different
  - Mostly not about intertemporal substitution
- Changes in *micro* Uncertainty Can Matter A Lot
  - When Michigan II, $\Delta U_t+1$, $C_t$
  - Explains Why Saving Rate ↑ in Recessions
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Key Question: How Large Is ‘the MPC’ ($\equiv \kappa$)?

If households receive a surprise extra 1 unit of income, how much will be spent over the next year?

Elements that interact to produce the answer:

- Households are heterogeneous *ex post* and *ex ante*
- Lots of HH’s who do lots of $C$ have little wealth
- $c$ function is highly concave
- $\Rightarrow$ Distributional issues matter for aggregate $C$
  - Giving 1 to the poor $\neq$ giving 1 to the rich
Micro Heterogeneity and Aggregate Consumption

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Consumption Concavity and Wealth Heterogeneity

Histogram: empirical (SCF1998) density of $m_t/(p_t W_t)$ (right scale)

Consumption/(quarterly) permanent income ratio (left scale)

$m_t/(p_t W_t)$
To-Do List

1. Calibrate realistic income process
2. Match empirical wealth distribution
3. Back out optimal \( c \) and \( c'(m) = \kappa(m) \) out of transitory income
4. Is MPC in line with empirical estimates?
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Our (Micro) Income Process

Idiosyncratic (household) income process is logarithmic Friedman:

\[ y_{t+1} = p_{t+1} \xi_{t+1} W \]
\[ p_{t+1} = p_t \psi_{t+1} \]
\[ p_t \] - permanent income
\[ \psi_{t+1} \] - permanent income
\[ E_t[\xi_{t+n}] = 1 \] - transitory income
\[ E_t[\psi_{t+n}] = 1 \] - permanent shock
\[ W \] - aggregate wage rate

Generates ex post dist’n of \( y \) that matches cross-section data
Unemployment and Unemployment Insurance

Modifications from Carroll (1992)

Transitory income $\xi_t$ incorporates unemployment insurance:

$$
\xi_t = \mu \text{ with probability } u \\
= (1 - \tau)\bar{\ell}\theta_t \text{ with probability } 1 - u
$$

$\mu$ is UI when unemployed
$\tau$ is the rate of tax collected for the unemployment benefits
Model Without Aggr Uncertainty: Decision Problem

\[ v(m_t) = \max \{ c_t \} \quad u(c_t) + \beta \mathbb{E}_t \left[ \psi_{t+1}^{1-\rho} v(m_{t+1}) \right] \]

s.t.

\[ a_t = m_t - c_t \]
\[ a_t \geq 0 \]
\[ k_{t+1} = a_t / (\partial \psi_{t+1}) \]
\[ m_{t+1} = (\bar{l} + r) k_{t+1} + \xi_{t+1} \]
\[ r = \alpha Z(K/\bar{L})^{\alpha-1} \]

(State and control variables normalized by \( p_t W \))
What Happens After Death?

- You are replaced by a new agent whose permanent income $p$ is equal to the population mean.
- Prevents dist'n of $p$ from spreading out, so long as

$$\mathbb{E}[\psi^2] < 1$$

which holds for our parameterization (next slide).
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The Key is Getting Micro Consumption Right
Matching Net Worth vs Liquid Assets
Life Cycle Model
A Related Model

Parameter Values

- $\beta$, $\rho$, $\alpha$, $\delta$, $\bar{\ell}$, $\mu$, and $\nu$ taken from JEDC special volume
- Main new parameter values:

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2. **Aggregate Shocks**
   - (No)
   - Krusell–Smith
   - Friedman/Buffer Stock

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**‘$\beta$-Point’ model**

- ‘Estimate’ single $\hat{\beta}$ by matching the capital–output ratio

**‘$\beta$-Dist’ model—Heterogenous Impatience**

- Assume uniformly distributed $\beta$ across households
- Estimate the band $[\hat{\beta} - \nabla, \hat{\beta} + \nabla]$ by minimizing distance between model ($w$) and data ($\omega$) net worth held by the top 20, 40, 60, 80%

$$\min_{\{\hat{\beta}, \nabla\}} \sum_{i=20,40,60,80} (w_i - \omega_i)^2,$$

s.t. aggregate net worth–output ratio matches the steady-state value from the perfect foresight model
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**‘$\beta$-Point’ model**
- ‘Estimate’ single $\hat{\beta}$ by matching the capital–output ratio

