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Demonetization and Digitalization: The Indian government's hidden agenda

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Demonetization; **Digitalization**; Financial inclusion; Cashless; Mobile banking; Policy implications; India.

ABSTRACT:

The Indian demonetizations of November 2016 came at an entirely new scale to those of January 1946 and January 1978. This time **around**, the Narendra Modi government's **measures** applied to 86.4% of the banknotes and coins in circulation, the equivalent to 11% of GDP. **Much analysis has been undertaken** on the demonetization. **This has largely been** critical because of its disastrous consequences on local populations **and** the most deprived **among them**. Our paper adopts a **different angle**: it argues that demonetization has had a **key** impact on the digitalization of payments. **We use** data from the Reserve Bank of India from 2014 to 2020 to show that **the** demonetization period **brought about a** decline in Automatic Teller Machines (ATM) withdrawals. **It equally boosted the** adoption of digital means of payments, via Point of Sale Terminals (POS) and mobile banking. Since October 2016, the number of POS transactions **has risen** almost threefold, **while the number of** ATM transactions **has decreased** by almost one-fifth. **The current** government's rhetoric is to promote digitalization as a means of both formalizing the economy and protecting the poor. **Its claim** is unfortunately **highly** debatable.

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1. INTRODUCTION

On 8 November 2016, Indian Prime Minister Narendra Modi announced the impending, almost immediate demonetization of all 500- and 1,000-rupee banknotes (equivalent to 6.85 and 13.7 euros)¹ and the introduction of a new series of 500 and 2,000-rupee banknotes. The country's 1.3 billion population, a quarter of which is illiterate, would have until December 30 (**less than** two months) to exchange those notes at a bank or post office branch. India had already experienced the demonetization of some of its outstanding banknotes, but never on this scale. The demonetization of 2016 applied to more than 80% of **the banknotes** in circulation.

In January 1946, the British Raj (the British colonial regime) instructed the Indian Central Bank (RBI) to withdraw the 1,000, 5,000 and 10,000 rupee-banknotes in circulation at the time. The objective was to fight counterfeiters. Notwithstanding false rumors as to the withdrawal of the far more widely used 100-rupee banknotes, this demonetization had little impact on the general population because it rarely used such high denominations. A few years later, Chintaman Dwarkanath Deshmukh, Governor of the RBI from 1943 to 1949, argued that it was more a matter of a conversion than a demonetization (RBI, 1970, p. 709).

The 1,000, 5,000 and 10,000-rupee denominations were reintroduced in 1954 and caused regular controversy in the fight against counterfeit money. The Wanchoo Committee, a working group on direct taxes, regularly called for the demonetization of large, easily falsifiable denominations. This committee would only **make itself** heard with the rise to power of Moraji Desai in 1977 who, with the Janata Party², ousted the Indian Union Congress for the first time in its history. On 16 January 1978, going against the advice of the Governor of the RBI, the Prime Minister I.G. Patel announced the demonetization of the 1,000, 5,000- and 10,000-rupee notes. The population then only had three days to exchange these denominations. Although there were queues outside the RBI offices, the January 1978 demonetization had no lasting effect on the money supply, price developments or personal savings (RBI, 2005, p. 450). The demonetization only affected a small proportion of the money supply: only 1.7% of all banknotes in circulation, an estimated equivalent to 0.1% of the country's GDP.

In November 2016, the Narendra Modi **government's measures** applied to 86.4% of banknotes and coins in circulation, the equivalent to 11% of GDP. India is one of the most cash-dependent countries in the world. 98% of **consumers' payment** (68% in value) are **made** in cash (PricewaterhouseCoopers, 2015). By way of comparison, cash accounts for only 55% of total **consumers' payment** (14% in value) in the United States and 78% in Europe (54% in value) (Henk & Hernandez, 2017).

Demonetization has given rise to **much analysis, which has largely been** critical because of its disastrous consequences on local populations, **and** especially the most deprived **among them**. Our paper adopts a different angle: it argues that demonetization had a central impact on the digitalization of payments. **We** will first discuss the origins of the events and the government's grounds for action. Secondly, drawing on RBI data, we will analyze the nationwide evolution of monetary and financial practices, with a particular focus on electronic payments via Automatic Teller Machines (ATM), digital payments via Point of Sale Terminals (POS), and mobile banking. Electronic transactions, which are only an

¹ Exchange rate as of 8 November 2016.

² The Janata Party was a grouping of political parties opposed to the state of emergency declared across India between 1975 and 1977.

intermediary step towards dematerialization, are stagnating or even regressing. But for digital transactions, November 2016 was a turning point for their widespread adoption. As is well-known, economic policies sometimes conceal political agendas. They are also liable to have various unexpected and unpredictable effects, whether positive or negative. For our purposes, while demonetization was initially presented as a measure to eradicate the illegal economy, it has above all contributed to accelerate digital finance. In concluding, we will question the meaning and consequences of this digitalization.

2. TACKLING THE ILLEGAL AND INFORMAL ECONOMY, OR PROMOTING DIGITAL PAYMENTS?

When the Indian Prime Minister unexpectedly announced the demonetization of the two denominations, the country's political authorities claimed that the instant invalidation of the two largest banknotes in circulation in the country should help tackle counterfeit banknotes, terrorism financing, corruption, and the illegal economy. By curtailing black money, expanding the fiscal space and promoting a cashless economy, this policy was intended to help promote the formalization of the economy, which in turn was supposed to benefit the poor.

But, as laudable as the Prime Minister's motivation may have sounded, the justifications for the demonetization immediately raised doubts. Many public figures criticized his decision, including Amartya Sen, laureate of the 1998 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, Kaushik Basu, Vice President and Chief Economist at the World Bank until October 2016, and Raghuram Rajan, the former governor of the RBI. All criticized the Indian government for its hastiness and poor preparation (Usmani, 2016).

The claim that counterfeit banknotes help fund terrorism via foreign countries seemed to stem more from political concerns than economic analysis (Chandrasekhar & Ghosh, 2017). The circulation of counterfeit money in India is similar to that of most countries. In 2016, the National Investigation Agency and the Indian Statistical Institute estimated that counterfeit money represented a face value of 400 crores³, i.e. only 0.022% of the money in circulation (Ghosh, Chandrasekhar & Patnaik, 2017).

