On November 8, 2016, the Prime Minister of India, Narendra Modi, took the nation by surprise by announcing that the government was demonetizing currency with denominations of 500 or 1,000 rupees, with immediate effect. This amounted to the demonetization of 86 percent of the Indian currency in circulation. Holders of the demonetized currency were given till December 31, 2016 to exchange their demonetized bills for newly issued currency, which would be in denominations of 500 and 2,000 rupees.

Modi gave two main reasons for the move: first, it would allow the state to seize the wealth in the economy that was accumulated through undeclared income. Hence, this was to be a decisive blow against corruption. Second, it would eliminate the scourge of counterfeit currency that was circulating in the economy. This second motive, while laudable, seemed aimed at a small target because estimates from the Indian Statistical Institute suggested that counterfeit currency accounted for a bare 0.025 percent of the currency in circulation (as reported in Chauhan 2016).

In subsequent days, two other motives were added to the narrative. Third, demonetization was intended to be a way of pushing India toward a modern digitized economy, which would be less reliant on cash. More digitized payments would bring a larger share of the informal Indian economy into the organized and formal sector. Fourth, by forcing people to convert their old cash into the new currency through the banking system, it was both bringing unaccounted money into the

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formal tax network and generating greater digital footprints to track individuals and firms who were hitherto hidden from the tax network.

After an extended counting process, when the dust cleared, the Reserve Bank of India announced that over 99 percent of the demonetized currency had been returned to it through the commercial banks. Also, within a year of the demonetization, currency in circulation in the economy was also back to its predemonetization level.

Panel A of Figure 1 shows the time paths of three different measures of money: M0, M1, and M2. The units are in millions of rupees. M0 measures currency in circulation, plus deposits by bankers and others with the Reserve Bank of India. M1 includes currency, demand deposits with the banking system, and other deposits with the RBI. M2 adds savings deposits of post office savings banks to M1. As can be seen from the figure, by the end of March 2017, both M1 and M2 were just 2.1 and 2.9 percent below their October 2016 levels. M0, on the other hand, remained 15 percent below its predemonetization level. In fact, it wasn’t until January 2018 that M0 recovered to its predemonetization level.

There were two ways in which the Indian public could exchange the demonetized cash: they could either swap the old currency for new currency (subject to daily limits), or they could deposit the old cash in their bank accounts. Panel B of Figure 1 shows the contrasting behavior of currency in circulation and bank deposits (which comprise saving and checking deposits) during the episode. Currency in circulation fell by around 8.4 trillion rupees while bank deposits rose by a meager 1.5 trillion rupees between October (the last month before demonetization) and December 31, 2016 (the last date for exchanging the old bills for new ones). Most of the demonetized currency was instead deposited in time deposits, which rose by over 4 trillion rupees during this period.

The banks, in turn, parked the returned cash with the Reserve Bank of India first in the form of bankers’ deposits and subsequently in special purpose bonds issued by the RBI. Since most of the demonetized currency was eventually returned, the overall level of RBI liabilities barely changed during the entire episode.

While the move was initially hailed as courageous and transformative by some commentators, the mood rapidly gave ground to widespread concerns regarding: (1) the preparedness of the Reserve Bank of India to manage the process of remonetizing the economy, (2) the potential of demonetization to achieve the stated goals, (3) and the costs of the move for the Indian economy. With two years having passed since the enactment of the policy, what does the evidence suggest about the effects of India’s demonetization?

The evidence points to demonetization having mostly failed to have achieved its stated objectives. The goal of eradicating black wealth and corruption by demonetizing currency was problematic from the start, given the widespread acknowledgement of the fact that undeclared income is seldom held for long periods in terms of cash. Moreover, demonetizing currency, which attacks a stock, does little to impede the fresh creation of undeclared income, which is a flow
The second goal of destroying counterfeit currency was suspect to start with given the very low-estimated counterfeit currency in circulation in India. An examination of the growth in digitized payments, in the tax base and in tax revenues, suggests that the move achieved little in terms of changing the predemonetization trends in these measures. Digitized payments were growing exponentially in India prior to 2016, and they have continued on the same nonlinear trend. I also do not detect any systematic impact of demonetization on either the number of tax filers or tax revenues. Of course, given the relatively short period of time since the demonetization, these conclusions on the time trends in digital transactions and taxes should be viewed as tentative. On the cost side, however, there appears to be strong evidence that demonetization reduced output and employment, especially in the informal sector. However, these losses were likely temporary rather than being permanent. On balance, demonetization appears to have failed the cost-benefit analysis of public policy initiatives: it had little success in achieving its stated goals while having imposed significant costs on the public.

In the next section, I place India’s demonetization initiative in context by describing the intellectual arguments for demonetization as well as the experience of two other demonetization exercises that were carried out in the past in India. I then examine the preparedness of the central bank in dealing with the mechanics.
of demonetization. The discussion then presents the evidence in the context of the logic of the stated goals and considers evidence on the costs of demonetization before offering a brief conclusion.

Intellectual and Historical Context

Demonetization as a tool for fighting crime, tax evasion, and activities in the underground economy has been advocated in the past. One of the more well-known recent contributions along these lines was made by Ken Rogoff (2016, 2017). The argument rests on the premise that, in an international context, many underground economy activities are financed using large-denomination currency notes. Following World War II, Britain and other European countries fought back against illicit wartime speculative wealth gains by demonetizing high denomination bills. In 1969, the United States demonetized bills with denominations of $500 and higher; in 2017, the European Central Bank demonetized the 500-euro bill.

