International Growth Centre

Authors

Karthik Muralidharan
Associate Professor of Economics
University of California - San Diego

Paul Niehaus
Assistant Professor of Economics
University of California - San Diego

Sandip Sukhtankar
Assistant Professor
Dartmouth College

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Biometric payment systems and welfare benefits

Biometric payment systems are claimed to reduce leakages in public welfare programmes. Indeed, 230 programmes in more than 80 countries are currently deploying such systems to improve security and reduce corruption and fraud. Yet, there is little evidence for their effectiveness

The Government of India allocates over Rs. 250,000 crores (US$ 41.6 bn approx.) per year to the social sector (including subsidies), but the delivery of services is marked by high levels of leakage and corruption. Weak governance plagues service delivery across sectors and programmes ranging from education, health, MNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme), and TPDS (Targeted Public Distribution System). Yet, governments are often tempted to focus energies on announcing new programmes and schemes, rather than on building state capacity for better implementation of existing programmes. This is partly due to political incentives: specific programmes can better deliver patronage to target voter groups, and the returns to investing in implementation capacity may not be seen within one electoral cycle.

One notable exception to this pattern has been the ambitious Aadhaar initiative of the Government of India to issue biometric unique IDs linked to bank accounts to all residents. It is hoped that this biometric payments infrastructure will allow direct benefit transfers (DBT) to intended recipients and reduce leakage[1].

Yet there are several reasons to be skeptical about its impact. First, implementation challenges are non-trivial and the whole system may fail even if only some components fail, potentially making the project a 'white elephant'. Second, the initiative may be subverted by politically-powerful vested interests whose rents are threatened. Third, there may be exclusion errors if genuine beneficiaries are denied payments, leaving the poorest worse off. Fourth, there may be negative effects on access to programmes (like MNREGS) if the loss of rents reduces incentives for officials to implement the programme. Finally, even assuming positive impacts, the cost-effectiveness of the system is unknown. Overall, there is very little evidence to support either the enthusiasts or skeptics of biometric payment systems.

Evaluating the impact of the AP Smartcard Programme

We aimed to fill this evidence gap by working with the Government of Andhra Pradesh (GoAP) to evaluate the impact

of the AP Smartcard Programme, which used biometrically-authenticated "**Smartcards**" to make payments to MNREGS and Social Security Pension (SSP) beneficiaries. The new system used a network of locally-hired, customer-service providers (CSPs) to biometrically authenticate beneficiaries and make cash payments in villages. It thus provided beneficiaries with the same effective functionality as intended by Aadhaar-linked DBT.

The key to the scientific credibility of our **evaluation** was a landmark MoU with GoAP to randomise the order in which mandals (block-equivalents) in eight districts of AP would be covered by the new system over a two-year period. Since mandals that received the Smartcard programme first (the treatment group) were chosen by lottery, they were on average identical to those that received the programme two years later (the control group). Thus, differences in programme delivery across treatment and control mandals after two years can be exclusively attributed to the Smartcard programme. Carried out in close collaboration with GoAP and covering close to 20 million people, this was one of the largest randomised controlled trials ever done. **We report several findings.**

First, our experience confirms that **implementing** such a complex project at scale is non-trivial, and will face considerable technical, administrative, and political challenges. Despite exemplary efforts by GoAP to achieve full coverage in treatment mandals, the share of Smartcard-enabled payments in those mandals was ~50% after two years. Enrolling beneficiaries who missed initial enrollment "camps" was a serious challenge, highlighting the importance of processes for continuous enrolment[2].

Yet despite the incomplete implementation, beneficiaries in "carded" mandals experienced a faster, more reliable, and less corrupt payment experience. The Smartcard system reduced the lag between working on an MNREGS project and collecting payment by 29%, and reduced the unpredictability in the lag by 39%. Further, it reduced by 19% the time workers spent collecting MNREGS payments.

Smartcards also reduced leakage. MNREGS beneficiaries in treated mandals reported a 24% increase in weekly earnings, while fiscal outlays did not change, resulting in a 35% reduction in leakage (a 10.8 percentage point reduction relative to the average leakage of 30.8% in the control areas). Similarly, SSP reported earnings went up by 5%, while official disbursements did not, leading to a 49% decline in leakage (a 2.9 percentage point reduction relative to average leakage of 6% in the control areas).

We find no evidence that poor or vulnerable segments of the population were made worse off by the new system. For key outcomes such as the time to collect payments, payment delays, and payments received, we find that no treatment household was worse off relative to a control household at the same percentile of the outcome distribution. Programme impacts also did not vary significantly as a function of village-level baseline characteristics, suggesting broad-based gains across villages from access to the new payments system.

These gains for participants who obtained MNREGS work were not offset by reduced access to MNREGS. We find that the proportion of households reporting having worked on MNREGS increased by 18%. We show that this result is explained by a significant reduction in the fraction of "quasi-ghost" beneficiaries – defined as cases where officials reported work against a beneficiary's name and claimed payment for this work, but where the beneficiary received neither work nor payment. These results suggest that the introduction of biometric authentication made it more difficult for officials to over-report the amount of work done (and siphon off the extra wages unknown to the beneficiary), and that the optimal response for officials was to ensure that more actual work was done against the claimed wages, with a corresponding increase in payments made to workers.

We find that improvements in the timeliness of payments are concentrated entirely in villages that switched to the new payment system, but do not vary across recipients who had or had not received biometric Smartcards within these villages. In contrast, increases in payments to beneficiaries and reductions in leakage are found only among recipients who received biometric Smartcards. This suggests that organisational changes associated with the new payment system (especially moving the point of payment to the village) drove improvements in the payments process, while biometric authentication was the key to reducing fraud.

