Cash and the Economy:
Evidence from India's Demonetization[*]

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Abstract

We analyze a unique episode in the history of monetary economics, the 2016 Indian "demonetization." This policy made 86% of cash in circulation illegal tender overnight, with new notes gradually introduced over the next several months. We present a model of demonetization where agents hold cash both to satisfy a cash-in-advance constraint and for tax evasion purposes. We test the predictions of the model in the cross-section of Indian districts using several novel data sets including: a data set containing the geographic distribution of demonetized and new notes for causal inference; nightlights data and employment surveys to measure economic activity including in the informal sector; debit/credit cards and e-wallet transactions data; and banking data on deposit and credit growth. Districts experiencing more severe demonetization had relative reductions in economic activity, faster adoption of alternative payment technologies, and lower bank credit growth. The cross-sectional responses cumulate to a contraction in employment and nightlights-based output due to demonetization of 2 p.p. and of bank credit of 2 p.p. in 2016Q4 relative to their counterfactual paths, effects which dissipate over the next few months. We use our model to show these cumulated effects are a lower bound for the aggregate effects of demonetization. We conclude that unlike in the cashless limit of new-Keynesian models, in modern India cash serves an essential role in facilitating economic activity.

Executive Summary

We analyze a unique episode in the history of monetary economics, the 2016 Indian "demonetization." On November 8th, 2016, the government of India unexpectedly declared 86% of the existing currency in circulation illegal tender, effective at midnight. Referred to as "demonetization," this policy resulted in a sharp decrease in the availability of cash which could be used in transactions because printing press constraints prevented the immediate replacement of the demonetized currency with new notes. The stated objectives of the policy were to target black money, reduce corruption, and remove fake currency notes.

We analyze the *short-term* consequences of this episode in two steps: First, we build a model of demonetization where agents store cash both to satisfy a cash-in-advance constraint and for tax evasion purposes. Second, we empirically test the predictions of the model in the cross-section of Indian districts using several novel data sets.

There are several challenges to estimating the *causal impact* of demonetization. The first is that aggregate measures and time trends of economic activity capture the influence of other economic shocks and policies besides demonetization. The second is that data such as GDP have limited coverage of the informal, cash-intensive sector of the economy, particularly at the frequencies required to study the impact of demonetization.

We address the twin challenges using the following approach: Firstly, to isolate the impact of demonetization we study its consequences in the cross-section of Indian districts. Using a data set from the RBI containing the geographic distribution of demonetized and new notes we construct a local area demonetization shock as the ratio of the arrival of new notes in an area to the quantity of demonetized notes in that area. We present both narrative and statistical evidence that variation in these demonetization shocks occurred essentially at random with respect to economic activity. Secondly, to capture the impact on both the formal *and* informal sectors of the economy we employ several data bases including (i) satellite data on human generated nightlight activity, (ii) survey based measure of employment, (iii) measures of deposit and credit growth, and (iv) ATM, debit/credit cards/e-wallet transactions data.
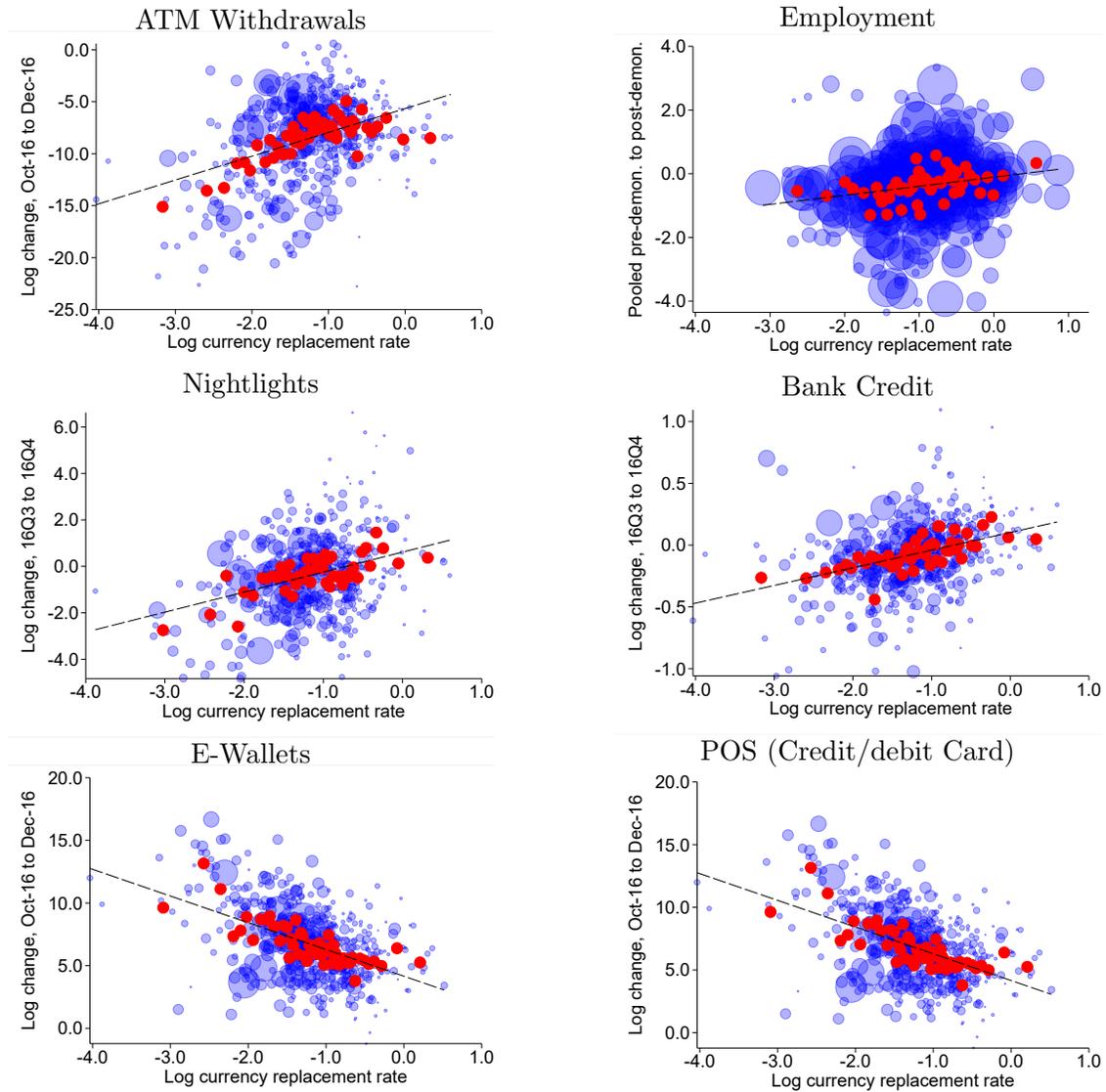
Figure 1 summarizes our main results. Each sub-figure plots an outcome variable against the cash replacement rate for each district in the period immediately after demonetization. The variation on the horizontal axis shows the power of this approach. While all districts experienced a contraction in cash in the period following demonetization with the average district having a cash replacement rate of 31% by December 2016, there was significant variation across districts. The 10th percentile district experienced a 13% cash replacement rate while the 90th percentile district had a 64% cash replacement rate. We find that:

