

Citizens and States

How Can Digital ID and Payments Improve State Capacity and Effectiveness?

Alan Gelb | Anit Mukherjee | Kyle Navis



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Preface

Digital technologies are part of our everyday lives. We communicate through email, text messages, and WhatsApp. We connect with others on social media, search for information, listen to music, stream movies, shop online, and commute using rideshare services. We pay for these digitally, often using our mobile phones. Many of the digital tools we use did not exist a decade ago and some may not survive beyond the next decade. The only constant in the digital world is change, and we need to adapt quickly to keep up with it.

Governments around the world are moving to harness the power of digital technologies to improve their capacity to serve people. Many public services are now online—passports, driver licenses, land records, just to name a few. Food stamps are distributed as electronic vouchers; pensions, education stipends, and social grants are directly transferred to bank or mobile money accounts. These changes are not limited to rich economies—countries like Bangladesh, India, Kenya, Pakistan, and Rwanda, for example, are leapfrogging their way towards digital governance at a rapid pace. The language of governance is changing, and it is becoming increasingly digital.

In this dynamic and evolving context, how can digital technologies play a positive role to achieve the ambitious objectives and targets embodied in the Sustainable Development Goals (SDGs)? How can they both empower citizens and improve state capacity? What can we learn from the experiences of digital reform in developing countries? Finally, what can we say about the future trajectory of digital governance—the guiding principles, the harmonization of policy design and technology, the risks, and the challenges going forward?

This report considers the potential of digital ID, financial inclusion, and mobile technologies to improve the capacity of governments to deliver better, more inclusive, and accountable public services, subsidies, and transfers. It proposes an analytical framework to achieve global development objectives, reviews the growing body of literature on digital reforms, presents new evidence from country case studies and field-based research, and recommends a set of principles for countries to follow as they move forward on their digital governance journey.

Universal access to well-functioning ID, connectivity, and financial inclusion has to be a first principle when considering moving citizen-government interactions in this direction. Digital reforms should be designed in a beneficiary-centric approach, understanding their needs and their capacity to navigate the new digital ecosystem. Aligning incentives is critical to improve accountability and prevent vested interests from derailing well-meaning reforms. Digital technology should be a tool for inclusion and empowerment as embodied in the SDGs—it is certainly possible but not certain.

Finally, the report outlines the challenges that states must confront, including the issue of political will, digital capacity, and protection of personal information. ID, mobile communications, and digital finance offer huge potential but also increase risks of tracking and surveillance. Digitized service delivery also generates enormous volumes of data, much in real time, increasing the importance of sound data governance. These are universal challenges and ones that resonate strongly in countries of the developing world.

Governance will need to evolve as citizens increasingly adjust to—as well as demand—“digital first” interactions with the state. We hope that this report will be a useful starting point for future work in this important and emerging area of policy and practice.

A handwritten signature in black ink, appearing to read 'Masood Ahmed', with a stylized flourish at the end.

Masood Ahmed
President
Center for Global Development

Acknowledgments

This report draws on studies conducted over several years. Some have been in collaboration with MicroSave Consulting (MSC), and here we want to recognize and thank the members of their teams, including Mitul Thapliyal and others, for a productive and enjoyable collaboration. We thank our co-authors and other authors of a range of papers that have been part of the project on which the report is based. We have been fortunate to be able to draw on many other valuable research studies and contributions in the area. And a special thanks to those who have encouraged our work, including Nancy Birdsall, Masood Ahmed, and Nandan Nilekani.

Especially in a new and emerging area, there is no substitute for the exchange of knowledge at workshops, seminars, and conferences. We have benefited greatly from such exchanges in Washington, DC; India; Europe, including with the Global Development Network and the Digital Identity Forum at Cambridge; and Africa, including presentations and exchanges at the annual ID4Africa conferences in Abuja and Johannesburg. We also gratefully acknowledge the very

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We are especially grateful to the Bill & Melinda Gates Foundation for their support of the work. This has encompassed more than simply financial support; their staff, including Dan Radcliffe, Seth Garz, Aishwarya Lakshmi Ratan, and Maria May, have given their time and expert advice very generously throughout the project.

None of those mentioned above has any responsibility for errors and shortcomings. These would doubtless have been more serious without their help and advice.

CGD is grateful to the Bill & Melinda Gates Foundation for supporting this work.

Acronyms

AAY	Antodyaya Anna Yojana
APL	Above Poverty Line
BC	Business Correspondent
BISP	Benazir Income Support Programme
BOP	Bottom of the Pyramid
BPL	Below Poverty Line
BVN	Bank Verification Number
CICO	Cash In Cash Out
DBT	Direct Benefit Transfer
DFS	Digital Financial Services
e-KYC	Electronic Know Your Customer
ePOS	Electronic Point of Service
FATF	Financial Action Task Force
FISP	Farmer Input Support Program
FMIS	Financial Management Information Systems
G2P	Government-to-Person
GESS	Growth Enhancement Support Scheme
GSMA	Global System for Mobile Communications Association
ID	Identification
IPB	Implementing Partner Bank
JAM	Jan Dhan-Aadhaar-Mobile
KYC	Know Your Customer
LIC	Low-Income Country
LPG	Liquified Petroleum Gas
MDG	Millennium Development Goal
MFS	Mobile Financial Services
MNO	Mobile Network Operator
NADRA	National Database and Registration Authority
NFSA	National Food Security Act
NGO	Non-Governmental Organization
NPK	Nitrogen, Phosphorus, and Potassium

NRC	National Registration Card
NREGS	National Rural Employment Guarantee Scheme
NSER	National Social and Economic Register
P2G	Person-to-Government
PDS	Public Distribution System
PESP	Primary Education Stipend Program
PHH	Priority Households
POS	Point of Service
PSP	Payment Services Provider
SCM	Supply Chain Manager
SDG	Sustainable Development Goal
SIM	Subscriber Identity Module
SNAP	Supplemental Nutrition Assistance Program
SSA	Sub-Saharan Africa
UPI	Universal Payments Interface
USSD	Unstructured Supplementary Service Data
VAT	Value-Added Tax

Executive Summary

In Bangladesh, a mother can now receive her child's education scholarship through her mobile phone account instead of having to stand in long lines at the school on a prearranged day for a cash handout. Not only does this save her time and effort and provide accurate and documented payment, but it also relieves school officials of a burdensome administrative process and of the risk that—rightly or wrongly—they can be accused of corrupt handling of funds. In Kenya, a farmer can invest his or her savings directly in a small slice of a government bond through a mobile phone. He or she can become eligible for a small loan on the basis of a stable record of receipts and payments on his or her mobile account without posting collateral. In Andhra Pradesh, a state in India with 50 million people, the authorities can drill down through state-wide reporting data, in real time and across thousands of delivery points, to monitor the provision of rations to poor beneficiaries. They can detect transaction failures almost immediately and require rapid follow-up and remediation.

Digital technology, notably in the areas of identification (ID), mobile communications, and financial payments, is impacting societies and economies in many ways. It is changing the way that citizens (in the sense of individuals) and states can interact and transact business with each other across a wide range of programs and services. This offers new levers to states to implement a wide range of policies and programs, to increase effectiveness and accountability, and also to include many who have been effectively shut out—whether through lack of recognition, high transactions costs, or the inability to ensure that payments or other services are delivered accurately, to the right person, and at the right time.

Expanding the policy possibility frontier

This report considers the potential of ID, mobiles, and payments to improve the capacity of governments to deliver more effective, inclusive, and accountable programs. This trinity has been termed “JAM”¹ in India, and the same terminology is used here for convenience, though the focus is more general than India alone. The programs can provide government-to-person (G2P) payments, or vouchers tied to the purchase of essential goods, or in-kind provision of goods and services—with or without conditionalities. They can also include fee-based services that require person-to-government (P2G) payments. These enable governments to implement a broader set of policies to reform citizen-state interactions—in other words, expanding the “policy possibility frontier.” In this report, we explore a wide range of these digitally enabled reforms and their implications across sectors, regions, and countries—and more importantly, on actual beneficiaries of public services, subsidies, and transfers.

The objective is not to cover this huge field exhaustively or to advocate for one approach over another, such as whether to provide food rations or cash, or education vouchers or public schools. It is, rather, to consider the potential for digital technology to enable three things—the precise identification of all parties to a transaction; low-cost communications; and accurate, accountable, and convenient payments—and so to improve the interactions between citizens and states.

1. The letters stand for Jan Dhan program to open bank accounts, Aadhaar biometric ID, and Mobile communications.

No silver bullet

Even though this report stresses potential benefits, it recognizes that context matters more than technology, and that the latter is only a tool. On its own it does not necessarily lead to better policies or to stronger implementation—and it can also be used to implement bad policies more effectively. Much depends on the objectives to which it is applied and how well implemented and inclusive the systems that use it are. This theme emerges clearly from the cases considered, together with some downside risks. ID systems can be used to exclude as well as include, and even well-intentioned innovations can increase the exclusion of vulnerable groups. The massive amounts of data generated by digital systems can facilitate profiling and tracking, including transaction records and locations, and can threaten privacy. And while it has the potential to increase state capacity and effectiveness, JAM imposes new demands on states and civil society, as well as imposing capability requirements on citizens who need to be able to navigate new systems.

Conceptual framework: The SDGs as a measure of state capacity

Is a capable state a “good” state? The record suggests not necessarily. In developmental terms, state capacity can only be assessed relative to some specified objectives. For these, we can turn to the global development consensus, as embodied in the Sustainable Development Goals (SDGs). They represent an ambitious elevation of aspirations relative to the Millennium Development Goals, placing new emphasis on the nexus between the state and the individual.

Box 1 sets out SDG goals and targets especially relevant for JAM. As shown in the first cluster, the SDGs recognize the importance of JAM; ID, mobile communications, and financial inclusion are intrinsic goals in themselves, in addition to being possible instruments to help achieve other goals and targets. Box 1 clusters the latter around several groups of SDG objectives: to increase environmental sustainability, including by

reforming pricing in resource-based sectors while preserving or improving equity; to expand the coverage and effectiveness of social protection systems, whether cash-based or in-kind; to improve performance and reduce corruption in services requiring user charges and similar P2G payments; to render public services more accountable and increase client satisfaction; and to support affirmative measures to help close gender gaps, including in access to ICT.

These objectives should motivate governments to use digital technologies—especially ID and payments—to improve delivery of public services, subsidies, and transfers. Without an effective ID system, beneficiary lists are often replete with nonexistent individuals or “ghosts,” resulting in misuse of scarce public resources. Without increased access to financial accounts, it is difficult to pay beneficiaries electronically instead of in physical cash. Finally, without the capacity to gather feedback on the quality and timeliness of public services and payments, it is difficult to identify bottlenecks and improve the efficiency and accountability of service provision. Digital technologies, appropriately designed and implemented, can address these issues, improving the capacity of states to improve the efficiency and equity of delivery mechanisms over a broad range of public goods and services in developing countries.

This report follows the SDG-based structure, drawing on selected examples for policy lessons on how these challenges can be addressed through the application of digital technologies strategically, through JAM. Each country is different, so the aim is not to provide a detailed blueprint. It is, rather, to set out a broad picture and important policy directions.

Report summary

The aim of the report is to consider the potential for digital technology that enables three things—the precise identification of all parties to an interaction; low-cost communications; and accurate, accountable, and convenient payment processes—to help reform citizen-state interactions, and to do this in a way that increases

Box 1. SDGs Related to Digital ID, Mobile, and Payments

Cluster 1. Access to JAM

16.9 By 2030, provide legal identity for all, including birth registration; 17.8 Enhance the use of technology, in particular ICT; proportion of individuals who: own a mobile telephone; are covered by a mobile network; use the Internet; 8.10 Strengthen the capacity of domestic financial institutions to expand access to financial services for all; proportion of adults with a financial account or with a mobile money account

Cluster 2. Efficient Pricing and Sustainability with Equity

12.2 Achieve the sustainable management and efficient use of natural resources; 12.c Rationalize inefficient fossil-fuel subsidies, phase out to reflect environmental impact, and minimize the possible adverse impacts on the poor; 11.6 Reduce the adverse environmental impact of cities, including air quality; mortality rate attributed to household and ambient air pollution; 15.2 Sustainable management of forests, halt deforestation, restore degraded forests; 6.4 Increase water-use efficiency

Cluster 3. Poverty, Social Protection, and Service Delivery

1.3 Implement social protection systems for all; 1.3.1 Proportion of population covered by social protection systems; 2.1 End hunger and ensure access to safe, nutritious, and sufficient food

Cluster 4. Frictionless Payments

17.1 Strengthen domestic resource mobilization; 1.4.1 Proportion of population living in households with access to basic services; 3.8.2 Number of people covered by health insurance or a public health system; 10.c Reduce remittance costs to less than 3 percent

Cluster 5. Effective and Accountable Governances

16.6 Develop effective, accountable, and transparent institutions at all levels; 16.5 Reduce corruption and bribery in all their forms; proportion of persons who had at least one contact with a public official and who paid a bribe to a public official, or were asked for a bribe during the previous 12 months; proportion of the population satisfied with their last experience of public services

Cluster 6. Gender-Related

5.a Give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance, and natural resources; 5.b Enhance the use of enabling technology, in particular ICT, to promote the empowerment of women

individual agency and improves efficiency in the delivery of public services, subsidies, and transfers.

Chapter 1: Common problems solved by JAM

Governments in developing countries face several challenges in delivering benefits and services to their

citizens, such as identifying recipients, transitioning from physical cash to digital payments, monitoring implementation, increasing accountability, and gathering feedback on the quality of public services and transfers. Furthermore, effective governments desire to empower and build the agency of their citizens to grow and prosper. JAM provides the capacity to direct payments to verified recipients at convenient times;

it allows governments to transfer benefits directly and target progressively instead of relying on economy-wide price ceilings and subsidies—thus enabling more equitable outcomes. But while digital technology has the potential to increase state capacity, it creates new demands on citizens, especially the poor and the vulnerable, who need to be able to access payments, services, and information in new, digital ways.

Chapter 2: A picture of JAM coverage

Citizens and states cannot interact with each other through JAM if people do not have ready access to its components that constitute the first SDG cluster in Box 1. In Chapter 2, an index of JAM inclusion shows that this is shaped by both country-level factors and layered individual attributes including wealth, education, workforce status, and gender. Access to an ID and a mobile increases the probability that an individual will have a financial account. When all of a person's demographic attributes are favorable (i.e., employed men with high levels of income and education), their probability of financial inclusion is over 80 percent; when they are unfavorable (i.e., poor, unemployed, illiterate women), it is as low as 7 percent. Having an ID and a mobile phone boosts the chances of financial inclusion—the probability for the most disadvantaged group increases to 34 percent, an increase of nearly five times over the baseline case. Finally, receiving a government transfer increases the probability of financial inclusion by 31 percent for an individual at the midpoint of the attribute scale. G2P transfers therefore can be an effective means for greater financial inclusion. However, our analysis also shows that in addition to addressing country-level issues such as weak ID systems and inadequate mobile coverage, policies to provide for universal financial access will need to make special efforts to reach excluded groups, often including women but also, in some cases, ethnic minorities.

Chapter 3: Policies towards universal JAM

JAM is greater than the sum of its parts. Chapter 3 demonstrates the wide range of synergies between its three components, including economies of scope that can reduce the costs of essential infrastructure. For example, the provision of mobile financial services, as well as voice and data, boosts the business case for constructing cell towers to expand mobile coverage. There are also two-way supply-side and demand-side drivers between JAM and its use in the delivery of public services. As noted in Chapter 2, routing G2P transfers and other payments through bank or mobile accounts can help drive financial inclusion and encourage competition, especially if recipients have a choice of payment providers. Figure 1 illustrates how each component fits into supply- and demand-side drivers that reinforce their shared utility for payments and transactions.

Figure 2 situates JAM as a digital mediator in the middle of citizen–state interactions, highlighting the supply- and demand-side drivers as well as risks for each side of the transactions. With the population financially included, fee-for-service programs can be facilitated by frictionless and accountable digital P2G payments, as described in Cluster 4 of Box 1. While we do not address this area in detail in this report, the available literature indicates the need for an enabling digital payments acceptance ecosystem to reap the full benefits of digital G2P transfers. Because so many different regulatory agencies and service programs are involved, governments need to adopt a strategic approach based on JAM as an integrated platform for service delivery and governance. Each country starts from a different place, so the details will differ, but the framework presented here would be relevant for most cases.

The next three chapters illustrate the various contexts where this can be applied: reforming energy and agricultural subsidies, strengthening social protection, and facilitating beneficiary feedback mechanisms.

Figure 1. Synergies between ID, finance, and mobile communications

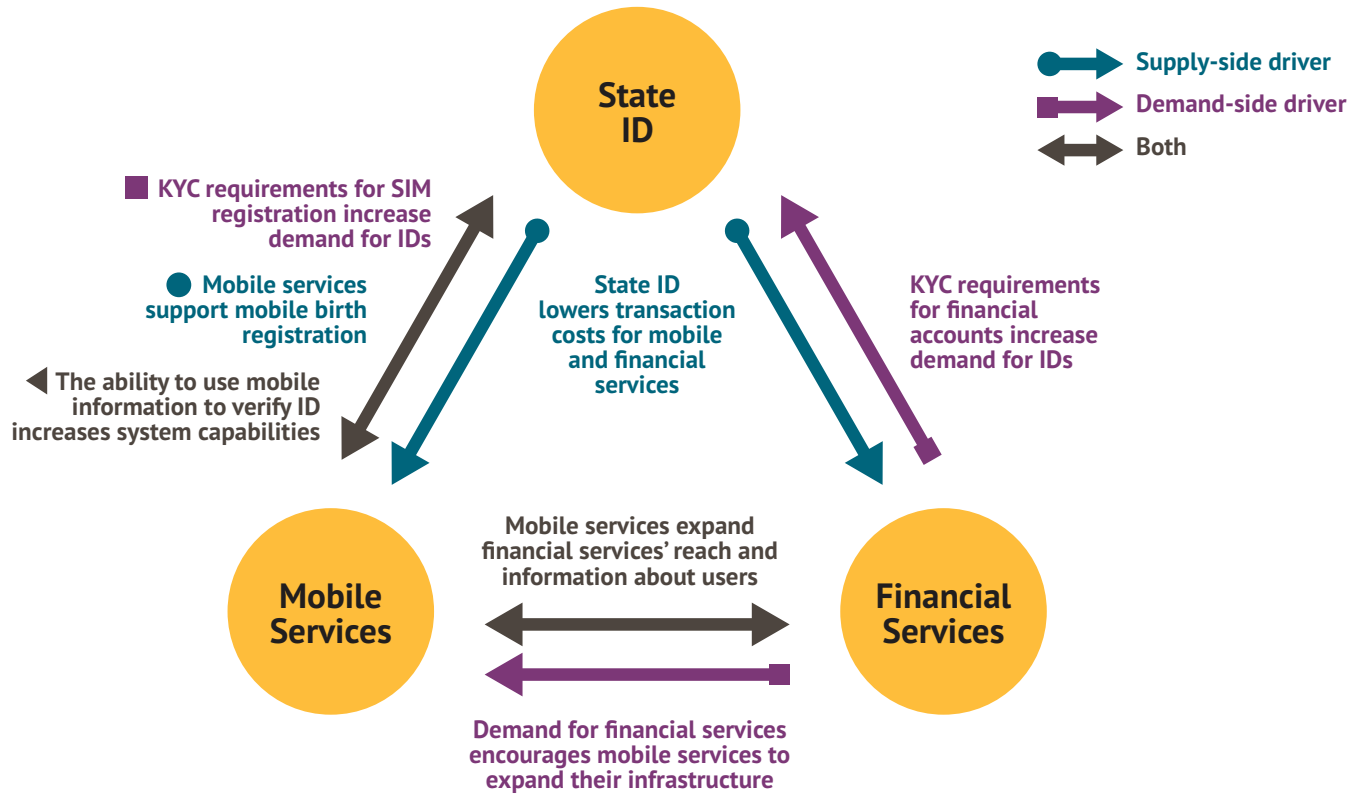
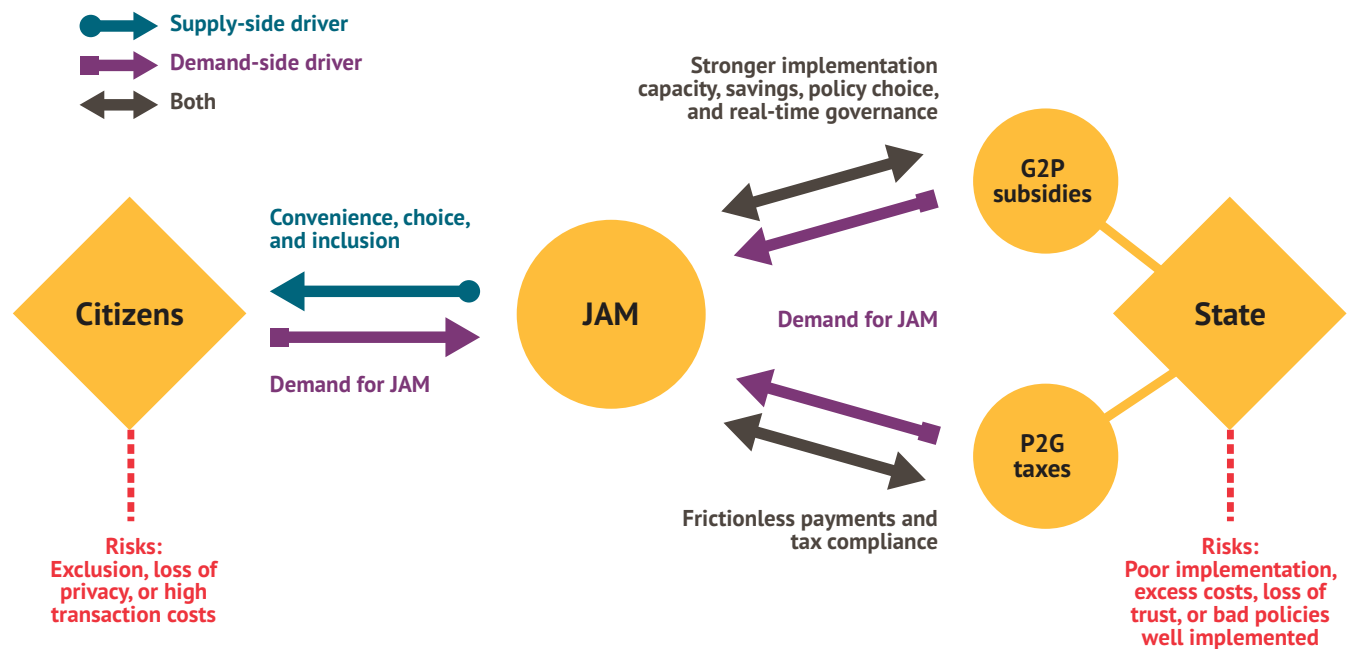


Figure 2. Citizens, states, and digital capacity



Chapter 4: Towards sustainability: Efficient pricing with equity

Fuel subsidies continue to be a major concern in many countries; many governments also offer price subsidies on other products with environmental effects, such as fertilizers. In addition, countries have been slow to levy “green taxes” to price fuels “efficiently” to allow for carbon emissions and other externalities. They also fail to price natural resources, such as water or forests, to reflect their scarcity and the environmental services they provide. All these examples reflect the importance of reforming prices (Cluster 2 in Box 1), a policy made more difficult because of its distributional implications.

As noted in Chapter 3, use of JAM can help to personalize subsidies, to move away from inefficient, distortionary, and inequitable price subsidies towards individualized vouchers or transfers. This enables the price system to be liberated from distributional constraints and allows resources to be priced at efficient levels. India’s massive LPG cooking gas program demonstrates that personalizing subsidies can also facilitate new approaches to targeting and more fiscal flexibility to respond to unexpected price shocks. Moreover, it can also address existing gender inequalities within the household distribution of labor and access to public benefits through greater use of ICT, as described in SDG Cluster 6. Reforms of fertilizer subsidies in several countries show different ways of engaging JAM, and also varying degrees of success. However, as confirmed by recent protests in France, Iran, and other countries, it is also clear that technology is no substitute for effective communication and the political will to overcome vested interests.

Chapter 5: Social protection and associated goals

Social protection features prominently in the SDGs, as described in Box 1, Cluster 4. At first sight, the use of JAM argues for moving all social protection towards

transfers, increasingly delivered through financial intermediaries. There may indeed be a trend in this direction, but the choice of modality needs to be assessed carefully for each program, taking into account any wider objectives it might have. The cases examined in this study from Bangladesh, India, and Pakistan indicate that digitized delivery systems can improve the performance of both cash-based and in-kind social protection programs (and service programs more generally) along some critical dimensions—better service, greater user convenience—as well as possibly providing fiscal savings. But the cases in Chapter 5 also show that results are heavily dependent on the institutional context, the objectives of the reform, and whether incentives along the delivery chain are also reformed as it is digitized, to encourage service providers to reach out to their clients. Ill-designed reforms can raise transactional costs and access barriers for poor beneficiaries, and can increase exclusion.

Programs can also be structured to provide advantages to women, including launching their first steps on the road to financial inclusion. At the same time, in strongly patriarchal settings, women may face structural barriers to agency, impeding their access to the opportunities that digital reforms are able to provide. This warrants careful attention in the design of reforms (see Table 2 below).

Chapter 6: Towards real-time governance

With accurate identification, mobile communications, and payments, citizen–state interactions and payments can be tracked individually and in real time. Even as the huge volumes of data produced by such digital systems raise certain risks, they can be used to monitor performance and increase accountability, as illustrated in Chapter 6, directly related to SDG Cluster 5. Monitoring can also draw on rapid citizen feedback, including from providing choice between different service providers or, indeed, alternative programs. Real-time feedback systems are not new in the commercial world, but in the development context this

area is still nascent. While some programs have moved towards collecting real-time data, few have yet developed comprehensive systems to analyze it in real time, to combine administrative data and customer feedback, and to cycle the information back into implementation. These capabilities as developed by the state of Andhra Pradesh, for example, represent the most advanced phase of the digital service revolution and are still very much at the frontier.

Cross-cutting theme: Gender-based digital and financial inclusion

Throughout each chapter, we consider how gender differences reflect structural barriers that impede uptake among potential users. Globally, there is a 1.4 percentage point gap in identification coverage, a 6.0 percentage point gender gap in financial inclusion, and an 8.1 percentage point gap in mobile phone ownership between men and women. Getting to universal JAM coverage presents a challenge and an opportunity for women, but there is a need for policies that facilitate their engagement with digital public service delivery platforms.

Key messages and principles for policy

Digital technology, including ID and payments and supported by mobiles (JAM), can enhance state capability to deliver a wide range of policies and programs relating to multiple SDGs in the areas of sustainability, social protection, and governance. Improvements can include better accountability, service and user empowerment, greater equity, and sometimes fiscal savings. The last can come mainly from three sources: lower transaction costs, eliminating ghost and duplicate beneficiaries (both within and across programs), and reducing leakages in subsidies delivered through G2P and P2G payments as well as goods delivered through digitally controlled supply chains. Shifting from physical cash payments to financial transfers,

for example, can ease the burden of managing cash on frontline service providers, such as teachers in the case of education supplements in Bangladesh.

