Section 7: Consumption Smoothing

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November 5, 2021
Outline

Additional PIH Intellectual History

Proposed Explanations for PIH Failure

Consumption-Smoothing Value of UI

Concluding Thoughts
OG Keynes

\[ c_t = \alpha_0 + \alpha_1 y_t \]

- How does this capture concepts we’ve talked about?
- What are important features it leaves out?
Friedman (1957) PIH Reframed

\[
\max E_t \left[ \sum_{n=0}^{\infty} \delta^n u(c_{t+n}) \right]
\]

subject to the constraint

\[
a_{t+1} = (a_t + y_t - c_t) R_{t+1}
\]
Friedman (1957) PIH Reframed

$$\max E_t \left[ \sum_{n=0}^{\infty} \delta^n u(c_{t+n}) \right]$$

subject to the constraint

$$a_{t+1} = (a_t + y_t - c_t)R_{t+1}$$

Euler equation:

$$u'(c_t) = E_t \left[ R_{t+1} \delta u'(c_{t+1}) \right]$$
Friedman (1957) PIH Reframed

\[
\max E_t \left[ \sum_{n=0}^{\infty} \delta^n u(c_{t+n}) \right]
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Euler equation:

\[ u'(c_t) = E_t \left[ R_{t+1} \delta u'(c_{t+1}) \right] \]

- How does this capture the PIH?
- What modifications could we make to capture violations of the PIH?
Visualizing PIH: Groups

**FIGURE 7**
Hypothetical Regressions of Consumption on Income for Farm and Nonfarm Families
(k and $P_y$ assumed same)
Visualizing PIH: Groups

- MPC out of permanent income $= k$
- Conditioning on occupation
  $\Rightarrow y$ variation more transitory
  $\Rightarrow$ shallower slope
Visualizing PIH: Panels

**FIGURE 10**
Hypothetical Regressions for Groups Classified by Change in Income
(average change assumed zero for group as a whole)

\[ c_p = ky_p \]

- Decline
- No change
- Rise
- All
Visualizing PIH: Panels

- Cross-sectional slope includes both permanent and transitory $y$ differences
- Conditioning on income change
  $\Rightarrow y$ variation more permanent
  $\Rightarrow$ steeper slope
Hall (1978) JPE Test of PIH

Recall Euler equation:

\[ u'(c_t) = E_t \left[ R_{t+1} \delta u'(c_{t+1}) \right] \]

Assume:

1. \( R_{t+1} = R \)
2. \( R \delta = 1 \)
3. \( u(\cdot) \) is quadratic
Recall Euler equation:

\[ u'(c_t) = E_t \left[ R_{t+1} \delta u'(c_{t+1}) \right] \]

Assume:

1. \( R_{t+1} = R \)
2. \( \delta R = 1 \)
3. \( u(\cdot) \) is quadratic

\[ \Rightarrow c_t = E_t[c_{t+1}] \Rightarrow E_t[\Delta c_{t+1}] = 0 \]
Recall Euler equation:
\[ u'(c_t) = E_t \left[ R_{t+1} \delta u'(c_{t+1}) \right] \]

Assume:
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\[ \Rightarrow c_t = E_t[c_{t+1}] \Rightarrow E_t[\Delta c_{t+1}] = 0 \]

• How does this capture the PIH?
• What happened to the distinction between transitory and permanent income?
Visualizing Hall (1978) Test of PIH

Permanent Income Shock

Transitory Income Shock
Visualizing Hall (1978) Test of PIH

Permanent Income Shock

- Impulse response functions simulated in QuantEcon lecture notes (great computational reference!)
- Infinitely lived consumer saves transitory shock and consumes (constant) interest payments
- Turns out Hall (1978) finds support for “consumption random walk” in aggregate data!

Transitory Income Shock
Outline

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Reasons for “excess sensitivity” of $\frac{dc}{dy}$ Handbook of Behavioral Economics chapter on behavioral household finance

1. Rational
2. Behavioral
Rational Explanations

- High impatience
- Support for dependents
- Liquidity constraints
- Durables
- 2-asset buffer stock model
- Near-rationality
Behavioral Explanations

- Present bias
- Mental accounting
- Myopia
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Concluding Thoughts
Nonzero MPC Predicted by Different Mechanisms

<table>
<thead>
<tr>
<th>Predictable Income Change</th>
<th>Increase</th>
<th>Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIH</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Liquidity</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Behavioral/myopia</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Figure 4. Impact of Unemployment on Consumption Growth