Demonetization was also intended to hit back at undeclared, and as such tax-exempt, income (be it from informal commercial activities, or corruption and the crime economy). But the RBI's own data shows that 99.3% of demonetized banknotes were returned via bank or postal agencies (RBI, 2018). This suggests that most banknotes were laundered (including 'dirty money') via intermediaries (Ghosh, 2018), when the amount to be converted exceeded the authorized limit. The government's argument therefore does not hold water. Undisclosed income was not connected to criminal activities, particularly when held as cash. Economic livelihoods are largely socially regulated (Harriss-White, 2003, 2017). This means that funds from the informal activities of the most vulnerable households do not constitute a stockpile, but a rapidly spent flow. Depending on the methodology used, the estimated scale of India's informal economy ranges from 50% (Charmes, 2012) to as much as 72% of GDP (Government of India, 2019). So how could we think that demonetization would solve both the problems of informality and illegality? A significant part of illegal activities and corruption in India is concentrated in precious metals, and therefore could not be affected by demonetization (Bhandari, 2016). Most income from criminal activities is as such invested by purchasing gold or property (Reimers, Schneider & Seitz, 2020; Weinstein, 2008). Also

³ One crore amounts to 10 million rupees and one lakh amounts to 100,000 rupees.

noteworthy is the purchase of jewelry and foreign currencies, or *benami* accounts (using a bank account under someone else's name) (Midthanpally, 2017).

Some economists **have called** for the eradication of high denominations (Europe, for example, has stopped issuing 500-euro banknotes, **although their use is still legal**) because high face-value notes make it easier to engage in illegal trade or to make informal transactions. But the 500- and 1,000-rupee notes were not comparably high denominations to those 500-euro notes, or even to the 1,000-rupee notes demonetized in 1978. Moreover, the move to introduce a new 2,000-rupee note made no sense in the light of this argument.

In the face of such inconsistencies, which were certainly known to the government, one wonders what the real agenda for demonetization was. Political analysts suggest that the agenda was primarily political. Ahead of elections in spring 2017, **this agenda** aimed at **preventing** other political parties from handing out banknotes, or goods purchased from cash funds, to buy their electors' votes as usual (Martin & Picherit, 2020). Ruling party officials may have been let in on the secret in good time, allowing them to exchange and sell on these banknotes through intermediaries.

Another analysis, which is not incompatible, is that digitalizing payments **aimed to bring** economic activities **further** into the formal sector, **to boost tax** collection. Was **this** premeditated, or designed to compensate for the considerable damage caused by the shock and to rationalize a measure that turned out to be a social disaster? **There is no way of knowing**.

An analysis of keywords from the Prime Minister's various speeches from 8 to 27 November 2016 shows a semantic shift (Shaikh & Deshpande, 2017). In his first speech (PMO, 2016), Modi made no arguments **about digital payments**, highlighting the fight against dirty money and counterfeit money. Over **the following** three weeks and **in** seven public speeches, Modi increasingly focused on digital payments and the dawn of a cashless economy. **On 25 December 2016**, the **twenty-seventh** episode of the radio campaign Narendra Modi **had launched clarified his central demonetization** agenda: to "promote an economy without cash" **with the expectation to** "formalize the economy", about half of which escaped any form of taxation. In Modi's words, the digitalization of payments **would primarily** benefit the poor because it **would** "stop the exploitation" of workers (Modi, 2016). Modi also thanked the population **on air** for their efforts – **in** late December, the liquidity shortage **was still** partially paralyzing the economy, with the poor obviously the most affected. **He** encouraged **people and, as a priority, the poor and small businesses, to keep up** their efforts by digitizing their payments. They **were** promised "thousands of gifts". **Every** digital payment **would** entitle them to a lottery ticket and in the next 100 days, and the generous sum of Rs. 1,000 (14 euros) **would** be distributed to 1.5 million lucky winners. Small **businesses** digitizing their payments **would be** exempted from tax **over** a **set** period, given that none currently **paid** tax.

It was assumed that the goal of formalizing the economy **would** require digitalizing payments, **which was set** at the top of the demonetization agenda. After the 8 November 2016 announcement, people soon faced cash shortages and were urged to use electronic and digital payment methods **in** their everyday monetary transactions, especially in urban and metropolitan areas (Chodorow-Reich et al., 2020; Joshi, Gupta & Rangaswamy, 2019). Four years **on, the** empirical evidence shows that his objective has been partially achieved.

3. ELECTRONIC AND DIGITAL PAYMENTS

3.1 What do we know?

We are not the first to have studied the effects of demonetization. The table below offers an exhaustive list of the studies carried out to date, specifying the methodology, the period, the type of data, the location, and the main results (Table 1). Most of these studies draw on secondary data such as RBI data, consumer data, agricultural markets data, and so on. Some papers use quantitative and/or qualitative primary data, and others offer theoretical reflections. Our corpus mostly consists of papers on the demonetization per se, but also includes further analyses of the digitalization of finance.

By and large, the available evidence highlights various sorts of negative consequences. On the macroeconomic level there is lowered growth. This translates into a decline in employment, income, remittances, and an increase in prices. A sharp rise in digital transactions results in overspending, and reduced agricultural trade. The negative effects seem to be stronger for the informal sector, the poor, the lowest castes, and women. As an ethnographic study by Sam and Chakraborty (2019) of women informal workers in North India has shown, the transition to non-cash forms of payments drove women who had been used to engaging with the banking system back into the household domain. A study from rural Tamil Nadu shows that the informal economy was only able to adapt by increasing informal debt and credit transactions (contrary to intentions). This entailed drawing on social networks, to which people do not have equal access. The capacity to manage cash shortages was therefore very uneven, reinforcing social inequalities of gender, class and caste (Guérin et al., 2017). Ethnographic observations also report cases of women having to reveal their secret financial assets, compromising their financial independence (Ghosh, 2018). The only players to have apparently benefited from demonetization are the banks, with recorded increases in their returns on assets, and fintech companies. The founder of PayTM (Pay Through Mobile) himself acknowledged that he is “one of the biggest beneficiaries of India's demonetization” (Thomas, 2018). The risks of new forms of wealth extraction and governmentality through digital finance are therefore apparent. After demonetization, several studies have explored the various uses of and resistance to digital finance (from individuals and companies). These look to vary along the lines of gender and other forms of social differentiation.

This paper looks to add to this body of knowledge by measuring, four years after demonetization, the extent and intensity of some of these electronic and digital financial services.