Gains are not automatic, however. Technology is only a tool. Even as it opens up new opportunities, its impact will be shaped by institutional and economic conditions as well as the aim of the reforms.

In some cases, state capacity has been a constraint on implementing better policies (Nigeria), but expanding the policy possibility frontier does not necessarily lead to better policies, either to address sustainability (Bolivia) or to improve social protection. Reforms are inherently political and often require sustained effort to overcome strong vested interests. A shift to digitized programs places new demands on the capabilities of the state to regulate the new systems and to apply them in programs, and on citizens to navigate them.

Technology amplifies the power of data, and its impact on development depends on how this power is used. States can use data to improve service delivery, but they may not be benign users of data. The rapidly evolving tools available to governments also have the potential to leave marginalized groups behind, or to further isolate them. New checks and balances will be needed to ensure that digital technology serves the needs of all citizens.

JAM is a flexible platform, and it is being applied in different ways. The principles that follow are based on cases to date, but there is still a great deal to learn about the introduction of digitized service programs.

Access

Universal access to well-functioning ID, connectivity, and financial inclusion has to be a first principle when considering moving citizen-government interactions in this direction.

The details differ, but there are common policy directions. A full treatment of policies to increase access to JAM is beyond the scope of this report. However,

drawing on a range of material in addition to our own studies, Table 1 shows policy directions acting on both the supply side and the demand side, applicable to many countries. Some have the primary objective of increasing access; others of increasing functionality, value, and user trust which, in turn, encourages take-up. Many require coordination across several ministries or regulators to reap the benefits of common physical or agent infrastructure, which can expand the reach of JAM components and increase the convenience of users, such as common payment arrangements across programs.

Fiscal windfalls from the mobile revolution can be exploited to encourage access. For example, the rapidly growing demand for high-speed internet increases the value that governments can obtain from spectrum auctions. Part of this can be allocated to cross-subsidize at least basic connectivity for more remote or disadvantaged groups. Increased access, in turn, enables government to shift more programs and services onto a JAM-based platform (including those that require fees and other P2G payments), to improve services, and, in many cases, to create fiscal savings.

Accountability

Accountability for service delivery is a second principle that emerges from the cases.

The primary aim of reform should be to improve quality and inclusion, with fiscal savings a secondary objective, to be obtained from efficiency gains. Cases suggest that a single-minded focus on fiscal savings risks increasing exclusion because there is little effort to put in place the monitoring and protocols needed to prevent it (see the Jharkhand food rations case in Chapter 5). They also show that large fiscal gains are often possible, whether through eliminating ghosts or duplicates from beneficiary rolls or from eliminating leakages and corruption in the distribution and payments process, even when fiscal saving is not the prime driver of the reforms (see the biometric smartcards and food rations cases in Andhra Pradesh in Chapter 5,

and the LPG cooking gas case in Chapter 4). In extreme cases a hurried emphasis on cutting costs may even backfire, as in the abortive effort to introduce stock reconciliation in the ration system in Jharkhand. It is better to take a phased approach, first putting in place the new systems, ensuring that they work well, and then using them to help trim beneficiaries and reduce leakage (see discussion of the LPG cooking gas case and Andhra Pradesh's implementation throughout Chapters 4 and 5) than to attempt to do it all simultaneously (see the Rajasthan case in Chapter 5).

Digital approaches can open the door to new ways to approach targeting. Targeting offers another opportunity for phased approaches. Because they enable benefits to be provided accountably to well-identified recipients, governments can invoke “soft targeting” through moral suasion and other indicative approaches (see the LPG cooking gas case in Chapter 4). Targeting can then be progressively “hardened,” including through mechanisms such as legally binding self-declarations, to focus the benefits more tightly on poorer citizens. A further phase, using data analytics on consumption patterns to screen potential beneficiaries on an ongoing basis, is increasingly feasible in a digitally connected world but may be seen as overly intrusive.

Incentives throughout the delivery chain are a critical counterpart to accountability and need to be factored into rollouts and reforms. If digital reforms eliminate avenues for diversion and corruption, margins for service providers will probably need to be increased to compensate for reduced opportunities to exercise their discretion. Cooking gas distributors, for example, as well as owners of ration shops in Rajasthan and Andhra Pradesh, saw increases in commissions; many would probably not have stayed in business otherwise. In the latter case, dealers also benefited from reforms higher up the supply chain that increased the accuracy and predictability of deliveries to their shops. Inadequate compensation for business correspondents probably was a factor in the unsatisfactory performance of the banking system in delivering

Table 1. Policy directions for universal JAM

No.	Goal	Description
1	Access to ID and building trust	<ul style="list-style-type: none"> • Robust ID for all with strong authentication ecosystem. • Free, easy enrollment with minimum possible data requirements. • Coordination with civil registration to facilitate updating. • Clear accountability for data protection, managing grievances, and handling technology failure.
2	Access to mobiles and finance	<ul style="list-style-type: none"> • Simplify KYC documentation around ID and move to risk-based KYC and e-KYC to cut onboarding costs. • Level the playing field: uniform requirements for SIM registration and basic mobile money or bank accounts.
3	Access to mobile	<ul style="list-style-type: none"> • Encourage universal access to at least 2G. • Cross-subsidize coverage through proceeds and conditions of spectrum auctions. • Consider subsidies or tax breaks on feature phones; avoid excessive taxation. • Provide for number portability.
4	Access to finance, and trust	<ul style="list-style-type: none"> • Allow nonbanks (notably MNOs but also other businesses) to offer payment services as a low-cost way to extend financial access to poor customers. • KYC, along the lines of SIM registration subject to trust account arrangements and prudential oversight.
5	Access to mobile and finance	<ul style="list-style-type: none"> • Encourage shared infrastructure—cell towers, perhaps through tower companies—and agents. • Promote nonexclusivity to share fixed costs and facilitate expansion.
6	Value and convenience of finance	<ul style="list-style-type: none"> • At an appropriate stage of market development, encourage payments interoperability. • Support technology switch (like UPI) and encourage mutually beneficial interchange agreements between providers. • Encourage innovations such as tokenized addresses to increase convenience and trust.
7	Accountability and access to finance	<ul style="list-style-type: none"> • G2P payments through common platform able to pay to any general-purpose financial or mobile account. • Minimize cash and special-purpose channels, while recognizing that these may be essential in some areas. • Develop a common approach to paying for “last-mile delivery” through general-purpose instruments, and for separating out identity verification from payments.
8	Value, acceptance, and convenience of finance	<ul style="list-style-type: none"> • E-Payment Gateway to enable P2G payment for government-provided services to be made easily through any account. • Enforce use progressively as financial inclusion increases. • Use Gateway and possibly other measures to incentivize wider merchant acceptance ecosystem for digital payments.
9	Value, acceptance, and convenience of finance	<ul style="list-style-type: none"> • Avoid excessively high taxation of digital transactions that may discourage use and merchant acceptance. • Consider fiscal incentives to encourage acceptance, such as temporary VAT reductions on digital transactions. • Review tax administration and audit requirements to reduce need for paper receipts and records, since these undermine the benefits of moving to digital systems.
10	Value/access, benefits of digital governance, trust in digital data	<ul style="list-style-type: none"> • Use digital data to monitor implementation and performance of government programs (towards real-time digital governance). • Monitor beneficiary experience to ensure that poor and vulnerable groups are not excluded by digital divide. • Take steps to secure the large amounts of transactional and other data that will be generated by the use of JAM.
11	Access to ID, mobile, and finance	<ul style="list-style-type: none"> • Ensure that applications and interfaces are designed to meet the unique needs and preferences of vulnerable and marginalized groups, including but not limited to women, linguistic/ethnic/religious minorities, differently abled people, etc.
12	Capability for wider access and functionality	<ul style="list-style-type: none"> • Encourage partnerships, including with service providers, self-help groups, and NGOs, to promote digital education and capacity across the population, in particular among women.

pensions in Andhra Pradesh. It may be necessary to adopt tiered service margins to compensate for higher last-mile delivery costs, especially as services and benefits are extended to sparse or poor regions. Also, charges for authentication and other “platform” services should not be set at levels that compromise inclusion.

It is essential to have effective policies and procedures in place to monitor technology failures and grievances and to resolve them, especially as reforms move important elements of delivery out of the hands of local officials and towards more remote systems and data. By and large, people respond pragmatically to the introduction of new systems. They like them when they feel empowered, with better service and more control; they disapprove when faced with difficulties in executing transactions, even in cases where these are not so serious as to result in actual exclusion. No system is perfect, and even the best technology is subject to failures, whether due to poor connectivity, authentication failures, or other factors.

Even programs seen as “good” by the majority of beneficiaries and customers can increase the marginalization of vulnerable groups. For this reason, there needs to be a special focus on such groups when assessing the impact of changes. This can include technological challenges—for example, to provide alternative options for authentication through an ID system. Examples show that performance can improve over time (see the experience of various Indian authentication cases in Chapter 5, and the fertilizer cases in Chapter 4), but human processes are essential as a last resort. Innovative use of technology can also limit the amount of discretion in these processes (see the case of Andhra Pradesh in Chapter 6), thereby maintaining a high level of accountability.

Reforms can also involve transitional frictions such as reconciling data errors and inconsistencies as previously manual or scattered systems are integrated. These problems will be more serious for groups with less capacity—the poor, elderly, or women—who are

frequently the most dependent beneficiaries of public programs. It is essential to have well-working systems to resolve such difficulties, as well as to enable the easy updating of personal information.

Choice and voice

Digital technology should empower citizens by increasing agency, expanding choice, and strengthening voice through better and more effective use of feedback systems.

Digitized delivery systems generate enormous quantities of data, much of it in real time, which can provide critical feedback to programs and transition towards a system of real-time governance. With fully identified participants and mobile communications, delivery can in principle be monitored continually at every service point (as shown in Rajasthan and Andhra Pradesh). This enables governments to identify underperforming service areas and failed individual transactions. The example of Andhra Pradesh suggests that the feedback loop from a failed transaction can intervene with the dealer (one of some 24,000 in the state) within as little as 10 minutes. This degree of monitoring may not be realistic on a large scale, but it illustrates something about the possibilities of such systems. Clients can also receive timely information on the status of their requests (orders for LPG cooking gas cylinders, for example).

Because benefits are personalized and attached to the beneficiary, they can be made portable, subject to logistical constraints. The exercise of choice by users provides a second important real-time feedback signal to program administrators. Choice of service provider has been an important element of beneficiary empowerment in some programs (see the case of LPG cooking gas in Chapter 4 and the Andhra Pradesh food rations and pensions cases in Chapter 5). Surveys suggest that this is much welcomed by beneficiaries. It adds convenience, especially for mobile populations, and provides the option of moving to suppliers who provide better service. Efficient

portability within an in-kind delivery system is not possible without real-time monitoring of transactions to reconcile stocks and flows and avoid excessive buildup of inventory or stockouts. Choice might not be feasible in all situations (for example, in sparse regions), but even there it can sometimes be facilitated through more flexible arrangements—enabling transfers to be cashed out at shops and other local service points and enrolling businesses as smaller-scale rural distributors, as in the case of the LPG cooking gas program.

User responses can provide a third feedback loop, operating in almost real time. This can include star ratings of distributors and beneficiary surveys through robocalls (see the LPG cooking gas and Andhra Pradesh case in Chapter 6) as well as phone-based systems for filing complaints. Complaints need to be routed rapidly to the responsible department, with time-bound and monitored deadlines for response. Such real-time systems have great advantages over more traditional user surveys and studies that may take years to yield results, during which time administrators and officials will have turned over. Rapid feedback can help to focus the bureaucracy and feed into systems that rate providers on service delivery, increasing competitive pressure for improvement.

Although elements of the approach could be included in many programs, not all jurisdictions will have the motivation and capability needed to operate a full real-time governance feedback system. While JAM opens up new possibilities for real-time governance, cases suggest that there are some preconditions for such systems to be effective.

- First is sustained political will, to prioritize service delivery over other political interests. The successful cases studied for this report benefited from support at the highest levels of government. This is needed to counterbalance the tendencies for lower levels of the administration to work against such a governance system, since it severely constrains their discretion.

- Second is program and funding stability, together with a degree of preexisting capacity. Reforms of this type typically take several years to transition to steady-state systems. Feedback loops will not resolve problems that originate outside the delivery system, such as erratic funding or severely disrupted supply chains (see the fertilizer reforms in Nigeria and Zambia in Chapter 4). In a low-performing program, a real-time feedback system would probably be overwhelmed by complaints and quickly become ineffective.
- Third is the social and political acceptability of ID systems with the capabilities of Aadhaar, together with the retention of transaction records to build large data sets. Only now are governments, as in the case of Andhra Pradesh, beginning to grapple with the question of how to manage the data generated by their reforms.

Ensuring the long-term political sustainability of real-time feedback systems is difficult, but transparency can help build citizen demand and buy-in. The real-time governance cases studied in Chapter 6 feature real-time aggregated scores based on beneficiary feedback, but some of these are only visible internally. The results generated by feedback systems will need to be readily available and easily accessible to the public to establish it as a citizen expectation and a useful tool for civil society.

Cross-cutting goals: Gender equity and financial inclusion

Even as digitizing programs can contribute to more effective service delivery, it can support women's empowerment and provide a stimulus to financial inclusion. These are useful steps towards the goal of changing gender norms, although this is a much longer-run proposition.

While this report focuses on service delivery in general, several programs are particularly significant for

women. These include the LPG cooking gas program, which aims to improve time use and health outcomes for women; Rajasthan's Bhamashah program designates women as the head of household for program purposes; Bangladesh's program to provide education supplements to women through mobile phones; and Pakistan's BISP program to support poor women. The case of Andhra Pradesh highlights the role of women in the new digital economy as business correspondents of commercial banks.

A growing body of evidence shows that women and other marginalized groups such as ethnic and linguistic minorities, as well as differently abled persons, face extra structural barriers to adopting the JAM components. This report shows that globally, the 8.0 percentage point gender gap in financial inclusion would close by 5.5 percentage points if women had the same socioeconomic characteristics as men (the same level of education, income, workforce status, etc.). Women's economic empowerment through education, workforce participation, and access to mobile technology would contribute significantly to closing the gaps.

Surveys paint a broadly favorable picture in most cases but point to the need for attention to the constraints on women that limit their agency. This can dilute the gains from digitizing programs or even cause more difficulties. Programs like these can improve women's lives even though the immediate outcome may represent only a modest step towards the ultimate goal of gender equality. But multiple overlapping attributes can contribute to individuals falling below an "agency threshold" needed to benefit from the reform. For example, if the shift towards digital services and payments reinforces structural barriers to financial access rather than providing alternative solutions, reforms can reduce women's agency. Measures may be needed in multiple areas; the gender gap in mobile ownership, for example, appears to be related to that in financial inclusion and is of similar magnitude. Technology can help to ensure that women receive their benefits in person (as in the Pakistan case in Chapter 5), but they may still face particular hurdles

to accessing service points to cash out transfers, or to transacting independently.

The road from digital transfers to full use of financial accounts is long, but specific measures can help. By and large, very few of the women receiving transfers into bank or mobile money accounts are doing more than cashing them out. They are financially included, but more in a formal sense than in a real sense. This is not unexpected; it will take time to build experience with the saving, payments, and other services that financial accounts can offer, as well as to build the wider acceptance system for payments. Digital and financial literacy is a hurdle for many women; partnerships with self-help groups and NGOs could help to improve these capabilities and empower them to function in the digital economy. Government can complement this with active measures to link the provision of mobile phones to programs and to support the provision of messaging and interfaces in the local language (as shown in the case of Bangladesh in Chapter 5).

Combining policy and technology

Drawing from the SDG framework and analysis of cases, this report suggests several principles that can be helpful in formulating or assessing digital governance systems. Do they provide for universal access? Do they embody clear accountability for performance? Do they empower beneficiaries by providing them with choice over service provider and effective voice? Does the design of reform exploit the potential for favorable externalities, such as gender equity and women's economic empowerment? Each of these elements has both a policy design and a technology component that should be considered together to achieve better developmental outcomes (Table 2).

Concluding comments

There is a large unfinished agenda to extend JAM access and use. JAM cannot be used as a delivery platform for services unless it is widely accessible. While there has been spectacular growth in coverage, the

Table 2. Digital governance principles: Design and technology

	Policy design	Technology
Inclusion	<ul style="list-style-type: none"> • “No person left behind” principle • Address last-mile access issues and vulnerable groups • Shift from generalized approaches towards personalized interventions and instruments 	<ul style="list-style-type: none"> • “Bottom of digital pyramid” approach • Ease of use • Ability to reach last mile • Flexibility to facilitate progressive targeting
Accountability	<ul style="list-style-type: none"> • Identify vulnerable people and processes to monitor • Integrate clear human fail-safe option and processes in case of failure of technology including backup alternatives • Resolve queries and provide remediation quickly 	<ul style="list-style-type: none"> • Remedial alternatives if mainline approach fails • Use administrative data to document service transactions in real time and monitor service delivery, for example, to identify cases of exclusion • Link to performance measures, including from beneficiary assessments
Choice	<ul style="list-style-type: none"> • Offer multiple agencies/channels to access benefits (portability) • Restructure incentives to encourage service and to promote competition between providers 	<ul style="list-style-type: none"> • End-to-end digitization of front-end delivery systems as well as supply chains • Use authentication capability of ID system to render service entitlements fully portable • Develop option for personalized choice over in-kind to cash transition
Voice	<ul style="list-style-type: none"> • Integrate digital feedback loop (both implementing agency and beneficiary) as well as user surveys of perception and experience • Identify and address inclusion and accountability gaps 	<ul style="list-style-type: none"> • Personalized feedback systems including text messages, robocalls, interactive voice response, etc., along with human interface • Ratings of service quality and providers • Integration in digital dashboards for monitoring, accountability, and redesign
Externalities	<ul style="list-style-type: none"> • Identify desirable externalities and combinations, for example, women’s empowerment and financial inclusion • Design intervention to favor such outcomes in addition to efficiency and inclusion 	<ul style="list-style-type: none"> • Assess technology access, capabilities, and gaps in terms of externality objective • Explore special measures to complement technology rollout to increase access and use (for example, financial literacy classes for women)

cross-country picture is uneven, including in reaching the poor and vulnerable groups who are often the highest priority for service. Similarly, the wide gap between leading use cases and others indicates how much further there is to go in using JAM to reform citizen–state engagement. Addressing this challenge will require strategic approaches that build on natural synergies, especially since ID systems, mobile communications, and payment systems are multiuse platforms that can be applied to many programs and services.

Governance will need to evolve as citizens increasingly adjust to—as well as demand—“digital first” interactions with the state. There are still many

questions around the longer-run implications of digitization. While digitization of government payments has been motivated largely by the objective of governments to improve the efficiency of public expenditure, we have yet to see its impact on revenue mobilization, especially in developing countries. To what extent ubiquitous citizen–state digital payments (both G2P and P2G) would lead individuals to change their preferences for cash versus financial transactions is also an open question. The impact of digitization is complex—for example, the trade-offs between greater transparency and accountability of transactions enabled by digital ID and payments on the one hand and the incentive to deliver better services by those who

benefited from the previous system on the other. Digitization would entail significant realignment of incentives between the government, its intermediaries, and citizens.

More monitoring and research are needed as the use of JAM extends to more countries and programs. While this report has sought to build on

available evidence, this is still sparse. Few system reforms are adequately monitored, so provision for this—including client surveys—should be built into their design at the start. There is also a need to better understand how the shift towards digital mechanisms influences social and gender norms over the longer run.

Chapter 1.

Citizens and States: How Can Digital ID and Payments Improve State Capacity and Effectiveness?

In Bangladesh, a mother can now receive her child's education supplement through her mobile phone account instead of having to stand in long lines at the school on a prearranged day for a cash handout. Not only does this save her time and effort and provide accurate and documented payment, but it also relieves school officials of a burdensome administrative process and of the risk that—rightly or wrongly—they may be accused of corrupt handling of funds. In Kenya, a farmer can invest his or her savings directly in a small slice of a government bond through a mobile phone. He or she can become eligible for a small loan on the basis of a stable record of receipts and payments on his or her mobile account without posting collateral. In Andhra Pradesh, a state in India with 50 million people, the authorities can drill down through statewide administrative reporting data, in real time and across thousands of delivery points, to monitor the provision of rations to poor beneficiaries. They can detect transaction failures almost immediately and ensure rapid follow-up and remediation.

Digital technology, notably in the areas of identification (ID), mobile communications, and finance/payments, is impacting societies and economies across the developing world in many ways. Technology has increased the reach of ID systems and mobile networks and helped to increase financial inclusion in many countries; it has also boosted capabilities in each area. This is changing the ways that citizens and states can interact and transact business with each other across a wide range of programs and services.

This transition towards digital governance and service delivery is not without its risks. As shown by many examples of success and failure, technology is not a silver bullet. Its impact in any given application will depend on many contextual factors, including the objectives to which it is applied and the details of implementation. Each of the three technologies erodes the anonymity of users, enabling better tracking of transactions and locations. There is also the risk that some will find the new systems and approaches difficult to navigate and that innovations intended to empower marginalized groups will end up marginalizing them further. But at the same time, the transition offers new levers to states to implement a wide range of policies and programs, to increase effectiveness and accountability, and also to include many who have been effectively shut out—whether because of lack of recognition, or high transactions costs, or the inability to monitor delivery and ensure that payments or other services are delivered accurately, to the right person, and at the right time.

This paper considers the potential of digital technologies, particularly in the areas of identification, mobile communications, and finance/payments, to improve the capacity and effectiveness of states and to support more effective and accountable interactions between citizens and states and more efficient and inclusive programs. The interactions can be of several types. One category, such as pensions, child allowances, or education grants, involves government-to-person or G2P payments. These can be unconditional (proposals

for a universal benefit, as in India), categorical (grants to women only, as in the BISP program in Pakistan, or child support grants and pensions, as in South Africa), or conditional (the Bangladesh education supplements, which require children to attend school). Another category involves the use of vouchers, whether for the purchase of food and essential supplies (the US SNAP program), clean cooking fuel (India's LPG program), fertilizers (the digital voucher programs of Nigeria and Zambia), or other prescribed commodities. A third category is the direct, in-kind provision of essential commodities (India's PDS system) or services such as health or education. Yet another group of interactions are those that involve person-to-government or P2G payments (more generally, person-provider payments), as are common in many countries, whether for vehicle registration, passports, hospital care, school or examination fees, access to public recreational facilities, or taxes.

Our objective is not to cover this huge field exhaustively or to advocate for particular modalities—for example, whether to require conditionality for social grants, whether to replace in-kind food ration programs with cash grants, or the merits of education vouchers relative to public schools. These questions have been much debated and researched, and other studies have covered them more completely and authoritatively than we can hope to do. In general, the literature does not provide clear and universal prescriptions, either on conditionality or on the debates over cash versus vouchers versus in-kind provision. Context matters, as do the objectives of a particular program.² The aim of this paper is, rather, to consider

2. Attanasio, Oppedisano, and Vera-Hernández (2015) summarize arguments for and against conditionality in cash transfers. One view is that if cash transfers are desirable, for redistributive purposes or to alleviate liquidity constraints, conditionalities would not be required as households would allocate the grants to their most efficient use. An alternative view is that conditionalities promote investments in some activities that should be subsidized, either because of positive externalities or because of the failure on the part of the parents to recognize the long-run returns to such activities. Conditionalities can increase the cost of running programs but may also provide a political justification that allows their survival. Alderman, Gentilini, and Yemtsov (2017) provide an extended analysis of another debated area—the arguments for cash transfers versus food vouchers versus food rations. Here the prime focus hinges on the impact on nutrition, but the authors recognize other, perhaps complementary, objectives, such as ensuring national food security.

the potential for digital technology that enables three things—the precise identification of all parties to an interaction; low-cost communications; and accurate, accountable, and convenient payment processes—to help reform citizen-state interactions across any of these modalities.

Having said this, there is, however, one clear implication of the shift towards digital technology for policy design. Combined with accurate identification, digital payments enable benefits or subsidies to be personalized, rather than relying on blunt, indiscriminate mechanisms like controlled prices. As is widely recognized, price subsidies have many undesirable side effects and distortions, and they tend to be inequitable because richer consumers use more of the subsidized commodity than the poor. The benefits from precise personalization of interventions is an important theme, and perhaps especially relevant in the context of natural resource pricing and sustainability.

Beyond this, it is less easy to assert that digital technology provides a conclusive argument for one modality over another. At first sight, it appears to provide an edge to interventions that stress payments or vouchers rather than the direct provision of goods or services, because payments become so much more accurate and accountable. But in an age that has seen huge improvements in logistical efficiency and the emergence of Amazon, eBay, and Alibaba, this may not always be the final word. As noted by Alderman et al. (2017):

[I]n-kind assistance has not benefited to the same extent as cash transfers from knowledge-sharing and learning platforms. This is an area where countries could greatly benefit in exchanging experiences from reform processes, program design, and implementation.

We therefore see digital mechanisms as providing platforms that are broadly applicable to a wide range

On the question of school vouchers, Epple, Romano, and Uquiola (2017) present a comprehensive review of the economic literature. While they find that, in general, the competition induced by vouchers tends to improve the performance of public schools, the evidence is not conclusive enough to warrant recommending that vouchers be adopted on a widespread basis.

of approaches and programs, and as facilitating a more flexible approach to service delivery, including expanding citizen choice over the appropriate form of intervention.

Development themes: From MDGs to SDGs—with JAM

“Strengthening state capacity” is a nebulous concept. Capacity for what? Is a capable state necessarily a “good” state? Many examples suggest that the answer is not necessarily yes, and that some “capable” states have also been heavily repressive. Capacity can only be understood and assessed relative to some specified objectives. For these, we can turn to the global development consensus, as embodied first in the Millennium Development Goals (MDGs) and later in the Sustainable Development Goals (SDGs). In important ways, the latter are far more than simply an extrapolation of the former.

As a first difference, the SDGs marked a quantum leap in aspirations. The MDGs were oriented towards reducing extreme income poverty and various other measures of severe deprivation. Their targets were broad, mainly related to achieving specified rates of progress—to reduce severe poverty, bring down infant and maternal mortality, and improve other development indicators. It was never completely clear whether the goals should be interpreted as global ones (would the MDG criteria judge development as a success if almost all global progress could be attributed to China?) or as distinct concerns at the level of each region or individual country—or province, or municipality?