Notes: This figure presents coefficients from separate regressions of leads and lags of the log change in food expenditure on an indicator of unemployment, along with controls for year indicators and a cubic in age. Data are from the PSID with one observation per household per year. Unemployment is defined as an indicator for the household head being unemployed. Following Gruber (1997) and Chetty and Szeidl (2007), food expenditure is the sum of food in the home, food outside the home, and food stamps. The horizontal axis presents the years of the lead/lag for the consumption expenditure growth measurement (i.e., 0 corresponds to consumption growth in the year of the unemployment measurement relative to the year prior to the unemployment measurement). The sample is restricted to household heads who are employed in $t - 1$ or $t - 2$. 
Hendren (2017) AER using PSID Consumption Changes

**Figure 4. Impact of Unemployment on Consumption Growth**

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**What is familiar? What is unfamiliar?**
Robustness Check: Ex Ante $\Delta c$ not driven by $\Delta y$

### Table 4—Ex Ante Drop in Food Expenditure Prior to Unemployment and Implied (Ex Ante) Willingness to Pay for UI

<table>
<thead>
<tr>
<th>Impact of unemployment on $\log(c_{t-1}) - \log(c_{t-2})$</th>
<th>Baseline (1)</th>
<th>Controls for needs (2)</th>
<th>Under-50 sample (3)</th>
<th>Job loss Job loss income controls (5)</th>
<th>Household head income controls (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment</td>
<td>−0.0271</td>
<td>−0.0211</td>
<td>−0.0288</td>
<td>−0.0260</td>
<td>−0.0272</td>
</tr>
<tr>
<td>Standard error</td>
<td>(0.00975)</td>
<td>(0.0105)</td>
<td>(0.0106)</td>
<td>(0.00824)</td>
<td>(0.00969)</td>
</tr>
</tbody>
</table>

**Specification details**

- Sample employed in $t - 2$ and $t - 1$: X X X X X X
- Controls for change in log needs ($t - 2$ versus $t - 1$): X
- Change in log HH income ($t - 2$ versus $t - 1$) (3rd-order poly): X
- Change in log HH head income ($t - 2$ vs. $t - 1$) (3rd-order poly): X

**Mean dependent variable**

- 0.000
- −0.001
- 0.007
- 0.000
- 0.000
- 0.000

**Observations**

- 65,483
- 53,327
- 52,463
- 65,556
- 65,399
- 64,119

**Households**

- 9,557
- 8,371
- 8,512
- 9,560
- 9,547
- 9,448

**Notes:** This table presents estimates of the impact of unemployment in year $t$ on consumption growth in year $t - 1$ relative to $t - 2$, $\log(c_{t-1}) - \log(c_{t-2})$. Column 1 controls for a cubic in age and year dummies and restricts to the baseline sample of those who are employed in both year $t - 2$ and $t - 1$. Column 2 adds controls for the change in log expenditure needs (need_std. p) between $t - 2$ and $t - 1$ and the change in total household size between $t - 2$ and $t - 1$ (this is not available in all years of the survey). Column 3 restricts the sample to those aged 50 and under to the baseline specification. Column 4 replaces the unemployment indicator with an indicator for job loss. Job loss is defined as an indicator for being laid off or fired. Column 5 adds controls to the specification in column 1 for a third-degree polynomial in the household's change in log income between years $t - 2$ and $t - 1$. Column 6 adds controls to the specification in column 1 for a third-degree polynomial in the household head's change in log income between years $t - 2$ and $t - 1$. All standard errors are clustered at the household level.
Alternative (Predictable) Unemployment-Based Income Drop

• Peter’s paper used predictable benefit expiry to test consumption-smoothing models
• Job loss might have both a predictable and unpredictable component. Implications:
  1. Cons. models:
  2. Gruber (1997) value of UI:
  3. New value of UI:
Alternative (Predictable) Unemployment-Based Income Drop

- Peter’s paper used predictable benefit expiry to test consumption-smoothing models
- Job loss might have both a predictable and unpredictable component. Implications:
  1. Cons. models: Ex ante $\Delta c$ is itself evidence of consumption-smoothing
  2. Gruber (1997) value of UI: Downward bias by relying on the drop at UE onset
  3. New value of UI: Given perceived UE risk, drop prior to UE itself gets UI WTP estimate unaffected by state-dependent utility concerns
Figure 2. Predictive Content of Subjective Probability Elicitations: Binned Scatter-Plot of U versus Z, Conditional on X

Notes: This figure reports mean rate of job loss in each elicitation category controlling for demographics, job characteristics, and year controls. To construct this figure, I run the regression in equation (1). The figure plots the coefficients on bins of the elicitation. I omit the lowest bin (corresponding to $Z = 0$) and add back the mean rate of job loss of 1.9 percent to all coefficients. The 5/95 percent confidence intervals are constructed using the standard errors of the regression coefficients, clustering by household.
Combining PSID Consumption Drop and HRS Private Info

