Non-Durable Consumption and Housing Net Worth in the Great Recession: Evidence from Easily Accessible Data

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IIES

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New Perspectives on Consumption
• Boom and bust in house prices

• Boom and bust in non-durable consumption
Background

• U.S. Great Recession 07-09

  ▶ Sharp drop in house prices $p_h$ ($\sim 30$ pct)

  ▶ Durable $C'$ expenditures tanked, as in every recessions

  ▶ Unusually large drop in non-durable consumption (ND-C)
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  - Sharp drop in house prices $p_h$ ($\sim$30 pct)
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  - Unusually large drop in non-durable consumption (ND-C)
- Causal link between $p_h$ and ND-C? How large is this elasticity?
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• Causal link between $p_h$ and ND-C? How large is this elasticity?

• Answer relevant for:
  ▶ Consumption insurance
  ▶ Sources of aggregate fluctuations
  ▶ Policies that mitigate welfare costs of business cycles
Widely cited answer

- Mian, Rao and Sufi (QJE, 2012)
  - The relationship is causal (IV approach)
  - The elasticity of non-durable consumption to changes in the housing share of net worth (HNW shock) is 0.36
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• Methodology:
  ▶ Geographical (county-level) variation
  ▶ Instrument: Saiz (2010) local housing supply elasticities
  ▶ $p_n$ data: CoreLogic & ND-C data: MasterCard
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- Limitation: proprietary data, not replicable
Our contributions

1. Replicate the MRS analysis with (more) easily accessible data and confirm MRS estimates

   • $p_h$ data: Zillow & ND-C data: Kilts-Nielsen Retail Scanner
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   • 1/5 of drop in expenditures due to lower prices
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2. Separation of price and quantity effect in expenditures
   - 1/5 of drop in expenditures due to lower prices

3. Use CEX Diary to infer elasticity for Total ND-C
   - Elasticity of Total ND-C to $\Delta p_h$ is 20 pct lower than that of Kilts-Nielsen bundle
DATA
Expenditure data

- Kilts-Nielsen Retail Scanner Data (KNRS)
  - Weekly panel dataset of sales for over 30,000 stores affiliated with about 90 participating retail chains across 55 MSA geographically dispersed across the US
  - Information on both quantity sold and price charged per unit at UPC (barcode) level
  - Construct an annual store-level panel of sales
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- **Store-switching a problem?**
  - For continuing stores, not an issue
  - Shoppers switching from exiting to surviving stores: attenuation bias
## Coverage

<table>
<thead>
<tr>
<th>Category</th>
<th>All Stores (2006)</th>
<th>Baseline Sample (2006-09)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry grocery</td>
<td>37%</td>
<td>37%</td>
</tr>
<tr>
<td>Frozen foods</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Dairy</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Deli</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Packaged meat</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Fresh produce</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Non-food grocery</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Health and beauty aids</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>General merchandise</td>
<td>8%</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Number of stores</strong></td>
<td><strong>31,093</strong></td>
<td><strong>14,756</strong></td>
</tr>
</tbody>
</table>

- Bundle composed mostly of groceries, cosmetic, and drugs
Correlation with NIPA PCE in ND goods and services

- Exclude gasoline and energy from NIPA PCE

- State-level correlation in 06-09 nominal sales growth: 0.54
Net Worth data

\[ NW_t^i = H_t^i + F_t^i - M_t^i - D_t^i \]

- Financial assets \( F \): as in MRS, we allocate financial assets in FoF proportionally to the interests and dividend income from county-level IRS-Statistics of Income

- Mortgage debt \( M \) and other debt \( D \): as in MRS, we use Equifax data underlying the FRB-NY Consumer Credit Panel

- Housing \( H \): compute number of houses by county from ACS, and multiply by Zillow Home Value Index for All Homes

- Aggregate all at CBSA level (level of Saiz instrument)
• 929 Core Based Statistical Areas (Metro SA + Micro SA)
CoreLogic vs Zillow House Price Indexes

- **CoreLogic**: repeat-sale index
- **Zillow**: hedonic price index, includes new constructions
METHODOLOGY
Regression specification

- Housing net-worth shock:

\[ \Delta HNW_{06-09} = \Delta \log p_{06-09} \times \left( H_{06}^i / NW_{06}^i \right) \]

- MRS statistical model:
  - First stage:

\[ \Delta HNW_{06-09} = \alpha_0 + \alpha_1 SaizElast^i + \eta_{06-09} \]
  
  - Second stage:

\[ \Delta \log C_{06-09}^{s,i} = \beta_0 + \beta_1 \Delta HNW_{06-09}^i + \epsilon_{06-09}^{s,i} \]

- Weight obs. by store sales in 06 & cluster S.E. at CBSA level
A visual of the first stage

- Nonlinear relationship

- We use a quartic in the Saiz-elasticity in the first stage
Elasticity of ND expenditures to HNW shock