In contrast, the SDGs represent a critical conceptual shift away from focusing on improving global trends and towards universal inclusion—the philosophy that successful development requires that no one be left behind. Even accepting this—and the enormous increase over the MDGs in the numbers of specific goals and targets—as more aspirational than realistic, the level of ambition and scope of the SDGs throws the

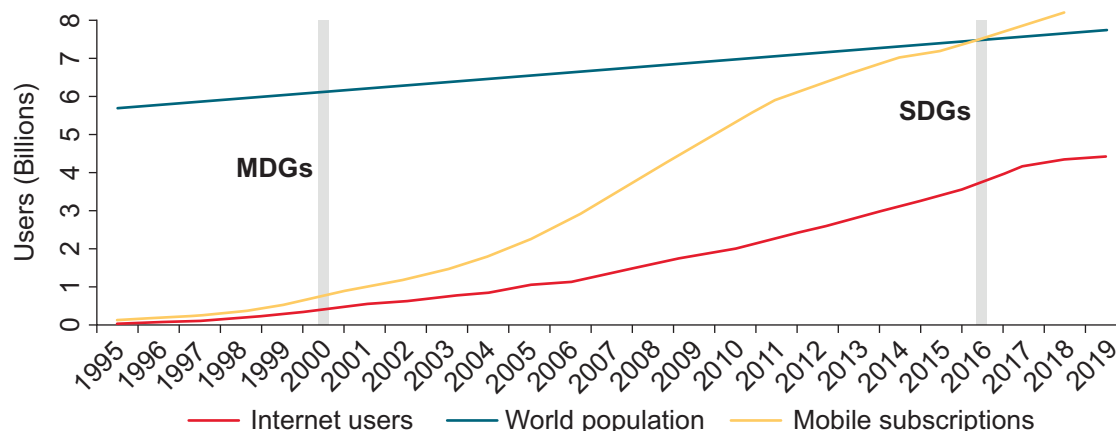
relationship between citizens (in the sense of individuals) and states into sharp relief. The explicit focus on inclusion signals a shift towards a rights-based view of development even if the goals and targets are not explicitly framed in this way. There is a fine line between declaring that everyone should have adequate social protection or health care or access to a “good job” and asserting these as rights.

A second difference is that, in contrast to the MDGs, the SDGs explicitly recognize the importance of access to digital technology. This evolution is not surprising, as the period between the announcements of the MDGs and the SDGs was one of enormous advances in this area. The MDGs were announced at the 2000 Millennium Summit, but they originated earlier, in the report *Shaping the 21st Century* (Development Assistance Committee, 1996). At that time, digital technology had only begun to gather momentum from its modest beginnings. In 1993 the volume of digital data was barely 3 percent of the global total; by 2000 its share had risen to 25 percent, and by 2002 to 50 percent. A mere five years later, it was estimated that 94 percent of the world’s information storage capacity was digital.³ By the time the SDGs came of age, the development community was enveloped in a digital world, with as many mobile subscriptions as people and about half of the global population using the internet. The spread of mobile technology has been astonishing, including in poor countries; mobile phones are becoming a key mode of interaction between citizens and states, as well as between private parties. Figure 1.1 shows global trends in mobile and internet use for the 2000–2016 interval between the MDGs and SDGs (the interval marked by vertical lines).

A third difference is recognition of legal identity for all individuals as a goal (Goal 16.9), although the appropriate indicator is still a matter of some debate. This, too, responds to facts on the ground. The period since the announcement of the MDGs has seen a huge

3. <https://www.forbes.com/sites/gilpress/2015/12/27/a-very-short-history-of-digitization/#7f666c2349ac>.

Figure 1.1. From MDGs to SDGs: Mobile subscriptions and internet users



increase in the focus on ID systems and development. Since the start of the new millennium, more countries have initiated national-level ID systems than ever had them before (Gelb and Diofasi Metz, 2018). Not all are geared up to provide full “digital ID” or remote digital authentication, but many have this potential, and the vast majority embody digital technology in various ways, including biometrics to ensure that registered identities are unique.⁴ The number of application-specific, or functional, ID systems has also boomed, spurred on by the needs of different programs as well as global concerns around security following the 9/11 attacks on the World Trade Center and the Pentagon.

As one consequence of the digital revolution, there has also been an upsurge of attention to financial inclusion and the provision of digital payments and other financial services. This has involved both the onboarding of new customers through mobile money and the provision of mobile banking and payments for established customers of more traditional banks. As defined by Perlman and Wechsler (2019):

4. Digital ID or e-ID is usually taken to mean the ability to authenticate individuals using digital mechanisms, either remotely or in person by a frontline service provider. While this may be the wave of the future, few systems yet have this capability, even though most now use digital technology in essential ways, including to ensure that identities are unique by biometric de-duplication.

Digital Financial Services (DFS) is a relatively new, low-cost means of digital access to transactional financial services. Aimed at those at the Bottom of the Pyramid (BOP) in developing and emerging countries and with an aspirational goal of improving financial inclusion, it shifts provision of financial services from primarily banks to non-banks, with the core access to services using a mobile phone.

The trinity of ID, mobile communications, and finance/payments—the so-called JAM trinity in India⁵—has been engaged in many countries to help “digitize” a wide range of government programs, including those that provide transfers, subsidies, and other benefits. The JAM functionalities may be applied in different ways depending on country-specific conditions and the needs of particular programs. For example, because of Aadhar’s cardless design, mobile is used extensively in India to authenticate beneficiaries of government programs against the central database, while most other countries use ID card-based systems. On the other hand, “mobile money” provided through new regulatory arrangements and relationships between mobile network operators (MNOs) and banks is more prevalent in East Africa than in India, where finance is still

5. The acronym JAM stands for Jan-Dhan financial accounts (accounts opened for direct payment of government benefits), the Aadhaar ID system, and Mobile communications.

bank-based, although there too the number and value of digital payments are increasing rapidly. Such differences, while important, do not detract from the broad commonality in the direction of digitization across many countries. For convenience, we refer to the trinity by its Indian acronym (JAM) but as a common term in a broader global context.

For development applications, we can look for the main linkages between the SDGs and JAM. These are set out in Box 1.1 and are grouped into six thematic clusters. The first cluster sets out the goals relating to universal access to JAM itself—to identity, mobile communications, and financial inclusion. Universal JAM is therefore an intrinsic SDG aspiration in its own right, as well as an instrument to help achieve other SDGs.

These intrinsic and instrumental aspects of JAM are closely related. Governments cannot move programs, services, and other interactions with citizens onto a digital platform unless people are digitally included and able to use the systems. But, conversely, government programs can provide a powerful stimulus towards universal JAM, increasing demand for ID, mobile communications, and finance/payments, and at the same time supporting the wider rollout of these services.

The clusters in Box 1.1 can be used to set out policy areas where reforms and program implementation can be most closely related to JAM. The second cluster concerns natural resource management and environmental sustainability. These are areas where pricing policies are key. One important use of JAM is to help move towards efficient prices—with equity—through shifting from price subsidies towards individualized vouchers or transfers. The third cluster involves the broad area of social protection, including both the provision of G2P cash payments and in-kind commodities or services. The fourth considers the role of frictionless private-government, or P2G, payments to facilitate a range of critical public services as well as better tax administration. The fifth cluster covers

more accountable governance, with less corruption and higher citizen satisfaction with the quality of service.

Finally, the sixth cluster, women's empowerment and gender equality, can be an important consideration in the design of digital reforms, even when their main focus is not necessarily on this issue. Globally, surveys suggest a 1.4 percentage point gap in identification coverage, a 6.0 percentage point gender gap in financial inclusion, and an 8.1 point gap in mobile phone ownership between men and women. Throughout each chapter, we consider how gender differences reflect structural barriers that impede uptake among potential users. Getting to universal JAM coverage presents a challenge and an opportunity for women, but there is a need for policies that facilitate their engagement with digital public service delivery platforms.

Cautions: No “silver bullet”

Before proceeding further, some qualifications are needed. First, it is not a new message that context matters more than technology in the application of technological “solutions.” Technology is a tool, and by their nature tools help do tasks better; on its own, technology does not necessarily lead to better policies or to stronger implementation—and it can also be used to implement bad policies more effectively. Technology expands the policy possibility frontier—the set of policies that government is able to implement—but successful outcomes depend on the objectives to which technology is applied and how effective and inclusive the systems are that use it. The importance of political economy factors is evident, for example, in the uneven results of projects to install financial management information systems (FMIS) to strengthen public financial management (Cangiano, Gelb, and Goodwin-Groen, 2019). This theme—that technology is a tool rather than a solution—emerges clearly from the cases considered below.

Second, even as we stress potential benefits, we need to recognize the potential downsides to a JAM-based

Box 1.1. SDGs Related to Digital ID, Mobile, and Payments

Cluster 1. Access to JAM

16.9 By 2030, provide legal identity for all, including birth registration; 17.8 Enhance the use of technology, in particular ICT; proportion of individuals who: own a mobile telephone; are covered by a mobile network; use the Internet; 8.10 Strengthen the capacity of domestic financial institutions to expand access to financial services for all; proportion of adults with a financial account or with a mobile money account

Cluster 2. Efficient Pricing and Sustainability with Equity

12.2 Achieve the sustainable management and efficient use of natural resources; 12.c Rationalize inefficient fossil-fuel subsidies, phase out to reflect environmental impact, and minimize the possible adverse impacts on the poor; 11.6 Reduce the adverse environmental impact of cities, including air quality; mortality rate attributed to household and ambient air pollution; 15.2 Sustainable management of forests, halt deforestation, restore degraded forests; 6.4 Increase water-use efficiency

Cluster 3. Poverty, Social Protection, and Service Delivery

1.3 Implement social protection systems for all; 1.3.1 Proportion of population covered by social

protection systems; 2.1 End hunger and ensure access to safe, nutritious, and sufficient food

Cluster 4. Frictionless Payments

17.1 Strengthen domestic resource mobilization; 1.4.1 Proportion of population living in households with access to basic services; 3.8.2 Number of people covered by health insurance or a public health system; 10.c Reduce remittance costs to less than 3 percent

Cluster 5. Effective and Accountable Governance

16.6 Develop effective, accountable, and transparent institutions at all levels; 16.5 Reduce corruption and bribery in all their forms; proportion of persons who had at least one contact with a public official and who paid a bribe to a public official, or were asked for a bribe during the previous 12 months; proportion of the population satisfied with their last experience of public services

Cluster 6. Gender-Related

5.a Give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance, and natural resources; 5.b Enhance the use of enabling technology, in particular ICT; to promote the empowerment of women

approach. One risk is the further exclusion of poor and vulnerable groups. More rigorous identification or authentication requirements can exclude their members, even without intending to do so. Technology makes it easier to deliberately exclude particular groups even as it facilitates the inclusion of others.⁶

6. One example has been the Dominican Republic, where the rollout of a strengthened ID system facilitated the loss of de facto nationality for many residents of Haitian origin even as it supported the inclusion of many poor Dominicans into the national social safety net (Gelb and Diófasi Metz, 2018).

The poor may face a digital divide. Can they afford mobiles? In patriarchal societies, do women have access to mobiles and the agency to use mobile money independently? Identification systems, the extensive

Another potential example could be the rollout of Aadhaar in Assam, a state where the legal status of many longtime residents is uncertain. The Aadhaar does not constitute proof of national status or even legal residence, but by linking Aadhaar numbers to the determination of status, it can be a powerful tool to exclude noncitizens from a very wide range of services. See <https://scroll.in/article/902731/grey-area-assam-seeks-to-merge-nrc-claims-process-with-the-collection-of-biometric-data-for-aadhaar>.

use of mobile technology, and the replacement of (anonymous) cash by digital payments can facilitate profiling, as well as transactional and location tracking. These systems generate massive amounts of data, which can raise threats to privacy. From the government's perspective, the ineffectual implementation of digitization programs that serve no useful purpose can lead to wasted resources. And, even as digital technology has the potential to increase state capacity, it imposes new capacity requirements on states to regulate the area (Ndung'u, 2019) and to manage data, as well as capacity requirements for citizens who need to be able to access payments, services, and information in new ways.

Third, just as technology is a tool that can increase efficiency, when combined with vast amounts of information, it also amplifies power. The ability to collect, aggregate, and analyze large volumes of data shifts the balance of power towards those who are able to draw insights and take action.⁷ While this creates new opportunities for states to improve governance, not all of them may be benign in the design of their policies based on the information collected. Citizens and states must continue developing new ways to constrain and balance power so that governments serve the needs of citizens through the appropriate use of technology.

A final caution is that this is a rapidly evolving area. Only a few use cases have been rigorously researched, and these tend to be in relatively few countries. India has emerged as a country of special interest, a global laboratory for the deployment of digitized programs, often at great scale.⁸ But other countries also offer useful examples, including the remarkable cases of the rollout of mobile money in East Africa, Bangladesh, and some other countries, and the use of e-vouchers to reform pricing policies in others. This paper does

not try to be all-encompassing but draws on selected examples for their policy lessons. The following sections of the paper correspond, broadly, to the clustering of SDG goals and targets set out in Box 1.1.

A picture of JAM coverage

Citizens and states cannot interact with each other through JAM if people do not have ready access to its components. This is particularly important for the poorer and more excluded sections of society, who most need the benefits, services, and access that technology is intended to provide. Drawing on information in Findex surveys and other sources, Chapter 2 develops an index of JAM inclusion—the first SDG cluster in Box 1.1. Even as ID systems and digital access have spread across the world, there are still many who lack access of some, or all, of the trinity. These include many of the poorest and most vulnerable, who are most in need of the support and services that governments need to provide.

Inclusion into the components of JAM is shaped by a range of country-level factors and layered attributes at the personal level. Individuals who are rich, male, in the workforce, and well educated are very likely to be financially included, especially if they also have an ID and a mobile phone. Conversely, poor women not in the workforce and with little education are unlikely to have an account, especially if they do not have an ID or mobile phone. In terms of individual coverage, the various JAM components tend to come together. As well as supply-side policies, demand-side measures, such as providing social transfers through financial service providers, can help to boost inclusion for less favored groups. Women in particular confront large gaps in mobile ownership in some countries, as well as in financial access.

Of course, coverage is not a sufficient metric. Quality dimensions are also important; the capabilities of an ID system (and how it handles grievances and authentication failures), the reliability and speed of mobile connectivity, and the convenience and interoperability of

7. For example, it is often feasible to identify individuals based on fully anonymized data. Kondor, Hashemian, de Montjoye, and Ratti (2018) were able to match mobility metadata to individuals at a 17 percent success rate with one week of observations, increasing to over 55 percent with four weeks.

8. By 2018 some 600 million people had been enrolled in direct benefit transfer (DBT) cash transfers and 700 million in DBT in-kind transfers using digital mechanisms, including Aadhaar identification. See <https://www.cogitasia.com/modi-reform-scorecard-dbt-checks-the-right-boxes/>.

financial and payment systems can be as critical as the level of access, although they are less systematically documented.

Policies towards universal JAM

As set out in Chapter 3, there are strong synergies between the three components of JAM as well as two-way supply-side and demand-side drivers between JAM and its use in the delivery of public services. The combination of ID, mobiles, and finance/payments is greater than the sum of its parts. Impediments to one component will impede demand for the others, while access to any one component makes it easier to roll out the others. In many countries, the need to register SIMs is the greatest stimulus to acquiring an ID, with KYC requirements for a financial account not far behind. Conversely, having an effective ID system can cut the cost of onboarding clients for mobile and financial services. There are also powerful economies of scope—the provision of mobile financial services, as well as voice and data services, boosts the business case for constructing cell towers to expand mobile coverage. Routing government-to-person (G2P) payments through bank or mobile accounts can help drive financial inclusion and encourage competition, especially if recipients have a choice of payments provider. Conversely, a wide range of fee-for-service programs, whether for health, education, driver's licenses, passports, or access to national parks, can be facilitated by frictionless and accountable digital P2G payments—the fourth SDG cluster noted in Box 1.1.

In areas related to JAM there will typically be at least a dozen different agencies and regulatory bodies, in addition to the many ministries and agencies responsible for the government programs and services that can use JAM. The synergies argue for a strategic view of how best to increase access, using both supply-side and demand-side policies. Because of the importance of individual attributes in coverage, active measures will be needed to ensure that the most vulnerable

groups are included. A full treatment of policies is beyond the scope of this paper, but this section concludes with a compact list of the main policy directions for accelerating universal access to JAM.

Towards sustainability: Efficient pricing with equity

Even after the decline in energy prices from peak levels, budgetary and economic subsidies continue to be a major concern in many countries. In addition, countries have been slow to levy “green taxes” to price fuels to reflect the impact of emissions on climate change, health, and other externalities. Pricing policy is a more general issue; many governments offer price subsidies on other products with environmental effects, such as fertilizers, or fail to price valuable natural resources, such as water or forests, to reflect their scarcity and the environmental services they provide. Failure to implement “efficient” pricing that takes externalities into consideration creates massive misallocation losses and compromises several SDG goals and targets.

While there are many challenges to implementing efficient pricing policies, an important one is how to do so in an equitable manner—the second SDG cluster in Box 1.1. Even though the poor may consume less energy than the rich, fuels and energy-intensive items can account for a sizable share of their spending. As set out in Chapter 4, JAM can help to personalize compensatory subsidies through direct transfer programs or vouchers, and to reform pricing in areas such as fuels or fertilizers. This enables efficient pricing policies to be implemented in an equitable way. As shown by the case of India's massive LPG program, which shifted from price subsidies to a form of voucher, it can also facilitate new approaches to targeting, increasing savings that can then be used to expand coverage to the poor. But technology does not make policy; there is no guarantee that countries will respond to this expansion of the policy possibility frontier to improve sustainability, efficiency, and equity.

Social protection and associated goals

Chapter 5 considers the third cluster of SDGs in Box 1.1, related to the more efficient and equitable implementation of a range of G2P transfers and in-kind benefits. Digital delivery can improve the performance of both these modalities along some critical dimensions: better service, user convenience, and choice of provider, and possibly fiscal savings. But cases also show that results are heavily dependent on the institutional context, the objectives of the reform, and whether incentives are also addressed along the delivery chain as this is digitized, to encourage service providers to reach out to their clients. Ill-designed reforms can raise transactional costs and access barriers for poor beneficiaries, thus increasing exclusion. One priority is for accurate and timely monitoring of performance, particularly as it impacts beneficiaries. Placing fiscal savings as the sole, or even the dominant, objective of the reform is likely to result in worsened service and perhaps exclusion. Far better is to seek to improve efficiency and delivery, and to reap savings in the process.

With the population financially included, fee-for-service programs can be facilitated by frictionless and accountable digital P2G payments, as described in Cluster 4 of Box 1. While we do not address this in detail in this report, the available literature suggests the need for an enabling digital payments acceptance ecosystem to reap the full benefits of digital G2P transfers. Because so many different regulatory agencies and service programs are involved, governments need to adopt a strategic approach based on JAM as an integrated platform for service delivery and governance, not only to increase efficiency of public expenditure but also to improve its capacity for mobilization of domestic resources through taxation. Each country starts from a different place, so the details will differ (as we illustrate in the cases of Kenya and India in Chapter 2), but the lessons from the cases presented here would be relevant for many countries.

Programs can also be structured to provide advantages to women, including launching their first steps on the

road to financial inclusion. At the same time, in strongly patriarchal settings they may face difficult problems of agency, not being able to exercise the opportunities that digital reforms are able to provide. This warrants careful attention in the design of reforms.

Towards real-time governance

With accurate identification, mobile communications, and payments, citizen–state interactions and payments can be tracked individually and in real time. Even as they raise certain risks, the huge volumes of data produced by such digital systems can be used to monitor performance and increase accountability. They can also facilitate rapid citizen feedback and choice between different service providers or, indeed, alternative programs.

Real-time feedback systems are not new. Major companies such as Amazon, Google, Walmart, and FedEx or UPS make extensive use of data analytics, including ratings. Some airports, too, are following Singapore’s lead by offering passengers the opportunity to signal satisfaction with security or check-in processes by choosing to press a button with a smiley, neutral, or frowny face. But in the development context, this area, related to Cluster 5 in Box 1.1, is still nascent. While some programs have moved towards collecting real-time data, few have yet developed comprehensive systems to analyze it in real time, to combine administrative data and customer feedback, and to cycle the information back to improve quality of implementation and accountability of government functionaries as well as frontline public service providers. These capabilities represent the most advanced phase of the digital revolution and are still very much at the frontier.

Chapter 6 draws on selected cases to consider digital governance and accountability, notably India’s LPG program and, in particular, the comprehensive systems developed in Andhra Pradesh. It also considers the preconditions for demanding systems of this type

to be effective. One is political will; administrative and customer feedback data cannot be effective in driving performance unless there is a commitment to use it for this purpose. The other is a reasonable degree of preexisting capacity; if this is lacking, feedback will overwhelm the ability of the system to respond to it. Yet another is whether the collection and analysis of

data on this scale is politically and socially acceptable. Full application might be beyond the present capability of many countries, but elements of the approach could be introduced into many programs. There is still a great deal to learn about the applications of JAM to strengthen state capacity, but this, in particular, is an area that warrants far more research.

Chapter 2.

ID, Mobile, and Finance: A Picture of Access to JAM

The UK government made Universal Credit the first major government service that is “digital by default.” . . . Many poorer and more vulnerable households are effectively offline . . . 21% of the UK population do not have five basic digital skills. . . . Universal Credit has built a digital barrier that effectively obstructs many individuals’ access to their entitlements. Women, older people, people who do not speak English and the disabled are more likely to be unable to overcome this hurdle. . . . As of March of this year, only about one third of all Universal Credit claimants could verify their identity online via GOV.UK Verify, a crucial step in the application process.

—Professor Philip Alston, United Nations
Special Rapporteur on Extreme
Poverty and Human Rights (2018)

States cannot effectively move their services and interactions with citizens onto a digital footing without ensuring that all have the means to access them. This can be a special challenge for the poorer and less connected social and economic groups that are the focus of many government programs. As shown by the example of Universal Credit in the UK, the problem of including all when systems transition towards new delivery mechanisms is not confined to poor countries. Over time, the coverage and capabilities of ID systems and mobile networks have been increasing, as has the number of people with financial accounts. But there are still many who lack one or more of the interrelated elements of JAM, and who will not easily be able to participate in programs that require them as conditions of inclusion.

This chapter considers the first cluster of SDGs in Box 1.1. It draws on data from the Findex 2017 survey

(Demirgüç-Kunt et al., 2018), as well as other sources, to set out a snapshot of the global coverage of JAM for 2017, the latest date possible, and explores factors associated with exclusion and gender gaps.

Data considerations

Creating an index of access to JAM faces challenges, set out in more detail in Annex 1. Survey data are lacking on some important countries. Measures of coverage—whether an individual has access to an ID, a mobile or SIM, and a financial account—do not account for the quality of the services these facilities are able to provide, including the capabilities needed to reduce transaction costs through the full use of digital technology. Each facet of JAM presents specific nuances to be considered.

- Is the ID system robust, and can it assure users that identities are unique? Should the measure focus on only one credential, such as a national ID (the approach in the Findex survey), or count a voter card or some other widely held credential that may offer a partial substitute (the approach in the World Bank’s ID4D database)? How to allow for the capabilities of different systems, including their ability to offer full remote digital authentication and e-KYC? Although almost all national ID and similar systems now use digital technology in many ways, only a few have these capabilities.⁹ How do the systems

9. Digital authentication can be defined as the capability to authenticate identity by digital means, whether in person at a service facility (Aadhaar) or remotely, using a mobile or other portable device (Estonia). Although most systems use digital technology in various ways, including biometrics to

protect personal data and remediate technology failure?

- Mobile access can be measured in several different ways, including the number of total active SIMs per (adult) population, the number of unique subscribers (which can be difficult to monitor in a country without a robust unique ID system), or the percentage of (adult) possession of a mobile phone. This may underestimate access since people may share mobile facilities, accessing services through a close family member. Potential access can be measured as the share of the population in areas with mobile coverage. The speed and reliability of connectivity constrains the range and quality of services that mobile can offer, including the convenience and reliability of digital payments.
- Financial accounts offer variable bundles of services and different levels of convenience to their holders. Some countries have moved towards full payments interoperability; in others it may be easier and cheaper to cash out and cash in again than to transfer funds across providers. Some accounts may be inactive, so that their number overestimates use-based financial inclusion.¹⁰ On the other hand, some people without financial accounts may have effective financial access through a close family member.

The JAM picture can also change rapidly at the country level, so that any survey is a transient snapshot. Malawi, for example, rolled out its national ID in late 2017, after the Findex survey, extending coverage to almost all adults (Malik, forthcoming 2020). India has seen a remarkable increase in the coverage of Aadhaar and mobile communications, as well as the proportion of

de-duplicate identities, only a few have the capacity and authentication ecosystem to enable fully digital or remote authentication, or to source personal data electronically to satisfy KYC requirements, thus bypassing paper documentation. The combination of ID, mobile, and finance can work in different ways, so that, for the purpose of assessing coverage gaps, we abstract from this question. However, as countries shift towards digital services and commerce, the capabilities of ID systems will become increasingly important. 10. Perlman and Wechsler (2019) note that while the number of mobile money accounts has been rising, so have levels of inactivity.

its population with financial accounts: financial access rose from 35 percent in 2011 to 53 percent in 2014 and to 80 percent in 2017, largely closing the gender gap in the process. As coverage increases, there will be an increasing focus on quality of services and capabilities rather than on simple inclusion numbers. But this should not distract attention from the remaining challenge of including all.

A global snapshot

Findex 2017 is the largest survey that can provide a combined picture of all three JAM components at the individual level. It covers 144 countries, but for the 2017 iteration it excludes Somalia, a country of great interest. For 45 countries the survey did not include a question on possession of a national ID. Most of these are high-income states, but the list also includes several important developing countries such as the Democratic Republic of the Congo, Ghana, Iran, Nigeria, and the Philippines. The individual-level analysis can therefore cover 99 countries that have individual-level data on all three components.

Population-weighted individual survey results for these 99 countries show that 93.3 percent of adults have a national ID, 80.0 percent own a mobile phone, and 65.9 percent have a financial account, that is, a bank or mobile money account. (As flagged in Box 2.1, this terminology differs from that in Findex, so that “financial inclusion” corresponds to having a “financial account,” which can include mobile money.) For women, the corresponding numbers are 92.6, 75.4, and 61.8 percent. This picture represents substantial achievement against the first cluster of SDGs set out in Box 1.1, Chapter 1. ID falls under 16.9 (legal identity for all), mobile phones under 9.c (increase access to information and communications technology), finance under 8.10 (expand access to banking, insurance, and financial services for all), in addition to the gender-focused cross-cutting 5.b (enhance the use of enabling technology, in particular ICT, to promote the empowerment of women).

Box 2.1. Note on Terminology and Weighting

Account types

We draw on the Global Findex for much of our data but use a different vocabulary to describe financial inclusion. Specifically, we discuss three types of accounts.

This differs from the Findex database labels, which reserve the term “Financial Account” for those with a bank or formal financial institution and treats the combination of these and mobile money accounts as “All Accounts.”

National IDs

The Global Findex measures whether people have a nationally defined identity card. There is significant heterogeneity in the types and quality of these IDs, which is discussed in more depth in Annex 1.

Mobile phone ownership

Information about mobile phone ownership is based on the Gallup World Poll survey, for which the Global Findex was a module.

Weighting

All statistics in this section are computed using population weights. In the micro data, each person comes with a sample weight that is relative to their own individual country. To arrive at the population weights used in our analysis, we aggregate weights by country. Second, each individual’s weight is divided by their aggregated national weight and then multiplied by the adult population of that country. To ensure that weights are not driving statistical findings, we test uniform country weights in Annex 2.2 and find that results are relatively stable for different weighting systems.