**‘$\beta$-Dist’ model—Heterogenous Impatience**
- Assume uniformly distributed $\beta$ across households
- Estimate the band $[\hat{\beta} - \nabla, \hat{\beta} + \nabla]$ by minimizing distance between model $(w)$ and data $(\omega)$ net worth held by the top 20, 40, 60, 80%

$$
\min_{\{\hat{\beta}, \nabla\}} \sum_{i=20,40,60,80} (w_i - \omega_i)^2, \\
\text{s.t. aggregate net worth–output ratio matches the steady-state value from the perfect foresight model}
$$
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s.t. aggregate net worth–output ratio matches the steady-state value from the perfect foresight model
Alternatives to $\beta$ Heterogeneity

Perfect foresight ‘impatience’ condition is:

$$\left( \frac{(\beta RD)^{1/\rho}}{\Gamma} \right) \ < \ 1$$  \hspace{1cm} (1)

‘Target’ $m$ will depend on degree of impatience: $1 - \left( \frac{(\beta RD)^{1/\rho}}{\Gamma} \right)$

$\Rightarrow$ heterogeneity in beliefs about $\Gamma, R, D$ generate similar results
Results: Wealth Distribution

\[ F \]

- KS–JEDC
- \( \beta \)–Point
- \( \beta \)–Dist
- US data (SCF)
- KS–Hetero

Percentile

Carroll
HeteroMacro
## Results: Wealth Distribution

<table>
<thead>
<tr>
<th>Micro Income Process</th>
<th>Friedman/Buffer Stock</th>
<th>KS-JEDC</th>
<th>KS-Orig$^\circ$</th>
<th>U.S. Data$^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Point Discount Factor$^\dagger$</td>
<td>Uniformly Distributed Discount Factors$^*$</td>
<td>Our solution</td>
<td>Hetero</td>
</tr>
<tr>
<td></td>
<td>$\beta$-Point</td>
<td>$\beta$-Dist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 1%</td>
<td>10.1</td>
<td>26.7</td>
<td>2.6</td>
<td>3.0</td>
</tr>
<tr>
<td>Top 20%</td>
<td>54.8</td>
<td>83.3</td>
<td>35.9</td>
<td>35.0</td>
</tr>
<tr>
<td>Top 40%</td>
<td>76.4</td>
<td>94.</td>
<td>60.1</td>
<td></td>
</tr>
<tr>
<td>Top 60%</td>
<td>89.6</td>
<td>97.6</td>
<td>78.5</td>
<td></td>
</tr>
<tr>
<td>Top 80%</td>
<td>97.4</td>
<td>99.4</td>
<td>92.</td>
<td></td>
</tr>
</tbody>
</table>

Notes: $^\text{†}$ : $\dot{\beta} = 0.9894$. $^*$ : $(\beta, \nabla) = (0.9867, 0.0067)$. Bold points are targeted. $K_t / Y_t = 10.3$. 

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Benchmark Model
Fiscal Policy
Monetary Policy
Uncertainty Over the Business Cycle
HARK!
References

The Key is Getting Micro Consumption Right
Model Without Aggregate Shock
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Life Cycle Model
A Related Model
Marginal Propensity to Consume and Net Worth

- Most Impatient (left scale) ↘
- Identical Patience (left scale) ↘
- Most Patient (left scale) ↑

Representative agent's net worth →

Histogram: empirical density of net worth (right scale)
Empirical Estimates of MPC: $\sim 0.2–0.6$