Table 1. Listed survey of papers on the Indian demonetization

Reference	Results	Methodology	Data
Analysis on demonetization – Micro perspective			
Agarwal et al. (2019)	Consumers who used to rely on cash for supermarket spending were forced to switch to digital payments and significantly increased spending. Authors warns about overspending.	Estimation of the elasticity of spending with respect to digital payments usage.	Pre- and post-demonetization (April 2016 to September 2017). Indian level. Secondary data: Customer receipt-level transaction data from a supermarket chain (171 stores).
Ghosh (2018)	Demonetization negatively impacted the earnings of those employed in the	Ethnographic approach.	Pre- and post-demonetization.

	<p>informal sector.</p> <p>Women had to suddenly reveal their secret financial assets, compromising their financial independence.</p> <p>Forced adoption of digital payment affected balance of income and expenditure streams.</p>		<p>Kampala; New-Delhi, Bengaluru.</p> <p>Primary data: 116 interviews with 30 preliminary interviews and 86 follow-up interviews; 15 respondents over a three-month period.</p>
Guérin et al. (2017)	<p>The rural economy was adversely affected in terms of employment, daily financial practices, and social networks for over three months.</p> <p>Demonetization has further marginalized those without support networks.</p>	<p>Ground-breaking and first-hand quantitative and qualitative survey data collected just before and after demonetization shock.</p>	<p>Pre- and post-demonetization.</p> <p>Rural Tamil Nadu.</p> <p>Primary data: Pre-demonetization sample of 1,967 people; Post demonetization sample of 683 people.</p>
Joshi, Gupta & Rangaswamy (2019)	<p>Financial inclusion constitutes a lived process in a blend of habits, practices, and challenges in order to expand socio-economic capabilities.</p> <p>Business contexts influence the adoption of PayTM use.</p>	<p>Ethnographic investigation on street vendors in urban India, to capture the daily practices of digital money.</p>	<p>Post-demonetization.</p> <p>Delhi and Hyderabad.</p> <p>Primary data: 25 semi-structured interviews in five markets.</p>
Karmakar & Narayanan (2019)	<p>During the demonetization period, households with no bank accounts saw a significant decrease in income and expenditure.</p> <p>Recovery appears to be quick, but households smooth their consumption by borrowing from informal sources.</p>	<p>Impact assessment on households with no bank accounts relative to households with bank accounts.</p>	<p>Pre- and post-demonetization (January 2015 to November 2017).</p> <p>Indian level.</p> <p>Secondary data: consumer pyramids data on 100,000 households.</p>
Krishnan & Siegel (2017)	<p>In November, the average drop in income was about 10% of a typical monthly income.</p>	<p>Impact assessment.</p>	<p>Post-demonetization.</p> <p>Mumbai.</p> <p>Primary data: Survey includes 214 families living in 28 slums.</p>
Kurosaki (2019)	<p>Few firms shifted from cash-only transactions to bank-based transactions.</p> <p>The transition occurred only rarely, some of which returned to cash-only transactions after demonetization.</p>	<p>Bivariate differences. Multiple regression models.</p>	<p>Pre- and post-demonetization (November 2014 to August 2017).</p> <p>North-eastern areas of Delhi.</p> <p>Primary data: Survey of 287 micro and small businesses in manufacturing and services (109 registered; 178 unregistered).</p>
Pal et al. (2018)	<p>Materiality played an important role in how digital technologies were adopted and used.</p> <p>Once new banknotes became available, survey indicates a decrease in the use of digital payments.</p>	<p>Impact assessment.</p>	<p>Post-demonetization.</p> <p>Bengaluru, Mumbai.</p> <p>Primary data: Survey of 200 urban shopkeepers; 38 in-depth semi-structured interviews.</p>
Sam & Chakraborty (2019)	<p>Daily practices observations indicate a low level of knowledge of credit cards.</p> <p>Knowledge of e-wallets, mobile banking, etc. is non-existent.</p> <p>As access to money is shaped by gender roles, shifting to non-cash forms of money has not necessarily brought about effective access.</p>	<p>Essay comparing how the Indian government conceptualizes digital money and women's daily practices in North India.</p> <p>Understanding how digitized money is used by women.</p>	<p>Post-demonetization.</p> <p>Kanpur.</p> <p>Primary data: Two sets of women workers employed in a township were interviewed: 10 sanitation workers; 5 domestic workers.</p>
Vashistha, Anderson & Mare (2019)	<p>Referral rewards and sign-up incentives encourage customers to start using mobile payments.</p> <p>Customers were less likely to use these new payment methods.</p> <p>Merchants consider mobile payments as an unnecessary burden for their business.</p>	<p>Impact assessment.</p> <p>Different techniques were used for interviews: index cards, wallet-opening exercises, financial biographies, and workshops.</p>	<p>Post-demonetization.</p> <p>States of Maharashtra and Rajasthan.</p> <p>Primary data: 19 interviews with customers and 15 with merchants across rural, peri-urban, and urban areas.</p>
Zhu et al. (2018)	<p>Household income fell by about USD 20.6 over the two months post demonetization.</p> <p>Households with female heads and higher levels of unemployment were hit harder.</p>	<p>Estimation of the short-term effects of India's demonetization on the rural poor.</p>	<p>Pre- and post-demonetization.</p> <p>Four villages in the Sundarbans region of West Bengal.</p> <p>Primary data: Weekly financial diaries from 90 households.</p>