- Both datasets have unemployment for a representative sample ⇒ Two-sample IV scales the $\Delta c$ “reduced form” by the $\Delta Pr(U)$ “first-stage”
- This can be done both for $\Delta c$ at UE onset and $\Delta c$ prior to UE onset
Hendren (2017): Exploit Ex-ante Responses

Coefficient on Unemployment Indicator

Lead/Lag Relative to Unemployment Measurement

- Coeff
- 5%/95% CI
Hendren (2017): Exploit Ex-ante Responses

**Proposition 2:** WTP given by:

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma \left( \frac{d\log(c_{pre})}{dp} \right)
\]
Proposition 2: WTP given by:
\[
\frac{u'(c_u)}{v'(c_o)} = 1 + \sigma^* \left( \frac{d\log(c_{pre})}{dp} \right) = 1 + \sigma^* \frac{\Delta_{1}^{FD}}{\Delta_{1}^{Beliefs}}
\]

\[
\Delta_{1}^{Beliefs} = E[P_{t-1} | U_t=1] - E[P_{t-2} | U_t=1] - (E[P_{t-1} | U_t=0] - E[P_{t-2} | U_t=0])
\]
Hendren (2017): Exploit Ex-ante Responses

\[ \Delta_1^{FD} = 2.7\% \]

Proposition 2: WTP given by:

\[
\frac{u'(c_u)}{v'(c_e)} = 1 + \sigma \left( \frac{d \log(c_{pre})}{dp} \right)
\]

\[ = 1 + 2.7\% = 1 + \sigma \left( \frac{2.7}{9.4} \right) \]

\[ = 1 + 58\% \quad \text{for } \sigma = 2\]

\[ = 1 + 87\% \quad \text{for } \sigma = 3\]
• What was the main takeaway from Hendren (2013) ECMA?
• How does it relate to what you’ve seen in Hendren (2017) AER?
• Recall notion of “average costs” as pooled price ratio $T(p) = \frac{E[P|P>p]}{E[1-P|P>p]} \frac{1-p}{p} \geq 1$

• Market unravels when $\frac{u'(c_u(p))}{v'(c_e(p))} < T(p) \ \forall p$
Using Elicitations to Construct Pooled Price Ratio

## Minimum Pooled Price Ratio

<table>
<thead>
<tr>
<th>Specification</th>
<th>Sub-Samples</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age &lt;= 55</td>
<td>Age &gt; 55</td>
<td>Below Median Wage</td>
<td>Above Median Wage</td>
<td>Tenure &gt; 5 yrs</td>
</tr>
<tr>
<td>Inf T(p) - 1</td>
<td>3.325</td>
<td>3.442</td>
<td>4.217</td>
<td>3.223</td>
<td>4.736</td>
</tr>
<tr>
<td>s.e.</td>
<td>(0.306)</td>
<td>(0.279)</td>
<td>(0.417)</td>
<td>(0.268)</td>
<td>(0.392)</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Job Characteristics</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Num of Obs.</td>
<td>11,134</td>
<td>15,506</td>
<td>13,320</td>
<td>13,320</td>
<td>17,850</td>
</tr>
<tr>
<td>Num of HHs</td>
<td>2,255</td>
<td>3,231</td>
<td>2,916</td>
<td>2,259</td>
<td>2,952</td>
</tr>
</tbody>
</table>
Hendren (2017) AER Recap

- Consumption-smoothing prior to job loss is strong evidence in favor of a preference for smooth consumption and private information about job loss.
- Assuming consumption-smoothing preferences and measuring job loss beliefs delivers value of UI.
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Consumption-Smoothing Value of UI

Concluding Thoughts
Shimer and Werning (2008) AER assume standard consumption-smoothing preferences and find little welfare benefit of UI once workers are provided with liquidity

- Do workers not accumulate enough liquidity due to “rational preferences”, “behavioral biases”, or the existing policy environment?
- Given Kaplan and Violante (2014) ECMA “transaction-cost” model of liquidity, isn’t it less important to provide UI given that job loss is a large shock in dollar terms?

Hendren (2017) AER assumes standard consumption-smoothing preferences and finds large value of UI based on ex ante responses. Still not enough to justify a private supplemental market given the degree of adverse selection.

Did these lectures instill more or less faith in the Landais and Spinnewijn (2021) RESTUD MPC estimates?
• Shimer and Werning (2008) AER assume standard consumption-smoothing preferences and find little welfare benefit of UI once workers are provided with liquidity
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Connecting Consumption-Smoothing Lectures to Value of UI

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- Did these lectures instill more or less faith in the Landais and Spinnewijn (2021) RESTUD MPC estimates?
Connecting Consumption-Smoothing Lectures to PF

- How frequently should the government collect taxes and dispense transfers?
- How should the government pursue aggregate demand stimulus during recessions?
- What should be the time path of UI?