1. Districts which experienced more severe demonetization shocks (i.e. lower replacement rate, or higher cash shortage) experienced larger contractions in ATM withdrawals.

2. Districts experiencing more severe cash shortage had larger reductions in economic activity as measured by satellite data on human generated nightlight activity, and survey based measure of employment.

3. Credit growth slowed by more in districts with more severe cash constraints.

4. Districts with more severe demonetization experienced faster adoption of alternative payments technologies such as e-wallets and point-of-service cards.

Importantly, these differential effects do not exist in the pre-demonetization periods, validating our identification strategy. In terms of magnitude, comparing districts at the 10th and 90th percentiles of the demonetization shock in the period immediately after the announcement, both variables map into a difference in output due to demonetization of roughly 4.5 percentage points. While the difference in output across districts is substantial, it is far less than the roughly 50 percentage point inter-decile difference in the amount of currency replaced. This occurred because individuals found ways around using cash to conduct transactions, for example by switching to alternative payment methods like debit cards, credit cards, and e-wallets or by convincing retailers to open an informal line of credit or to accept old notes.

The cross-sectional responses cumulate to a contraction in employment and nightlights-based output due to demonetization of 3 p.p. in December 2016 relative to a no-demonetization counterfactual. This magnitude translates into a decline in the quarterly growth rate (not annualized) in 2016Q4 of 2 percentage points relative to a no-demonetization counterfactual. Similarly, the effect on credit implies demonetization reduced the quarterly growth rate of credit by 2 percentage points in 2016Q4. These effects peak in the months immediately after demonetization and dissipate over the next few months. We use our model to show these cumulated effects are a lower bound for the aggregate effects of demonetization. Importantly, despite the data sources being very different they tell a consistent story both qualitatively and quantitatively of a demonetization driven decline in economic activity.

We reiterate that the focus of this paper is on the *short-term* impact on demonetization. There can be potential *longer term* advantages from demonetization e.g. improvements in tax collections, a shift towards savings in non-financial instruments, and non-cash payment mechanisms. Evaluating these longer term consequences will require waiting for more data, and an econometric strategy more suitable to studying long-term effects.

Notes: Each blue circle in each subfigure represents a district, with the size of the circle proportional to 2015 district GDP. The red circles average observations into 50 quantile bins of the demonetization shock. The dashed line gives the best fit line.

Figure 1: Summary of Results