Analysis on demonetization – Macro and sectorial perspective

Aggarwal & Narayanan (2017)	In the short run, demonetization reduced domestic agricultural trade in the regulated market by over 15%. 90 days after demonetization, this figure settled at 7%.	Impact assessment. Difference in difference techniques used to assess the impact of demonetization on domestic trade in agricultural commodities.	Post-demonetization (April 2017). Indian level. Secondary data: arrivals and prices on 35 major agricultural commodities across all regulated market (<i>mandi</i>) (3,000 markets).
Almaqtari et al. (2019)	Significant impact on Return On Assets (ROA) No significant impact on Returns On Equity (ROE).	Ordinary Least Squares model.	Pre- and post-demonetization. Indian level. Secondary data: RBI data on 69 commercial Indian banks.
Chodorow-Reich et al. (2020)	Contraction in aggregate employment. Reduced cash slowed the growth rate of economic activity by at least 2 p.p. during the demonetization quarter. Neutrality of money hypothesis rejected.	Model of demonetization in which agents hold cash both to satisfy a cash-in-advance constraints and for tax evasion purposes.	Pre- and post-demonetization period. District level. Secondary data. Geographic distribution of new notes; night light activity; employment surveys; Debit, credit cards and e-wallet transactions data; Banking data on deposit and credit growth.
Dasgupta (2016)	Macroeconomic variables ought to be badly impacted (predictions on food prices, increased value of imports, etc.). Article shows how the interaction of the monetary (money market equilibrium) and non-monetary (good market equilibrium) variables of the economy is potentially negatively affected by the random effect of demonetization.	Predictive macroeconomic model.	Post-demonetization. Indian level. Secondary data: RBI.
Dash et al. (2017)	Increase in saving flows into equity/debt oriented mutual funds and life insurance policies.	Narrative of the financialization of savings and insurance.	Post-demonetization. Indian level. Secondary data: RBI; Insurance Regulatory and Development Authority of India; Securities and Exchange Board of India
Ghosh (2017)	Demonetization is likely to bring about cumulative decline in output levels in both the organized and unorganized sectors. The poorer segments of the population are most affected by demonetization.	Theoretical approach. Author develops a macro-theoretical model to examine the impact of demonetization.	Post-demonetization. Indian level. No data: Theoretical approach.
Dharmapala & Khanna (2019)	Substantial positive returns for banks and for State Owned Enterprises (SOEs). Little evidence that sectors thought to be associated with greater tax evasion or corruption experienced significantly different returns.	Simple model of tax evasion in the real estate sector.	Pre- and post-demonetization. Indian level. Secondary data: Indian daily stock price trading data.
Lahiri (2020)	No impact on the number of tax filers or tax revenues. Digitized payments continued to grow on the same nonlinear trend. Demonetization reduced employment, especially in the informal sector.	Narrative of the costs of demonetization for the Indian economy.	Pre- and post-demonetization. Indian level. Secondary data: RBI.
Mohan & Ray (2019)	Currency as a proportion of broad money (M3) took 15 months to return to its previous level. Demonetization resulted in a huge excess of liquidity.	Narrative of Indian monetary policy.	Mid-2008 to March 2018. Indian level. Secondary data: Currency and deposits (as % of M3).
Mukhopadhyay (2019)	Results show a net optimistic outlook for the pre-demonetization period. Post-demonetization led to a pessimistic outlook. Future is marked by higher uncertainty.	Logistic regression.	Pre- and post-demonetization (March 2015 to May 2018). Delhi, Hyderabad, Kolkata, Chennai, Bengaluru and Mumbai. Secondary data: RBI's consumer confidence survey.
Singh, Sawhney & Kahlon (2018)	At the outset of demonetization, there was popular support for the government's decision. When banknotes became unavailable,	Sentiment analysis on social media.	Post-demonetization. Indian level. State-wide analysis. Secondary data: 48,926 tweets in the

	sentiments turned negative. Once banknote availability improved, sentiments became more positive again.		first phase (November 8 to 15, 2016); 11,294 tweets were collected in the second phase (November 17 to 23, 2016).
Upadhyay & Suvarna (2018)	No significant impact of demonetization on stock prices (BSE and on the S&P BSE SENSEX index) Effect of demonetization was measurable for a short duration, but the market slowly recovered to normalcy.	Event study testing to assess whether the stock performance was statistically different from what is expected, which will be abnormal returns.	Pre- and post-demonetization. Indian level. Secondary data: 373 observations from the stock returns and the S&P BSE SENSEX index.
Vyas (2018)	Labor participation rates fell by about 3% after demonetization. Employment over the 2 months following demonetization was about 12 million lower than during the 2 months preceding demonetization. Over a 4-month period, the impact of demonetization decreased to a loss of about 3 million jobs.	Estimation of a fast frequency measure of unemployment.	Pre- and post-demonetization. Indian level. Secondary data: Consumer Pyramids Household Survey (CPHS) with data on 6,146 households.
Analysis and reflection on digital finance and financialization in relation to demonetization			
Athique (2019)	Transferring the monetary system's risks and costs onto citizens is an unprecedented shift in the contract between citizens and the state.	Narrative of the demonetization and the international cashless agenda.	Pre- and post-demonetization. Indian level. Secondary data: international media commentary; impact assessments by Indian scholars; declaration of the Government of India.
Chandrasekhar & Ghosh (2017)	Digital transactions can be a mean for finance to extract rentier incomes out of relatively poor populations.	Narrative of the Indian experience on reducing cash usage and the phenomenon of financialization of finance.	Pre- and post-demonetization period. Indian level. Secondary data: RBI data on digital payments.
Jain & Gabor (2020)	Authors introduce the concept of digital financialization, which helps to bridge the gap between the literature on state financialization, and on the digital turn in financial inclusion.	Conceptual approach.	Post-demonetization. Indian level. No data: conceptual approach.

Source: authors

3.2. Methodology

We draw on secondary data from May 2014 to March 2020. Data on payments systems are from RBI's monthly reports on bank wise ATM, POS and card statistics (RBI, various date-a) and bank wise volumes in mobile transactions (RBI, various date-b)⁴. Data on financial inclusion come from two sources, the RBI's annual report on Basic statistical returns of scheduled commercial banks in India (RBI, 2017) and from the Global Findex data (Demirgüç-Kunt et al., 2018). Data on telephone-density indicators come from the Telecom Regulatory Authority of India (TRAI, 2020). These data have allowed us to trace the evolution of electronic transactions via ATMs, and some of the digital transactions via POSs and the mobile phone tools.

To date, there is no standard definition of digital finance. The World Bank defines Digital Financial Services (DFS) as “financial services which rely on digital technologies for their delivery and use by consumers” (Pazarbasioglu et al., 2020, p. 1). While the potential benefits of digital finance for access to financial services have been widely documented, this concept remains very broad. In India, a large number of reforms have been successively implemented

⁴ These RBI data were collected at five points in time: end-December 2018, end-March 2019, end-December 2019, end-January 2020, and mid-July 2020. They were collected from the RBI website at different points in time to allow sufficient time for them to be complete; these data are made public after a time lag and are revised over time.