Financial: a transacting account that at the very least can be used to save money and make transactions. This includes both institutional bank accounts and mobile money accounts. However, this does not include accounts with a rotating credit and savings association (ROSCA) or, for example, department store-issued credit cards.

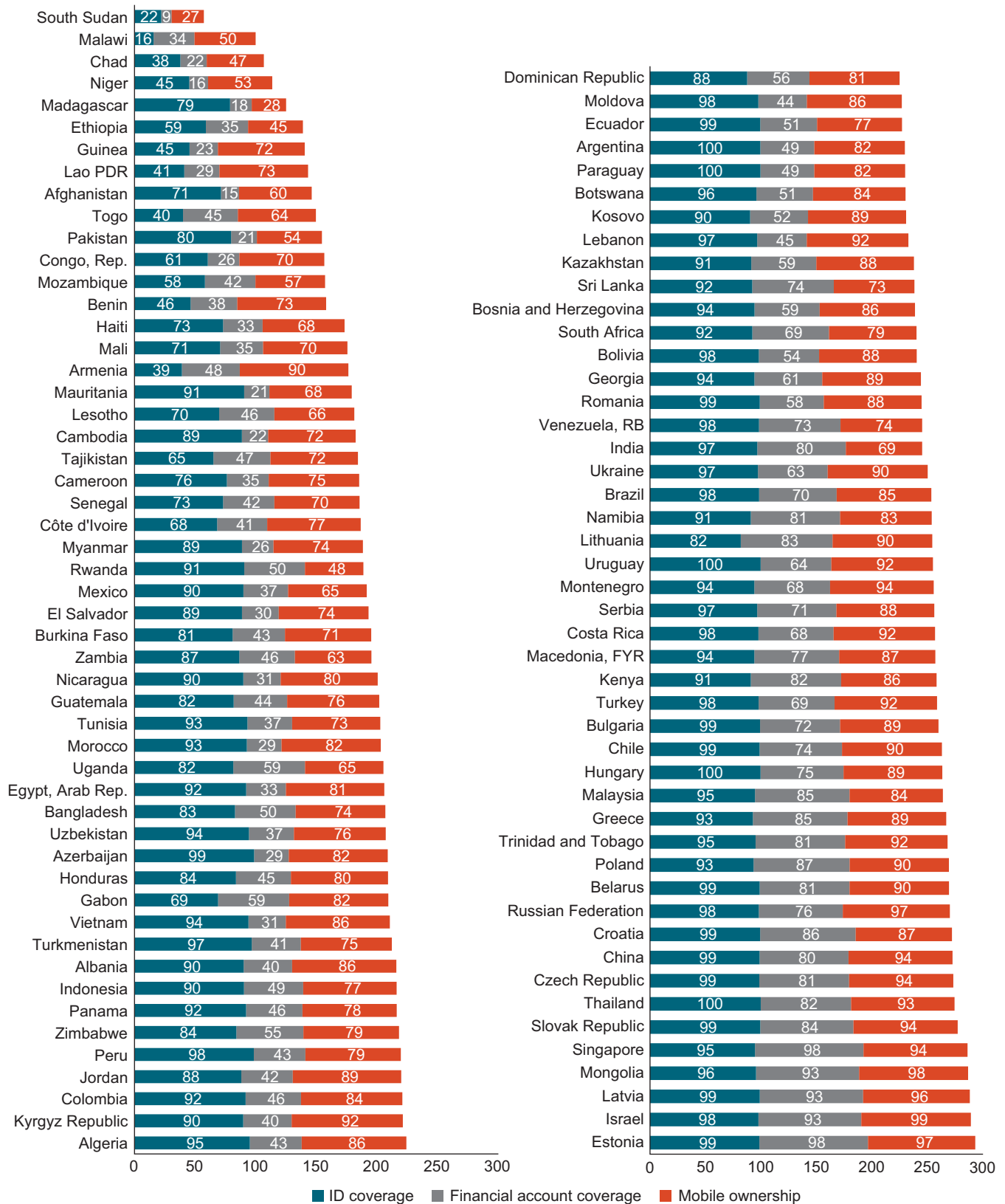
Bank: a transacting account with a bank or formal financial institution, “such as a credit union, a microfinance institution, a cooperative, or the post office (if applicable), or having a debit card” (Findex Glossary).

Mobile Money: a transacting account with a mobile money service that is included in the GSMA’s Mobile Money database.

Coverage varies substantially by country and region. Figure 2.1a stacks adult coverage for each component by country on a scale of 0–100 such that full coverage would represent a score of 300. Unsurprisingly, the score tends to rise with income levels—but there are outliers. Even as countries like Kenya are nearing universal access, some richer ones, like Mexico and Lao PDR, rank far lower than would be expected. Most

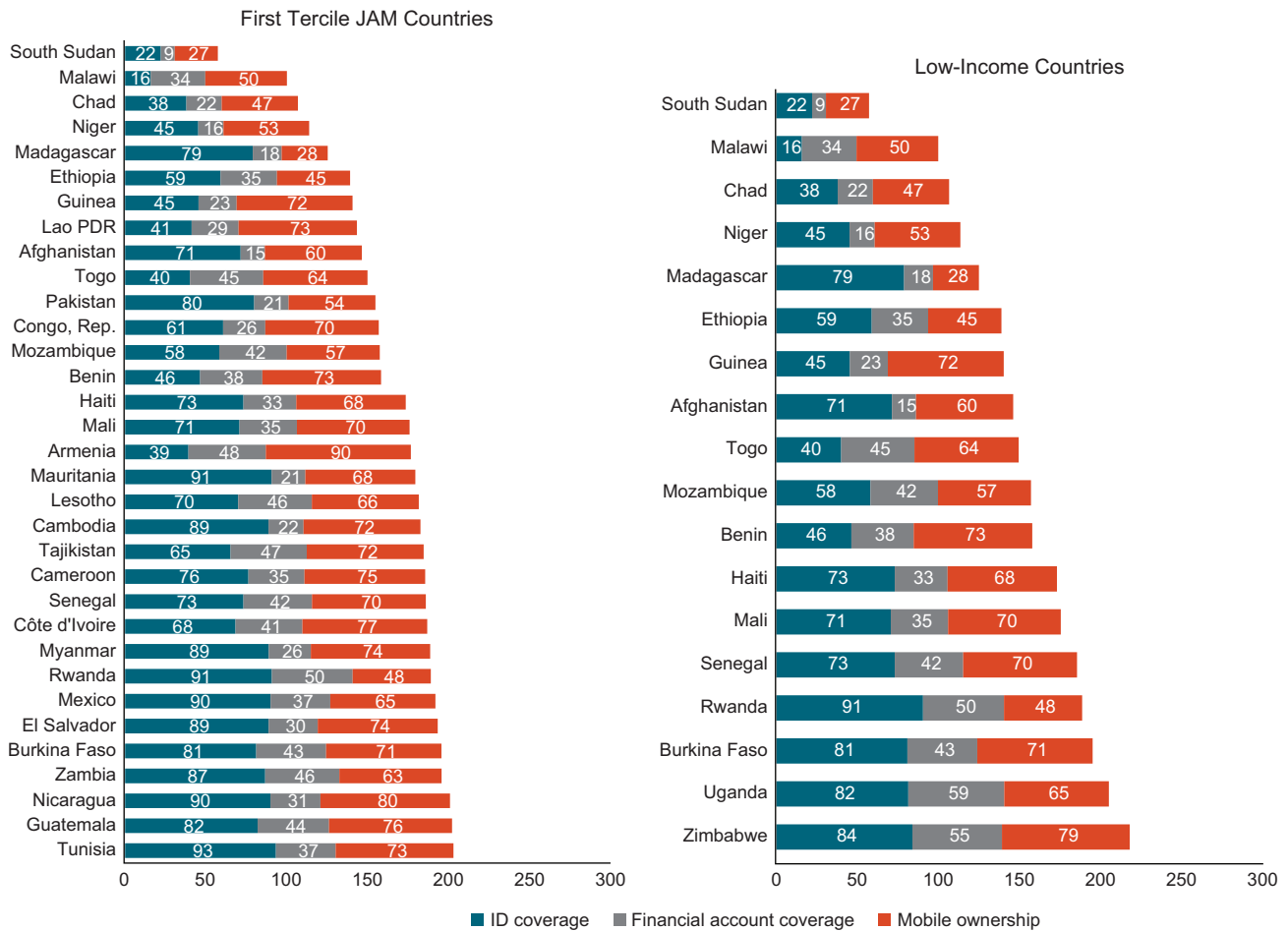
countries score between 200 and 300, and they consistently have higher rates of ID and mobile ownership than access to financial accounts. Only the top five countries have over 90 percent financial account ownership, so that financial inclusion and Goal 8.10 remain the major laggard of the three components. Only South Sudan and Malawi come in below 100, and Malawi’s successful ID registration in late 2017 and 2018

Figure 2.1a. JAM scores by country



Source: Findex 2017

Figure 2.1b. Subsamples of JAM scores



Source: Findex 2017

(Malik, forthcoming 2020) should see it leapfrog ahead in the next round of data collection. Figure 2.1b shows the distribution of JAM scores for the lowest tercile of countries and for the low-income countries, two subsamples that are considered separately in Annex 2.2.

Table 2.1 aggregates at the regional level. ID coverage surpasses 90 percent everywhere except in sub-Saharan Africa, where low levels are largely driven by fragile or conflict-affected situations. Mobile phone ownership lags in the same region, as well as in South Asia, where the exceedingly low rates of ownership among women in Pakistan, along with Afghanistan, pull down the regional average. Financial inclusion

lags everywhere behind the other two components. It is quite high in (relatively poor) South Asia, a consequence of the aggressive opening of Jan Dhan bank accounts in India to receive the proceeds of G2P payments, lower in the Middle East and North Africa, sub-Saharan Africa (SSA), and surprisingly low in (relatively richer) Latin America and the Caribbean. In the MENA region, Morocco (28.6 percent) and Egypt (32.8) pull down the regional average,¹¹ while Algeria, Jordan,

11. Some of this is due to the sample selection, which we have discussed elsewhere: Table 2.1 excludes countries that do not have data for national ID coverage but have higher account coverage, such as Iran (94.0 percent) and Libya (65.7 percent). Still, the spread of outcomes—especially for large countries—is worth considering.

Table 2.1. JAM components by region

	Overall			Gender gap**		
	Has a national ID	Has a financial account	Owns a mobile phone	Has a national ID	Has a financial account	Owns a mobile phone
World Bank region*						
East Asia and Pacific	97.1	72.3	90.5	-0.3	5.9	2.8
Europe and Central Asia	96.4	65.3	90.8	-0.9	6.1	2.7
Latin America and Caribbean	94.7	54.4	78.7	0.0	6.5	2.6
Middle East and North Africa	93.0	35.2	82.6	3.1	19.0	14.5
South Asia	93.3	69.9	67.7	2.7	10.6	21.6
Sub-Saharan Africa	69.7	45.0	62.8	9.2	9.2	10.8

* Excluding high-income countries.

** Calculated as proportion of men minus proportion of women.

Lebanon, and Morocco suffer from gender gaps of over 20 percentage points in account coverage.

Figure 2.2 shows relationships with income at the country level. While most countries report reasonably high ID coverage, the strugglers are not limited to the poorest countries. Panels B and C show clearer relationships between mobile and financial access and income, although the dispersion around the trends is considerable. The strongest relationship at the national level is between income and financial inclusion. In the poorest countries, only around 30 percent of adults will typically hold a financial account, but mobile phone ownership of 60 percent is not unusual, even in a poor country.

The state of financial inclusion in SSA has some distinctive features. It is relatively high in a number of countries, including Kenya, Uganda, Tanzania, and Zimbabwe, largely due to the prevalence of mobile money. With a JAM score of 258, Kenya stands out as exceptional considering its level of income and development, well ahead of South Africa and India. Beneath similar JAM scores, countries can be very different; a comparison of Kenya and India offers an example (Box 2.2). Overall, mobile money accounts for around 10 percentage points of SSA's 45 percent financial coverage; Box 2.3 sets out its contribution for leading countries.

As impressive as mobile money penetration has been in Africa, however, the largest absolute user bases are found elsewhere. From the 2017 Findex data, the

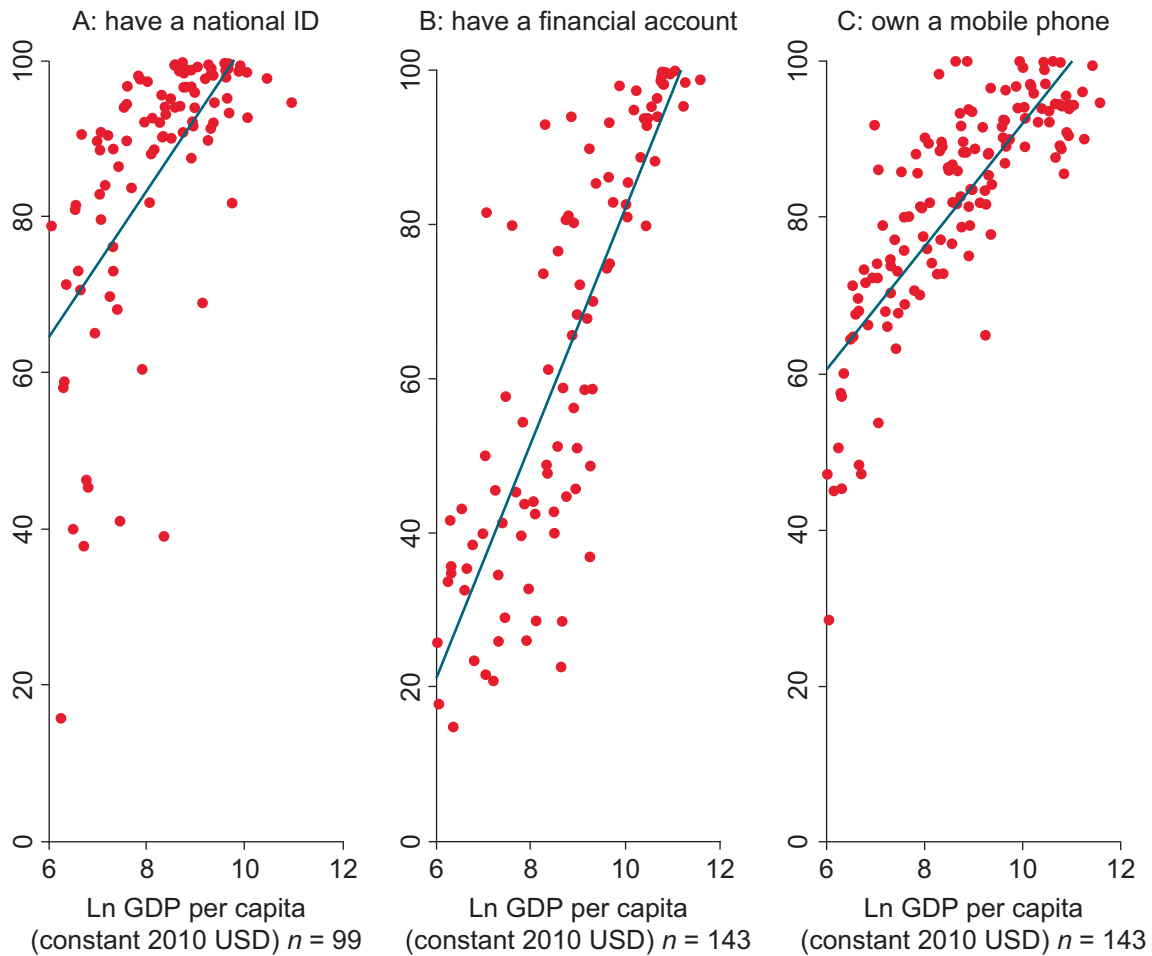
approximately 24.6 million adults with mobile money accounts in Bangladesh had already outpaced the 20.9 million users in Kenya. Even small levels of penetration in large countries can represent enormous user bases in absolute terms. For example, at 19 million people the 2.0 percent of Indian adults with mobile payments represent the third-largest user base.¹² After these three, the next largest in Findex 2017 include Iran (16.1 million), Tanzania (11.8 million), Uganda (10.9 million), Turkey (9.7 million), and Pakistan (8.7 million).

One important outlier that was not surveyed in the 2017 edition of Findex is Somalia. In 2014, 75 percent of its financial inclusion was accounted for by mobile money accounts. A 2017 World Bank study found that mobile money penetration had grown to 73 percent of adults (16 years and older), while mobile phone ownership sat at 90.1 percent and ID at 44 percent (Altai Consulting, 2017). The gender gap in mobile money was only 5 percent—quite small relative to comparator countries, although perhaps less surprising as mobile money has largely displaced the role of cash for transactions. Somalia's mobile network operators operate in an

12. In all likelihood, at the time of publication India is probably already far ahead of Bangladesh in terms of its mobile money user base. The 2.0 percent estimate falls within the 2.2 percent margin of error for the India sample, and even a 0.6 percentage point increase would be sufficient to put India's user base ahead of Bangladesh. Likewise, Annex note 2.1 on the JAM data describes how an Indian mobile money platform launched during the Findex 2017 sampling process had accumulated over 350 million active users within two years, again suggesting that India now has an enormous mobile money user base—to say nothing of China.

Figure 2.2. Country-level JAM and income

Proportion of the population who ...



Source: Findex 2017 and World Development Indicators

effectively unregulated environment due to a combination of insecurity and weak governance. While security concerns have pushed people towards mobile money for P2P payments and as an alternative to holding cash, the lack of regulation, including the lack of an effective ID system, means that trust in mobile network operators and the system as a whole is low (Altai Consulting, 2017). Without an effective ID system to register accounts and transactions, it is difficult to use the system for payments for public services.

Moving to individual data, panel A of Figure 2.4 depicts the component overlaps for the global set of

countries. Overall, 56.1 percent of people have all three of the JAM components and 29.8 percent have two. Among those who have two of the three components, more than twice as many people have an ID and a mobile phone than an ID and a financial account, confirming that the drivers for mobile are stronger than those for financial inclusion. Significant gaps exist, and the 2.1 percent of people who are fully excluded from all three JAM components will be the hardest populations to reach. Analyzing the data at a more granular level will allow us to better identify those populations and design policies to reach them.

Box 2.2. JAM comparison: Kenya and India

Kenya and India both have high JAM scores for their income levels, but this masks some important differences. For ID, Kenya operates a traditional card-based system with wide coverage, while India's Aadhaar system provides full digital ID to virtually all adult residents, including e-KYC to streamline the opening of financial accounts and SIM registration. Mobile ownership was higher in Kenya in the Findex 2017 survey, but with major efforts to improve infrastructure and affordability, India had pulled ahead in the 2018 GSMA Index of Connectivity. While the level of financial inclusion was similar in the two countries, India's financial

sector remained bank-based, with many accounts opened to receive G2P direct-benefit transfers. In contrast, spurred by an explosion in digital P2P and later P2B payments, using feature phones rather than smartphones, and with an innovative dominant provider, mobile money accounted for much of Kenya's financial inclusion.

Kenya's high digital consumer readiness and prevalence of digital transactions may also reflect the relative strength of its education system, with an estimated 7.8 learning-adjusted years of school relative to only 5.8 years in India.

	Kenya	India
Total JAM Score	259	246
Percent 15+ with ID	91	97
Features	Card-based, remote card verification possible	Biometrics-based e-ID including e-KYC
Percent 15+ with Mobile	86	69
GSMA Connectivity Index 2018	51	56
Affordability	45	65
Consumer Readiness	59	49
Percent 15+ Financially Included	82	80
Important Inclusion Driver	P2P payments	G2P payments
Percent 15+ with Bank Accounts	58	80
Percent 15+ Made/Received Digital Payment in Last Year	79	29
Payments Features	Largely 2G USSD Dominant provider	Emphasis smartphones Multiple providers
HCI Learning-adjusted Years of school	7.8	5.8

Source: Findex 2017, GSMA Connectivity Index 2018, World Bank Human Capital Index (HCI)

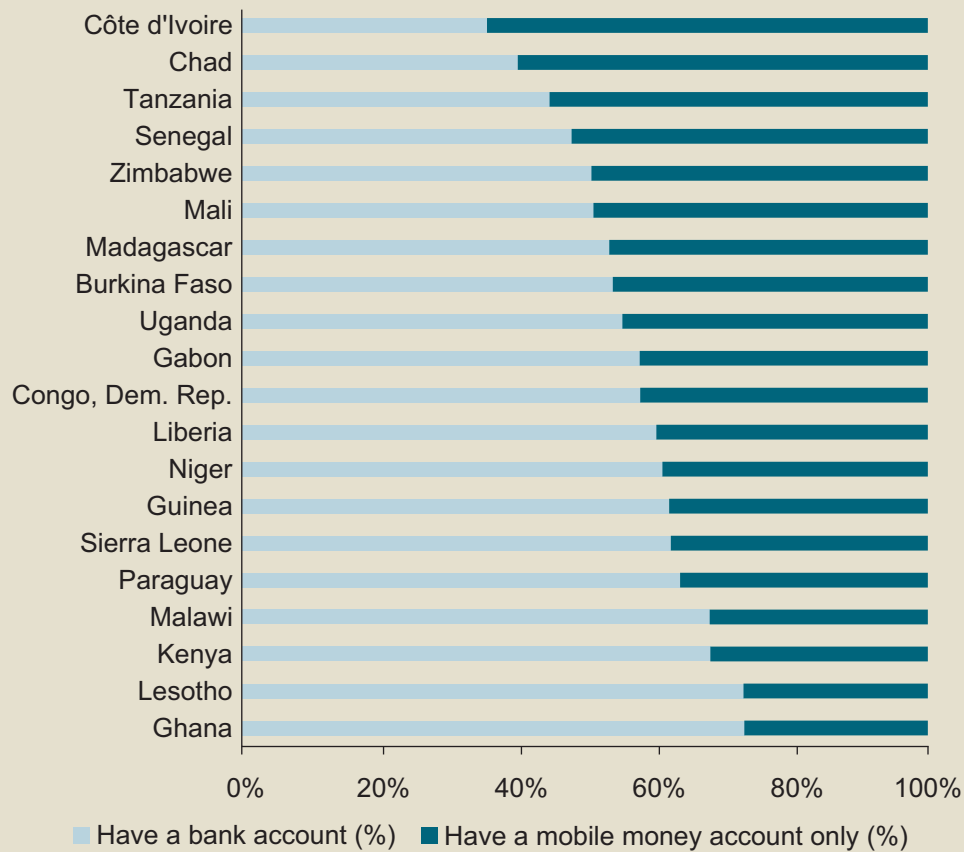
Box 2.3. Mobile money's contributions to financial inclusion in sub-Saharan Africa

Countries that are higher up the income ladder generally have higher levels of financial inclusion. This is not universally the case, however, and several African countries like Kenya, Uganda, Zimbabwe, and Tanzania are outperforming lower middle-income countries like Honduras, Pakistan, and the Philippines, and even upper middle-income countries like Colombia and Mexico. Many of these cases can be attributed to the additionality provided by mobile money, which remains largely an African story.

mobile money accounts (that is, users who do not also have a bank account). As of 2017, the only non-African country to make it into the top 20 is Paraguay. Likewise, top-placed Côte d'Ivoire and Chad along with four other countries are listed as fragile and conflict-affected situations, demonstrating the potential for mobile money to bridge financial inclusion gaps even in very weak institutional contexts with limited banking systems. As noted elsewhere, mobile money is even more dominant in Somalia, both relative to its banking system and in terms of absolute coverage.

Figure 2.3 shows the top 20 countries by proportion of overall financial inclusion due exclusively to

Figure 2.3. Proportion of financial inclusion attributable to mobile money

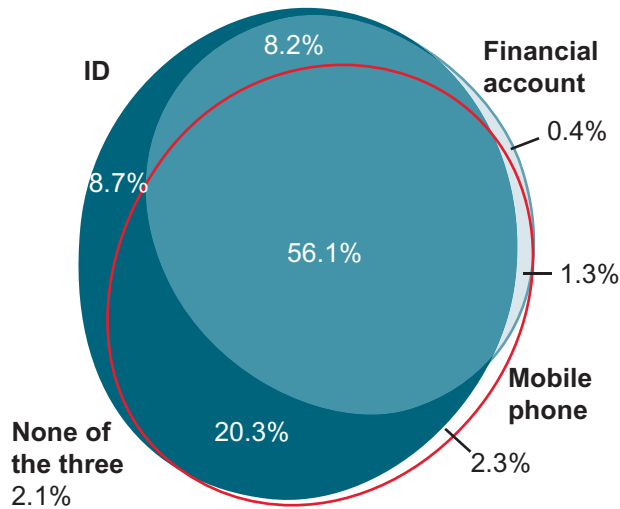


Source: Findex 2017

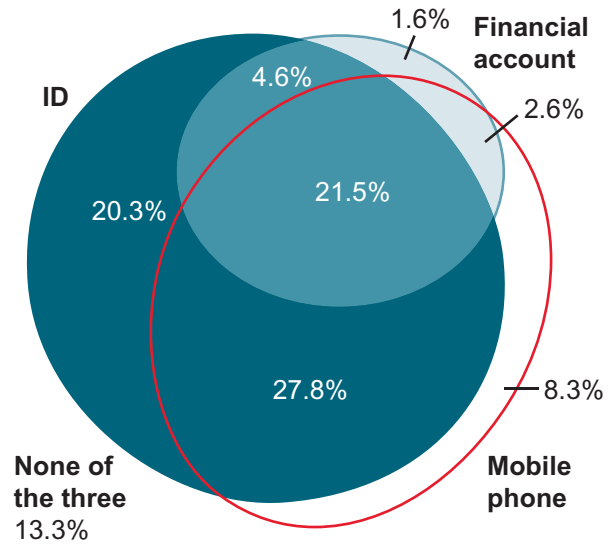
Note: Measured as (financial account coverage – bank account coverage) / financial account coverage

Figure 2.4. Global inclusion and exclusion across JAM

Panel A. Sample includes all 99 countries with data for all three JAM components



Panel B. Sample only includes countries in the lowest tercile of overall JAM score



Source: Findex 2017 microdata, using sample and population weights

Note: Numbers do not sum to 100 due to rounding errors. Made using eulerAPE (Micallef and Rodgers, 2014).

Panel B shows the same picture for the 33 countries that make up the lowest tercile by overall JAM score. For this sample, only about one in five people have all three components, while 13.3 percent are completely excluded. While 74.1 percent of people have an ID and 60.2 percent have a mobile, less than one in three holds a financial account.