Friedman (1963) estimated $\kappa = 1/3$

<table>
<thead>
<tr>
<th>Authors</th>
<th>Nondurables</th>
<th>Durables</th>
<th>Total PCE</th>
<th>Horizon</th>
<th>Event/Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blundell et al. (2008b)†</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
<td>Estimation Sample: 1980–92</td>
</tr>
<tr>
<td>Coronado et al. (2005)</td>
<td></td>
<td>0.36</td>
<td></td>
<td>1 Year</td>
<td>2003 Tax Cut</td>
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<tr>
<td>Hausman (2012)</td>
<td></td>
<td>0.6–0.75</td>
<td></td>
<td>1 Year</td>
<td>1936 Veterans’ Bonus</td>
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<tr>
<td>Johnson et al. (2009)</td>
<td>~ 0.25</td>
<td></td>
<td></td>
<td>3 Months</td>
<td>2003 Child Tax Credit</td>
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<tr>
<td>Lusardi (1996)†</td>
<td>0.2–0.5</td>
<td></td>
<td></td>
<td>3 Months</td>
<td>Estimation Sample: 1980–87</td>
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<tr>
<td>Parker (1999)</td>
<td>0.2</td>
<td></td>
<td></td>
<td>3 Months</td>
<td>Estimation Sample: 1980–93</td>
</tr>
<tr>
<td>Parker et al. (2011)</td>
<td>0.12–0.30</td>
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<td>0.50–0.90</td>
<td>3 Months</td>
<td>2008 Economic Stimulus</td>
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<td>Sahm et al. (2009)</td>
<td></td>
<td></td>
<td>~ 1/3</td>
<td>1 Year</td>
<td>2008 Economic Stimulus</td>
</tr>
<tr>
<td>Shapiro and Slemrod (2009)</td>
<td></td>
<td></td>
<td>~ 1/3</td>
<td>1 Year</td>
<td>2008 Economic Stimulus</td>
</tr>
<tr>
<td>Souleles (1999)</td>
<td>0.045–0.09</td>
<td>0.29–0.54</td>
<td>0.34–0.64</td>
<td>3 Months</td>
<td>Estimation Sample: 1980–91</td>
</tr>
<tr>
<td>Souleles (2002)</td>
<td>0.6–0.9</td>
<td></td>
<td></td>
<td>1 Year</td>
<td>The Reagan Tax Cuts of the Early 1980s</td>
</tr>
</tbody>
</table>

Notes: †: elasticity.
## Model Results: MPC (in Annual Terms)

<table>
<thead>
<tr>
<th>Micro Income Process</th>
<th>Friedman/Buffer Stock</th>
<th>KS-JEDC</th>
<th>Our solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>β-Point</td>
<td>0.1</td>
<td>0.23</td>
<td>0.05</td>
</tr>
<tr>
<td>β-Dist</td>
<td>0.07</td>
<td>0.06</td>
<td>0.04</td>
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</table>

By wealth/permanent income ratio

<table>
<thead>
<tr>
<th>Overall average</th>
<th>Friedman/Buffer Stock</th>
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<tbody>
<tr>
<td></td>
<td>0.07</td>
<td>0.05</td>
<td>0.04</td>
</tr>
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<td>0.07</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
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<td>0.07</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>Top 40%</td>
<td>0.07</td>
<td>0.12</td>
<td>0.04</td>
</tr>
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<td>0.13</td>
<td>0.35</td>
<td>0.05</td>
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</table>

By employment status

<table>
<thead>
<tr>
<th>Overall average</th>
<th>Friedman/Buffer Stock</th>
<th>KS-JEDC</th>
<th>Our solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed</td>
<td>0.09</td>
<td>0.2</td>
<td>0.05</td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.22</td>
<td>0.54</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Notes: Annual MPC is calculated by $1 - (1 - \text{quarterly MPC})^4$. 