A unique aspect of the Indian measure was that it was carried out during a period of economic stability, but with very little time given to the public to exchange their demonetized bills. This created the potential for a lot of disruption and inconvenience since the demonetized bills, especially the 500-rupee bill (worth about US$14 at prevailing exchange rates), were heavily in use for daily transactions.

The demonetization of 2016 was not the first such episode in Indian monetary history either. There were two other episodes in the post-World War II era with remarkably similar underlying justifications: one in 1946, the other in 1978.

Soon after the end of World War II, on January 12, 1946, the Government of India demonetized all currency bills of denomination 500 rupees and above. In the lead-up to that decision, the finance member of the Governor General of India’s Executive Council, Sir Archibald Rowlands, cited the Bank of England’s decision to demonetize currency after the war “as one more concrete example for the Indian government to follow in its fight against black market money and tax evasions which have now assumed enormous proportions.” There were of course officials who were skeptical of the effectiveness of measure at the time, including the then-Governor and Deputy Governor of the Reserve Bank of India. When all the exchanges were done, it turned out that 94 percent of the demonetized currency was returned to the RBI. The scheme was generally regarded as a failure because not much was garnered in the form of unreturned currency, while the demonetization caused considerable hardship to the general public. Moreover, the higher denomination bills were all reintroduced by 1954.

The second such episode was in 1978. On January 16, 1978, the government demonetized all currency bills of denominations 1,000 rupees and above. In contrast to the 2016 measure, which demonetized 86 percent of the currency

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1 Facts and the background surrounding this episode can be found on page 706 of volume 1 of the fascinating history of the Reserve Bank of India (1970).
in circulation, the 1978 measure only affected approximately 1.5 percent of the currency. As a result, the disruption for the general public was limited. This measure was also opposed by the governor of the Reserve Bank of India at the time, I.G. Patel. Amongst other reservations, Patel (2002) held that “such an exercise seldom produces striking results” and “the idea that black money or wealth is held in the form of notes tucked away in suit cases or pillow cases is naïve.” The move was marginally more successfully than the 1946 experience in that 86 percent of the demonetized currency was exchanged for lower denomination bills.

The remarkable part about the 1946 and 1978 episodes was the similarity of the motivation behind them as well as the concerns regarding their efficacy in achieving the stated objectives. In addition, the two previous episodes were similar in that most of the demonetized currency was successfully converted by the public. This rendered the objective of taxing undeclared income unfulfilled for the most part.

The Preparedness of the Reserve Bank of India

Prime Minister Modi announced the demonetization of 500- and 1,000-rupee currency bills on November 8, 2016. It was later revealed that the Board of the Reserve Bank of India had met earlier that evening to consider a letter from the Ministry of Finance that the Government of India received the previous day, along with a memorandum from a deputy governor recommending the demonetizing. Two key reasons for the proposal cited in the government letter were: (1) between 2011 and 2016, the supply of 500- and 1,000-rupee bills had grown by 76 and 108 percent, respectively, while India’s economy had only grown by 30 percent during this period; and (2) cash typically facilitated “black money.” The board was further told that the measure was also intended to encourage greater financial inclusion and to incentivize greater digitization of the economy.

The board approved the proposal, but not before making a few trenchant comments. It noted that the measure may not have the desired effect on black money because most people do not hold undeclared wealth in cash. It further worried about the negative effects on growth that were likely to occur in the short run. Possibly the most damning observation was that the primary fact on which the government had based its proposal—that the supply of 500- and 1,000-rupee bills had far outstripped the growth rate of the economy—was simply wrong. The board pointed out the embarrassing fact that the government had compared GDP growth in real terms with the growth of currency supply in nominal terms. In fact, nominal GDP growth had summed to over 80 percent between 2011 and 2016 and hence was in line with the growth of the currency bills to be demonetized.²

The minutes suggest that the board was assured that demonetization had been under discussion between the Reserve Bank of India and the government

²See the Minutes of the Five Hundred and Sixty-First Meeting of the Central Board of Directors of the Reserve Bank of India (Reserve Bank of India 2016).
for the preceding six months, during which these issues had been considered. The ex-Governor of the Reserve Bank of India, Raghuram Rajan, whose term as governor had ended on August 31, 2016, has gone on record confirming this. He said that the RBI had indeed been consulted about demonetization and had advised the government against it (as reported in *Hindu Business Line* 2018).

The preparation of the Reserve Bank of India for this massive operation came into severe focus almost immediately as automatic teller machines ran out of cash for long periods of time across the length and breadth of the country, including the major metropolitan cities. Moreover, when the automatic teller machines had supplies of the new currency, most of it, at least initially, was in the form of 2,000-rupee denomination bills, which was not helpful for daily transactions whose average cash value tended to be much smaller. The process of remonetizing the economy with the new currency bills proved to be slow and severely disruptive for regular commercial transactions.

A further source of concern regarding the preparedness of the Reserve Bank of India for a policy measure of this scale came in the form of the multiple circulars that it issued after the initial notifications announcing the demonetization. The RBI issued 57 official circulars between November 9 and December 31, 2016, which kept revising the conditions under which the public could make deposits, withdrawals, and exchanges of the demonetized currency. For example, over-the-counter exchange of demonetized currency was initially limited to 4,000 rupees per person per day. This daily limit was first raised to 4,500 rupees and then reduced to 2,000 rupees before being completely stopped starting November 24th. On withdrawals from bank accounts, initially daily over-the-counter cash withdrawals were capped at 10,000 rupees with a weekly limit of 20,000 rupees. This weekly limit was subsequently raised to 24,000 rupees, while the over-the-counter limit of 10,000 rupees was withdrawn. Withdrawals via automatic teller machines were initially restricted to 2,000 rupees per day per card before being raised to 2,500 and then 4,000 rupees per day per card.