<table>
<thead>
<tr>
<th>Dep. var: $\Delta \log C^{s,i}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBSA 2006-09</td>
</tr>
<tr>
<td>OLS</td>
</tr>
<tr>
<td>IV (linear)</td>
</tr>
<tr>
<td>$\Delta HNW^i$</td>
</tr>
<tr>
<td>0.239**</td>
</tr>
<tr>
<td>(0.029)</td>
</tr>
<tr>
<td>0.361**</td>
</tr>
<tr>
<td>(0.077)</td>
</tr>
<tr>
<td>0.405**</td>
</tr>
<tr>
<td>(0.089)</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>14,756</td>
</tr>
<tr>
<td>12,701</td>
</tr>
<tr>
<td>12,701</td>
</tr>
<tr>
<td>Clusters</td>
</tr>
<tr>
<td>281</td>
</tr>
<tr>
<td>181</td>
</tr>
<tr>
<td>181</td>
</tr>
<tr>
<td>$R^2$</td>
</tr>
<tr>
<td>0.024</td>
</tr>
<tr>
<td>0.017</td>
</tr>
<tr>
<td>0.012</td>
</tr>
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- Remarkably similar to MRS estimate of 0.34-0.38 in spite of different data on ND-C and house prices
A structural interpretation of this elasticity $\beta_1$

- Life-cycle model with: $\beta(1 + r) = 1$, Cobb-Douglas $u(c, h)$, deterministic income path, no borr. constraints, no trans. costs
- Elasticity of $C$ to a permanent unexpected change in $p^h$:

$$\frac{\Delta C_{it}/C_{it}}{\Delta p^h_{it}/p^h_{it}} = \frac{H_{it}}{\sum_{\tau=t}^{T} \left( \frac{1}{1+r} \right)^{\tau-t} y_{i\tau} + H_{it} + A_{it}}$$
A structural interpretation of this elasticity $\beta_1$

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$$\Delta \log C_{it} = \left[ \frac{H_{it} + A_{it}}{\sum_{\tau=t}^{T} \left( \frac{1}{1+r} \right)^{\tau-t} y_{i\tau} + H_{it} + A_{it}} \right] \times \Delta \log p_{it}^h \left( \frac{H_{it}}{H_{i,t} + A_{it}} \right)$$

- Similar to income pass-through coeff. of Blundell et al. (2008)
### Consumption vs Expenditures

**Dep. var:** $\Delta \log C^{s,i}_{\text{real}}$

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$\Delta HNW^i$ & 0.196** & 0.298**

(0.026) & (0.085) & 

| N | 14,756 | 12,701 |
| Clusters | 281 | 181 |

$R^2$ & 0.016 & 0.012 |

- Nominal expenditures deflated through Paasche index
- 20 pct of drop in nominal exp. due to lower prices (0.30 vs 0.36)
From Kilts-Nielsen bundle to Total ND-C

- Wish to translate estimated elasticity in terms of Total ND-C
- Use CE Diary Survey (Attanasio-Battistin-Ichimura, 05) where items in KN bundle are better measured

\[
\log c_{it}^{ND} = D_t + \beta'_0 X_{it} + \beta_1 \log c_{it}^{KN} + \epsilon_{it}
\]

where \(X\): equivalence scale, family type, age, edu, race, region
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• NIPA ND goods (excl. energy): KN goods + clothing and footwear, tobacco, books, newspaper and magazines

• NIPA ND goods & services: ND goods + food away from home, clothing services, entertainment, communication, and transportation services
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- NIPA ND goods (excl. energy): KN goods + clothing and footwear, tobacco, books, newspaper and magazines
- NIPA ND goods & services: ND goods + food away from home, clothing services, entertainment, communication, and transportation services
- Result: elasticity of total ND to KN bundle is 0.7 – 0.9
## Elasticity of ND expenditures to housing wealth

### Dep. var: $\Delta \log C_{s,i}$

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<tr>
<td>$\Delta \log H^i$</td>
<td>0.124**</td>
<td>0.183**</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.038)</td>
</tr>
<tr>
<td>$\Delta \log (H^i - M^i)$</td>
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- More intuitive elasticities
- Elast. wrt to housing equity smaller b/c changes are larger
Taking stock

• Replication of MRS based on alternative and more accessible data largely confirmed their empirical findings

• Useful ‘moment’ to match to validate structural models
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• Our preferred way to state the key quantitative finding:

1. The elasticity of total real ND exp. to housing equity is \(0.08\)

2. Given an aggregate drop in housing equity of 50 pct, the implied drop in aggregate ND-C is 4% (half of the total)

3. Corresponding annual MPC for ND-C out of housing equity is:

\[
\frac{\Delta C_t}{C_t} = 0.08 \times \frac{\Delta H^e_t}{H^e_t} \rightarrow MPC_{H^e} = 0.08 \times \left( \frac{C_t}{H^e_t} \right) = 0.03
\]

\(\sim 0.37\)
THANK YOU!