Friedman/Buffer Stock

β-Point

β-Dist

Our solution
Typology of Our Models—Four Dimensions

1. **Discount Factor $\beta$**
   - ‘$\beta$-Point’ model: Single discount factor
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2. **Aggregate Shocks**
   - (No)
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   - Friedman/Buffer Stock

3. **Empirical Wealth Variable to Match**
   - Net Worth
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4. **Life Cycle**
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HARK!
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Results: MPC Is Stable Over the Business Cycle

There Is Such a Thing as ‘the MPC’:

<table>
<thead>
<tr>
<th>Model: $\beta$-Dist</th>
<th>Krusell–Smith (KS)</th>
<th>Friedman/Buffer Stock (FBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario</td>
<td>Base</td>
<td>Recssn</td>
</tr>
<tr>
<td>Overall average</td>
<td>0.23</td>
<td>0.25</td>
</tr>
<tr>
<td>By wealth/permanent income ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 1%</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Top 10%</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Top 20%</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Top 40%</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Top 50%</td>
<td>0.09</td>
<td>0.10</td>
</tr>
<tr>
<td>Top 60%</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Bottom 50%</td>
<td>0.35</td>
<td>0.38</td>
</tr>
<tr>
<td>By employment status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.54</td>
<td>0.56</td>
</tr>
</tbody>
</table>
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Dimension 3: Matching Net Worth vs. Liquid Assets

Liquid Assets $\equiv$ transaction accounts, CDs, bonds, stocks, mutual funds
Match Net Worth vs. Liquid Financial Assets

- Buffer stock saving driven by accumulation of **liquidity**
- May make more sense to match liquid (and retirement) assets (Hall (2011), Kaplan and Violante (2014))
- Aggregate MPC Increases Substantially: $0.23 \rightarrow 0.44$

<table>
<thead>
<tr>
<th>β-Dist</th>
<th>Net Worth</th>
<th>Liq Fin and Ret Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall average</td>
<td>0.23</td>
<td>0.44</td>
</tr>
<tr>
<td>By wealth/permanent income ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 1%</td>
<td>0.05</td>
<td>0.12</td>
</tr>
<tr>
<td>Top 20%</td>
<td>0.06</td>
<td>0.13</td>
</tr>
<tr>
<td>Top 40%</td>
<td>0.08</td>
<td>0.2</td>
</tr>
<tr>
<td>Top 60%</td>
<td>0.12</td>
<td>0.28</td>
</tr>
<tr>
<td>Bottom 1/2</td>
<td>0.35</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Notes: Annual MPC is calculated by $1 - (1 - \text{quarterly MPC})^4$. 
### Match Net Worth vs. Liquid Financial Assets

- Buffer stock saving driven by accumulation of **liquidity**
- May make more sense to match liquid (and retirement) assets (Hall (2011), Kaplan and Violante (2014))
- Aggregate MPC Increases Substantially: 0.23 \( \uparrow \) 0.44

<table>
<thead>
<tr>
<th>( \beta )-Dist</th>
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**Match Net Worth vs. Liquid Financial Assets**

- Buffer stock saving driven by accumulation of liquidity
- May make more sense to match liquid (and retirement) assets (Hall (2011), Kaplan and Violante (2014))
- Aggregate MPC Increases Substantially: 0.23 \( \uparrow \) 0.44

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</thead>
<tbody>
<tr>
<td>Overall average</td>
<td>0.23</td>
<td>0.44</td>
</tr>
<tr>
<td>By wealth/permanent income ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 1%</td>
<td>0.05</td>
<td>0.12</td>
</tr>
<tr>
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<td>0.06</td>
<td>0.13</td>
</tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Bottom 1/2</td>
<td>0.35</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Notes: Annual MPC is calculated by \(1 - (1 - \text{quarterly MPC})^4\).
Wealth heterogeneity translates into heterogeneity in MPCs

Distribution of MPCs

Percentile

0 0.25 0.5 0.75 1
0
25
50
75
100

Annual MPC

KS–JEDC
KS–Hetero
Matching net worth
Matching liquid financial + retirement assets

Carroll
HeteroMacro
Realistic Life-Cycle Model

- Three education levels: $e \in \{D, HS, C\}$
- Age/education-specific income profiles

\[
y_t = \xi_t p_t = (1 - \tau)\theta_t p_t,
\]

\[
p_t = \psi_t \overline{\psi}_{es} p_{t-1}
\]

