Curbing Leakage in Public Programs: Evidence from India's Direct Benefit Transfer Policy

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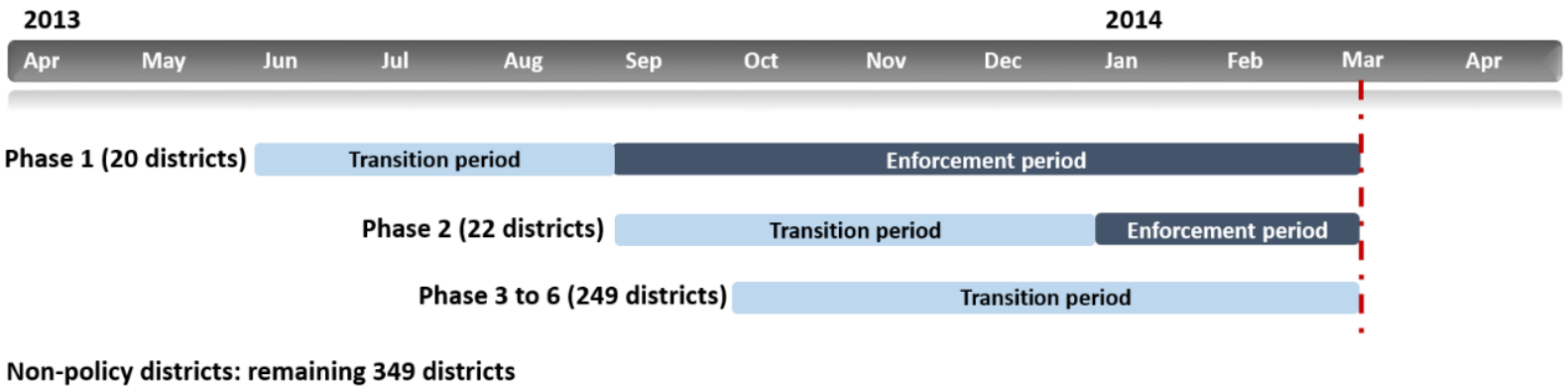
Motivation

- Pervasive corruption and evasion lead to inefficiency in developing country public programs
  - Exacerbated by presence of underground economy
- Problem: information asymmetries between government and agents
  - Latter have perverse incentives to misreport $\Longrightarrow$ subsidy diversion/leakage through "ghost" beneficiaries
- Question: can technology-driven enforcement systems improve a state's ability to administer transfers?
  - What are the effects of increased enforcement on black market prices and commodity tax evasion?

Context

- LPG subsidized for domestic cooking use, taxed for commercial use
  - Dual pricing gives rise to black market as firms incentivized to avoid tax
  - Mechanism: 'ghost' beneficiaries
- Direct Benefit Transfer for LPG (DBTL) subsidies in India
  - In-kind subsidies replaced with bank transfers, conditional on fuel purchase, to beneficiaries who are verified via biometrics

Figure 3: Timeline: The DBTL policy roll-out and termination



Conceptual Framework

- Total LPG sales given by

$$D_{Total} = \underbrace{D_{household} + D_{ghost}}_{\text{Domestic fuel sector}} + \underbrace{D_{firm} - D_{ghost}}_{\text{Commercial fuel sector}}$$

  where $D_{firm} = D_f\left[\min\left(p + t, P + C_{firm}\right)\right]$, with C denoting enforcement

- Before DBTL, price ceiling and floor in black market given by $P \in \left(p - s + C_{ghost}, p + t - C_{firm}\right)$
  - DBTL shifts floor up: $P \in \left(p + C_{ghost}, p + t - C_{firm}\right)$

- Predictions for effects of DBTL's introduction
  1. **Domestic sector:** decrease in fuel purchase
  2. **Commercial sector:** increase in fuel purchase
  3. **Black market:** increase in price

Data and Identification

- Evidence
  - Random sample of HPCL database on 40 million beneficiaries
  - Distributor-month level LPG sales data on 3,341 distributors
  - Black market survey of LPG delivery men and small businesses

- DiD exploiting variation in treatment across time and districts:

$$Y_{idm} = \alpha + \beta . Post_m * DBTL_d + \mu_i + \pi_m + \varepsilon_{idm}$$

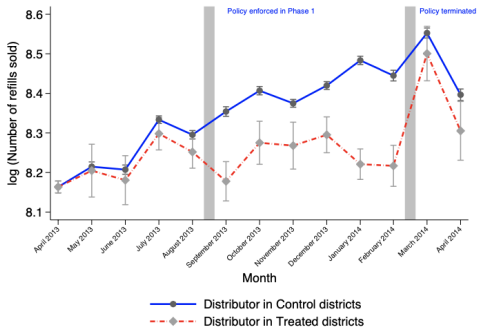
with the outcome LPG refill sales by sector, or black market price (similar setup used to study impact of termination)

  - Key assumption: selection of districts in earlier phases based on UID penetration is uncorrelated with LPG diversion
  - Preferred specification takes Phase 1 districts as treated group, comparing this with upcoming phases and non-policy districts

Results

- Domestic sector: DBTL introduction reduces demand by 11-14%

Figure 6: Impact of DBTL on domestic fuel sales by distributors



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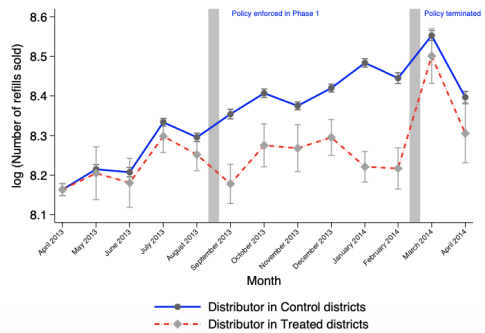
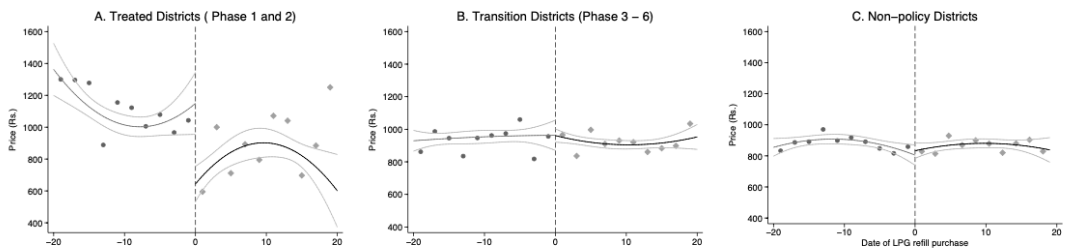


- Commercial sector: *insignificant* effect of DBTL introduction in fuel sales, but termination does lower fuel sales by 6-9%
- Black market: termination lowers prices in treated districts

Figure 11: Policy termination: Impact on equilibrium prices in the fuel black market



(a) Treated districts (b) Transition districts (c) Non-policy districts

Conclusion

- Other results
  - Late compliance and implementation issues: average purchasing behavior over 6 months comparable across relevant groups
  - Potential ghosts: DBTL caused a 10-13% increase in households not buying single refill in a given month
    - Beneficiaries drawing more refills pre-enforcement less likely to comply
  - Early compliers increase LPG refill purchases after DBTL, but effect small compared to overall impact on supply in black market
- Possible explorations
  - Differences in access to policy across demographics
  - Effect of demonetization on black market setup
  - Switching to dirtier fuels