The rules governing deposits were also constantly being revised. For customers with updated identity documentations, known as Know-Your-Customer or KYC norms, initially there was no capping on the amount to be credited to the account. For non-KYC compliant account holders, a maximum value of 50,000 rupees of demonetized bills could be deposited. On November 16, 2016, the Reserve Bank of India announced that all cash deposits exceeding 50,000 rupees in value needed to be supplemented with a copy of the taxpayer identification card number (known as PAN card) in case the account did not have that information.

The combination of the slow stocking of automatic teller machines with the new cash, the spate of revised notifications, the limited supply of new 500-rupee bills, and the relative excess of new 2,000-rupee bills, which were less useful for transactions purposes, suggested that the institution that had been tasked with implementing the policy was not adequately prepared. Rather, the policy was thrust upon the Reserve Bank of India, which then scrambled to implement the policy as best as it could.
Achieving the Stated Goals

Amongst the various stated policy goals, three of the early ones were: (1) to seize the black wealth created through undeclared income that was stored in the form of cash holdings, (2) increase the tax base by forcing people to exchange demonetized bills through the banking sector, (3) and to convert the economy into a more digitized one that was less dependent on cash.

Seizing Black Wealth: Direct and Indirect Methods

There are two ways of seizing unaccounted income or black wealth. The first is by taxing it directly, while the second is indirectly by bringing underground economy transactions into the tax net. We examine the effect of demonetization on both of these channels.

For the government to be able to directly seize black (unaccounted) wealth through demonetization, a necessary condition was that the share of demonetized currency that was returned to the Reserve Bank of India be significantly less than 100 percent. Given that over 99 percent of the old cash was returned, this direct method of capturing unaccounted wealth did not work. Nevertheless, in assessing whether the demonetization could have even been expected to achieve this goal, it is useful to conduct a few back-of-the-envelope computations.

Black money has both a stock and a flow aspect. To assess the impact of demonetization, we need estimates for both. In a World Bank study, Schneider, Buehn, and Montenegro (2010) estimate the parallel economy in India to be around 25 percent of GDP. This gives an estimate of the flow share of the underground economy.\(^3\) The wealth share of the underground economy is more difficult. Credit Suisse (2014) estimates the wealth-to-GDP ratio in India to be around two. If wealth creation is similar for both declared and undeclared income, this would suggest that black wealth in India is about 50 percent of GDP. It is likely larger because the saving rate out of undeclared income is probably greater than that out of declared income. Nevertheless, one can use these two estimates for a rough calculation of the amount of black wealth and black income that demonetization could have realistically been expected to mop up.

The demonetized money was about 10 percent of GDP. Even if the entire amount had been left unexchanged, it would have amounted to around 40 percent of the underground economy (or black income) and 20 percent of black wealth.

\(^3\)The Schneider, Buehn, and Montenegro (2010) estimate of the underground economy is an attempt to measure output that is deliberately not reported in order to avoid detection. It is different from the estimated informal economy share of Indian GDP of 45 percent. The estimated informal economy is part of India’s official GDP estimates. The estimate for nonagricultural informal sector output is derived from enterprise surveys of unincorporated firms. Estimates of labor value added in the unincorporated sector derived from the enterprise surveys are combined with estimates of labor supply to the informal sector derived from household employment surveys to arrive at the estimate for nonagricultural informal sector output. Estimates for agricultural informal sector output are derived by combining land-use statistics with data on cropping an area by crop and cost of inputs.
Given the historical precedents from 1946 and 1978, above, a reasonable working guess would have been 85–90 percent of the demonetized cash would be exchanged. Hence, the maximum amount that this move could have been expected to garner was around 2–3 percent of the black wealth in India (or 4–6 percent of black income).

These estimates, which would have been easy to compute before enacting the policy, seem rather small given the extent of the disruption to the economy. As it turned out, these gains were close to zero since over 99 percent of the demonetized cash was exchanged by the public. At least on this dimension, the policy seems to have been poorly conceptualized.

The second way in which demonetization could seize unaccounted wealth is indirectly through its effect on the tax base. To see this, note that there were two ways of exchanging old bills: (1) over-the-counter exchanges of old bills for new ones and (2) depositing old bills in one’s bank account and withdrawing new cash at a later date. The Reserve Bank of India imposed severe restrictions on the first option by limiting the maximum amounts that could be exchanged over-the-counter at banks. Inasmuch as the public returned the old bills through the second option, depositors would be traceable. Hence, the government could potentially identify individuals/entities whose deposits were higher than the norm. The government could then examine the tax and income footprints of these depositors more closely to identify tax evaders and confiscate some of their unaccounted-for wealth.

We investigate this indirect effect of demonetization by examining the time series behavior of two different indicators. The first considers the evolution of the tax/GDP ratio in India before and after demonetization, while the second examines the evolution of the number of tax filers before and after demonetization.

Before proceeding further, it is important to note two caveats. First, India enacted a key tax reform in July 2017 when it introduced a Goods and Services Tax (GST). GST replaced a complicated web of disparate indirect tax schemes that varied across states both in magnitude and extent. The GST reform had been in the works for over a decade. As a result of this change, assessing the impact of demonetization on tax revenues accruing to the government is problematic since the two measures occurred in such close proximity. Second, we only have three years of tax data after demonetization. This makes it difficult to draw any definitive econometric conclusions.

