Digitization and Demonetization in a Shadow Economy Model

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Objective

Means of payment:

- Cash; anonymous

- Debit cards (or bank transfer); recorded transactions

$\Longrightarrow$ A framework for "shadow economy" and the extent of digitization. Analyze the effect of policies to boost sales-tax revenues.

Key ingredients

- Two means of payment: cash and a digital means
  ⇒ Enforce sales tax payment on recoded transactions (only on ones using digital means)

- Costs of using cash (subject to theft) versus digital means (setup payment machines/account)

Results

1. The equilibrium size of the shadow economy:

   (a) A full shadow equilibrium (with high tax rate or high digital cost and low money holding cost)

   (b) A partial shadow equilibrium (with medium values)

   (c) A no-shadow equilibrium (with low tax rate and low digital cost)

2. No-shadow equilibrium maximizes private welfare

3. Tax revenue may not be maximized in a partial shadow equilibrium

4. Policies to reduce the size of shadow economy:

   (a) Demonetizing legal tender

   (b) Facilitating digitization of the means of payment

   (c) Reducing tax rates

5. Multiple equilibria and coordination

6. Calibration to US and Indian economies

Framework

- Lagos and Wright (2005): a monetary model with explicit medium of exchange

- Gomis-Porqueras et al. (2014): cash (subject to inflation) and credit (subject to tax)

Setups

- There are two subperiod each period. A market is open each subperiod.

- One is a decentralized market (DM) where buyers of a consumption good have to pay by cash or digital means

  - Transactions are anonymous with cash but are recorded with debit card

  - Sales tax can be enforced for electronic transactions abut not cash transactions

- The other is a centralized market (CM) where agents work, buy, sell and consume a general good.

  - Agents have to decide which payment method they use for the following DM

  - Cash and electronic payments are both rooted in the money which is issued by the central bank

- Preference:

  - High type: marginal utility from DM consumption is relatively high

  - Low type: marginal utility from DM consumption is relatively low

- Costs:

  - Cash: It might be stolen, the theft probability $\eta > 0$. This is marginal cost of cash holdings

  - Electronic payment: It requires fixed cost $\kappa > 0$. Also, marginal sales-tax rate $\tau \geq 0$

Three cases for monetary equilibria:

1. No shadow (low τ)

2. Partial shadow, with H-type debit and L-type cash (intermediate τ)

3. All shadow (more variety)

Multiple equilibria exist for case 2

Welfare

- Given that $\tau < \eta$, output is always higher under a digital equilibrium so that it is always better to hold digital rather than cash

- Because of taxes distortion, $\tau = 0$ is the optimal tax rate for surplus maximization

Tax revenue

If the government wants to maximize tax revenue by setting τ then a small shadow economy may be optimal

Intuition:

- A partial shadow economy regime has a higher tax rate, but with lower enforcement

- When the L-type is very low, the loss of tax revenue would be small even if they use cash

Policies

Policy variables: τ and κ

Suppose the size of the shadow economy is larger than the revenue maximization.

Then, consider the government policies to maximize revenue

- subsidizing κ $>>$ reducing τ

- demonetization, e.g. policy intervention in India to demonetize high denomination currency bills

− deeming useless any currency bills brought to CM (here the government is able to grasp cash bills)
$\implies$ cannot be converted to consumption goods in CM

− no real effect since buyers' money demand is not affected

− when the economy is in multiple equilibria, it may change the beliefs of agents and push them to coordinate on the "better" equilibrium

Discussion I: Electronic payments

- Transactions via electronic payments are all recorded including all the past histories

- This assumption is used to justify the government's tax collection in DM for electronic payments

- However, if so, agents can use credit and achieve a better allocation (money is costly to hold)

- Need to justify why this cannot happen

Discussion II: Shadow economy

1. Tax enforcement of agents who hold/use cash

   - Cash is assumed to be the way to escape from sales tax in DM since cash transactions are anonymous

   - The government could impose tax on agents and collect them in CM transactions even if they have used cash in the DM transactions (actually this is a standard way to think about tax in monetary equilibria)

   - Need to justify why cash holders can hide themselves in the CM

2. Uniform tax assumption

- The government could implement differential taxes in CM

- Indeed types may be revealed during the CM, why not make it contingent on CM transactions

- If so, the partial shadow would not maximize tax revenue

Discussion III: Policies

- Demonetization: currently not effective

- Inflation tax: currently neutral (but note the above comments).

  - Differential risks of a punishment (if found evading taxes) across payment methods

- Income tax: differential punishment risks upon tax audit