- Age-specific variances of income shocks
- Transitory unemployment shock with prob $u$
- Household-specific mortality $D_{es}$
Dimension 4: Overlapping Generations

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y_t = \xi_t \rho_t = (1 - \tau) \theta_t \rho_t, \\
\rho_t = \psi_t \psi_{es} \rho_{t-1}
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- Transitory unemployment shock with prob \( u \)
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Household Decision Problem

\[ v_{es}(m_t) = \max_{c_t} u(c_t) + \beta \mathbb{E}^{Es} \left[ \psi^{1-\rho}_{t+1} v_{es+1}(m_{t+1}) \right] \]

s.t.

\[ a_t = m_t - c_t, \]
\[ k_{t+1} = a_t / \psi_{t+1}, \]
\[ m_{t+1} = (\gamma + r)k_{t+1} + \xi_{t+1}, \]
\[ a_t \geq 0 \]
Macro Dynamics

- Population growth $N$, technological progress $\Gamma$
- Tax rate to finance social security and unemployment benefits:
  \[ \tau = \tau_{SS} + \tau_{U} \]
  \[ \tau_{SS} = \frac{\sum_{e \in \{D, HS, C\}} \left[ \theta_{e} \bar{p}_{e0} \sum_{t=164}^{384} \left( (1+\Gamma)(1+N) \right)^{-t} \prod_{s=0}^{t} (\psi_{es} \mathcal{D}_{es}) \right]}{\sum_{e \in \{D, HS, C\}} \left[ \theta_{e} \bar{p}_{e0} \sum_{t=0}^{163} \left( (1+\Gamma)(1+N) \right)^{-t} \prod_{s=0}^{t} (\psi_{es} \mathcal{D}_{es}) \right]} \]
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\]

\[
\tau_U = u \mu
\]
## Calibration

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Coefficient of relative risk aversion</td>
<td>$$\rho$$</td>
<td>1</td>
</tr>
<tr>
<td>Effective interest rate</td>
<td>$$(r - \delta)$$</td>
<td>0.01</td>
</tr>
<tr>
<td>Population growth rate</td>
<td>$$N$$</td>
<td>0.0025</td>
</tr>
<tr>
<td>Technological growth rate</td>
<td>$$\Gamma$$</td>
<td>0.0037</td>
</tr>
<tr>
<td>Rate of high school dropouts</td>
<td>$$\theta_D$$</td>
<td>0.11</td>
</tr>
<tr>
<td>Rate of high school graduates</td>
<td>$$\theta_{HS}$$</td>
<td>0.55</td>
</tr>
<tr>
<td>Rate of college graduates</td>
<td>$$\theta_C$$</td>
<td>0.34</td>
</tr>
<tr>
<td>Average initial permanent income, dropout</td>
<td>$$\bar{p}_{D0}$$</td>
<td>5000</td>
</tr>
<tr>
<td>Average initial permanent income, high school</td>
<td>$$\bar{p}_{HS0}$$</td>
<td>7500</td>
</tr>
<tr>
<td>Average initial permanent income, college</td>
<td>$$\bar{p}_{C0}$$</td>
<td>12000</td>
</tr>
<tr>
<td>Unemployment insurance payment</td>
<td>$$\mu$$</td>
<td>0.15</td>
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<tr>
<td>Unemployment rate</td>
<td>$$u$$</td>
<td>0.07</td>
</tr>
<tr>
<td>Labor income tax rate</td>
<td>$$\tau$$</td>
<td>0.0942</td>
</tr>
</tbody>
</table>
Results: Wealth Distribution

\[ F \]

- US data (SCF)
- KS–JEDC
- \( \beta \)-Point
- \( \beta \)-Dist

\( 0 \) \( \rightarrow \) \( 25 \) \( \rightarrow \) \( 50 \) \( \rightarrow \) \( 75 \) \( \rightarrow \) \( 100 \)