In Figure 2, panel A depicts the path of the tax/GDP ratio in India from 2005. The figure plots direct and indirect tax ratios separately. Direct taxes are primarily composed of personal income taxes and corporate taxes. Indirect taxes are comprised of sales taxes, customs duties, and excise duties. The vertical lines on the graphs mark the fiscal years in which demonetization and the Goods and

4 The tax data are annual. Because the Indian fiscal year goes from April 1 to March 31, the years in the figures refer to the fiscal year. Thus, 2015 refers to the fiscal year 2014–2015 that ended on March 31, 2015.
Demonetization and Tax Revenues

A: Tax/GDP ratio

| Year | Direct tax/GDP | Indirect tax/GDP |
|------|---------------|------------------|
| 2015 | 0.10          | 0.09             |
| 2016 | 0.11          | 0.08             |
| 2017 | 0.12          | 0.07             |

B: Number of tax filers

| Year | Corporates | Noncorporates |
|------|------------|---------------|
| 2015 | 300,000    | 200,000       |
| 2016 | 350,000    | 250,000       |
| 2017 | 400,000    | 300,000       |

Source: The tax data is from Government of India (2019), the Central Board of Direct Taxes (CBDT) in India. Data on the number of tax filers comes from Government of India (2019) and Comptroller and Auditor General of India (2019). The GDP data comes from Reserve Bank of India (2019).

Note: The figure in the left panel depicts the tax-GDP ratio for both direct and indirect taxes for the period 2005–2019. The figure in the right panel reports the number of tax filers in India during 2005–2019. The left axis reports the number of noncorporate tax filers, while the right axis reports the number of corporate tax filers.

Services Tax were introduced. Demonetization occurred in fiscal year 2016–2017, while GST happened in fiscal year 2017–2018.

A couple of features are noteworthy. First, direct taxes typically account for just about one-third of overall tax revenues in India. This is due to the very small number of individual and other noncorporate taxpayers in India (around 44 million in 2017, less than 10 percent of the labor force). The abysmal state of direct taxes has been a long-running public finance concern in India. It partly reflects the low income of most of the workforce, but is also symptomatic of widespread tax evasion. Second, there does appear to be a mild increase in both the direct and indirect tax/GDP ratios in 2017 relative to 2016 (the fiscal year before demonetization). However, the figure also shows that both the direct and indirect tax ratios in 2018 were not very different from their past trends. Thus, the direct tax ratio in India has been stable between 6 and 7 percent since 2010. Its levels in 2018 and 2019 were 6.7 and 6.9 percent, respectively. Interestingly, these levels for the direct tax ratio are below the levels it reached in 2008–2009. The indirect tax/GDP ratio has been on a gradually rising path except for declines in 2014 and 2015. Neither demonetization nor Goods and Services Tax appear to have pushed the indirect tax/GDP ratio off its recent trend path.
Based on the limited evidence of three years of post-demonetization tax revenue, it is hard to argue that demonetization induced a sharp increase in the collection of tax revenues. Clearly, a conclusive assessment of the impact of demonetization on tax revenues would require a few more years of data, as well as decoupling the effects of Goods and Services Tax from demonetization.

The tax revenue data do not distinguish between the tax rate and the number of tax filers. One conjectured effect of demonetization was that it would bring more individuals and firms into the tax net by forcing them to exchange their demonetized cash through the formal banking system. Figure 2 examines this hypothesis by plotting the evolution of the number of tax filers in India, broken up by noncorporate and corporate filers. The primary insight from panel B of Figure 2 is that both total and corporate tax filers have been steadily rising since 2014. There doesn’t appear to be any sharp increase in the number of tax filers in 2017, which was the year of demonetization. In fact, the figures suggest that there was a sharper increase in the number of tax filers in 2018, which was the year when Goods and Services Tax was introduced, followed by a further increase in 2019. Of course, this could also be the consequence of a delayed response of some tax filers to demonetization.

The general picture that emerges from Figure 2 is that there has been some improvement in public finances in India since 2016, but it is difficult to attribute this to demonetization because the changes appear to be consistent with a prior trend. Hence, the indirect effect of demonetization on seizing undeclared income seems muted at best.\footnote{Another popular method of evaluating the response of taxes is “tax buoyancy,” which measures the elasticity of taxes with respect to nominal GDP. An increase in tax buoyancy could thus indicate either an increase in the average tax rate or an increase in the number of people paying taxes. The conjectured effect of demonetization on bringing people into the tax net would typically operate through the second channel. The tax buoyancy numbers in India are so volatile that it is impossible to detect any trend or trend break from it. The tax buoyancy results are available from the author upon request.}

Creating a More Digitized India

The effect of demonetization on the goal of converting India into a more digitized economy is trickier to evaluate. The desire for more digitization originates in the fact that 80 percent of workers, 45 percent of GDP, and a majority of firms in India operate in the informal, unregistered sector. These entities are mostly unregulated and untaxed. Despite the scale of India’s economy—1.25 billion people and a labor force of 600 million—the total number of registered individual and noncorporate taxpayers in India, as noted earlier, is a measly 44 million.

This scale of informality in India creates multiple constraints for its economy. First, the small base for direct taxes creates an overdependence on indirect taxation for government revenues, which often results in cascading distortions and efficiency losses. Second, the widespread informal organization of production impedes the penetration of banks and formal finance which, amongst other factors, tends to cause a preponderance of small-scale, low-productivity establishments and firms. In
as much as demonetization induces greater digitization of the economy, it would also reduce these constraints.

Clearly, the greater the proportion of transactions that are done through electronic payments such as bank-to-bank money transfers, debit cards, and credit cards (for both business-to-business and business-to-customer transactions), the greater the digital footprints in the economy. How successful has demonetization been in increasing the speed of digitization of the economy?