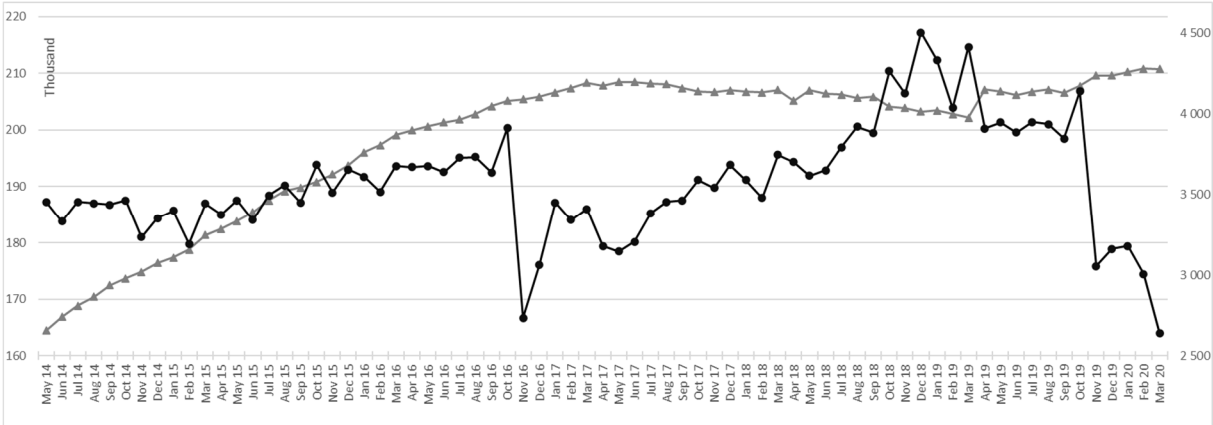
since the 1980s. Developments in the Indian payment system cover both consumer-initiated and government payments, and integrate various delivery channels⁵. Following Lahiri (2020), we define electronic transactions as **those** involving card transactions at ATMs. Other transactions such as **card and mobile phone** payments are classified as digital.

3.3. ATM

Despite a **highly** significant expansion of its ATM coverage, India still lags far behind other countries such as China. According to the sixth Financial Access Survey of the International Monetary Fund (IMF, 2017), while the number of ATMs per 100,000 inhabitants in China increased from 9.6 to 81.4 from 2006 to 2016 (8.5 times higher), over the same period, India saw a growth of 2.7 to 21.2 (7.7 times higher). This discrepancy in coverage is notably due to a strong cooperative network **across** India’s network (Burgess & Pande, 2005) that makes little use of ATMs. India has the fewest ATMs per 100,000 people out of all the BRICS countries (IMF, 2017; Menon, 2019).

It is surprising, however, to observe a stagnation or even a slight decline in the stock of ATMs during the post-demonetization period in India (Figure 1). While there are differing reasons for the downturn, the rural areas home to 68% of the Indian population once more appear to have been forgotten by the government **in** its decision. In December 2016, rural areas (defined by the RBI as towns or villages with fewer than 10,000 inhabitants) only had 17% coverage, as opposed to 27% for semi-urban areas (10,000 to 100,000 inhabitants) and 56% for urban and metropolitan areas (RBI, 2017).

Figure 1. Intensity of ATM transactions (May 2014-March 2020)



Left Y-axis: The total number of ATMs (in thousand) (grey curve).
 Right Y-axis: Intensity (**average number of transactions per ATMs**) (black curve).
 Sources: Calculated from RBI (various dates-a)

The **ATM** stagnation contrasts with the **Indian population’s widening** access to bank accounts, **following the Indian government’s promotion of** successive financial inclusion

⁵ To consult a chronology of the main programs implemented by the RBI in the Indian payment systems, see the work done by Chaudhari, Dhal & Adki (2019).

policies⁶. According to Global Findex data, the percentage of the adult population with an account in a formal financial institution increased from 35 percent to 80 percent from 2011 to 2018 (Demirgüç-Kunt et al., 2018). RBI data from March 2010 to September 2016 shows that the number of deposit accounts rose from 810.1 to 1,911.3 million (RBI, 2017)⁷. But the fact of people owning accounts says nothing about their use (Fouillet & Morvant-Roux 2018). Here, several studies show that a very large number of accounts are either dormant, or used only to channel social benefits (Goedecke et al., 2018; Jos et al., 2011; Lyer, 2015). This may explain why people do not need ATMs, but the reverse causality is equally valid: it is likely that the absence of ATMs discourages the use of accounts.

In early November 2016, not only were there insufficient ATMs to support the influx of users who had to withdraw the new denominations, but many ATMs quickly broke down. ATMs had to be upgraded to distribute the new denominations. Although the cash machines were well-built to issue different sizes of denomination, they did require technical upgrades for the new denominations. While only minor adjustments were needed, this largely explains the drop in transactions; there were undoubtedly insufficient technicians at the time of the operation. From October to November 2016, ATM transactions fell by 43%, from 803 to 562 million. The intensity of transactions in ATMs, represented by the number of transactions divided by the number of AMTs, fell from 3,913 to 2,735 from October to November 2016 (Figure 1). Although around 85% of the network had been upgraded by early December 2016, repeated malfunctions at ATMs resulted in a long-lasting drop in use of this means of withdrawal. As of August 2018, the total and average number of transactions in ATMs had returned to their October 2016 level⁸.

3.4. POS

The stagnating ATM stocks - whether deliberate or not – were in stark contrast to the sharply increased digital transactions. Faced with a liquidity shortage, people were urged to pay and transfer funds electronically. Two types of data are useful to look at. The first is the transaction intensity per POS (Point of Sale Terminal): Figure 2 very clearly shows a peak at the time of demonetization. The number of transactions per terminal doubles and then returns to its pre-demonetization level. But another piece of data is also useful: the number of merchants setting themselves up with terminals. From November 2016 to March 2017, POS numbers rose by 63%. Over this period, almost 940,000 POS machines were purchased and put into service (Figure 2). The pre-demonetization period saw around 200 million monthly POS transactions, while a peak of 531.5 million was reached in December 2016. While this