Findex enables analysis of coverage gaps by several different attributes, including income quintile, gender, labor force status, and region.¹³ Within-country income quintile influences financial inclusion more than it does mobile ownership, as shown in Figure 2.5; while both panels A and B show a steady increase with income in the proportions of people who, respectively, own an account or a mobile phone, the effect is more powerful for financial accounts than for mobiles.¹⁴

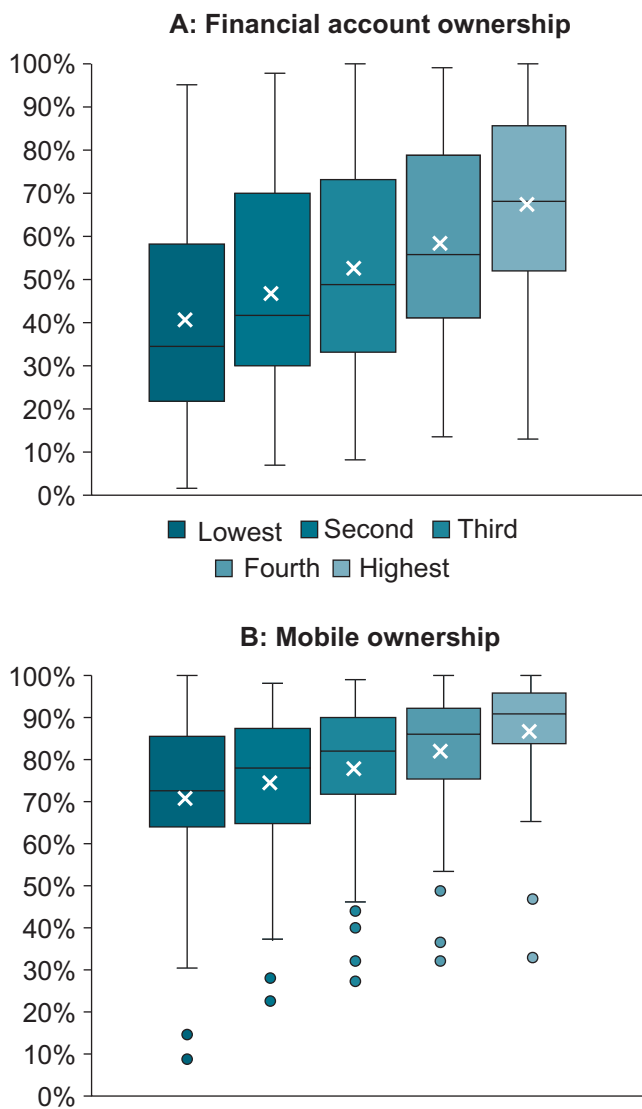
13. Unfortunately, Findex does not provide public data on rural/urban status. This is likely to be important for JAM because of limited mobile network coverage in sparse regions.

14. The low outliers in mobile phone ownership include South Sudan and Madagascar in all quintiles, joined by Malawi and Ethiopia in two cases. These patterns are also robust to the full 144-country sample.

Regarding the 2.1 percent of completely excluded individuals in Figure 2.4, 2.7 percent of women fall into this category, almost twice the 1.4 percent rate of men. While the highest rates of full exclusion track closely with measures of overall coverage, the countries that host the highest absolute numbers of fully excluded are large countries: Pakistan and Ethiopia (both around 16 million), India (9.9 million), Bangladesh (6.8 million), Indonesia (4.6 million), and Mexico (4.1 million).

Of these cases, Pakistan illustrates how gender can be a major factor for exclusion. Its fully excluded population includes 21.0 percent of women, but only 5.1 percent of men. Only 32.6 percent of Pakistani women own a mobile phone, which is less than half the rate of men (72.3 percent). Only a quarter of women in the poorest income quintile own mobile phones, and the rate does not surpass even 35 percent until the richest quintile. If income has an effect on diminishing gender-based exclusion for mobile phones, it therefore kicks in only at the highest income quintile. Under the BISP program, discussed further in

Figure 2.5. Financial inclusion and mobile ownership by income quintile



Source: Global Findex 2017

Note: Sample only includes countries that provide information on national ID coverage ($n=99$). The plots show mean, range, and interquartile range within each income quintile at the national level.

Chapter 5, Pakistan has used dedicated bank transmission accounts to deliver social benefits to poor women, but it is possible that this choice has had an opportunity cost by failing to stimulate a demand channel for mobile communications. Ethiopia is also a notable case—36.1 percent of women have none of the three components, compared to 15.9 percent of men.

Both are troublingly high rates of exclusion for a stable country with a relatively functional bureaucracy.

Researchers have noted the low level of financial account ownership in Latin America and the Caribbean relative to their per capita income levels. The conundrum has generated several hypotheses, including pervasive income inequality and deficiencies in institutional quality (Rojas-Suarez, 2016), low levels of financial literacy (Garcia, Grifoni, López, and Mejía, 2013), and “insufficient resources, high charges and mistrust of, or discomfort with, banking institutions” (Solo, 2008). While it is easy to come up with examples of these factors outside the region, the Findex data does offer some support for the cost argument. Table 2.2 lists several reasons cited for not having a bank account. The first three relate to factors largely on the supply side of financial services: distance to service point, costs and charges levied on financial accounts, and the difficulty in meeting documentation requirements to open accounts; the last can also act directly to depress demand. The last three relate to factors on the demand side: lack of money to deposit into an account, ability to access a shared account, and expressed lack of need for financial services. Overall, lack of money is the most frequently cited reason, particularly in (poorer) sub-Saharan Africa, but LAC is a clear outlier on the cost of maintaining an account. Fully 53 percent of those without an account cited this as a reason, far above the percentages in other regions.¹⁵ To expand their coverage, financial sectors will need to innovate, moving towards lower-cost mobile and low-fee accounts and designing and marketing financial products that serve the convenience and needs of marginalized groups (Mattern and Tarazi, 2015). Lack of necessary documentation can refer to a national ID or similar credential, but banks frequently require additional documentation to open an account. Chapter 3 elaborates further on risk-based

15. In the 2017 Global Financial Access and Consumer Protection Report, 59 percent of reporting countries had no regulations on bank charges. Only 8 percent regulated account opening fees and 10 percent account maintenance fees.

Table 2.2. Reasons for not having a bank account

World Bank region*	Percentage of people who do not have a bank account who say it is because . . .						
	Too far away	Too expensive	Lack documentation	Lack trust	Lack of money	Family member already has one	No need for financial services
E. Asia and Pacific	24%	20%	17%	9%	66%	32%	31%
Europe and C. Asia	15%	32%	15%	31%	51%	34%	54%
Latin Am. and Car.	27%	53%	25%	31%	59%	32%	35%
M. East and N. Africa	9%	20%	12%	12%	73%	12%	32%
S. Asia	22%	25%	20%	18%	58%	35%	31%
Sub-Saharan Africa	28%	30%	27%	16%	76%	12%	18%

Source: Findex 2017.

* Excluding high-income countries. Number of countries = 99.

KYC approaches to simplify requirements for restricted accounts to service poor customers.

Gender gaps in the JAM trinity

Gender coverage gaps in the JAM trinity reflect the layering of several attributes, each associated with exclusion. At 92.6 percent, women have 1.4 percentage points lower ID coverage than men. The difference is compounded by the intersection of income and workforce participation—only 88.6 percent of women in the poorest quintile and not in the workforce have ID. For out-of-workforce men, inclusion bottoms out in the second income quintile at 87.4 percent. It is unclear whether lack of ID might make it difficult to access employment or whether other vectors of poverty and deprivation, or seclusion from social and economic activity, which make it difficult to obtain ID, also make it difficult to find gainful employment. Regardless, the groups that have the highest levels of ID exclusion tend to be poor and out of the workforce.

Figure 2.6 breaks down the two remaining JAM components (using the 99-country sample). Examining financial account coverage, women are less included than men in all cases bar one.¹⁶ Overall, men have 8.3 percentage points higher account coverage than

16. Working women with the highest levels of education are just as financially included (90 percent) as their male counterparts.

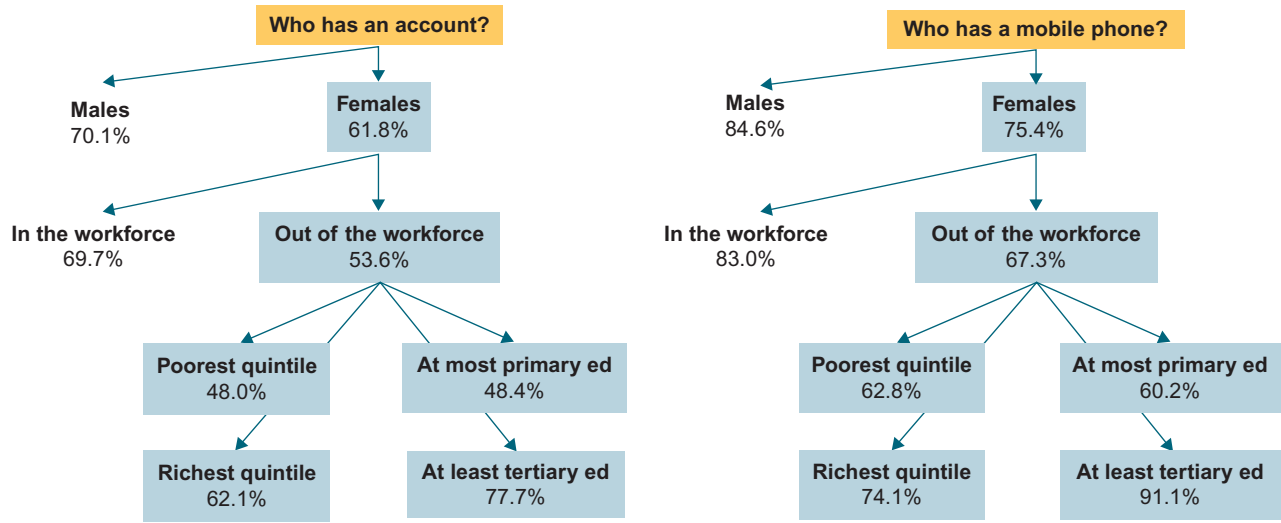
women. Coverage for working women is roughly comparable to that of the average male, but only 53.6 percent of women out of the workforce have an account. Of the women who have a primary education or less, 60.3 percent have an account, and for those outside of the workforce, only 48.3 percent.

Although mobile phone ownership is higher on average than financial inclusion, the gender gap is slightly larger at 9.3 percentage points. Again, mobile phone ownership among working females is near that of (all) males, but only 67.3 percent of out-of-workforce women have a mobile phone. In the poorest quintile, 68.4 percent of women overall have mobile phones, but if those women are out of the workforce, the proportion drops to 62.8 percent. Notably, 95.3 percent of women with tertiary education or more own a mobile phone, slightly more than the 93.8 percent of men who do.

Another approach to help understand what matters most for women’s financial inclusion is to apply the Blinder-Oaxaca decomposition to analyze inclusion gaps.¹⁷ Table 2.3 breaks down the differences in financial account ownership into three components: (1) those due to observed characteristics (“endowments”),

17. For a description of this procedure, see Jann (2008). This decomposition uses a logistic regression based on Model 4b in Annex 2, but it has been somewhat modified due to the way that Stata computes this decomposition. The education and income components are processed as continuous, rather than categorical, variables, and country dummies are not included.

Figure 2.6. Decomposition of financial and mobile inclusion



including income and workforce status, education level, access to ID and mobiles, and whether the individual received a government transfer in the last 12 months; (2) those due to different coefficients on those characteristics (“coefficients”), and (3) the interactions between these two effects (“interaction”). Fortunately, the interaction terms are small, allowing us to concentrate on the first two sets of effects. Intuitively, the estimates for endowments represent how much better off women would be if they had the same observed characteristics, while the estimates for the coefficients represent the advantage men have over women when all observed characteristics are equal.

The first conclusion is that the endowment effects dominate the coefficient effects. For the full sample, the gender gap of 8.0 percentage points would close by 5.5 percentage points if women had the same observed characteristics as men. Workforce participation (2.4 percentage points) and mobile phone ownership (1.4 percentage points) are the largest contributors to the gender gap in financial inclusion.¹⁸

18. These findings echo the conclusions of the Economist Intelligence Unit’s Global Microscope 2019, which notes that barriers to accessing tools like mobile phones and the internet also interfere with women’s capacity to access financial instruments.

Differential coefficients are less salient; a higher level of education, a change in workforce status, or being in a higher income quintile have broadly similar effects in changing the probability of financial inclusion for women and men. In other words, when examining financial inclusion, it is not that women are affected differently by income level; it is simply that they are poorer.

These group differences are amplified as we apply the decomposition to the more limited country samples for the lowest JAM tercile and LICs. In LICs, owning a mobile phone emerges as the most important contributor to the gender gap in financial inclusion (2.7 percentage points), followed by having a national ID (2.6 percentage points) and workforce participation status (2.2 percentage points). This suggests that the complementarities between the elements of the JAM trinity are stronger in low-income countries. Each country will be different; policymakers will need to understand the social and economic factors, as well as those relating to policies and regulation, that limit universal access to JAM. Nevertheless, global patterns provide useful benchmarks for comparison.

Table 2.3. Exposing financial inclusion gender gaps using a Blinder-Oaxaca decomposition

Sample	All countries in JAM	Lowest JAM tercile	LIC countries
Difference in account ownership between men and women	0.0804*** (0.000)	0.132*** (0.000)	0.118*** (0.000)
Difference attributable to . . .			
Endowments	0.0553*** (0.000)	0.0901*** (0.000)	0.0975*** (0.000)
Coefficients	0.0246** (0.002)	0.0562*** (0.000)	0.0209* (0.047)
Interaction	0.000563 (0.892)	-0.0140* (0.029)	-0.000343 (0.947)
Decomposition of endowments			
Has a national ID	0.00512*** (0.000)	0.01000*** (0.000)	0.0258*** (0.000)
Owns a mobile phone	0.0141*** (0.000)	0.0257*** (0.000)	0.0274*** (0.000)
Within-economy household income quintile	0.00685*** (0.000)	0.00445*** (0.000)	0.00492** (0.001)
Respondent is in the workforce	0.0241*** (0.000)	0.0421*** (0.000)	0.0219*** (0.000)
Respondent education level	0.00788*** (0.000)	0.00758*** (0.000)	0.0153*** (0.000)
Received government transfers in past 12 months	-0.00277* (0.029)	0.000290 (0.815)	0.00216 (0.059)
Observations	106,571	33,346	17,088

p-values in parentheses: * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

Financial inclusion patterns and government transfers: Insights from logistic regressions

Several studies, including Klapper and Singer (2017) and Stuart (2016), have considered the potential for government transfers to spur financial inclusion. Logistic regressions can further analyze the association of individual attributes with financial inclusion—education level, income quintile, gender, workforce status, having an ID or a mobile phone, and also whether or not the individual received a government transfer. Detailed results are set out in Annex 2 for a variety of specifications across all 99 countries, for the

bottom JAM tercile of countries, and for the subsample of countries designated as LICs. In general, the results are quite stable, including when dummy variables are included to allow for unobserved country-level factors.

Individual attributes enter with the expected signs and are important. For the global sample, when all are favorable, the probability that an individual will have a financial account is as high as 84 percent. When they are all negative, it is only about 7 percent. Having an ID and a mobile boosts the probability of financial inclusion—removing these from the favorable scenario drops the probability to 44 percent, while adding them to the unfavorable scenario boosts it to 34 percent.

Table 2.4. Conditional use of financial accounts

Workforce status	Percentage who used an account to _____ in the last 12 months				
	Pay utility bills	Receive wage payments	Receive govt. transfers	Receive agric. payments	Receive self-employment payments
In	30%	50%	56%	17%	22%
Out	20%	42%	52%	13%	15%

Source: Findex 2017 for 99 countries.

Note: Each percentage is conditional on having done the column item. For example, conditional on having paid utility bills in the last 12 months, 30 percent used a financial account to do so.

These are not causal relationships, but they indicate how strongly the elements of the JAM trinity tend to go together, even allowing for other personal attributes.

To estimate the impact of transfers, the target population will generally be people with a low probability of financial inclusion, or perhaps in the mid-range. The logistic regressions show that receiving a financial transfer is strongly associated with financial inclusion. For a (hypothetical) person with other attributes at the midpoint between favorable and unfavorable, receiving a transfer boosts the probability of financial inclusion by some 31 percentage points. Moreover, the results confirm the importance of the channel for providing transfers. For those reporting receiving them only in cash, there is no positive impact of the transfer on financial inclusion.

Further insight into this question is provided by information on the use of financial accounts (Table 2.4). For the 99-country sample, over half of those who had received a government transfer reported using a financial account to do so. In low-income countries, 43.9 percent of people who had received a government transfer reported that the first account they had opened was to receive this transfer. This group represents 3.0 percent of the LIC population.¹⁹ In lower middle-income countries, the effect is stronger, probably

because more transfer payments are made through financial accounts rather than in cash. The category includes 68.5 percent of transfer recipients (6.4 percent of the LMIC population).

From data to policy

Although only a rough snapshot of JAM coverage in 2017, this picture suggests some important conclusions regarding the first set of SDGs in Box 1.1, those relating to identification, mobile coverage, and financial inclusion. There is no single factor that shapes coverage. At the country level it correlates with income, but the considerable variation around this relationship indicates the importance of other factors, including policy. Countries like Kenya and India are well above their expected ranking; those like Mexico and Lao PDR are lower. Finance is the lagging component; mobile money can make a major contribution to financial inclusion (including in very difficult conditions, as shown by Somalia) but has done so in only a relatively few countries, mostly in Africa.

At the individual level, the probability of inclusion is shaped by country-level factors as well as powerfully affected by a range of personal attributes, such as income, education level, workforce status, and gender, as well as having access to other components of JAM. The latter does not prove a causal relationship, but it does indicate the degree to which the JAM components tend to come together. Gender gaps in financial and mobile inclusion are severe in certain countries, such as Pakistan, but modest in others. Overall, these gaps

19. Of low-income-country people who received a government transfer, 51.7 percent said that their account was their first account. Of those, 85.0 percent said they had opened it to receive government transfers. Combining these ratios yields 43.9 percent. The estimate of 3.0 percent comes from combining this with the 6.7 percent of the low-income-country population who received a government transfer.

are of similar magnitudes and strongly associated. While differences in several “endowments” are associated with the gender gap in financial inclusion, for low-income countries access to a mobile appears to be the most important correlate of the financial gender gap followed by access to ID. Finally, the results confirm that government transfers can play an important role in increasing access to finance, provided they are not disbursed in cash. This highlights the link between “supply-side” factors shaping access to JAM and the “demand-side” factors relating to the use of JAM in the delivery of a range of government programs.

The next step is to consider implications for policies to ensure universal access. It is already clear that

country-level measures of access to components of JAM can change relatively quickly. For ID we have examples such as India’s Aadhaar and Malawi’s ID, which was rolled out in 2017 (Malik, forthcoming 2020). Many countries have seen astonishing growth in mobile coverage—India and Kenya offer examples—and also of rapid increases in financial inclusion towards some 80 percent of the adult population through different routes. At the individual level, inclusion in JAM is likely to become more difficult as the challenge focuses on more disadvantaged groups—those with multiple economic and social attributes associated with exclusion. Both supply-side and demand-side policies to extend JAM to all are considered in Chapter 3.

Chapter 3.

JAM Synergies and Policy Directions to Increase Access

As shown in Chapter 2, gaps in the coverage of ID systems, access to mobile phones, and financial inclusion relate to both country-level factors and a layered set of personal attributes—poverty, low levels of education, being out of the workforce, and being female. There are synergies between the JAM components in the sense that having some of them increases the probability of having others. In addition to supply-side measures to increase access to IDs, mobiles, and financial accounts, demand-side effects can also be important, including the use of bank and mobile accounts to receive government transfers and, more generally, the use of components of JAM in a range of government programs.

It is beyond the scope of this paper to consider all policies concerning each of the three JAM areas. The focus is, rather, on broad policy directions. ID, mobile, and finance are multipurpose societal and economic platforms, providing capacity to identify, to communicate, and to transfer resources. Together, they offer economies of scope and scale from sharing essential infrastructure. Progress in one can reduce the service costs of the others and can help to extend their coverage. This argues for a strategic and coordinated approach, with mechanisms to improve coordination across a range of regulators and agencies, as well as government programs and services.

Synergies across the three components

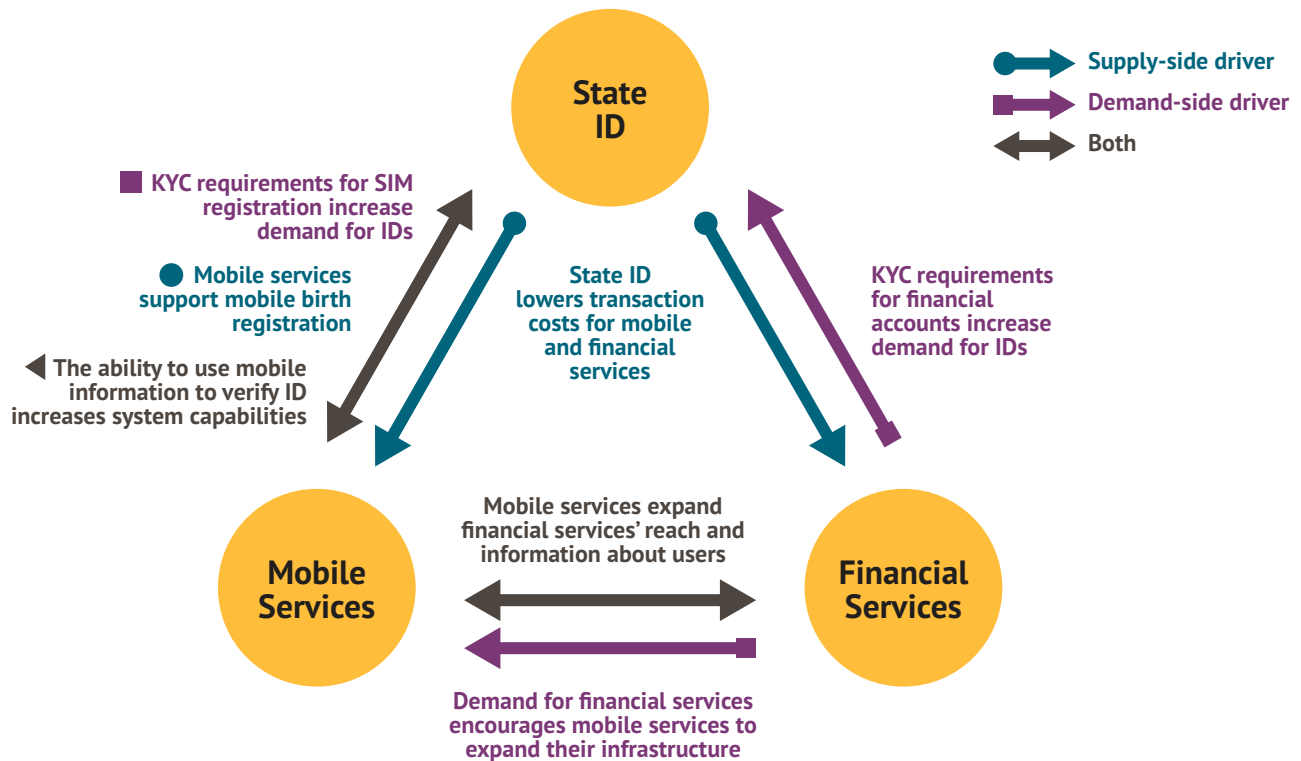
Synergies between the three JAM components, set out in Figure 3.1, involve both supply-side and demand-side

drivers. As with any commodity or service, the observed levels of use of an ID system, a mobile network, or financial services will reflect the interaction of demand and supply factors. People will not want to register for an ID if policies and arrangements for enrollment make this costly or difficult; there will also be little demand for the ID if it is seen as providing little value. Banks will have less incentive to roll out financial accounts to the poor if the regulatory cost of onboarding customers is high due to demanding customer identification requirements in the face of an inadequate ID system. Mobile operators will have an additional incentive to build out their cell-tower networks if they can also offer financial services in addition to voice and data. Over time, JAM coverage is driven forward by changes in demand-side and supply-side effects, and these will reflect both policies and evolving technology.

ID-mobile and ID-finance

According to the GSMA, at least 147 governments across the world require prospective mobile users to show proof of identity before a mobile network operator can activate a prepaid mobile SIM (GSMA, 2019b). Considering the high penetration of mobiles, it is not surprising that surveys confirm SIM registration as the major demand driver for the acquisition of an ID, followed by KYC requirements for financial accounts. Conversely, mobiles can facilitate enrollment into identification systems. One example is digital birth registration in Pakistan through a partnership that includes Telenor and UNICEF. Using franchising network points as registrars, some 700,000 children have been registered.

Figure 3.1. Synergies between ID, finance, and mobile communications



Similar programs have been launched in Tanzania, taking advantage of the mobile agent network.

Mobile also provides powerful ways to amplify the authentication ecosystem and propagate it across the country. The Aadhaar system relies on mobile for remote authentication. Smartphones can provide an alternative to a card and deliver powerful three-factor authentication using a combination of PINs and biometrics. With mass production, iris cameras can be built into smartphones at a unit cost of only \$4 (Gelb and Diofasi Metz, 2018), while recent advances in the accuracy of face recognition open up a natural role for built-in cameras, but even a simple feature phone linked to an ID number can offer authentication through an OTP. As in the India Stack model, mobile communications can expand the range of ID-based applications in other areas, including digital signatures and digital lockers as well as digital payments. These can be powerful service offerings to encourage demand.

At the same time, efficient and accessible ID services lower the cost of business for financial institutions and mobile network operators. Surveys conducted for the 2017 Global Financial Inclusion and Consumer Protection Survey Report find that, in addition to generally requiring a national ID or another ID document to open a bank account, 75 percent of reporting countries require proof of address, 69 percent proof of nationality, 44 percent proof of income, and 35 percent proof of employment (Demirgüç-Kunt et al., 2017). Although about half of the countries indicated that they had instituted risk-based KYC in the form of simplified requirements for restricted accounts intended for poor customers, this suggests that the problem posed by KYC requirements is greater than simply access to a national ID.²⁰

20. The Financial Action Task Force (2017) finds that national regulators have been cautious in applying simplified risk-based KYC and that financial institutions may be more conservative than their national regulators. This may reflect caution or the use of documentation requirements as a screening

Especially in countries with high levels of informality, potential clients often cannot provide such documentation. Ferreira, van der Linden, and Cooper (2018) analyze survey data for Nigeria, Tanzania, and Uganda. Considering ID only, this was held by 47, 74, and 69 percent of respondents in the respective countries, but when including both ID and proof of address, the numbers fell to only 39, 11, and 12 percent. As explained by Ferreira et al., the requirement for proof of address is due to cut-and-paste adoption of US requirements that date from a period when other forms of identification were lacking; it does not reflect the recommendations of the Financial Action Task Force (FATF), which has become increasingly concerned about barriers to financial inclusion and the slow adoption of risk-based or tiered KYC (FATF, 2017; Pisa and Woodsome, 2019). Ferreira et al. also note that countries have been slow to take advantage of improvements in the rigor and coverage of their ID systems to reduce other documentary requirements that offer far less robust identification than a modern ID system. Fully digital ID can make onboarding bank and MNO clients still cheaper and faster through e-KYC; in India this has reportedly cut costs associated with financial KYC from \$15 to \$0.50.