\( 0 \) \( \rightarrow \) \( 0.25 \) \( \rightarrow \) \( 0.5 \) \( \rightarrow \) \( 0.75 \) \( \rightarrow \) \( 1 \)
Results: MPC (in Annual Terms)

<table>
<thead>
<tr>
<th>Wealth Measure</th>
<th>Micro Income Process</th>
<th>Life-Cycle Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KS-JEDC</td>
<td>β-Point</td>
</tr>
<tr>
<td>Overall average</td>
<td>Our solution</td>
<td>β-Dist</td>
</tr>
<tr>
<td></td>
<td>NW</td>
<td>NW</td>
</tr>
<tr>
<td>By wealth/permanent income ratio</td>
<td></td>
<td>β-Dist</td>
</tr>
<tr>
<td>Top 1%</td>
<td>0.04</td>
<td>0.08</td>
</tr>
<tr>
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<td>0.09</td>
</tr>
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<td>0.08</td>
</tr>
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<td>0.05</td>
<td>0.13</td>
</tr>
<tr>
<td>By employment status</td>
<td></td>
<td>β-Dist Liquid</td>
</tr>
<tr>
<td>Employed</td>
<td>0.05</td>
<td>0.10</td>
</tr>
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<tr>
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</tr>
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References

The Key is Getting Micro Consumption Right Model Without Aggregate Shock Matching Net Worth vs Liquid Assets Life Cycle Model A Related Model
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A Related Model

Macro Handbook Model Like Ours, But With Multipliers

‘KMP’: Krueger, Mitman, and Perri (2016)
Effect of mean-preserving spread in unemployment risk:

![Graph showing the effect of mean-preserving spread in unemployment risk.](image-url)
Other Results from KMP (Macro Handbook Paper)

- Unemployment Insurance Has Big Macro Stabilization Role
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- Definition of “serious” microfoundations: Model that matches
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  - Wealth Distribution

- The model produces more plausible implications about:
  - Aggregate MPC
  - Distribution of MPC Across Households

- Can address questions like
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  - Role of Uncertainty in C collapse
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Larry Summers’ Infamous Quote (in 2011)

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What About Pre-1979 Macro?

Keynesian multipliers should be big in liquidity trap

Crudest Keynesian Model:

\[ Y = C + I + G \] and \[ C = (Y - T)\kappa \]

- Multipliers (if no pushback from monetary policy):
  - If \( \kappa = 0.75 \) then multiplier on \( G \) is \( 4 \) and \( T \) is \( 4 - 1 = 3 \)
  - If \( \kappa = 0.05 \) then multiplier is only \( \approx 0.05 \)
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- If \( \kappa = 0.75 \) then multiplier on \( G \) is 4 and \( T \) is 4 – 1 = 3

  - Recall: some micro estimates of \( \kappa \) are this large

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Insights From HA Model + Pre-1978 Macro

- ‘Stimulus’ might be effective
  - Best kind would be G spending
  - Want to target tax-based stimulus to high-MPC groups
    - Unemployed
    - Young
    - Low-Wealth
  - ‘Permanent’/persistent tax cuts more potent
  - Increase in uncertainty is a potential explanation of C collapse
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Insights From HA Model + Pre-1978 Macro

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Money: Representative Agent New Keynesian Models

In RANK models, log-linearized Euler equation captures almost everything (∼ 95 percent) of effect of monetary policy on $C$ dynamics:

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Heterogeneous Agent New Keynesian (HANK)

- Model like the one above plus New Keynesian prod fn
Monetary Policy According to HANK

Kaplan, Moll, and Violante (2016)

- RANK IES channel accounts for only 15 percent of effect of r
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Structural model in which saving rate depends on:

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- Unemployment Expectations (as proxy for Uncertainty)

Results:

- Model estimated pre-2006 captures post-2006 C collapse
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Personal Saving Rate

Red = Model; Black = Data
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- It’s not a ‘special case’
- We know what to do
- Kernel of the technology is here:
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