Overall, the data suggest that Smartcards improved beneficiary experiences in collecting payments, increased payments received by programme participants, reduced corruption, broadened access to programme benefits, and achieved these without substantially altering fiscal burdens on the state. Consistent with these results, we find that 90% of MNREGS beneficiaries and 93% of SSP recipients who were exposed to the Smartcard initiative reported that they prefer the new system to the old.

Finally, we find that Smartcards were very cost-effective. The monetised value of time savings to beneficiaries (Rs. 26 crores or US$ 4.3 mn approx.) alone was greater than the cost of the new system (Rs. 24 crores or US$ 4 mn approx.) for MNREGS. The reduction in MNREGS leakage (of Rs. 197 crores or US$ 32.8 mn approx.) was eight times the cost of the programme. SSP leakage was reduced by Rs. 20 crores (US$ 3.3 mn approx.) (relative to implementation costs of Rs. 14 crores or US$ 2.3 mn approx.). All estimates are only for the eight study districts, and would be higher if extended to all of AP.

What are the lessons of this smartcard project?

What can we learn from the Smartcards experience about the potential for Aadhaar-linked DBTs in other states and programmes? As always, one has to be careful in extrapolating from one state and two programmes, but our experiences working with GoAP suggest five broad lessons, and one caveat:

1. It is important to not expect miracles overnight. While 50% coverage in two years may seem modest, even the United States took 15 years to migrate Social Security payments from paper

checks to electronic transfers. Our results show that large gains in programme performance are possible even with 50% implementation, and that the investment in biometric payments can pay off in as little as two years. So, implementation challenges should be expected and addressed, but should not be used as an excuse for inaction.

2. Adopting biometric authentication need not exclude vulnerable beneficiaries. This is an important finding since such exclusion errors are a legitimate concern among opponents of biometric payments, yet we find no evidence of any such adverse effects. We believe this is at least partly because GoAP did not make Smartcards mandatoryfor collecting payment. Thus, while those who enrolled benefited from lower leakage, those who did not (or were not able to) were not excluded. While not mandating Smartcards certainly may have left open some avenues for corruption, it may also have been a politically astute choice that helped prevent exclusion errors and maintain broad-based beneficiary support. This lesson is especially pertinent given the Supreme Court's ruling that Aadhaar cannot be mandatory for programme participation. Our experiences suggest an approach that focuses on making Aadhaar-enabled payments more convenient to beneficiaries, but not mandatory, may be the most pragmatic one anyway.
3. There will inevitably be push back from vested interests whose rents are reduced. Senior officials in GoAP were much more likely to hear field reports about problems with Smartcards than about positive results. This bias was so severe that GoAP considered scrapping the Smartcard system in 2013, and their decision to not do so was partly in response to reviewing our data on beneficiary preferences. The episode provides an excellent example of the political economy of concentrated costs (to low-level officials who lost rents due to Smartcards, and were vocal with negative feedback) versus diffuse benefits (to millions of beneficiaries, who were less likely to communicate positive feedback), and highlights the importance of avoiding policymaking by anecdote, and instead relying on representative data from larger samples.
4. Given implementation complexities, it would make sense to focus on saturating Aadhaarcoverage in a few districts (a few per state) and mastering implementation details of integrating programmes with Aadhaar before trying to scale up too fast. A related lesson is to encourage multiplicity of vendors. An important implementation lesson from AP was the use of a "one-district one-bank" model, whereby different banks implemented the Smartcard project in different districts. While this increased coordination costs, it allowed GoAP to evaluate vendor performance in the field and re-allocate districts from non-performing banks to high-performing banks and technology-service providers (TSPs). This was critical in preventing GoAP from being held hostage by a non-performing vendor, and also provided incentives to better-performing banks.
5. It is essential to align the incentives of key partners – banks and TSPs – to provide the essential last-mile financial inclusion services. A "stick" based approach of providing banks with account-opening targets under pain of regulatory penalties is likely to result in large numbers of dormant accounts. On the

other hand, paying banks commissions on payments made (GoAP paid 2%) creates the right incentives for not just opening accounts but keeping them active. Overall, there are strong synergies between the government's focus on financial inclusion and DBT, since the commissions on DBT payments can cover the fixed costs of setting up and maintaining last-mile financial inclusion architecture.

The one policy caveat is that our results focus on the economic costs and benefits of biometric payments, and do not speak to concerns regarding privacy and unauthorised use of Aadhaar-linked data. It would therefore be prudent for the government to make sure that expansion of Aadhaar-linked service delivery is accompanied by enabling legislation with adequate data-use safeguards, and parliamentary approval.

A game changer for governance

Overall, our comprehensive study of the AP Smartcard project finds substantial economic benefits to taxpayers and programme beneficiaries from biometrically-authenticated payments, and the results suggest that Aadhaar-enabled DBTs can indeed be **a game changer** for governance in India. Senior leaders of the new government have **expressed strong support** for following through on this promise and implementation should now be a top priority.

Notes:

1. *Note that India is **not alone in its enthusiasm**. The potential for biometric payment systems to improve the performance of public welfare programmes (and also provide financial inclusion for the poor) has generated enormous interest around the world. A recent survey article has documented the existence of 230 programmes in over 80 countries that are deploying biometric identification and payment systems.*
2. *See our companion **implementation report** for further lessons regarding effective implementation of a biometrics payment system.*