A strong ID system also makes it easier for banks or MNOs to authenticate clients for transactions. Weak country-level ID systems have sometimes forced banks to develop their own solutions, such as Nigeria's Bank Verification Number (BVN); this raises the cost of doing business for the banks and discourages the onboarding of small customers. In countries like Peru and Pakistan, the financial sector accounts for a major part of the verification service requests addressed to the ID agency. As these countries show, fees for verification services can create income for the ID agency, but experience shows that if the charges are set too high, they can drive banks back towards the (inefficient) solution of creating their own systems.

mechanism to weed out potential customers who offer little potential business and profit.

Mobile-finance

As discussed in Chapter 2, mobile and finance also have strong potential synergies, in particular the ability of digital financial services to extend low-cost access to poorer customers (Perlman and Wechsler, 2019). Key to the spread of mobile money has been regulatory permission for nonbanks to offer payment services, under supervision and with counterparts to balances held in trust accounts with one or more commercial bank. The model can differ between countries, with MNOs in the lead in East Africa, a bank subsidiary (bKash) in Bangladesh, and a consortium approach in Peru (BIM). The important common factor appears to be to open up this space to nonbanks to make it contestable, and to harmonize the customer due-diligence requirements with those needed for SIM registration.

In the absence of these steps, efforts to encourage the use of mobile operators to include new customers appear to run into difficulties. MNOs have little power or security to motivate investments. Banks may offer mobile payment services to their clients but see little advantage to themselves in making the large and sustained investments required to roll out mobile money to poor customers, together with an associated agent network. Suarez (2016) offers a political economy analysis of the difference between Kenya, where MNOs were permitted to launch mobile money services despite opposition from the banks, and Mexico, where close relationships between banks and regulators prevented them from doing so. Mattern and McKay (2018) chronicle the case of Ghana, where mobile money stalled until MNOs were accorded this power in the face of determined efforts by banks to prevent it.²¹

The build-out of the agent network, together with its associated liquidity-management structures, is an essential step extending even beyond the early stages of digital money, to reduce distance to cash-in-cash-out

21. In addition to the East African model of MNO-led mobile money, this can be rolled out by bank subsidiaries such as bKash in Bangladesh (BRAC bank) or, as in the case of BIM in Peru, by a consortium of companies including banks.

(CICO) points. For Kenya, Suri and Jack (2016) observe that before M-PESA was launched, the average distance to the nearest bank was 9.2 kilometers, but in 2015, eight years later, the average distance to the nearest M-PESA agent was a mere 1.4 kilometers. Tanzania, Uganda, and some other countries in Africa have seen similar build-outs of their mobile agent networks with the spread of mobile money. Such an agent network will be needed for a long time—Hernandez (2019) summarizes several studies that demonstrate that the importance of CICO continues, and even increases, until financial markets reach their mature stages.

Mobile wallets and disruptive innovations in digital payments have erased much of the transactional difference between bank accounts and mobile money, other than the agent network. Working with accounts of any type, applications can increase the convenience of transacting between private parties, reduce frictions for G2P and P2G payments, and also increase user confidence. VOCALINK offers an example, combining real-time electronic payments between financial accounts and payment addresses such as mobile numbers or email addresses as alternatives to national ID or other numbers used to register the accounts. This helps to bolster confidence in the system because users can transact without divulging sensitive personal information. Rolled out as PromptPay in Thailand, the system now has 40 million users registered—more than half the population—and hundreds of millions of transactions. The system is being replicated in Peru and potentially other countries.

In turn, providing digital financial services creates economies of scope for mobile infrastructure and agent networks. In a study of six rural coverage pilots in Tanzania (GSMA, 2018), half of the revenue flow from cell towers came from voice and data services and half from mobile money services. Similarly, the opportunity to offer a bundle of services, including CICO, mobile facilitation, and possibly other businesses such as retailing, provides economies of scope for agents. As shown in the agent surveys of Unnikrishnan, Larson, Pinpradab, and Brown (2019), fixed costs,

such as rent and utilities, can represent as much as 70 percent of their total costs. The more lines of business an agent can combine, the greater are the possibilities to spread these costs across multiple businesses. On average, digital financial services represented only around 47 percent of the services offered by the average agent covered in the survey. The synergies are even greater when some of the shared businesses generate cash to augment the float needed to service CICO requests. Especially in rural areas, travel time and cost to replenish the float can absorb valuable agent resources. The implication for regulators is to open up access to providing mobile money and payments services while insisting on the role of the banking system in ensuring financial soundness, and to do everything possible to encourage the sharing of infrastructure and agent networks.²²

In addition to facilitating transactions, mobile communications transmit valuable information—for example, notification that a subsidy or pension payment has been made into an account and is available for pickup. The cumulative information from payments data can build customer information profiles to increase access to further financial services. DigiFarm—launched in Kenya by Safaricom, Mezzanine, and two other partners—has enrolled almost a million of Kenya’s 7 million small farmers. With little available data on their businesses, they have suffered from inadequate extension and access to financial services. But virtually all have mobiles that can be used to cut the costs of acquiring information on their activities. Farmers register, provide basic details, and gain access to input e-vouchers and customized technical and farm management advice. With the building of receipt and payment records over time, some have become eligible for small loans to augment their businesses.²³

Connectivity weaknesses have been flagged in many countries as limiting the efficiency and acceptance of

22. Kiarie, Odongo, and Bersudskaya (2018) offer several suggestions for easing the problem of managing agent liquidity, including the “Uberization” of agents.

23. <https://www.mezzanineware.com/digifarm>.

digital payments. Studies note the problem of “dropped transactions” and that time-out effects can be more serious for 2G transactions using feature phones and USSD interfaces that require interchange across providers. Cook and Raman (2019) provide an example for India, against the backdrop of the phenomenally successful introduction of the Universal Payments Interface (UPI), launched in 2016 by the National Payments Corporation of India. The problem partly reflected anticompetitive behavior by individual service providers who failed to streamline user interfaces to facilitate easy USSD cross-provider transactions. On this view, the thrust of the UPI has been more towards facilitating the higher-end levels of financial transactions than working effectively at the lower end.

This example, as well as the case of Tanzania, which has succeeded in creating a fully interoperable system—in a 2017 survey some 60 percent of users had made cross-provider payments (Cook, 2018)—points to the importance of encouraging payment service providers to reach mutually beneficial revenue-sharing agreements as well as simply focusing on providing a payments switch. MNOs, or others planning to roll out a digital payments service, can expect to make heavy investments before the business reaches sufficient scale to be profitable. Even modest profits should not be expected in less than four to five years (Almazán and Vonthron, 2014). In the long run all can benefit from an expanded user base, but the fact that much revenue derives from cash-out fees, commonly set at around 2 percent of value (Amin, 2014), creates a disincentive to transfer funds between providers.

The timing of a push towards interoperability is therefore a delicate matter; in the long run it is essential for quality service, but if it comes too early it could undermine incentives to invest. Active engagement by the Bank of Tanzania—after the mobile money system had begun to take off—was instrumental in encouraging mutually agreeable terms (Mattern and McKay, 2018; Ndulu and Qhotsokoane, 2018). In this case interoperability is secured through bilateral agreements rather than one single switch. In Ghana, interoperability was

mandated by the Bank of Ghana, but only in 2018, not too early in the rollout process. In Kenya, on the other hand, one innovative provider continues to dominate digital payments and controls the vast majority of mobile money agents, despite efforts to push for interoperability (Ndung’u, 2019). By comparison, in Bangladesh, a country where an early player captured a large market share, one response has been to promote mobile money service backed by a consortium of publicly owned banks. The systems, however, are not yet interoperable but may move towards being so in the future.

Increasing mobile and financial adoption is more than a financial and engineering challenge; it involves mitigating the impacts of social structures and systems that may exclude potential users. Women and the poor tend to face the most challenges in accessing mobile technology, although there is a growing body of literature suggesting several interventions that can overcome these exclusions (Buvinić and Furst-Nichols, 2016; Buvinić, Furst-Nichols, and Pryor, 2013; Buvinić and O’Donnell, 2016, 2019). Some of the easiest solutions simply involve recognizing women and the poor as potential customers—too often firms in the greater JAM space are concerned only with providing services to the “traditional” customers, and fail to carry out the basic market research necessary for identifying the needs and preferences of new customer segments (Mattern and Tarazi, 2015). The barriers to accessing mobile phones and those that impede mobile-enabled payments are intertwined, and many of the policy solutions for one have positive spillovers for the other.

Agents are usually the customer’s bridge between cash and noncash (mobile) money, and incentive structures and policies can help change inclusion dynamics, making the role more flexible or even allowing any mobile money customer to perform cash-in-cash-out services for any other customer as a kind of Uberization of banking agents (Kiarie et al., 2018). Bastian et al. (2018) demonstrated in Indonesia that banking agents can be incentivized to recruit women for their platforms, and women who also received a

business training intervention reported increases in household decision-making power. The financial sector also opens up a role for women as financial agents, a role that some interpret as also having an element of social work (Aadil et al., 2019). In a sector dominated by men, women agents can play a special role in encouraging other women to become familiar with mobile transactions.

Synergies between JAM and government services, payments, and programs

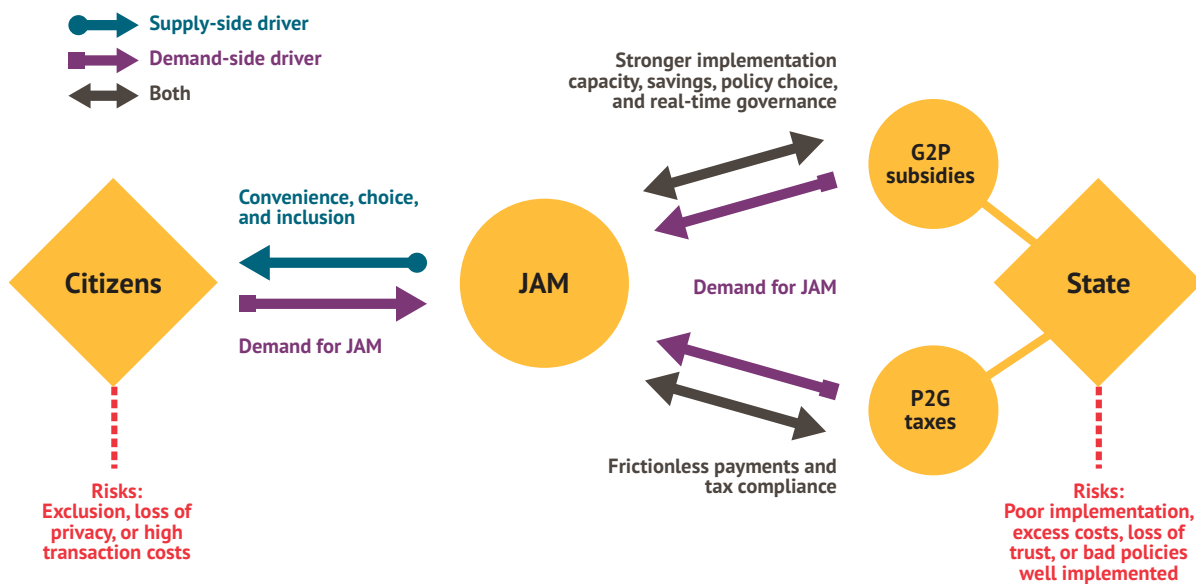
The synergies between JAM and government programs are depicted in Figure 3.2. Since those involving G2P financial payments and in-kind benefits and services are discussed in more depth in Chapters 4 and 5, the treatment is brief in those areas.

JAM–G2P Programs. Even as digital ID, mobiles, and payments can strengthen the capacity of the state to implement a wide range of transfer, subsidy, and social protection programs, digitizing G2P payments, as well as other services, can increase demand for the

components of JAM and support the rollout of essential infrastructure. Chapter 2 noted the role of government transfers in encouraging financial inclusion, but many programs are still not realizing their full potential.

Combining wages, transfers, and other payments to individuals, government payments typically represent around 12 percent of GDP in a developing country. The average government may operate as many as 21 distinct transfer programs, each with its own arrangements for making payments. In an ongoing World Bank survey of 71 social protection programs in 35 countries, 36 percent used cash or analog instruments such as checks or money orders to disburse payments, while 64 percent used digital channels, either smartcards or direct deposits into accounts. However, many of the latter cases used limited-purpose payment instruments—for example, cards or dedicated cash-out accounts (as for beneficiaries of Pakistan’s BISP program)—that did not offer payments, savings, and other financial services. Overall, fewer than half of the programs provided funding through general-purpose channels that facilitated access to

Figure 3.2. Citizens, states, and digital capacity



savings or payments.²⁴ Moreover, few of the programs encouraged competition by offering beneficiaries a choice of payment service providers. This could be for several reasons, including reluctance to change arrangements made at a time when there were few alternative payments providers. In some cases, banks have not found commissions high enough to interest them; also, they may not want to introduce the beneficiary authentication requirements demanded by the programs.

Even if many beneficiaries are initially slow to move away from cashing out their benefits as soon as they receive them, there is clearly room for more strategic use of G2P payment systems to encourage greater financial inclusion, both on the demand side and with delivery commissions supporting the further rollout of financial and digital infrastructure. India's Direct Benefit Transfer (DBT) program offers one example, with all payments routed through bank accounts linked to unique Aadhaar ID numbers. This has provided the impetus to open over 340 million accounts through the government of India's universal financial inclusion, or Jan Dhan, initiative. Another approach, as in Mexico, is to route G2P payments through a payments aggregator, such as a single treasury account, able to transfer funds directly to individual accounts held in any authorized PSP.

One question then is how to deal with the costs involved in making "last-mile" payments, especially to more remote communities. Under the physical cash payment option, much of the delivery costs are borne by the payments-providing agency in assembling, protecting, transporting, and disbursing cash, although the time and transport costs to beneficiaries of having to travel to a cash point at a particular time can also be considerable. In extreme situations, there will probably be little alternative to the use of dedicated mechanisms, for example, military facilities in some mountain communities of Bolivia (Laserna, 2018) or the naval vessel that provides banking, civil registration, health

care, and a range of other services to remote communities in Peru's Amazon region.²⁵ But the wide, and advancing, spread of mobile communications argues that it should be possible to reach an ever-increasing share of beneficiaries through direct deposit and similar mechanisms.

Two problems need to be addressed in order to shift from limited-purpose payment channels to general-purpose channels that blend transfers with funds from other sources. First, how to pay for the last-mile costs of delivery? Incentives are critical—financial institutions will have no incentive to deliver last-mile benefits unless they are adequately compensated; the case of pensions in Andhra Pradesh, discussed in Chapter 5, offers an example where commissions were too low to motivate delivery. It may be less complicated to build payment arrangements into specific channels; for example, the government may absorb all cash-out fees related to the provision of social grants through a selected provider, as in the case of primary education stipends in Bangladesh (Chapter 5), whereas cashing out their transfers through any other provider of the beneficiary's choice would normally incur a fee. Delivery fees might have to be tiered—higher for more remote areas—as in Kenya's Orphans and Vulnerable Children Cash Transfer Program,²⁶ which operates a three-tier system. One approach, consistent with allowing beneficiaries a flexible option to cash out their payment at any service provider, could be to build an allowance for the cash-out fee into the amount of the benefit. Another option could be to negotiate one free withdrawal per month into the payment fee structure, but this encourages cashing out the benefit, which obviates the purpose of shifting towards general-purpose mechanisms.

A second challenge can be how to handle beneficiary authentication in the likely event that programs require a higher level of confidence than is needed for

24. Of the 51 percent that did not, 31 percent were due to the use of cash or analog payments and 20 percent to the use of digital payments that are standalone cash-out.

25. <https://andina.pe/ingles/noticia-peru-navy-vessel-to-bring-public-services-to-lake-titicaca-populations-674241.aspx>.

26. <http://projects.worldbank.org/P111545/kenya-cash-transfer-orphans-vulnerable-children?lang=en>.

a general financial transaction or cash-out. Proof of life, for example, would need to be separated from authentication for cash-out; the alternative, to require it for every cash-out or payment transaction, would be unworkable for a general-purpose account that blends social transfers and other funds. Social payments in Kenya, for example, have been managed through a consortium of banks using biometric smartcards rather than simply routed through the M-PESA accounts that many beneficiaries already have. More recently, proof of life has been separated from payments, enabling more flexible arrangements for the latter while still requiring beneficiaries to authenticate periodically with the banks. In some extreme cases it may be risky to separate out authentication of low-agency beneficiaries from their receipt of payments if this enables others to appropriate their benefits. Biometric authentication for BISP payments in Pakistan, discussed in Chapter 5, offers an example.

P2G payments, JAM, and the acceptance ecosystem

The other side of the government-JAM linkage is the value of a strong payments ecosystem to facilitate a range of services by removing frictions and leakage from P2G payments, and from P2Provider payments more generally. East Africa has made progress in this area; Pillai (2016) and Ndung'u (2019) offer examples of services that have been facilitated by cashless payments in Tanzania and Kenya. They include the provision of cashless water vending machines; M-Tiba, a mobile phone-based health wallet that enables users to save and to pay accredited health service providers; and M-KOPA pay-as-you-go residential solar systems. As of June 2017, M-Tiba was reported to have registered nearly 900,000 users with access to 450 health facilities, and to have processed payments for 100,000 visits totaling \$1.4 million. In 2019 M-KOPA reported cumulative sales of over 750,000 off-grid solar systems serving 3 million individuals; customers were estimated to save about \$650 over five years (M-KOPA, 2019).

Another example is the conversion of tourism payments in Tanzania from cash to cards (Pillai, 2016). Two years after going cashless, the Ngorongoro Conservation Area Authority reported a 40 percent jump in revenue from the same volume of tourists. Other parks moved towards cashless payments, and in December 2015 cash was banned for all tourism-related payments in the national parks. While this has reduced some serious problems, including diversion and the theft of cash from tour operators and drivers, it has also faced challenges because of network connectivity failures, including long time lags in connectivity that prevent payments from being completed. All such initiatives expand the uses of finance and payments and boost demand for their services, as well as increasing the accuracy and accountability of payments to government agencies by avoiding cash payments at the point of service.

Here, too, a strategic approach can be helpful. As for G2P programs, in the early stages, individual services and facilities tend to develop their own customized approaches towards accepting noncash P2G payments. This became a problem, for example, in Tanzania, partly because of the lack of coordination across the government, but also because of the need to encourage the acceptance side of digital payments more widely across the economy. As an exceptionally large entity, government can play a key role in developing the wider acceptance of digital payments by transitioning towards a common, inclusive system for accepting digital payments. One example is Tanzania's Government e-Payment Gateway, which enables customers to pay for virtually all public services via cards, internet banking, and mobile money from any provider.²⁷ The need to increase acceptance by merchants and other service providers in India was highlighted by the report of the High-Level Committee on Deepening

27. Government officials have noted that in addition to easing the process of acquiring bills and making payments, the e-Payments Gateway has resulted in benefits such as proper recordkeeping, timely reporting, reducing leakages and fraud, as well as increasing revenues to the government entities (Tigo Tanzania, 2018). See <https://www.tigo.co.tz/news/tigo-customers-can-now-make-payments-using-the-government-electronic-payment-gateway-gepg> and <https://allafrica.com/stories/201808090047.html>.

of Digital Payments (2019),²⁸ which called for a similar Gateway facility.

Boosting the wider acceptance ecosystem has emerged as a common “second stage” challenge in many countries where either P2P remittances or G2P payments have driven financial inclusion. Kenya appears to have had more success than most in this area, perhaps because the dominance of M-PESA has made acceptance simpler, at the cost of market competition. Governments can also use fiscal measures to encourage wider acceptance of digital payments. Uruguay, for example, offered a temporary reduction in value-added taxes on digital payments, and this appears to have stimulated takeup by merchants (Better Than Cash Alliance, 2016). With high levels of tax evasion in the cash economy, such a measure may not incur a revenue cost and can be a good investment in strengthening the tax base for the future. Other avenues can be to subsidize the initial acquisition of POS terminals, reducing a setup cost that can be high for small businesses.

Leveraging high-speed mobile infrastructure to foster inclusion

While mobile phone ownership is relatively high in most countries, measures of higher-level connectivity and access to the internet show a more differentiated picture. Among the indexes in this area,²⁹ the GSMA Connectivity Index (2019a) covers 3G and higher networks and services and includes a number of indicators, including network speed, reliability, and content, as well as affordability. The overall index shows a very strong, almost linear cross-country relationship with log GDP per head, with rudimentary values in the poorest countries. Over time, the index also captures the marked increases in network power and capacity that have taken place in many countries.

28. <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/CDDP03062019634B0EEF3F7144C3B65360B280E420AC.PDF>.

29. For discussion and comparisons, see Esselaar, Gillwald, and Stork (2017).

Nevertheless, there are economic limits to the expansion of high-speed connectivity. Perlman and Wechsler (2019) point out that, barring a breakthrough in technology such as satellite internet or transmissions from balloons,³⁰ the economics of rolling out high-speed internet access will slow its spread, especially to poor and sparsely populated regions. These will not generate the density of business needed to warrant the substantial cost of rolling out high-speed network infrastructure. This is not to say that lower-income countries cannot make rapid progress. With major gains in coverage and falling broadband prices, India, in particular, has made remarkable gains on the GSMA Mobile Connectivity Index, advancing by 15 points between 2014 and 2017.³¹ However, India has far higher population and economic densities than many other developing countries; it will therefore be more economical to extend high-speed services across a greater part of its territory.³²

The market forces generated by higher-income consumer and commercial demand are driving countries towards ever-higher capacity networks—a trend that is evident from the GSMA Mobile Connectivity Index components, which show a larger gain in speed than in coverage between 2014 and 2017. This offers a huge opportunity for governments, even if high-speed internet service does not rapidly diffuse to serve poor people.³³ While 3G and higher communications can support a richer menu of services, including better customer interfaces for financial transactions, feature

30. For other examples, see <https://www.networkworld.com/article/3439140/space-internet-service-closer-to-becoming-reality.html> and <https://loon.com/>.

31. Well-performing countries at comparable levels to India, such as Kenya and Tanzania, advanced about 8–10 points in the same period. Countries that were already high in the 2014 index, like Canada or Australia, typically advanced by around 3 or 4 points. Countries at the very lowest level of the index in 2014—the bottom decile—also advanced more slowly. This suggests a process of convergence in many advancing countries, except at the bottom end, where some are being left behind.

32. To take an example, the economic density of India in 2017, measured as US dollar GDP per square mile, was 14 times the economic density of Tanzania. The combination of size and density provides a far larger potential market base to roll out high-speed connectivity.

33. Advances in technology and competition are pushing down the cost of smartphones to \$15, a level that is widely affordable in even the poorest countries (see <https://qz.com/africa/1629078/africa-will-stay-loyal-to-chinas-huawei-regardless-of-trump/>). Nevertheless, basic phones will continue to be a staple for some time to come.

Table 3.1. Policy directions for universal JAM

No.	Goal	Description
1	Access to ID and building trust	<ul style="list-style-type: none"> • Robust ID for all with strong authentication ecosystem. • Free, easy enrollment with minimum possible data requirements. • Coordination with civil registration to facilitate updating. • Clear accountability for data protection, managing grievances, and handling technology failure.
2	Access to finance and mobile	<ul style="list-style-type: none"> • Simplify KYC documentation around ID and move to risk-based KYC and e-KYC to cut onboarding costs. • Level the playing field: uniform requirements for SIM registration and basic mobile money or bank accounts.
3	Access to mobile	<ul style="list-style-type: none"> • Encourage universal access to at least 2G. • Cross-subsidize coverage through proceeds and conditions of spectrum auctions. • Consider subsidies or tax breaks on feature phones; avoid excessive taxation. • Provide for number portability.
4	Access to finance and trust	<ul style="list-style-type: none"> • Allow nonbanks (notably MNOs, but also other businesses) to offer payment services as a low-cost way to extend financial access to poor customers. • KYC, along the lines of SIM registration subject to trust account arrangements and prudential oversight.
5	Access to mobile and finance	<ul style="list-style-type: none"> • Encourage shared infrastructure—cell towers, perhaps through tower companies—and agents. • Promote nonexclusivity to share fixed costs and facilitate expansion.
6	Value and convenience of finance	<ul style="list-style-type: none"> • At an appropriate stage of market development, encourage payments interoperability. • Support technology switch (like UPI) and encourage mutually beneficial interchange agreements between providers. • Encourage innovations such as tokenized addresses to increase convenience and trust.
7	Accountability and access to finance	<ul style="list-style-type: none"> • G2P payments through common platform able to pay to any general-purpose financial or mobile account. • Minimize cash and special-purpose channels, while recognizing that these may be essential in some areas. • Develop a common approach to paying for last-mile delivery through general-purpose instruments, and for separating out identity verification from payments.
8	Value, acceptance, and convenience of finance	<ul style="list-style-type: none"> • E-Payment Gateway to enable P2G payment for government-provided services to be made easily through any account. • Enforce use progressively as financial inclusion increases. • Use Gateway and possibly other measures to incentivize wider merchant acceptance of digital payments.
9	Value, acceptance, and convenience of finance	<ul style="list-style-type: none"> • Avoid excessively high taxation of digital transactions that may discourage use and merchant acceptance. • Consider fiscal incentives to encourage acceptance, such as temporary VAT reductions on digital transactions. • Review tax administration and audit requirements to reduce need for paper receipts and records, since these undermine the benefits of moving to digital systems.
10	Value/access, benefits of digital governance, trust in digital data	<ul style="list-style-type: none"> • Use digital data to monitor implementation and performance of government programs (towards real-time digital governance). • Monitor beneficiary experience to ensure that poor and vulnerable groups are not excluded by digital divide. • Take steps to secure the large amounts of transactional and other data that will be generated by the use of JAM.
11	Access to ID, mobile, and finance	<ul style="list-style-type: none"> • Ensure that applications and interfaces are designed to meet the unique needs and preferences of vulnerable and marginalized groups, including but not limited to women, linguistic/ethnic/religious minorities, differently abled people, etc.
12	Capability for wider access and functionality	<ul style="list-style-type: none"> • Encourage partnerships, including with service providers, self-help groups, and NGOs to promote digital education and capacity across the population, in particular among women.

phones running on 2G can deliver the basics, including making payments, verifying balances, managing savings, and CICO services (Perlman and Wechsler, 2019). Increasing demand for high-speed service translates into increasing rents from auctions of high-speed spectrum. Fiscal policies to support basic communications can include cross-subsidizing basic service by using a portion of these rents to support at least basic connectivity in poor, sparse regions.

Rents from spectrum auctions and modest taxes on high-speed communications could also be used to underwrite programs to actively empower disadvantaged groups, subsidizing mobiles, including in the context of social protection and other transfers, and encouraging mobile and financial literacy for those needing assistance to navigate the system. As discussed in Chapter 5, in some countries restricted agency and capacity have emerged as a constraint for disadvantaged groups, often including women.