If demonetization induced the Indian public to switch out of cash transactions, then one should observe a rise in the velocity of money. Velocity of money is defined as the ratio of nominal GDP to the stock of money. It captures the speed with which money circulates in the economy in order to buy the flow of goods being produced. Naturally, the estimated value of velocity depends on the measure of money that one uses. The narrower the measure of money, the larger the measured velocity will be. Our interest here is not in the level of velocity, but rather its movements around and after the time of demonetization.

Figure 3 shows the measured velocity for three different monetary aggregates defined earlier, ranging from the M0, which is the narrowest, to M2, which is the broadest. Two features of the figure are worth noting. First, the biggest increase

Figure 3
Demonetization and the Velocity of Money

Source: The source for data on GDP and monetary aggregates is Reserve Bank of India (2019).
Note: Velocity is calculated as the ratio of nominal GDP to the relevant monetary aggregate. M0 measures currency in circulation, plus deposits by bankers and others with the Reserve Bank of India (RBI). M1 includes currency, demand deposits with the banking system, and other deposits with the RBI. M2 adds savings deposits of post office savings banks to M1.
in velocity around the demonetization period was for M0, which is the narrowest measure of money. Velocity of M1 rose as well but less than for M0. Movements in the velocity of the broader measures of money were extremely muted by contrast; indeed, measures of velocity associated with broader measures of money than M2 showed almost no change in response to demonetization. Second, after three quarters, all the velocity measures returned to their near-term trend levels. It would appear that initially there was some substitution from cash into other payment methods for transactions in response to the monetary shock. Once things normalized, however, the public returned to their usual usage of cash for transactions purposes.

An alternative approach to measure the effect of demonetization on digitization is to examine directly the time paths of digital transactions in the economy. Figure 4 examines the effect of demonetization on the digitization of the Indian economy by plotting the evolution of digital and traditional transactions, both in terms of volumes and value. Traditional transactions are transactions that involve either paper clearing or card transactions at ATMs, while all other transactions are classified as digital.

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**Figure 4**

Demonetization and Digitization

A: Transaction volumes

B: Transaction values

Source: Data on transactions comes from the Monthly Payment and Settlement Indicators of Reserve Bank of India (2019).

Note: The figure shows the volume and value of monthly traditional and digital transactions in India during January 2013–September 2019. The left panel shows the volume of transactions in millions, while the right panel shows the value of transactions in billions of rupees. Traditional transactions are transactions that involve either paper clearing or card transactions at ATMs, while all other transactions are classified as digital.

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6 Card transactions at automatic teller machines are considered as cash-based transactions and consequently collected under traditional transactions.
In Figure 4, panel A shows the volume of both digital and traditional transactions, while panel B shows the corresponding transaction values. A few features of the transactions data are noteworthy. First, the volume of digital transactions had been steadily growing in India and had almost caught up with the volume of traditional transactions. In fact, the volume of digital transactions had almost caught up with the traditional transactions by October 2016. The demonetization of November 2016 caused the volume of digital transactions volume to shoot up on impact, while simultaneously causing a drop in the volume of traditional transactions. These patterns reversed themselves somewhat in subsequent months so that the traditional transactions volume returned to its predemonetization level. The volume of digital transactions did fall back somewhat from its levels during the demonetization months but, nevertheless, stayed well above its predemonetization level. Indeed, digital transactions have consistently exceeded traditional transactions both in levels and growth rates since 2017. Second, the value of digital transactions have been larger and have also been growing faster than traditional transactions for the past decade. However, demonetization does not appear to have affected the trends or levels of either digital or traditional transactions. In fact, the introduction of the Goods and Services Tax reform also appears to have had no effect on the transactions values.

Because the volume of digital transactions has risen discretely post-demonetization while the value of digital transactions has stayed on its trend path, it appears that demonetization may have induced the public to start using digital payment methods for smaller value transactions relative to the predemonetization period.

Two recent papers investigate the effect of demonetization on digitization more formally. Crouzet, Gupta, and Mezzanotti (2019) examine the evidence to assess whether a large temporary shock to the availability of cash could induce a permanent adoption of electronic payment systems and thus induce digitization. Using data from a digital wallet firm called Paytm, the paper shows that the demonetization shock did induce a permanent increase in digitization. However, this adoption effect was crucially dependent on exposure to the demonetization shock. The Reserve Bank of India distributes currency throughout the country using around 4,000 “currency chests,” which are managed by individual bank branches. This research identifies areas further away from currency chest banks as areas that were most exposed to the shock and shows that areas that were more exposed to the shock adopted digital payment methods more aggressively. Moreover, areas that adopted digitization more aggressively were also areas that were more likely to have had higher adoption rates prior to the shock and were also likely to be closer to financial hubs. They interpret these findings as evidence of network effects in the adoption of new technologies.

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7 This statement is subject to the caveat that we do not have independent data on the volume and value of cash transactions in the economy, except for the indirect evidence through the velocity of money that we presented in Figure 3.
In a related paper, Aggarwal, Kulkarni, and Ritadhi (2019) use a difference-in-difference approach to confirm the Crouzet, Gupta, and Mezzanotti (2019) result that areas more exposed to the shock saw a larger increase in digital payments. They then show that adoption of digital payment methods was more muted in districts with more informal workers and rural households. They find that the positive digitization effects were concentrated in districts with fewer rural households and greater shares of salaried workers. Aggarwal, Kulkarni, and Ritadhi (2019) interpret this finding as suggesting that digitization was more likely to occur in response to a negative currency shock in areas that had the requisite infrastructure for digital payments already in place. Relative to the data used by Crouzet, Gupta, and Mezzanotti (2019), Aggarwal, Kulkarni, and Ritadhi (2019) differ along two margins. First, they not only use the location information about the currency chest but also use information about the currency disbursements made by the currency chests. Second, they use proprietary zip code level data on digital payments using debit and credit cards issued by a national vendor called RuPay.