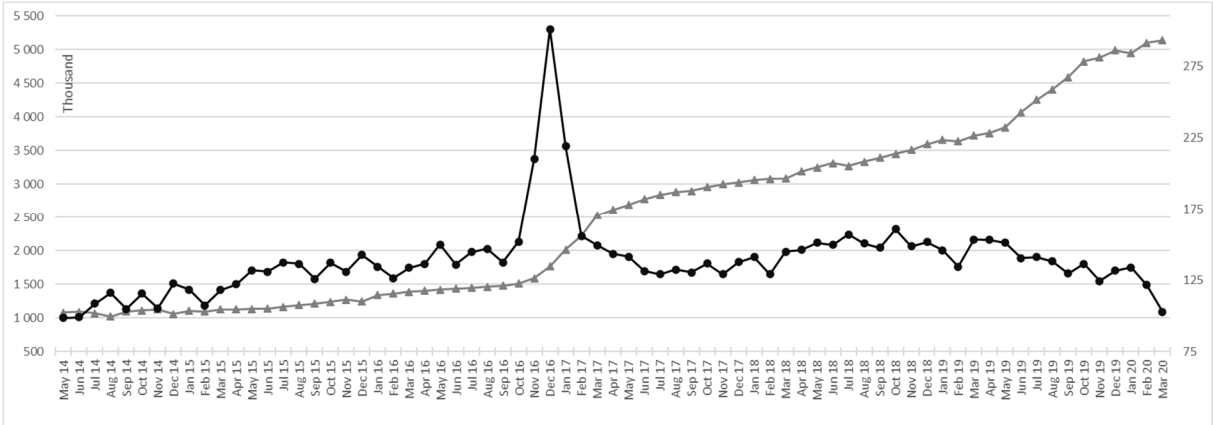
⁶ The requirement to have an account in order to be eligible for various social programs has probably been the most effective measure in increasing bank accounts (Fouillet & Morvant, 2018).

⁷ While one of the priorities of these programs was to open bank accounts for the most vulnerable, several studies point out that they only reinforced pre-existing economic and social inequalities. Majumdar & Gupta (2013), based on a survey of 20,752 households in Hooghly District, West Bengal State, conclude that the most excluded categories in terms of religion, caste, education and income were the same as those without access to these financial inclusion programs.

⁸ The total and average number of transactions in ATMs increased until 860 million and 4,139 respectively in October 2019 to fell once again probably due to the fact all Indian banks had to replace all magnetic chip-based debit cards with EMV (Europay, Mastercard and Visa) and PIN-based cards by 31st December 2019. According to the last data provided by the RBI, the total number of transactions via ATM was 300 million and the intensity of transactions in ATMs was 1,428 in April 2020, showing the impact of the Covid-19 epidemic.

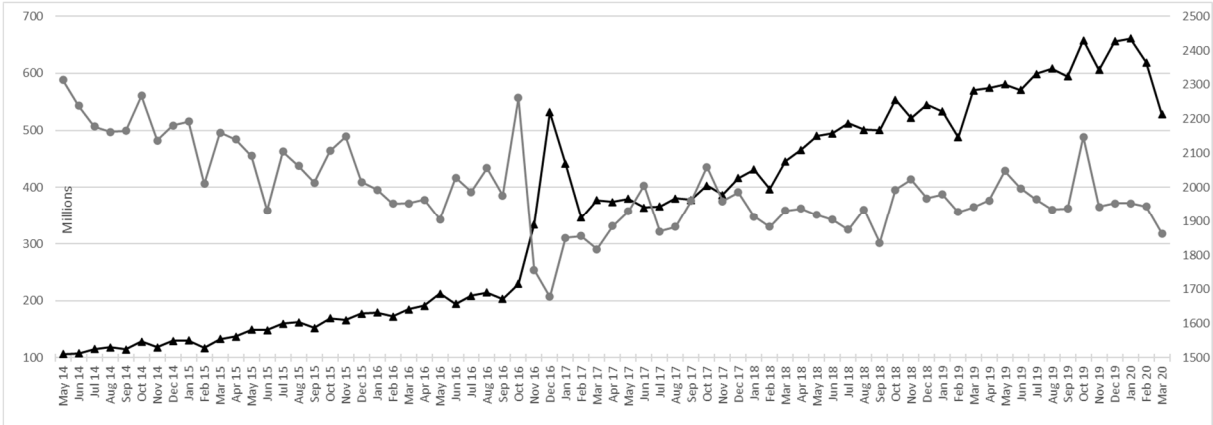
feverish intensity did not last, usage of **this means of** payment remained much higher than before and its growth continues to accelerate (Figure 3). In January 2020, just before the beginning of the Covid-19 epidemic, the monthly number of transactions **across POSs rose to** 661 million, a figure very close to that of transactions via ATM with 668 million. Just before the demonetization, the gap between the use of ATMs and POSs was huge. In October 2016, the monthly number of transactions via POSs was 229 million compared to 803 million for ATMs.

Figure 2. Intensity of POS transactions (May 2014-March 2020)



Left Y-axis: The total number of POSs (in thousand) (grey curve).
 Right Y-axis: **Intensity (average number of transactions per POS)** (black curve).
 Sources: Calculated from RBI (various dates-a)

Figure 3. Total number of POS transactions and average amount by POS transaction (May 2014-March 2020)



Left Y-axis: Total number of POS transactions (in million) (black curve).
 Right Y-axis: Average amount by POS transactions (grey curve).
 Sources: Calculated from RBI (various dates-a)

As such, demonetization changed the practices of the 40% of Indian adults with a debit or credit card: rather than withdraw cash, they now increasingly pay by card. Since October 2016, the number of POS transactions increased almost threefold, while the number of ATM transactions decreased by almost one-fifth.

3.5. Mobile banking

Unlike countries whose poor financial inclusion has spurred the rapid development mobile banking services in terms of access and usership, including Kenya, Tanzania and South Africa (Asongu, Biekpe & Cassimon, 2020; Shaikh & Karjaluoto, 2015), India has lagged behind in the development and rollout of such new services. But for over ten years now, the RBI has regularly relaxed its regulation of mobile transactions (RBI, 2011), and the Indian government has launched several schemes such as *Lucky Grahak Yohana* and *Digi-Dhan Vyapar Yojana*. Since the first financial inclusion campaigns in 2006, the major Indian commercial banks have developed a wide range of mobile banking services for their customers, but until recently without much success (Gupta & Jain, 2015; Mishra & Singh Bisht, 2013; Vashistha, Anderson & Mare, 2019).

Along with an increase in mobile density and mobile Internet users⁹, the demonetization of November 2016 served as a catalyst for the adoption of mobile banking. Both public and private banks have proactively offered mobile banking services through various channels such as text messages and mobile applications. According to the RBI's definition, mobile payments in India include transactions done via mobile bank applications and Unified Payment Interface (UPI) applications. Users must have a phone, a SIM card and a bank account. However, mobile banking without a bank account is possible, such as the wallet-based mobile payment system¹⁰.