Broad policy directions

The synergies in the system, as well as between JAM and a wide range of government programs, argue for taking a strategic approach to the area. The aim should be to avoid silos where there is little consideration of the impact of decisions in any one area on the demand and supply conditions that shape access, functionality, and use in other areas. Perlman and Wechsler (2019) list at least 13 commonly found regulators, agencies, and authorities with remits relating to JAM. These include the telecommunications regulator; the central bank (oversight of financial regulation, interoperability, etc.); the consumer protection agency; the Department of Home Affairs (civil registration and ID); the competition regulator; bodies overseeing financial intelligence, credit, insurance, and privacy/data protection; the environmental agency (rights of way for mobile infrastructure); the Ministry of Finance (VAT, taxes on licenses, mobile spectrum auctions, duties on imported equipment); and possibly a universal service

agency. To this should be added the range of government departments responsible for services and programs that use JAM, whether for identification or payments, both government-to-person and person-to-government. This formidable list points to the strengthening of regulatory capacity and coordination that will be needed as societies and economies transition towards greater use of digital mechanisms. Both are flagged as essential by Ndung'u (2019) in the case of Kenya's digital transformation.

Finally, the use of each component of JAM to implement government programs will generate vast quantities of data, including identities, locations, and transaction records. This can be helpful in monitoring the quality of service delivery (Chapter 6), but it raises the urgency of putting in place laws for data protection and arrangements to manage and safeguard public data. Many countries have already experienced huge and embarrassing breaches,³⁴ and the situation will only become more urgent as countries transition towards digital states.

It is beyond the scope of this paper to address all policy issues related to access to JAM, but it will be useful to summarize some broad policy directions for accelerating progress towards the first cluster of SDGs in Box 1.1, to provide all with ID, mobile access, and a financial account (Table 3.1). Some relate to individual JAM components, some to combinations, others to government programs that engage JAM and create demand for its services. Some are directly concerned with expanding access; others are mainly concerned with improving functionality, value, and trust. These are, of course, related—adding value and trust encourages take-up—but it is helpful to be clear on the prime focus. Country-level priorities will, of course, depend on local conditions. Chapters 4, 5, and 6 focus on the use of JAM to improve government capacity to implement a range of programs.

34. <https://www.nytimes.com/2019/09/17/world/americas/ecuador-data-leak.html>.

Chapter 4.

Towards Efficient Pricing with Equity: The Role of Digital Technologies

Efficient pricing and the SDGs

Efficient pricing arrangements take into account important economic and social externalities from the consumption of some key commodities, such as fuels, fertilizers, and water. The same principles apply in other areas—for example, the pricing of forest resources to value their benefits in terms of carbon sequestration and preserving biodiversity. Moving towards efficient pricing is critical to achieving a number of the SDGs, in particular the sustainability objectives in Goals 12 and 15 (Box 1.1). These include a range of targets related to combating climate change and adopting sustainable production and consumption patterns, including the management of water resources. Achieving these global goals in the long run depends on how well policies can be designed and implemented to balance three concerns: sustainability, efficiency, and equity.

Energy and food security policies exemplify the difficult trade-offs between these three objectives. Governments around the world provide subsidies to energy and agriculture to incentivize production and protect consumers from external shocks, but they distort prices in the process. Prices are sometimes held below market levels, while market prices in turn may be below efficient pricing levels. The result is heavy overconsumption relative to efficient and sustainable levels—for example, of water resources pumped by farmers using subsidized power. Over the years, generalized subsidies have had unintended

consequences, including CO₂ emissions, air pollution, environmental degradation, and the depletion of valuable aquifers.

While the principles of efficient pricing apply to many commodities, we focus on fuel and fertilizer subsidies. As the world grapples with the causes and consequences of climate change, there is an urgent priority to restructure the pricing of these commodities to minimize distortions, incorporate environmental externalities (through green taxes, for example), and improve equity through better targeting and delivery of benefits to the poor.

In this chapter, we consider an approach that uses digital ID, payments, and mobile technology to shift from a generalized price subsidy regime to personalized transfers. This increases the flexibility to reduce price distortions while at the same time efficiently costing externalities and enhancing equity by targeting subsidies to those most in need. We argue that many governments can enhance their capacity to undertake these reforms if they utilize synergies between the three digital pillars in a strategic way to expand their policy possibility frontier. However, as we also show, having capacity does not always translate into actual reform. The transition from price subsidies to efficient pricing with equity can be contentious. It confronts entrenched interests and requires both political will and sustained administrative effort to succeed.

Moving to efficient pricing with equity: The role of digital technologies

Reforming inefficient and inequitable energy subsidies continues to be an important priority for policy-makers, as does instituting “green taxes” to reduce carbon emissions. In 2015, fossil fuel subsidies, defined as fuel consumption times the gap between existing and efficient prices (including environmental costs), touched \$4.7 trillion, nearly 6.3 percent of global GDP (Coady, Parry, and Shang, 2019). Underpricing of local air pollution constitutes half of this amount, and accounting for global warming contributes another quarter of the total subsidy. The IMF also estimates that moving from market to efficient fossil fuel pricing through the introduction of “green taxes,” for example, would have lowered global carbon emissions by 28 percent in 2015 while increasing government revenues by 3.8 percent at the same time. If used appropriately, this fiscal space can improve equity by increasing access to clean energy sources for the poor, as we shall see below.

Global priorities and realities within countries often diverge, making it difficult to agree on a set of policy measures that would guide the process of reforms. At the country level, energy subsidy reform is complex,

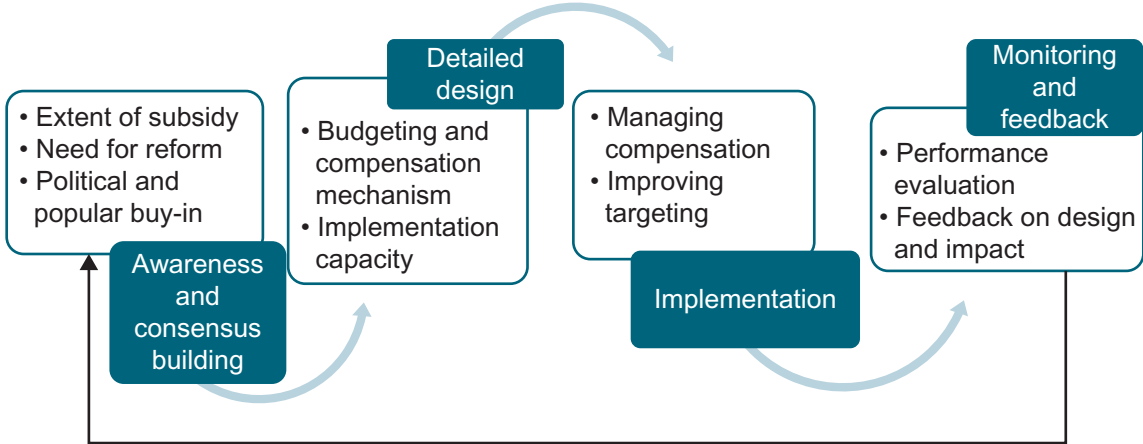
not least because of the distributional implications. These are recognized in Target 12c of the Sustainable Development Goals:

Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities.

Consistent with SDG12, one possible way to address this challenge is to shift from price subsidies towards individualized compensation, with the degree of targeting depending on country conditions. We break down the process into four components, as represented in Figure 4.1. They are not strictly sequential since the reform process will involve some focus on all elements at any given time and a constantly shifting emphasis between them.

Following this framework, a strategic approach to leverage digital technologies, especially digital ID and payments infrastructure, can facilitate the transition from price subsidies to individualized transfers in four ways.

Figure 4.1. Conceptual framework for fuel subsidy reform



- First, digital communications provide governments with tools to raise awareness of the need to reform subsidies and the consequences of inaction. Fuel subsidy reforms invariably trigger popular unrest since they are accompanied by increases in prices that affect everyone, particularly the poor. Governments need to control the narrative and proactively engage with citizens to build coalitions of support that would minimize the downside political risks of reform. Digital communications, including the use of social media, can facilitate outreach at scale and mitigate the political risk of the reforms. Digital and social media may also be used to mobilize citizens against reforms; they need to be an integral part of the government’s strategy to highlight the need for action, lay out goals and targets, and strengthen accountability.
- Second, the spread of digital technologies has made it possible to transition from general price subsidies to more efficient and equitable direct transfers. While relatively few countries have implemented this at scale in the case of fuel subsidies, many have G2P payments programs such as social pensions, maternal and child benefits, or student bursaries that are transferred through digital means. These can serve as a backbone for direct payments of compensatory subsidies to individuals.
- Third, digital technologies can provide governments with new opportunities to target beneficiaries in a progressive way. Beneficiary lists based on unique digital IDs can eliminate duplicate and false entries and generate fiscal savings for the government in the process. Once lists are clean, governments can implement “soft targeting” through moral suasion (or “nudges”), encouraging recipients to self-select out of the subsidy, through the “GiveItUp” program in India, for example (see Box 4.1). In the next step, it can tighten targeting by requiring self-declarations of income and move towards “hard targeting” by

requiring verification of income or asset ownership, removing beneficiaries who do not meet the means test. With better data on income and consumption, the targeting mechanism can exclude beneficiaries whose income is above a cutoff point, or who own assets that indicate their economic status, such as ownership of a valuable house or motor vehicle or paying costly fees for private schools. This graduated approach to targeting is different from one where the starting point is to cut the number of beneficiaries, often in an arbitrary manner. It can help mitigate popular opposition while at the same time consolidating support for the reforms if they are perceived to be fair and equitable.

- Fourth, digital mechanisms generate large volume of high-frequency data that can be used to monitor the implementation of the reform program. This can be supplemented by beneficiary feedback that would enable governments to flag bottlenecks, redesign policies, and address grievances in near real time. A digitally enabled, well-functioning feedback and grievance redressal system improves credibility and trust in the government, which in turn reduces the political risk of popular backlash against the reform.

Reimagining green taxes in the context of direct transfers

Reducing fossil fuel consumption is at the heart of the solution to combat greenhouse gas emissions. As well as moving away from subsidies relative to market prices, fossil fuel pricing reforms can include the implementation of green taxes in order to reduce carbon emissions and encourage a shift towards clean and renewable sources of energy. Designing, implementing, and enforcing green taxes has been difficult at both country and global levels. The recent (and continuing) “Yellow Vest” protests in France have rejected the notion of carbon taxes as “elitist” and detrimental to income security not only of the poor but also of the

middle class, who are facing stagnating wages in the aftermath of the global financial crisis.

These are common concerns in many countries. In the case of the United States, for example, Wheeler (2008) considered the factors behind state-level support for and opposition to high taxes on fossil fuels. He documented very similar views. The work of Nora Lustig and collaborators analyzes a similar concern for the impact of indirect taxes on the disposable incomes of the poor. Even if the rich consume far more energy per head than the poor, the weight of energy-intensive sectors in the consumption of the poor is often higher than for the rich. There is no guarantee that the poor will benefit from any generalized expansion in public services that might be funded out of higher consumption taxes (Inchauste and Lustig, 2017; Lustig, 2018); even if they did, the net result would be to reduce the real disposable incomes of very poor people. Digital technologies offer governments the opportunity to move towards efficient pricing with equity through a tax-and-transfer mechanism flexible enough to protect the interests of vulnerable groups.

The 2017 Carbon Pricing Watch Report documents a wide range of CO₂ tax rates, with a few being very high but most at modest levels. Seventy-five percent of the covered emissions were at prices under \$10 per ton, but quite a number exceeded this level by a substantial margin. At the same time, the UN Global Compact called for a minimum rate of \$100 per ton by 2020 to be on track for a temperature pathway of not more than 1.5–2.0 degrees Celsius of warming. Studies have suggested a wide range of tax rates and tax trajectories, with initial taxes increasing from around \$10 per ton to as much as \$100 per ton in the case of the modeling of the Carbon Tax Center (Handley, 2008). In considering the distributional impact of green taxes and how to compensate for them, it is therefore reasonable to think about a potential carbon tax range of \$10–\$100 per ton with a base scenario of around \$20.³⁵

35. The impact also depends, of course, on the share of emissions covered by a carbon tax regime. This can vary considerably; for the example of Canada, following the implementation of the carbon tax federal backstop on April 1,

Moving from taxes to pricing, a tax of \$20 per ton adds about \$0.20 per gallon to gasoline prices (somewhat less than 10 percent of recent US retail prices) and \$1.00 per 1,000 cubic feet for natural gas (Hafstead and Picciano, 2017). These increases are modest relative to the observed differences in fuel prices across countries and variations over time. A carbon tax at the upper end of the range would involve a tax of \$1.00 per gallon, but even this falls well within the range of historically observed price variation. Prices for West Texas Crude, for example, peaked at \$122 per barrel in 1980, crashed as low as \$18 per barrel in 1998, then skyrocketed as high as \$160 per barrel in mid-2008, just before the global financial crisis.

The percentage increase in fuel prices resulting from any given level of green taxes will vary a great deal across countries and over time, depending on the prevailing price of fuels. Across countries, on September 17, 2018, petrol prices ranged from a low of \$0.01 per liter in Venezuela to a high of \$2.17 in Hong Kong, with Norway and Iceland only a little lower. Natural gas prices vary a great deal too, being far lower in North America, which currently has a surplus of gas, than in Asia, which has a deficit.

Proposals to compensate consumers for higher fuel prices have outlined a number of possibilities. For the United States, for example, Metcalfe (2007) and a number of other studies have advocated using carbon tax revenues to reduce payroll taxes. A tax of \$17 per ton in the United States is estimated to provide enough resources to eliminate the payroll tax on the first \$3,660 earned by each worker and would enable an average 11 percent reduction in payroll taxes, with greater percentage reductions for the lowest-paid workers. Such an approach could be considered for higher-income countries, but in low-income countries payroll taxes are only levied on employees in formal sector occupations (and in some cases, only on public employees), and these tend not to be among the

2019, coverage in the provinces will range from a low of 47 percent in Prince Edward Island to a high of 90 percent in New Brunswick (Dobson, Winter, and Boyd, 2019).

poorer cohorts of society.³⁶ Direct financial transfers offer the only feasible way to insulate the poor from the impact of green taxes on their disposable income.

How large might such transfers be, and how do they compare with the “oil to cash” payments that have been advocated for fuel-exporting countries? We can take the example of Bolivia, which provides substantial fiscal and economic fuel subsidies to its citizens. Laserna (2018) estimates that domestic oil and gas prices are set at around 50 percent of border price levels and that the average implied subsidy per Bolivian household would be around \$300.³⁷ Adding a green tax of \$20 per ton of CO₂ to the reference price of fuel would increase the compensation by around \$17 per head, to around \$360 for an average household. For an energy exporter like Bolivia, the compensation for a green tax at this level would therefore not be too large relative to the average energy subsidy already received by the population.

To offer other (rough) estimates, fossil fuels represent around 40 percent of total energy consumption for lower-income sub-Saharan Africa. This is equivalent to around 70 gallons per head per year; green taxes of 20 cents per gallon would then amount to a uniform charge of \$14 per person per year, somewhat less than for Bolivia. Applying this charge to Tanzania, it would come to around \$70 per year for an average family. This is about the same level of compensation as provided by the basic unconditional tranche of the TASAF PSSN program, although total transfers under this program can be considerably higher. A similar calculation for India suggests an average green tax charge of

\$12.50 per head.³⁸ This is modest relative to central budgetary spending on India’s large and complex system of social benefits and subsidies, which amounts to around \$50 per person.

The level of compensation required to return the proceeds of green taxes to people uniformly across all income groups is therefore not negligible. However, unless the carbon tax is raised to very high levels, it is well within the range of social transfers already seen in many lower- and middle-income countries. For modest carbon tax rates, the levels of compensation may not be sufficiently high to warrant introducing a separate compensation scheme, so that it might be more feasible to graft additional financing onto existing programs. For high carbon taxes and “oil to cash” reforms in producing countries that maintain deep price subsidies, the situation is different. The implied levels of uniform compensation are large enough to warrant a distinct “dividend” program, especially if the intention is to aim for uniform compensation rather than to build on existing targeted programs (Moss, Lambert, and Majerowicz, 2015).

Some country experiences³⁹

Can digital technology, especially ID and payment systems, be leveraged to improve government’s capacity to move from generalized fuel price subsidies to individualized compensation? Will this reduce price distortion, improve efficiency, and enhance equity? How can these reforms be made sustainable? We consider these questions in the context of the experiences of Bolivia, Nigeria, Iran, and India—four countries that have attempted to introduce fuel subsidy reforms at scale, with varying degrees of success, as we shall see below.

36. Even in high-income countries, replacing income taxes with natural resource-based tax revenue can have adverse consequences if this unstable source of income is relied upon too heavily (and carbon taxes are designed to reduce consumption of the taxed resource). A dramatic example is found in Alaska, where oil revenues constituted around 85 percent of the state budget, and low oil prices are leading to steep cuts in government services (Banchemo, 2019).

37. This makes the simplifying assumption that all the subsidy is divided among households, with none allocated to help firms adjust to the new price levels. This may not always be the case. In Iran, for example, a significant proportion of the fiscal savings was allocated to improve firm-level energy efficiency.

38. Based on typical energy consumption levels; see <https://www.enerdata.net/publications/executive-briefing/world-energy-expenditures.html>.

39. This section draws heavily on Mittal, Mukherjee, and Gelb (2017) and Gelb and Mukherjee (2019).

Bolivia: Capability without reform

Bolivia's case shows that while digital identification and payment systems can be used as a tool to reform fuel subsidies, government capacity is not necessarily the binding constraint. As in many other countries, the primary constraint is political. A significant exporter of natural gas, Bolivia made efforts to rein in fuel subsidies by increasing gasoline prices in December 2010 following the global financial crisis and collapse of world energy prices. Protests erupted across the country, forcing the government to quickly back down and restore the status quo.

There has not been a reform episode since then, even though the country has good capacity to move towards direct compensation payments. Bolivia has for many years implemented large-scale social transfers effectively, taking advantage of a widely held biometric ID system to identify beneficiaries and high rates of financial inclusion to pay them, except for a relatively few beneficiaries living in remote Andean locations.

Nigeria: Reform effort without capability?

Nigeria has a long record of attempting to reform fuel price subsidies, most clearly when impelled by severe fiscal and macroeconomic constraints. However, among its other difficulties, it lacks the capacity to offer credible mechanisms to cushion the impact of higher prices, particularly on the poor. The most significant reform, introduced in 2012, failed in large part due to the government's inability to manage the fallout of the price decontrol policy that led to popular protests fueled by the spread of digital communications, especially mobile phones.⁴⁰ To boost the popularity of the reform, the government instituted the Subsidy Reinvestment and Empowerment Program (SURE-P) to increase budget allocations to social sectors, including through programs for maternal and child health,

40. See <https://www.cnn.com/2012/01/03/world/africa/nigeria-fuel-protest/index.html>.

public works, vocational training, and other initiatives. However, SURE-P did not offer transparent monetary compensation for higher fuel charges. It suffered from a lack of credibility and from perceptions of corruption and mismanagement similar to those that reflected the problems with the fuel subsidy regime and with public spending in general. It was discontinued by the Buhari government as soon as it took office in May 2015 on a strong program of anticorruption.

The "Occupy Nigeria" protests following the removal of the fuel subsidy were largely organized by text messages and social media posts, eventually leading to a rollback of the reforms. Nigeria's more recent achievement in shifting from subsidies to "price moderation" under intense fiscal pressure is not likely to be sustainable if oil prices increase going forward.

Iran: Building on capacity to reform

Iran's radical reforms in 2010, aimed at eliminating large fuel subsidies and replacing them with cash transfers to households, have generally been deemed to be a success. Fuel subsidies had been in place for nearly four decades. Although they were widely regarded as inefficient and inequitable, they had proved politically difficult to remove. Iran was the first country to institute a system of oil-to-cash transfers at a national scale, moving to individualize the subsidy at the household level and transfer it directly to beneficiary bank accounts—with the transfer visible to recipients before the price hike to boost credibility. In the process, the government was able to leverage Iran's strong civil registration system to identify beneficiaries and capacity in the banking system to expand financial access to make the transition to the new system relatively smooth and effective. Digitization played an important role in the implementation of the reforms, especially in the banking sector. Banks upgraded their payments infrastructure and collectively opened nearly 16 million new accounts to enable all eligible households to access their transfers.

As the reforms became embedded in the system, the government used “soft targeting”—encouraging richer households to opt out of the subsidy voluntarily—following it up with “hard targeting” as data improved—eliminating households by setting an income ceiling for benefits. It thereby achieved the twin objectives of reducing price distortions and improving equity in the distribution of fuel subsidies.⁴¹

India: The reform of the LPG system

India’s 2013 reform of LPG cooking gas subsidies used some similar approaches (Mittal et al., 2017). One important difference is that the government sought to encourage the use of LPG as a clean cooking fuel in place of biomass. The positive externalities, including better health for women, reduced deforestation, and lower carbon emissions than other available options, argued for an efficient price that was lower than full market price rather than above it. The problems were how to avoid the appropriation of the subsidy by dealers (who could divert subsidized cylinders to businesses willing to pay market prices) and to focus the subsidy on poorer consumers. The LPG reform involved a four-pronged approach.

- First, it was necessary to remove duplicate and nonexistent beneficiaries from the existing list of household LPG customers.
- Second, the reform eliminated the dual pricing mechanism by setting the same market price for all household and commercial LPG consumers. Households receive the subsidy directly into their bank accounts upon delivery of the cylinder, up to a maximum of 12 per connection per year.
- Third, higher-income households were encouraged to voluntarily opt out of the subsidy by

signing up for the GiveItUp program. This was popularized through an intensive public information campaign creatively using social media and mobile technology to reach the intended audience.

- Finally, the government launched a nationwide program to issue 80 million new LPG connections to poor rural women through the Ujjwala program, thereby providing them access to clean cooking fuel. Independent reports indicate widespread support for the program and positive impact on women’s health and well-being in general (Giri and Aadil, 2018; Jain et al., 2018). A more detailed description of the reforms and evidence of its impact is provided in Box 4.1.

Towards more efficient and equitable subsidies: PaHaL and Ujjwala

India has long suffered from inefficient and inequitable fuel subsidies. According to estimates, in 2014, only about half of India’s 250 million households had access to clean LPG cooking gas. Most of the LPG subsidy was captured by higher-income groups, mostly urban residents. The system was also riven with corruption and inefficiency. Duplicate connections, ghost beneficiaries, and significant diversion of subsidized domestic LPG towards commercial use led to inconvenience for genuine beneficiaries. The subsidy also came at a significant fiscal cost (US\$5.4 billion, or 2.8 percent of fiscal revenue in 2013) and fiscal uncertainty due to volatile international energy prices. Due to limited LPG connections, the poor were excluded from the LPG distribution network and had to use firewood to cook, leading to severe health problems, especially for women.

Starting in 2013, the PaHaL program reformed this system. Instead of paying a subsidized price for LPG cylinders, beneficiaries paid the market price and the government transferred the subsidy directly into their

41. In 2019, under extreme fiscal pressure, Iran again sought to implement a large increase in fuel prices. In contrast to the 2010 reforms, there was little prior communication or arrangements to implement a credible compensation system. The result was massive social unrest and a scramble to put in place some offsetting transfers.

bank accounts when they paid the dealer to deliver the cylinder. This system is effectively a voucher, delivered on a verified purchase, as opposed to an unrestricted transfer that could be used to purchase any commodity, as in the case of the monthly cash transfers that replaced gasoline subsidies in Iran. Payment was confirmed by text messages (SMS) sent to mobile phones. Customers could track their deliveries, rate their distributors, and change them if dissatisfied.

On the implementation side, the program created a clean list of beneficiaries, removing some 25 million false and inactive recipients. Dealers could no longer profit from diverting subsidized cylinders, and wait times for refills for genuine households decreased. The reform also led to fiscal savings, although the quantum is open to debate. With the subsidy individualized to identified people and households, nearly 10 million LPG consumers voluntarily relinquished it through the government's GiveItUp campaign. Among other incentives, this offered a placing on a digital "Roll of Honor" linked to the name of a poor family whose subsidy had been made possible by the voluntary withdrawal. Further targeting measures were then taken, first to exclude households earning enough to file a tax return, and second, to require beneficiaries to submit a legally binding declaration that their household income was not above the cutoff level.

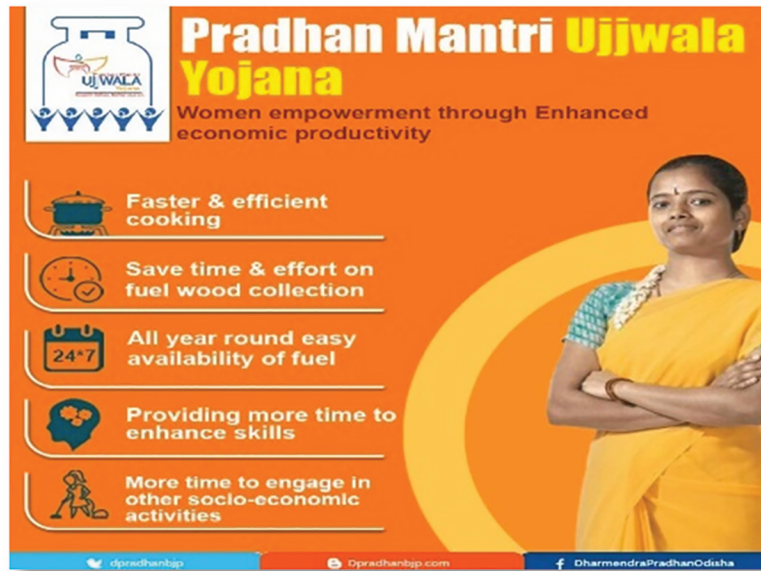
The implementation strategy appropriately leveraged the ID-payments-mobile framework. The first phase of de-duplication relied on name and address matching, as penetration of Aadhaar had not yet reached saturation in many states. As Aadhaar coverage increased, beneficiaries were encouraged to provide their unique ID numbers and as well as Aadhaar-linked bank accounts and mobile numbers, to the program database. Unique identification has been key in the transformation of the subsidy regime. Surveys indicate high rates of customer satisfaction with the changes, largely because eliminating the incentives for dealers to divert cylinders had slashed delivery waiting times for households.

Building on the success of PaHaL and the savings, in 2016 the federal government announced a program (Ujjwala) to provide 50 million poor rural women with LPG connections within three years. Aadhaar is now mandatory to obtain a new LPG connection, so new applicants can be checked against existing beneficiary lists to eliminate fraud. Moreover, many of the Jan Dhan accounts were opened by rural women to receive the subsidy, giving them greater agency in the receipt of the cash transfer.

Independent assessments of the Ujjwala program indicate a significant positive impact on adoption and use of LPG, especially in rural areas. A recent survey conducted in six states by the Center for Energy, Environment, and Water (Jain et al., 2018) indicates that the share of households using LPG as their primary cooking fuel increased from 14 to 37 percent in 2015–2018 and that Ujjwala accounted for 43 percent of all new rural LPG connections. Greater penetration of LPG in rural areas has also increased demand—83 percent of households that do not have an LPG connection are interested in doing so and are willing to pay for it. Ujjwala beneficiaries are women, per the eligibility criterion of the program. They receive the subsidy directly in their bank accounts, increasing their agency over the transfer (Jain et al., 2018).

