Explaining Consumption Excess Sensitivity with Near-Rationality

Evidence from Large Predetermined Payments

Lorenz Kueng

Northwestern University and NBER
How do HHs respond to large, predictable and salient cash flows?

- important for macro stimulus programs
- informative for micro consumption models, ranging from
  - basic PIH under certainty (MPC \approx 0)
  - to hand-to-mouth behavior (MPC = 1)

To answer this question I use

- repeated quasi-experiments from Alaska Permanent Fund Dividend (PFD) payments
- transaction-level data from large personal finance website
- Consumer Expenditure Survey (CE) for external validity
Preview of Main Results

- Large average MPC \( \sim 30\% \) for nondurables

- Heterogeneous MPCs concentrated among higher-income HHs

- Derive potential loss from not smoothing consumption
  - predicts MPC heterogeneity well

- However, actual losses are very small (\( \approx 0.1\% \))
  \[ \Rightarrow \text{behavior consistent with near-rationality} \]
Alaska Permanent Fund Dividend (PFD) = annual payments from state’s broadly-diversified wealth fund

Important characteristics of PFD for excess sensitivity tests:

1. predetermined, regular, and salient
   - based on June numbers, announced in Sept., paid in October
   - highly predictable: 5-year moving average of fund’s income
   - well covered by local media during the year

2. nominally large and lump-sum
   - latest dividend: $2,072 in October 2015 per person!
Salience: Dividend predicted by local newspapers

- Actual Permanent Fund Dividend (PFD)
- Expected PFD (narrative-based)
Household Spending Data

1. New transaction data from user accounts at a large personal finance website from 2010-2014
   - 1,400 Alaskan users that receive dividend via direct deposit (treatment group)
   - 2,200 users from state of Washington (control group)

2. Consumer Expenditure Survey (CE) to check external validity of new data and results
Nonparametric Evidence: Average nondurable spending changes per person by month in Alaska vs. Washington (Diff-in-Diff)

Implies MPC of 12% after one month, 22% after one quarter
### Parametric Evidence: No anticipation effects

\[ \Delta c_{it} = \sum_{s} \beta_s \cdot PFD_{i,t-s} + \alpha_t + \text{Alaska}_i + \lambda \cdot \text{FamilySize}_i + \epsilon_{it} \]
**Parametric Evidence**: Cumulative MPC stable after 1 quarter.
What can explain this large excess sensitivity?

- Liquidity-to-income ratio does predict lower MPC, but most is left unexplained

- Instead, see if near-rationality explains excess sensitivity

- Derive potential loss from fully spending PFD in the 4th quarter ($c^{coh}$) instead of fully smoothing ($c^*$)

\[
Loss(c^{coh}, c^*) \equiv \frac{\Delta W}{W} \propto \left( \frac{PFD}{c_T} \right)^2
\]

- The actual loss depends on endogenous HH behavior (MPC)

\[
Loss^{ex-post} = MPC^2 \times Loss(c^{coh}, c^*)
\]
Potential-loss statistic quintiles across HHs (average numbers)
Does loss predict MPCs? \(\uparrow\) interact PFD with loss quintiles

- Economic Loss (in %): 0, 0.2, 0.4, 0.6, 0.8, 1, 1.5, 2, 2.5, 3
- MPC: 0, 0.2, 0.4, 0.6, 0.8, 1, 1.5, 2, 2.5, 3
- Potential−loss quintile: 1, 2, 3, 4, 5

Potential loss vs. MPC graph:
- Red line: Potential loss
- Green line: MPC

Numerical data points:
- (0.84, 0.5)
- (0.60, 0.22)
- (0.42, 0.41)
- (0.27, 0.87)
- (0.16, 3.18)
- (0.08, 0)
- (0.5, 1)
- (1, 1.5)
- (2, 2)
- (3, 2.5)
- (4, 3)
- (5, 3.18)
Is this near-rational behavior? ⇒ calculate actual losses

![Graph showing MPC and Economic Loss in % relationship]

- Potential loss
- Actual loss
- MPC

Economic Loss (in %): 0, 0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.5, 2, 2.5, 3

Potential–loss quintile: 1, 2, 3, 4, 5

MPC: 0.84, 0.60, 0.42, 0.27, 0.16, 0.08, 0.22, 0.41, 0.87, 3.18
What drives this heterogeneity? ⇒ mostly *income per capita*
External validity implementing same analysis using the CE

I obtain similar results after taking into account

1. dividend has to be imputed in the CE
2. different sample composition

Table 5: External Validity using the Consumer Expenditure Survey (CE)

<table>
<thead>
<tr>
<th>Dep. var.: $\Delta c_{it}$, quarterly nondurables and services</th>
<th>CE Sample</th>
<th>PFW Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>using the observed PFD</td>
<td>using the imputed PFD</td>
</tr>
<tr>
<td>PFD payments</td>
<td>0.276***</td>
<td>0.184***</td>
</tr>
<tr>
<td>(0.042)</td>
<td>(0.031)</td>
<td>(0.048)</td>
</tr>
<tr>
<td><strong>PFD x family size</strong></td>
<td><strong>0.079</strong></td>
<td><strong>0.184</strong></td>
</tr>
<tr>
<td><em>(0.036)</em></td>
<td><em>(0.031)</em></td>
<td><em>(0.048)</em></td>
</tr>
<tr>
<td>PFD x family size x income/$100,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>predicted MPC at average CE income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Time FE, Alaska FE, other controls</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>385,800</td>
<td>50,210</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.006</td>
<td>0.107</td>
</tr>
</tbody>
</table>
Conclusion

Main findings

1. Large average excess sensitivity even to large payments

2. Potential-loss statistic predicts higher-income HHs MPCs

3. Low liquidity-to-income predicts low-income HHs MPCs

4. Actual ex-post losses are similar and small ⇒ near-rationality

Policy implications

- Targeting low-income HHs might not be the only way to stimulate the economy

- Modeling near-rational behavior is important next step: Why do high-income HHs spend dividend? (see Gabaix 2015)
How much of the MPC heterogeneity can **liquidity** (CoH-ratio) and **near-rationality** (potential-loss statistic) jointly explain?

### Table 3: MPC Heterogeneity and Near-Rationality

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dep. var.: $\Delta c_{it}$, quarterly nondurables and services (8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFD payments</td>
<td>0.881*** (0.125)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFD payments x potential-loss quintile</td>
<td>-0.161*** (0.032)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PFD payments x liquidity quintile</td>
<td>-0.054** (0.023)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Time FE</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Alaska FE</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Potential-loss quintile FE</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cash-on-hand ratio quintile FE</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Other controls</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>44,577</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.108</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quintiles go from 0-4 $\Rightarrow$ from lowest quintiles cell to the highest reduces MPC from 88% to 2%
Various robustness checks in paper

1. difference between spending and consumption
   ⇒ broad-based effect, incl. groceries and restaurants

2. consumption commitments and wealthy-hand-to-mouth cons.

3. decomposition of identifying variation, such as
   ▶ using only variation within Alaska
   ▶ controlling for family FE
   ▶ difference between family size and # of users

4. log-changes (elasticity) vs. level differences (MPC)

5. squared instead of relative PFD payments