Several field studies on street vendors, shopkeepers and other micro and small businesses in urban and metropolitan areas show an increase in the adoption of mobile payments during the demonetization period (Joshi, Gupta & Rangaswamy, 2019; Kurosaki, 2019; Pal et al., 2018). Several lucrative incentives, such as referral and transactional rewards, encouraged customers to start using mobile payments (Vashistha, Anderson & Mare, 2019).

RBI data show the evolution of transactions carried out via mobile bank applications and UPI applications (wallet-based mobile payments are not considered in these data). From October 2016 to January 2020, mobile phone transactions exponentially increased (from 72.6 million transactions to 1,440.3 million) (Figure 4). While the number of mobile banking transactions has risen almost twenty-fold over the past three years alone, the average mobile banking transaction amount was divided by four (from 14,355 rupees in October 2016 to 3,620 in January 2020).

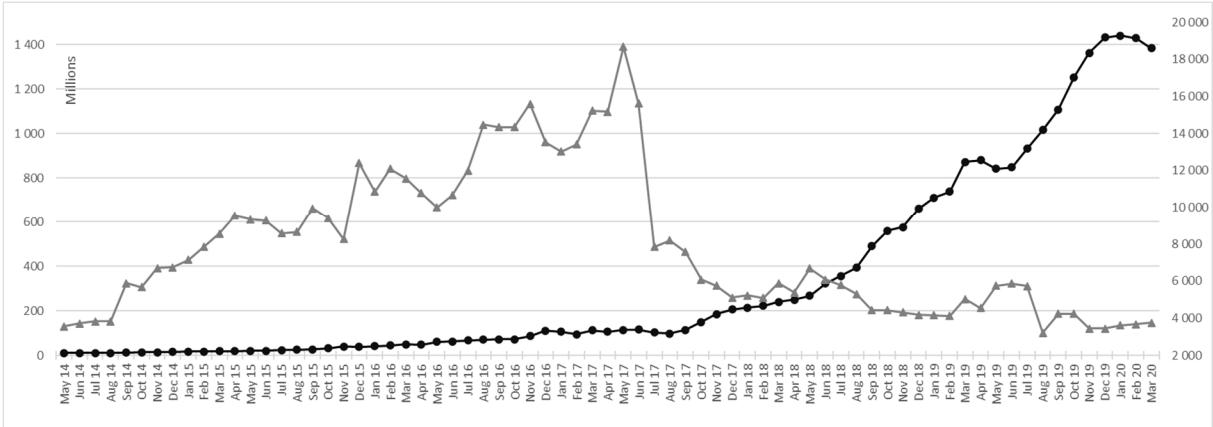
From July 2017, RBI changed its methodology to account for mobile transactions. From this date, the RBI recorded only individual and corporate payments on mobile devices, which explains the fall in the average transaction amount in July 2017 (RBI, 2018) (Figure 4). Nevertheless, the average transactions amount continued to fall after July 2017, alongside a significant increase in the number of transactions. It appears that a growing proportion of the Indian population is using mobile payment methods for smaller-value transactions.

⁹ The wireless telephone-density subscribers were 88.9% for India as a whole in September 2019, and 57.3% and 156.2% in rural and urban areas respectively. At the same date, the rate of internet subscribers was 52.1% countrywide in India, and 27.6% and 104.2% in rural and urban areas respectively (TRAI, 2020).

¹⁰ The main difference between these two mobile payment systems is the way funds are managed. For the wallet-based mobile payment system, customers keep their balances in an online wallet account. For the UPI-based mobile payment system, the money managed by the customer stays in their bank account and all customer transactions are direct to the customer's bank account.

Since demonetization, new players have emerged such as PayTM, an e-commerce payment system and financial technology company that was issued a banking license from RBI in August 2015. This type of player still remains marginal to mobile transactions involving a bank account (the only ones recorded by the RBI). In March 2020, PayTM’s share was 5.92%. Banks control a large share of the market. The State Bank of India, which is owned by the federal government, and the largest Indian bank in terms of income and capital, has the biggest market share (23.31% of transactions), followed by three private commercial banks (Axis Bank, HDFC and ICICI with 9.95%, 8.71% and 7.30% respectively) (RBI, various date-b). ICICI Bank saw its share of digital transactions on savings accounts increase by 82% from March 2017 to March 2018 (Sridhar, 2018). Since demonetization, many urban street vendors now accept payment via digital wallet when they do not accept credit cards (Joshi, Gupta & Rangaswamy, 2019).

Figure 4. Rates of mobile phone-based transactions (May 2014-March 2020)



Left Y-axis: Total number of mobile banking transactions (in millions) (black curve).
 Right Y-axis: Average mobile phone transaction amount (in rupees) (grey curve).
 Sources: Calculated from RBI (various dates-b)

It is worth noting however that in rural areas, many shops and merchants do not have facilities to accept cards, UPI, mobile wallet and other e-payments (Guérin et al, 2017). As one might expect, urban locations and the more affluent strata of the population are more open to digitization than others (Draboo, 2020; Mohanty et al., 2019). In June 2020, RBI announced the creation of a Payment Infrastructure Development Fund (PIDF) to encourage and enable electronic and digital payments in India’s small towns and remote areas (RBI, 2020). The aim of this fund is to deploy POS infrastructures (physical and digital modes) in tier-3 (population up to 49,999) to tier-6 (population lower than 5,000) centers and north eastern states. The main objective is to give an additional push to digital payments to develop card acceptance infrastructure across small towns and remote areas and, in the process, to reduce demand for cash over time.

4. DISCUSSION

Using RBI data, we have shown that the demonetization period brought about a decline in ATM withdrawals and fueled uptake of digital means of payment. Of course, we cannot know what would have happened to those digital payments in the absence of demonetization.

They **too may** have ended up **increasing**. But our data does reveal a significant spike: a continuous **rise** in digital payments, especially for POS transactions, **dating** back to demonetization. **ATM** numbers and usage show a much more **mixed** situation, **and** even a decline, depending on the period. As with mobile phones in most countries of the Global South, this indicates a leapfrog process: users are moving **away** from a purely manual use of cash to **its** digital **usage**.