The results of Aggarwal, Kulkarni, and Ritadhi (2019) and Crouzet, Gupta, and Mezzanotti (2019), despite their somewhat different data and methods, point to a common finding. Specifically, the likelihood of demonetization having the desired positive effect on digitization and formalization of the economy depended crucially on the extent of formalization and digitization of the economy already. Put differently, areas that were informal and not very integrated with the formal financial network were unlikely to adopt digitization in response to a shock like demonetization.

**Economic Costs of Demonetization**

Demonetization clearly upended the daily life of Indians in a significant way. Starting from the immediate constraints faced by individuals and households of conducting daily transactions with a severely diminished supply of cash to the hurdles faced by informal firms trying to pay their suppliers and workers without the standard access to cash, anecdotal evidence abounds on the scale of the disruption. Indeed, newspaper accounts and industry reports at the time highlighted sharp job losses in small and medium manufacturing enterprises as well as a huge increase in the demand for jobs under one of India’s biggest rural job guarantee schemes called Mahatma Gandhi National Rural Employment Guarantee Program (MNREGA) (for example, as reported in Nair 2017; Janardhanan 2017).

Estimating the effects of demonetization is difficult because the event is still relatively recent, and as noted earlier, the time series aggregate data are not long enough to allow any credible econometric analysis of the economic consequences. But as an indicator based on current data, Figure 5 shows the path of four different interest rates in India since 2013 as well as the path of bank credit and bank deposits. The interest rates shown in the figure are the repo rate, which is the policy rate of the Reserve Bank of India; the call money rate, which is the rate at which short-term
funds are borrowed in the overnight money market; the bank lending rate; and the bank-term deposit rates. All the interest rates other than the repo rate are weighted averages.

Because banks were flush with deposits during the months immediately after the demonetization shock, one might have expected credit conditions to have become significantly easier. However, none of the interest rates showed any sharp movement off their long-run trends around the demonetization date, nor did bank credit pick up in any significant way. In fact, bank credit fell marginally on impact. This is somewhat surprising given that total bank deposits rose by almost 6 trillion rupees on impact of the shock.

The unemployment rate is another variable that one might look at for clues regarding the effects of demonetization. There are no official statistics on unemployment in India currently. However, a private data firm called the Centre for Monitoring the Indian Economy (CMIE) has started collecting high-frequency labor force data since 2016 to fill this gap. The CMIE labor force survey is a longitudinal survey that samples around 160,000 households in three waves every year. Since the surveys are conducted nationally year-round, they publish monthly, quarterly,

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**Figure 5**

**Interest Rates and Bank Credit Conditions**

A: Interest rates

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Year | Repo rate | Call money rate | Bank lending rate | Deposit rate
--- | --- | --- | --- | ---
2013 | 12% | 10% | 8% | 6%
2014 | 11% | 9% | 7% | 5%
2015 | 10% | 8% | 6% | 4%
2016 | 9% | 7% | 5% | 3%
2017 | 8% | 6% | 4% | 2%
2018 | 7% | 5% | 3% | 1%
```

B: Bank credit and deposits

```
Year | Total deposits | Bank credit
--- | --- | ---
2013 | 40,000,000 | 20,000,000
2014 | 60,000,000 | 30,000,000
2015 | 80,000,000 | 40,000,000
2016 | 100,000,000 | 50,000,000
2017 | 120,000,000 | 60,000,000
2018 | 140,000,000 | 70,000,000
2019 | 160,000,000 | 80,000,000
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Source: The data on interest rates, deposits, and bank credit comes from the Reserve Bank of India’s Database on Indian Economy.

Note: The figure shows the monthly data on different interest rates during January 2013–January 2019 and bank credit and bank deposits in India during January 2013–September 2019. The repo rate is the policy rate of the Reserve Bank of India, and the call money rate is the rate at which short-term funds are borrowed in the overnight money market. The bank lending rate is the weighted average lending rate of banks, while the deposit rate is the weighted average bank-term deposit rate. Bank credit and bank deposits are reported in millions of rupees.
The figure reveals two interesting features. First, the unemployment rate in India was declining throughout 2016. There is hardly any noticeable effect of demonetization on this declining trend. Second, the unemployment rate begins to rise steeply in India after the introduction of the Goods and Services Tax reform.

While Figure 6 might suggest that demonetization had a tepid effect on unemployment in India, Vyas (2018) presents evidence suggesting that underneath the declining unemployment rate trend though is a steep decline in the labor force that coincides with the demonetization quarter. Using the CMIE monthly and quarterly labor force statistics, Vyas documents two facts. First, relative to the three-month period immediately preceding demonetization (July–October 2016), the number of employed individuals declined by 3.5 million during the period November 2016–February 2017. Second, the CMIE survey also found a dramatic 15 million decline in the size of the labor force between these two periods. Most of this decrease in the labor force was accounted for by a fall in the number of individuals who identified themselves as unemployed. In other words, Vyas suggests that the period of
demonetization coincided with a sharp increase in the number of discouraged workers who simply exited the labor force completely.

