Digital Payments Induce Over-Spending: Evidence from the 2016 Demonetization in India

Sumit Agarwal, Pulak Ghosh, Jing Li, Tianyue Ruan (2019)

Yi Huang

Associate Professor of Economics
Pictet Chair in Finance and Development & CEPR
Graduate Institute, Geneva

The 7th Annual Conference, Asian Bureau of Finance and Economic Research
May 28, 2019
Cash vs. Digital Payment

Demonetization - Going Cashless

THE CURSE OF CASH

KENNETH S. ROGOFF

With a new afterword by the author
2016 Demonetization in India: Anti-corruption and promote the digital payment and E-commerce....
2016 Demonetization in India:
86% cash in circulation becomes the illegal tender overnight.

Source: Crouzet, Gupta and Mezzanotti (2019)
2016 Demonetization in India: Rising the non Cash payment
Main Findings: less cash payment and more spending
Overview: Contributions

- **Cash vs. Digital Payment?**
  - **Cash-in-advance constraint (CIA) models** (Clower, 1976; Rao and Wallace, 1991; Hellwig, 2000)
  - **Money in the utility function (MIU) models** (Ramsey, 1928; Sidrauski, 1967; Walsh, 2003)
  - **Money illusion** (Fisher, 1928; Shafir, Diamond, and Tversky, 1997)
  - **Behavior approach**: Salience on the decision point, memorability, Pain in payment, degree of coupling and quality of feedback, carry cost...

- **Evidences?** confounding factors and endogeneity of the financial technology adoption (Higgins, 2018 Mexico debit card experiment; Economides and Jeziorski, 2017 Tanzania transaction fee experiment)

- Effects on the Demonetization (Chodorow-Reich et al. 2018): Districts experiencing more severe demonetization had relative **reductions in economic activity**, faster **adoption of alternative payment technologies**, and **lower bank credit growth**.

- A very smart and cute identification using cross sectional variations of the Demonetization shock across the pre-event cash dependence household.

- The important and timely research on the **consumption behavior** by the digital payment comparing with the cash usage. Existing literature focuses on the unanticipated income shocks by fiscal, monetary policies.... **shop level granular transactional data and unexpected external shock on the payment**.
Main Identification : DID setting

(b) Log spending amount over time

\[ y_{i,t} = \mu_i + \pi_t + \beta (Prior\ Cash\ Dependence_i \times Post_t) + \epsilon_{i,t} \] (1)
Overspending or unintended consequence?

\[ y_{i,t} = \mu_i + \pi_t + \sum_{t} \beta_t \times \text{PriorCashDependence}_i \times \mathbb{1}_t + \epsilon_{i,t} \]
Potential issues

1. Income Shock

2. Credit Supply
   - Effects on the Demonetization (Chodorow-Reich et al. 2018) shows the opposite.

3. Supplier Pricing Adjustment
   - No evidence that high exposure products experienced a larger price increase vs. low exposure products

4. Moving purchases to the formal market
   - Low prior grocery spending household (< 95%) is associated with a higher spending response, opposite of the hypothesis.
Besides the consumer and time fixed effects, any regional heterogeneity?
### Table 1: Summary statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase Amount per Transaction</td>
<td>373.92</td>
<td>969.95</td>
</tr>
<tr>
<td>Log(Purchase Amount per Transaction)</td>
<td>4.96</td>
<td>1.65</td>
</tr>
<tr>
<td>Dummy for Non-cash Payment</td>
<td>0.34</td>
<td>0.47</td>
</tr>
<tr>
<td>Purchase Amount per Month</td>
<td>1018.64</td>
<td>24219.97</td>
</tr>
<tr>
<td>Log(Purchase Amount per Month)</td>
<td>6.02</td>
<td>1.44</td>
</tr>
<tr>
<td>% of Non-Cash Spending per Month</td>
<td>0.36</td>
<td>0.45</td>
</tr>
<tr>
<td>% of Cash Spending per Month prior to the Shock</td>
<td>0.7</td>
<td>0.38</td>
</tr>
</tbody>
</table>
## Debit card and Credit Card Substitution by Interest rate channel?

<table>
<thead>
<tr>
<th></th>
<th>(1) Cash usage</th>
<th>(2) Debit usage</th>
<th>(3) Mobile usage</th>
<th>(4) Credit usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PriorCashDependence × Post</td>
<td>-0.313***</td>
<td>0.268***</td>
<td>0.001***</td>
<td>-0.024***</td>
</tr>
<tr>
<td></td>
<td>[-429.49]</td>
<td>[311.06]</td>
<td>[6.71]</td>
<td>[-55.26]</td>
</tr>
<tr>
<td>Consumer Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.626</td>
<td>0.568</td>
<td>0.359</td>
<td>0.368</td>
</tr>
<tr>
<td>No. of Observations</td>
<td>7,644,270</td>
<td>7,644,270</td>
<td>7,644,270</td>
<td>7,644,270</td>
</tr>
</tbody>
</table>
Panel A: Results using the second most granular definition of categories

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PriorCashDependence x Post</td>
<td>10.828***</td>
<td>19.255*</td>
<td>0.084*</td>
<td>0.281</td>
<td>1.932***</td>
<td>1.616***</td>
<td>-0.002***</td>
<td>-0.004***</td>
</tr>
<tr>
<td></td>
<td>[2.86]</td>
<td>[1.84]</td>
<td>[1.69]</td>
<td>[1.56]</td>
<td>[23.30]</td>
<td>[21.13]</td>
<td>[-4.87]</td>
<td>[-9.72]</td>
</tr>
<tr>
<td>Consumer Fixed Effects</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Consumer-Category Fixed Effects</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Category-Time Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R²</td>
<td>0.111</td>
<td>0.432</td>
<td>0.139</td>
<td>0.434</td>
<td>0.558</td>
<td>0.682</td>
<td>0.407</td>
<td>0.649</td>
</tr>
<tr>
<td>No. of Observations</td>
<td>47,182,408</td>
<td>47,182,408</td>
<td>47,182,408</td>
<td>47,182,408</td>
<td>47,182,408</td>
<td>47,182,408</td>
<td>47,182,408</td>
<td>47,182,408</td>
</tr>
</tbody>
</table>
Rate of Inflation goes down

![Graph showing WPI Inflation (YoY%) with trends from Jan-16 to Sep-17. The graph indicates a decrease in inflation rates post-demonetisation.]

Source: CMIE, MOSPI
Minor comments:

Online VS. Offline?

Low income group?

Durable vs.. Non Durable?

Variety of consumption?

Winner or loser?
Conclusions

- Great paper with policy implications: enjoy reading it and learn a lot!

- I can not recommend it highly enough (citation, and reading list/syllabus ...)

- Good luck: next version for the top publication

- Few practical suggestions
谢谢
고맙습니다
Thanks
Grazie
Merci
Danke
Gracias
Obrigado
Tack
Yi.huang@iheid.ch