According to the Indian Finance Minister (2004-8) Palaniappan Chidambaram¹¹, the 2016 demonetization cost the Indian economy the equivalent of 1.5% of its GDP. At least 12 million daily-wage workers found themselves without work for several weeks, while hundreds of thousands of small and medium-sized **businesses** had to shut up shop (Vyas, 2018). A hundred people committed suicide, believing themselves ruined, or out of despair and **distress** at the huge queues outside the banks. As numerous studies have shown (see Table 1), the economic and social costs of demonetization have been considerable, especially for the most marginalized populations.

One can reasonably wonder whether the boost to digital payments could justify such collective turmoil and private cost. The effects of demonetization in terms of digitalization raise two questions. The first **concerns** the formalization of the economy, **in line with the assertions of** (belatedly announced) government discourse. It is **quite justifiable** to envisage measures **for** formalizing the economy and protecting the poor, but **it is delusionary to imagine** that technology – **in this case** digitalizing payments – could **automatically** solve the problem. Formalization requires much more than **payment** transparency. In Europe, bancarization, i.e. what we call financial inclusion, emerged **alongside** social protection, but **did** not come first. **It was in no way the** fundamental cause of social protection. If formalization is designed to protect the poorest people, there must be the political will to tax the richest people (which digitalization does not allow) and **to** then redistribute **that taxation**. Measuring informality remains a challenge **since December 2016, but neither** the informal economy nor informal employment **appear to have fallen** (Harriss-White, 2020). **With the onset of the** Covid-19 epidemic, the way the lockdown was handled **and its** disastrous **impact** on a large **section** of the informal economy **suggested** that **the** Modi government's **was not looking** to improve **informal workers'** conditions, but to destroy **the informal** economy (*ibidem*). The **latest available** data shows a considerable contraction in digital payments (from January 2020 to April 2020: mobile phone transactions **fell** by 28% in number and 30% in value; (POS transactions dropped by 57% in number, 66% in value)¹². **This** probably reflects a contraction in total payments.

The second question **concerns** the long-term consequences of digitalization. **The** “dematerialization of money” (Gordon, 2005) **is nothing new**. It should **first** be noted that this expression can lead to confusion. **It refers to a** change of medium, rather than dematerialization as such. Substantial infrastructure **is needed to** operate digital payments. It requires the use of raw materials (oil, rare earths, etc.), considerable volumes of energy

¹¹ “Indian economy lost 1.5% of GDP in terms of growth. That alone was a loss of Rs 2.25 lakh crore [2.25tn] a year. Over 100 lives were lost. 15 crore [150m] daily wage earners lost their livelihood for several weeks. Thousands of SME units were shut down. Lakhs [hundreds of thousands] of jobs were destroyed”, elements cited by Dutta (2018).

¹² From 1,440 million mobile phone transactions in January 2020 to 1,128 in April 2020 (-28%) – from 5,214 to 3,640 billion rupees in value) (-30%); and from 661 million POS transactions to 285 during the same period (-57%) – from 1,292 to 439 billion rupees in value) (-66%) (RBI, various dates-a, b).

(electronic servers operate day and night), and above all, players must all be set up with the right equipment. The environmental footprint of this equipment production and the cost of access for users can be much bigger than for coins and banknotes (with the latter, the ecological cost is mainly armored truck transportation). Moreover, the dematerialization of money has a long history that can be traced back to ancient Egypt and the Near East in their use of accounting systems. The banknote was created in China at the turn of the thirteenth century (Horesh, 2013) and the bill of exchange was developed in West European trading communities in the sixteenth century. Note, too, the postal money order, the commercial paper, and even the check, which for example was compulsory for certain payment operations in France from 1940. Many informal and formal payments systems have coexisted for centuries. Some fall out of use and reemerge later, such as certain forms of paper money.

The champions of the cashless movement highlight a range of reasons for boosting digital payments. There is a clear gap between official rhetoric and hidden agendas. For the web giants, online payments are a convenience for their customers, but above all a new way of capturing big data from the global South (Taylor & Broeders, 2015), and crucial for building the markets of the future. Governmental rhetoric includes issues of efficiency in social transfer payments, transparency, and as such citizenship (Fouillet & Morvant 2018). But this rhetoric disguises key surveillance issues (Gabor & Brooks, 2017; Gruin, 2019; Petry, 2020). For banks and the financial technology sector, notwithstanding additional profits (transactions come at a price!) and significant savings (no more ATM maintenance), it is the opportunity to take control over money at the expense of states, and therefore at the expense of democratic access to monetary instruments.

For users, it is reasonable to ask whether the disadvantages do not outweigh the benefits in terms of price, comfort, and personal freedom. When making a digital payment, each transaction gives rise to a cost ultimately borne by the consumer. When a coin is produced, it can be exchanged thousands of times without any additional cost for those who circulate it. Coins and banknotes are accepted even for those who do not use bank accounts, lack electricity, internet access and digital devices. Coins and banknotes can be passed from hand to hand anywhere, anytime, and without leaving a trace. This allows individuals to escape family surveillance (this is particularly important for women and young people). Cash also makes it possible to escape state surveillance - in an increasingly authoritarian state such as the current Modi government, this is a central issue. Cash also makes it possible to escape the surveillance of the markets, which are deploying increasingly aggressive techniques to capture new consumers.

5. CONCLUDING REMARKS

The violence of Indian demonetization and its dramatic consequences on the Indian population have been widely documented. The digitalization of payments is a further effect of demonetization, and it has probably not received enough attention. With data gathered from the Reserve Bank of India from 2014 to 2020, we have shown here that the demonetization period brought about declines in Automatic Teller Machines (ATM) withdrawals, and the faster adoption of digital means of payments via Point of Sale Terminals (POS) and mobile banking. Since October 2016, while the number of POS transactions almost tripled, the number of ATM transactions fell by almost one-fifth. In the present government's rhetoric, digitalization is a means of formalizing the economy and protecting the poor. This argument is unfortunately highly open to debate.

Digital payment instruments certainly bring complementarity. But the type of cashless society that the Indian government seems to be promoting through radical measures would further exclude those without access to such new payment instruments. There would also be the risk that computer hacking, or major weather incidents such as floods, would make it impossible to use POS, cards, or mobile phone payments.

Our aim here is not to vilify digital payments systems. Access to money is already unequal, but digital money can further widen preexisting inequalities. In 2019, Sweden proclaimed that it would become the world's first cashless nation by 2023, yet it started to backtrack in January 2020, for two main motives: to allow people the freedom to choose their means of payments, and to protect people who are economically vulnerable or located in remote areas and may not be able to use digital finance. The Swedish example is certainly one to follow.

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