Researchers have attempted to get around the limitations of the time series evidence by exploiting the cross-sectional heterogeneity in India. Two recent papers that take this cross-sectional approach to identifying the effects of demonetization are Chodorow-Reich et al. (2018) and Karmakar and Narayanan (2019). Both papers attempt to measure the costs of demonetization by identifying some exogenous cross-sectional variation in exposure to the shock in order to draw causal inference.

Chodorow-Reich et al. (2018) use the variation in remonetization at the currency chests around the districts of India after the demonetization notification as a source of exogenous and random variation. They then measure the cost of demonetization by regressing the cross-sectional outcome variables that vary across districts on the remonetization of the currency chests and other controls. They use a slew of different outcome variables that include “night lights” data, labor force statistics, digitization rates, and others. Based on their estimated cross-sectional responses, they estimate that demonetization induced at least a 2 percentage point decline in GDP in the quarter of demonetization relative to the counterfactual of no-demonetization. They also find that, like the results on digitization described earlier, the output costs of demonetization dissipate over the subsequent months, implying that the effects were transitory.

A potential problem with the identification in Chodorow-Reich et al. (2018) is the assumption that the remonetization at the different currency chests can be treated as exogenous. The validity of the causal inference rests crucially on this identifying assumption. While the paper presents evidence that the rate of distribution of new cash across districts seemed mostly unrelated to variations in the predemonetization levels of different variables, one might nevertheless worry that the distribution of the new cash around the different currency chests may not have been completely random. Indeed, the Reserve Bank of India’s (2017) annual report suggests that the distribution of new currency followed a prior plan. Moreover, it would be realistic to expect that the RBI responded to incoming status reports in choosing the allocations of the freshly minted currency during the 52 days between November 9 and December 31, 2016, when the currency exchange was permitted.

The work by Karmakar and Narayanan (2019) uses an alternative identification scheme. They look at a panel dataset on Indian households with information on their asset holdings as well as a host of other indicators such as income, consumption, and others. Their identification scheme is to contrast the response of households who did not have bank accounts on the date of demonetization versus those that did have them. The assumptions underlying this is twofold. First, having a bank account before the demonetization shock was clearly exogenous to demonetization. Second, the real effects of the shock would likely operate through the transactions value of cash. Because access to the new currency was much easier if one had a bank account, the two assumptions jointly imply that those with bank accounts would have smaller disruptions than those without.
The principal findings of Karmakar and Narayanan (2019) are that in December 2016 (the month immediately following the demonetization shock), the 17 percent of households that didn’t have bank accounts experienced 2 to 7 percent lower consumption than the control group of households with bank accounts, with the size of the effect varying by the initial asset levels of the household. Moreover, they also found that households without bank accounts tried to find alternative sources of borrowing from various sources at higher rates relative to households that had bank accounts.

Conclusion

The demonetization of 86 percent of the outstanding currency in circulation by the Government of India announced on November 8, 2016, was arguably one of the largest monetary shocks to ever hit the Indian economy. At the end of the exercise, over 99 percent of the demonetized currency was successfully returned by the public in exchange for either new currency bills or claims to new currency. During the transition, however, the demonetization caused almost two months of acute disruption of basic economic activity in a country heavily dependent on cash transactions.

The effect of demonetization in terms of its stated goals were limited at best. Because almost all the demonetized currency was returned to the central bank, it failed in its goal of taxing undeclared income and black (undeclared) wealth. Moreover, available estimates of the circulation of counterfeit currency at the time of demonetization suggested that it was minuscule to start with. Relative to past trends, demonetization does not appear to have had any significant effect on the tax base. There does, however, appear to have been a positive, albeit muted, permanent increase in the degree of digitization of the economy. These conclusions though should be viewed as tentative given that we only have three years of data post-demonetization.

The costs of demonetization are difficult to estimate. However, there are clues. As an example, the large increase in bank deposits during the demonetization period caused a surplus of loanable funds. However, there was almost no impact of this either on the amount of bank loans or in the average lending rate. This tends to suggest that the economic disruption induced by demonetization may have caused a deterioration in the perceived creditworthiness of the average borrower.

Existing research on estimating the costs of demonetization using disaggregated data suggests that it could have lowered output by as much as 2 percentage points during the demonetization quarter. Almost all work in this area also suggests that the costs were temporary and lasted at most two quarters. This is not a surprise because the monetary shock was temporary and the remonetization of the economy was complete in less than two quarters. Available labor market statistics suggest that up to 3.5 million jobs may have been lost during the three months following demonetization while 15 million people may have exited the labor force.

It is surprising, however, that the aggregate statistics do not reveal much effect of the demonetization shock. Perhaps the most striking is the official aggregate
GDP statistic for fiscal year 2016–2017. On January 31, 2019, India’s Central Statistical Organization released a revised GDP series, which estimates real GDP growth in the fiscal year 2016–2017 to have been 8.2 percent, the highest since 2011–2012. This implies that India’s annual GDP growth increased by 20 basis points in the year of demonetization, relative to the previous year. It is possible that growth in the nondemonetization quarters, particularly the period April–September 2016, saw very rapid economic growth that was partially undone by the negative effects of demonetization during the rest of the year. On the face of it, however, the dissonance between the available cost estimates of demonetization from the disaggregated studies and the estimated increase in aggregate GDP growth from the official statistics for that year represents a puzzle which requires a closer examination.

Demonetization probably had some ancillary effects as well. For example, fighting elections in India requires cash, and there was a major election in the most populous Indian state, Uttar Pradesh, scheduled for February 2017. Demonetization almost surely would have affected the parties that were fighting the Uttar Pradesh election, though the extent of it would likely vary across national parties and regional parties. Little research exists on the political economy dimension of demonetization, and it would certainly be a worthwhile area of future research.

Another issue of importance is the distributional impact of demonetization. Demonetization was packaged as a measure against relatively wealthy individuals who had accumulated undeclared wealth. However, anecdotal accounts suggest that it may instead have disproportionately affected the relatively poorer households working in the informal sector. As more disaggregated household survey data become available over the next few years, this would be another interesting issue to study.

More generally, the Indian experience suggests that demonetization is likely to have a better chance of achieving the goals of fighting crime and tax evasion if larger denomination bills are demonetized. In India, the 500-rupee bills were heavily used for daily transactions. Arguably, the disruptive effects of demonetization would have been more limited if the government had demonetized just the 1,000-rupee bills. Governments contemplating such moves in the future may be better advised to demonetize large denominational bills rather than those that are heavily used for daily transactions.

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8 Intriguingly, the older data prior to the data revision showed a 1.1 percentage point reduction in the annual growth rate in 2016–2017 relative to the previous fiscal year, which was more in line with the disaggregated data. A description of the revision is reported in Times of India (2019).
References

Aggarwal, Bhavya, Nirupama Kulkarni, and S. K. Ritadhi. 2019. “Cash Supply Shock and Formalization: Evidence from India’s Demonetization Episode.” https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3418430.

Center for Monitoring the Indian Economy. 2019. “Unemployment Rate.” Center for Monitoring the Indian Economy. https://www.cmie.com/.

Chauhan, Neeraj. 2016. “Fake Notes Worth Rs 400 Crores in Circulation.” Times of India, May 11. https://timesofindia.indiatimes.com/india/Fake-notes-worth-Rs-400-crores-in-circulation/articleshow/52214965.cms.

Chodorow-Reich, Gabriel, Gita Gopinath, Prachi Mishra, and Abhinav Narayanan. 2018. “Cash and the Economy: Evidence from India’s Demonetization.” NBER Working Paper 25370.

Comptroller and Auditor General of India. 2019. Compliance Audit of Union Government. New Delhi: Comptroller and Auditor General of India.

Credit Suisse. 2014. Global Wealth Databook 2014. Zürich: Credit Suisse.

Crouzet, Nicolas, Apoorv Gupta, and Filippo Mezzanotti. 2019. “Shocks and Technology Adoption: Evidence from Electronic Payment Systems.” https://www.kellogg.northwestern.edu/faculty/crouzet/html/papers/TechAdoption_latest.pdf.

Government of India. 2019. “Income Tax Department Time Series Data Nancial Year 2000–01 to 2018–19.” Government of India’s Income Tax Department. https://dbie.rbi.org.in/DBIE/dbie.rbi?site=home.

Hindu Business Line. 2018. “Demonetization Was ‘Not a Good Idea’: Rajan.” Hindu Business Line, April 12. https://www.thehindubusinessline.com/economy/implementation-of-gst-not-unfixable-problem-rahguram-rajan/article23510689.ece.

Janardhanan, Arun. 2017. “Manufacturing Sector Suffers from Considerable Job Loss Post Note Ban.” Indian Express, January 17. https://indianexpress.com/article/business/economy/demonetisation-manufacturing-sector-suffers-from-considerable-job-loss-post-note-ban-4477687/.

Karmakar, Sudipto, and Abhinav Narayanan. 2019. “Do Households Care about Cash? Exploring the Heterogeneous Effects of India’s Demonetization.” Research in Economics and Mathematics (REM) Working Paper 073-2019.

Nair, Shalini. 2017. “As Rural Hands Return, NREGA Demand Spikes over 60 per Cent.” Indian Express, January 9. https://indianexpress.com/article/india/as-rural-hands-return-nrega-demand-spikes-over-60-per-cent-4465577/.

Patel, I. G. 2002. Glimpses of Indian Economic Policy: An Insider’s View. Oxford: Oxford University Press.

Reserve Bank of India. 1970. History of the Reserve Bank of India (1935–51). Vol. 1. Bombay: Reserve Bank of India.

Reserve Bank of India. 2016. “Minutes of Five Hundred and Sixty First Meeting of the Central Board of Directors of the Reserve Bank of India.” December 2016. http://www.humanrightsinitiative.org/download/DeMon%201stattachment.pdf.

Reserve Bank of India. 2017. Reserve Bank of India Annual Report 2016–17. Mumbai: Reserve Bank of India.

Reserve Bank of India. 2019. “Database on Indian Economy.” 2019. RBI’s Database on Indian Economy. https://dbie.rbi.org.in/DBIE/dbie.rbi?site=home.

Rogoff, Kenneth S. 2016. The Curse of Cash. Princeton: Princeton University Press.

Rogoff, Kenneth. 2017. “Dealing with Monetary Paralysis at the Zero Bound.” Journal of Economic Perspectives 31 (3): 47–66.

Schneider, Friedrich, Andreas Buehn, and Claudio E. Montenegro. 2010. “Shadow Economies All over the World: New Estimates for 162 Countries from 1999 to 2007.” Policy Research Working Paper 5356.

Times of India. 2019. “Revised GDP Data Shows Year of Demonetisation Was Best for Narendra Modi Government.” February 1. https://timesofindia.indiatimes.com/business/india-business/revised-gdp-data-shows-year-of-demonetisation-was-best-for-narendra-modi-government/articleshow/67782001.cms.

Vyas, Mahesh. 2018. “Using Fast Frequency Household Survey Data to Estimate the Impact of Demonetisation on Employment.” Review of Market Integration 10 (3): 159–83.