Against the backdrop of widespread concern for the negative externalities from fossil fuel consumption, the gender, health, and environmental impact of Ujjwala offers a useful example of the flexibility afforded by digital technology in dealing with positive social as well as environmental externalities. Cooking is almost exclusively done by women, who are also responsible for collection of firewood and biomass, especially in rural areas. The health and environmental externalities are not insignificant. Reduction in exposure to indoor air pollution through the use of clean cooking fuels reduces tuberculosis incidence by half, with most of the health benefit accruing to women (Singh, Kashyap, and Puri, 2018). With greater access, availability, and use of LPG, reliance on firewood and

Figure 4.2. Ujjwala communications: Inclusive access and women’s empowerment



biomass declines. This should provide another positive externality, especially in fragile environmental zones.

Digital technology cannot solve the problem of fiscal sustainability, but it offers a flexible menu of options to help address it. Even as affordability remains a continuing barrier to uptake, especially for poor families, concern is mounting over increasing fiscal allocations to the subsidy. One approach could be to rebalance the LPG subsidy in favor of the rural poor by reducing the number of free cylinders from 12 per year to six, which is close to the average consumption level but still higher than the average for poor consumers. Another is to reduce the transfer to non-Ujjwala PaHaL beneficiaries, tapering the subsidy to less-poor groups or eliminating it altogether for these groups while increasing the subsidy to the very poor.⁴² Any of these approaches, or a combination, would satisfy the objective of efficient pricing (at the margin) with increased equity.

42. In a policy brief, the Collaborative Clean Air Policy Center proposes increasing the subsidy to 73 million poor households so that the cost of a cylinder would be 4 percent of monthly expenditures. <https://static1.squarespace.com/static/59f2a2038a02c746600f6bbb/t/5d0503a7562f010001cc373f/1560609704122/Ujjwala+V2.0+Jun+19b.pdf>.

Reforming fertilizer subsidies: Digital ID and payments for sustainable agriculture

Subsidies on fertilizer—an essential input into agricultural production—are often motivated by the objective of ensuring food security and reducing dependence on imports and external assistance. As for fuel, governments often provide generalized price subsidies to producers as well as to consuming farmers, which greatly distort the market pricing mechanism. Lower fertilizer prices are supposed to benefit farmers but can also result in severe overuse, thereby creating negative externalities vis-à-vis soil health, food safety, and access to water (Jayne and Rashid, 2013). Low administered prices may be politically appealing, but they fail to account for the usage of valuable natural resources, thereby making it difficult to achieve several SDG goals related to protection of the environment and sustainable use of natural resources, as described in Chapter 1 (Box 1.1).

Fertilizer subsidies suffer from significant inefficiency, inequity, and misallocation of public resources. As we

have seen in the case of fuel, reforming fertilizer subsidies is not an easy task. Farmers are an influential political lobby; corruption in fertilizer procurement and distribution creates vested interests opposed to changes in the status quo. However, these challenges are not insurmountable. The framework of individualizing the subsidy that has been successful in the case of LPG in India can be applied in this case as well. Simultaneously, there are additional challenges that policy-makers need to take into account as they move from price subsidies to individualized transfers for fertilizers.

- (i) *Absence of a beneficiary database:* Unlike the case of LPG in India or fuel-consuming households in Iran, where the beneficiary profiles are well defined and lists digitized, often no such database exists for farmers. Determining beneficiaries on the basis of land ownership would almost certainly exclude tenant farmers, sharecroppers, and others who are informally engaged in agriculture. Moreover, land records are often outdated and inaccurate, increasing the chances that subsidies will be misallocated.
- (ii) *Heterogeneity:* The farm sector is extremely heterogeneous—there are multiple inputs and multiple products; the demand for inputs such as fertilizers and seeds varies across crops, time, and space. This makes it difficult to arrive at a base allocation for a “representative” farmer and to target efficiently.
- (iii) *Environmental externalities:* The challenge of determining the optimal transfer is further compounded by changing weather patterns, differential soil quality, and availability of water resources. If equity is the main policy goal, farmers who own more productive land and have better access to water should theoretically pay more for fertilizer than those with lower soil quality and water resources. However, cheaper fertilizer in the second case may

lead to its overuse, further depleting natural resources and reducing land productivity, something that the SDGs seek to mitigate.

- (iv) *Infrastructure and capacity:* Using ICT and payments presupposes the existence of both financial and digital infrastructure in rural areas. This is not the case in most countries. While it is undeniable that mobile technology, including mobile money, has penetrated significantly in parts of rural Asia and Africa, there are still large gaps in connectivity, financial access points, and digital literacy among the rural poor, especially women.

Notwithstanding these challenges, several countries have implemented fertilizer reforms using digital technologies with the objective of moving towards efficient pricing with equity. We explore three cases.

Nigeria

In Nigeria,⁴³ the government initiated a new fertilizer distribution scheme in 2012 called E-Wallet under the Growth Enhancement Support Scheme (GESS). The main innovation was the use of mobile technology to transfer fertilizer subsidies from the government directly to farmers, bypassing middlemen, who frequently used fraudulent documents to collect subsidized fertilizers from government stores to sell at market rates. The government was removed from the direct procurement and distribution of fertilizer. The scheme was implemented with the collaboration of the federal government, state ministries of agriculture, supply chain managers (SCMs), and a private-sector digital platform builder/operator.

Registered farmers received E-Wallet vouchers through their mobile phones and used them to buy inputs at designated agro-dealer redemption centers. Farmers received two 50-kg bags of fertilizer (one bag of urea and one bag of NPK) at half the market price, with the payment being made in cash directly to the

43. This case is based on Onyekwena et al. (2018).

agro-dealer, who also could redeem the voucher. Beneficiaries also received one free 25-kg bag of rice or 20-kg bag of maize seeds. The federal and state governments shared the fiscal cost of the subsidy equally.

Most stakeholders, especially farmers, perceived the program to be a success. A survey of 213 farmers conducted through a field questionnaire and by phone found considerable support, with over half of the respondents reporting that E-Wallet was better than the previous system. The main reasons were convenience (timely access to fertilizers during farming season) and control (getting the desired type and quantity of fertilizer). Some farmers reported that the price was also lower, possibly due to the elimination of middlemen and improvements in the supply of fertilizer to the market. There seemed to be a fairly broad consensus that farmers actually benefited from the scheme and that reducing the influence of middlemen led to less fraud and corruption in the distribution of fertilizer.

While the survey paints a hopeful picture, the E-Wallet system was not without challenges. On the technical side, nearly a quarter of the survey respondents indicated that the system was not effective, especially for areas that had poor mobile network coverage. Network breakdowns were frequent, and the E-Wallet platform provider was unable to effectively cover all redemption centers in remote rural locations. This eventually led to offline redemption of inputs; corrupt practices ensued, denting the credibility of the reform. Because Nigeria lacks an effective ID system, there were difficulties identifying beneficiaries, resulting in some duplicate and ineligible entries. The equal allocation of subsidized bags regardless of size of landholding, type of soil, and cropping pattern led to the provision of inputs to heterogeneous farmers without taking into consideration their actual needs. From 2015 onwards, the system was rolled back after the change in the administration, officially for technical reasons but reputedly also in response to pressures from interests seeking to regain control of the distribution system.

Zambia

Zambia's Farmer Input Support Program (FISP, formerly known as the Fertilizer Support Program) has been an integral part of its agricultural policy since 2002, receiving up to 50 percent of the government's agricultural budget.⁴⁴ In this program, the government assumed the responsibility of distributing farming inputs to small-scale farmers to incentivize the use of fertilizer and increase agricultural output.

However, FISP was plagued by several issues that limited its effectiveness as a tool to increase farm productivity, ensure food security, and reduce poverty, including frequent delays in allocating budgetary resources, mounting costs of procurement, and corruption in the fertilizer distribution system. In a bid to transform FISP and address its mounting inefficiencies and ineffectiveness, the government launched the Electronic Voucher Farmer Input Support Program during the 2017/2018 farming season.

The FISP e-voucher program transfers approximately US\$170 to each of 1 million farmers per season through a government-issued payment card (voucher scratch card) linked to the beneficiary's National Registration Card (NRC) number. The cards are redeemed at retail agro-dealer outlets by entering the voucher and NRC numbers through their cell phones, enabling the holder to purchase agricultural input supplies of their choice at the market price, up to the allotted amount. On confirmation of the transaction, the agro-dealer receives an instant payment to their online bank account, thereby closing the payment loop electronically.

The FISP e-voucher program provides another example of bringing together ID, mobile technology, and financial accounts in an integrated manner to move towards a more efficient pricing system. However, the scheme suffered from several challenges on the implementation side that have led to its partial rollback—40 percent

44. For more detail on Zambia, see Chikobola and Tembo (2018). We are grateful to Mupwaya Mutakwa for very useful conversations and for access to his unpublished thesis (Mutakwa, 2018), available on request.

of e-voucher beneficiaries were returned to the manual system for the 2018/2019 farming season. The major reasons for the decision were (a) poor connectivity and mobile network coverage, (b) delays in scratch card production and distribution, (c) farmers losing their cards and not being able to use PINs, and (d) supply constraints faced by agro-dealers in serving the demand from farmers.

Although the government has cited technical challenges as the reason for the rollback, others have speculated that it lacks the political will to take on the vested interests who benefited from the earlier system. As in the case of Nigeria, sustaining change is a challenge when reforms disrupt the status quo.

India

India's⁴⁵ fertilizer consumption per acre of arable land in 2014 was over three times the level in Zambia and 15 times the level in Nigeria. Its approach to fertilizer subsidy reform has been different; instead of implementing "hard targeting" of beneficiaries and an e-voucher system, its reform has been based on "soft targeting" through biometric authentication at the point of sale, with the objective of reducing the demand for fertilizer and increasing "subsidy salience"—the recognition by farmers that the government spends significant fiscal resources to benefit them. On the supply side, the government moved from general subsidies to fertilizer companies to compensating them for low prices on the basis of the amount sold in their retail outlets, verified through successful Aadhaar authentication. The aim has been to reduce the diversion of subsidized fertilizer to the open market.

The initial design was ambitious. It involved linking the beneficiary's Aadhaar number to their land ownership records and soil health cards evaluated at a large number of locations. Farmers were expected to undergo biometric authentication at fertilizer distribution points. The system would determine an indicative fertilizer

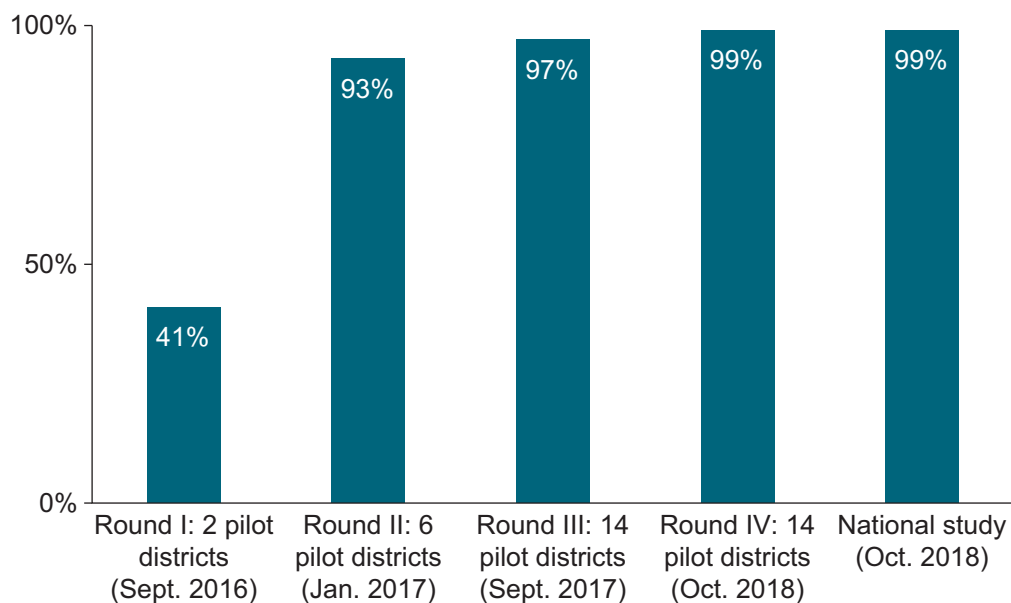
allocation based on the size of the landholding, the quality of soil, and the crop. It was expected that this would help farmers to rationalize fertilizer use, thereby reducing negative environmental externalities, especially soil degradation and depleting water resources. The longer-term objective was to fix base fertilizer allocations and move towards market pricing, with the option of transferring the compensatory subsidy through bank deposits in cash to individual farmers.

This ambition has been significantly scaled back as a result of field-level assessments and an iterative process of learning from a series of pilots that have been progressively scaled up from 2016 onwards. Initial results of full-scale pilots in two digitally advanced districts—Krishna and West Godavari in Andhra Pradesh—indicated significant delays in distribution due to the difficulty in linking land records and soil health cards to Aadhaar. Farmers did not put much store in the soil health cards. Moreover, the system required strong and stable data connectivity, which was a challenge in both the districts. Aadhaar authentication success rates were also unacceptably low in the dust-filled environments of the distribution centers, resulting in manual overrides and reversion to paper-based records, thus defeating the purpose of the use of technology in the reform process.

These lessons have been taken on board to redesign the program. Further pilots in 14 districts carried out in mid-2017 required only Aadhaar authentication to complete the sale. Farmers could buy unlimited quantities, but the subsidy amount was highlighted in their receipt to raise awareness of the cost to the government—a "nudge" to rationalize fertilizer use. At the same time, the government concentrated its efforts to improve authentication success rates as it prepared for a national rollout in April 2018. Evidence from field assessments indicates that this has indeed succeeded; Aadhaar authentication rates increased from 41 percent in September 2016 to 99 percent in October 2018 (Figure 4.3) (Giri et al., 2019). This sets the stage for strengthening the system for determining base subsidy allocations, introducing more sophisticated

45. This case is based on Giri, Thapliyal, Rautela, and Sharma (2019).

Figure 4.3. Aadhaar authentication rates in fertilizer distribution



Source: Replicated from Giri et al. (2019)

Table 4.1. Summary of cases

Type	Country	Reform	Technology	Outcome
Fuels	Bolivia 2010	Increase fuel prices, reduce subsidies without compensation	–	Aborted
	Nigeria 2012	Increase prices to reduce fuel subsidies without cash compensation	–	Aborted
	Iran 2010	Remove subsidies, provide compensation to households through bank transfers	Strong ID (civil registry) and capable banking system	Successful
	India (LPG) 2013	Move to market pricing, voucher compensation through bank accounts, cap subsidized consumption, increase rural access	ID, mobile, and payments	Successful, ongoing
Fertilizer	Nigeria 2012	Move to market prices, e-voucher compensation; cap subsidized consumption	ID, mobile vouchers	Aborted
	Zambia 2017	Move to market prices, scratch vouchers, and digital payment; cap subsidized consumption	ID, scratch card, and mobile	Scaled back
	India 2016	Subsidy to manufacturer only after verified farmer purchase, subsidy salience. Eventual goal: cap to subsidized consumption, move to e-voucher	ID, mobile, eventually digital payments	Ongoing

targeting mechanisms, and moving to an e-voucher-based system in future iterations of the reform process.

Lessons from the cases

Using insights from country case studies, this chapter has provided an overview of several efforts to shift from generalized price subsidies towards market or efficient prices together with better-managed, more equitable, individualized direct transfers, highlighting the role of digital technology (Table 4.1). Fuel and fertilizer are not the only candidates for such reforms, but these two sectors are extremely relevant for several SDGs, especially those related to sustainable use of natural resources, environmental protection, and combating climate change.

A first lesson is that, while they do not solve all problems, digital mechanisms offer new ways to reform price subsidies and implement efficient pricing. They expand the policy possibility frontier, helping government to know the identities of beneficiaries, to communicate with them, and to pay them efficiently, accountably, and without leakage. They increase flexibility to improve the efficiency of targeting and expand access for vulnerable groups, especially poor women. They may not solve the problem of fiscal sustainability, but they provide a wider range of options to respond to it in an equitable manner. Digital communications, including through social media, provides governments with the opportunity to spread awareness and build supporting coalitions for reform, for example, through stressing the improvements in equity.

A second lesson is the variable way in which technology has been used—or not used—to reform price

subsidies. Some cases have used “cash” compensation through bank accounts, others a voucher mechanism tied to a baseline consumption allocation. Not all cases have had the preconditions for success. While India's LPG reform has been very successful, the fertilizer reforms in Nigeria and Zambia suffered from a range of technical problems, including supply-side constraints, limited connectivity, weak identification of beneficiaries (Nigeria), and the inability of some farmers to work with PINs and ID numbers (Zambia). Although India appears to have solved its authentication challenge, it has not yet been able to put teeth into its fertilizer reforms by mapping out a set of base allocations based on the area, quality, and use of farmers' landholdings.

A third lesson is that having the capacity to reform does not mean that there is the political will to do so. As shown by the case of Nigeria, lack of capacity and credibility can stymie reforms but, as in Bolivia, having the capacity to reform does not mean that reforms will be taken up. The politics of subsidy reforms is fraught; resistance can be expected from both the beneficiaries of the existing system and from vested interests, such as administrators, dealers, and suppliers, who have been able to take advantage of opportunities for leakage and diversion. In some cases, digital media have been used to strengthen movements and coalitions against reform. Sequencing is key, including well-targeted communications.

Finally, the cases show the importance of sustained effort, feedback, and adaptability. India's LPG reforms had to be recalibrated several times before becoming effective; the recalibration of its fertilizer reforms is still ongoing.

Chapter 5.

Improving the Efficiency of Social Protection

Social protection features prominently in the SDGs, especially those related to ending poverty and hunger, achieving gender equality, and women's empowerment. These include:

Goal 1.3: Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable.

Goal 1.4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology, and financial services, including microfinance.

Goal 2.1: End hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious, and sufficient food.

Goal 5.a: Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance, and natural resources, in accordance with national laws.

Goal 5.b: Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.

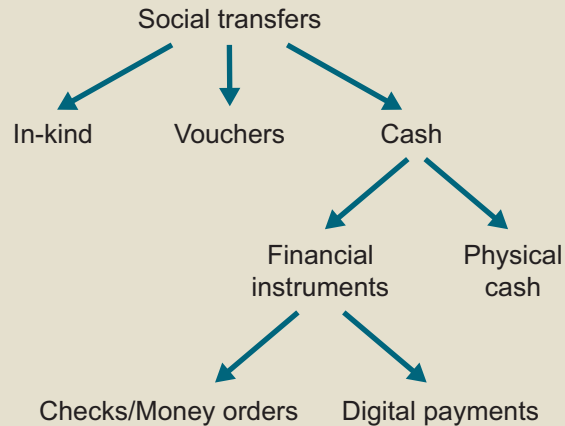
Social protection systems vary greatly in scope and scale; they are not static, but respond to political decisions, donor preferences, administrative capacity, and technological innovation (Alderman, Gentilini, and

Yemtsov, 2017). As outlined in Chapter 1, programs can be unconditional (universal basic income), categorically targeted (to poor women or old age pensioners), or conditional (an education grant subject to school attendance). The modalities through which social transfers are delivered can include in-kind provision of certain products or services (food rations or medical supplies); vouchers linked to the purchase of particular goods (essential foodstuffs or fertilizers, as discussed in Chapter 4); and cash transfers, provided as physical cash or through a range of financial instruments (see Box 5.1).

There are many policy debates in this area, often around the two dimensions of (a) conditionality and (b) the choice between delivery modalities of in-kind, voucher, or cash. We do not attempt a full survey of the extensive literature on these complex questions. On the in-kind versus cash debate for food assistance, for example, a cross-country review suggests that the relative *effectiveness* of programs designed to ensure food security may, on average, be similar for cash assistance and in-kind transfer programs (Gentilini, 2016a, 2016b). However, relative *efficiency*, as measured by the cost of reaching beneficiaries, is usually greater for cash transfers than in-kind provision, with the latter being more expensive to administer compared to giving people cash. However, context matters, and in-kind provision continues to be an important component of social protection in many low- and middle-income countries. In addition to concern about the possibility of market failure, in-kind may be preferred because programs encompass a wider set of objectives, such as supporting commodity production through guaranteed

Box 5.1. A taxonomy of transfers

The literature on transfers can be confusing, particularly on the use of the term “cash.” For greater clarity, in this section we break social transfers into three broad categories: in-kind benefits, vouchers, and cash transfers. The last are then divided into physical cash payments, payments through financial instruments such as checks and money orders, and payment through digital mechanisms. These could include, for example, smartcards or transfers into mobile money accounts.



procurement, stabilizing price fluctuations, and influencing preferences. Advocates of in-kind programs also note that ration programs are more difficult to dismantle than cash transfer systems. They are highly visible and have long-term procurement and distribution arrangements that engage many powerful interests. In contrast, cash transfer programs are more subject to the whims of annual budgets, and their real value can be slowly eroded by inflation.

We do not take a strong stand on the modality of delivery of social protection, focusing instead on how digital ID, payments, and mobile technology can be leveraged to improve the efficiency and effectiveness of such systems. In the case of food subsidies, for example, digitization makes it possible to provide an electronic voucher through smartcards and mobile phones or to provide an equivalent cash transfer through bank or mobile money accounts. At first sight, this argues for a shift away from in-kind provision towards vouchers or cash transfers. However, at the same time, cases show how digital technology can make the supply and distribution of food rations more efficient and accountable and, at least on the customer-facing side, help to increase choice of service point, and possibly also facilitate flexible choice over the modality of support.

We first summarize several ways in which combinations of ID, mobiles, and payment systems can improve service delivery, then consider three cases of transfer systems using different approaches—smartcards, bank transfers with biometric authentication, and mobile money. We then address the use of digital systems to improve the efficiency of in-kind transfers, in this case of food rations, and follow with a brief focus on two common cross-cutting goals: women’s empowerment and financial inclusion. The chapter concludes with a summary of lessons and recommendations.

Role of digital technology

Many lower-income developing countries have a long history of personalized social transfer systems operating at the communal level and relying heavily on local processes to identify recipients and make payments. One such example is the Tanzanian Social Action Fund (TASAF), which was set up in 2000 to pursue collaborative efforts on poverty reduction programs. TASAF reached some 1.1 million poor households in 2017, paying in cash at bimonthly communal meetings.⁴⁶ Another notable program is the Productive Social

46. For a description of TASAF and an assessment, see <http://ispatools.org/tools/ISPA-Country-Report-Tanzania-PWP.pdf>.

Safety Net Program (PNSP) in Ethiopia, which supports some 8 million people. Such programs may include several components such as cash transfers and public works. Sometimes they are combined with components to strengthen communal processes—to spread information, for example, on public health issues or to build the capacity of local administrations and increase trust.⁴⁷

With people more mobile and urbanized, and less attached to traditional communities, these approaches are steadily being superseded by alternative, less personalized delivery mechanisms, including through the use of digital technology for identification and payments (Radcliffe, 2016), to help target beneficiaries (Chapter 4) and also to monitor implementation. The costly, and sometimes difficult, changes in administrative processes and delivery mechanisms are motivated by the objectives of making governments more inclusive and efficient, reducing diversion while at the same time providing greater control to beneficiaries and convenience in accessing their entitlements. One criterion for the success of digital reforms is therefore whether the delivery of public services, subsidies, and transfers has or has not improved from the perspective of beneficiaries—particularly those belonging to the most disadvantaged groups. This is also important in building wider support for digital reforms, increasing political viability, and ensuring continuity over the medium and longer term.

Governments face complex challenges in making these changes. They must address issues of identification, the targeting of beneficiaries, and delivery mechanisms in a coherent way. Even if the delivery of benefits is digitized, the selection of people into beneficiary rolls may remain heavily influenced by local political

47. Local capacity-building has been a focus of TASAF in addition to social protection. Evans, Holtemeyer, and Kosec (2019) report on a program that relied on the popular election of community management committees. They find that this increased trust in leaders and improved perceptions of government responsiveness to citizens' concerns and the honesty of leaders. One indicator that governance may have improved is that records from school and health committees are more readily available in treatment villages.

interests.⁴⁸ Disparate data systems, often with conflicting information, must be integrated without excluding genuine beneficiaries. Even with the best communications efforts, many people will have limited understanding of the new systems. Some will not be able to use them effectively, requiring protocols for managing exceptions and speedy dispute resolution. The incentives of local officials and service providers on the ground will change. Typically, they will have less autonomy and perhaps fewer opportunities to benefit personally from their positions; this raises the risk that their incentives to deliver services will be compromised. All these challenges and transitional frictions make it even more important that, once fully implemented, the new digitally enabled systems perform better than the old ones.

The impact on beneficiaries, and on citizens more broadly, depends on whether, and how, these technological tools are harnessed for better and more efficient governance. Examples from many countries show a wide range of both benefits and risks as they endeavor to deliver social protection more efficiently (Gelb and Diofasi Metz, 2018). This, in turn, makes it even more important to be clear on the problems—what they are, and how digitization will solve them—and to monitor implementation carefully.

Cash transfers

As noted previously, there is already a large literature on the use of digital technology for G2P payments (examples include Aker, Boumniel, McClelland, and Tierney, 2016; Banerjee, 2015; Fiszbein et al., 2009; Gelb and Decker, 2011; Gelb and Diofasi Metz, 2018; Gelb, Mukherjee, and Navis, 2018; Klapper and Singer, 2014, 2017; Radcliffe, 2016; and others). By and large, the effects of moving away from physical cash seem to be favorable, giving recipients greater control over

48. For example, local political committees and officials play a role in determining eligibility for benefits in Pakistan (union councils) and in Andhra Pradesh (Janbhoomi committees) (Aadil et al., 2019).

entitlements, improving timeliness and convenience of transfers, and generating fiscal savings by cleaning beneficiary lists and streamlining targeting. However, some studies also flag factors that may cause recipients to prefer physical cash, including low levels of literacy and the transaction time and costs of cashing out financial payments.⁴⁹

Some of the issues in this area were discussed in Chapter 3, including the use of special-purpose payment mechanisms versus deposits into general-purpose bank or mobile accounts. While many, though not all, transfer programs appear to have transitioned away from physical cash, less than half appear to pay through general-purpose accounts able to offer services such as savings or payments. Special- and general-purpose payment modalities offer similar advantages from the perspective of public financial management. With unique identities assured by a strong ID system and suitable authentication of the beneficiaries, payments are accurate and can be traced and audited. However, special-purpose vehicles do not offer the same support to increasing financial inclusion, on the demand side by stimulating beneficiary choice and on the supply side by supporting the extension of infrastructure and service networks through delivery commissions on payments. General-purpose payment mechanisms therefore offer advantages, but there can also be factors that argue for special-purpose payment vehicles in some cases, at least for an interim period. These could include a still-undeveloped financial system with inadequate density of cash-out points or a lack of agency of beneficiaries (particularly women) to use general-purpose systems. Some programs use a mix of mechanisms. We draw insights from four cases, focusing on the problem, the mechanism, and its impact.

49. Roessler et al. (2019) report on experiments in Tanzania that leveraged the random assignment of mobile phones. Getting phones into the hands of women mattered for financial access, but other than for remittances, physical cash was preferred to mobile money for receipts and transactions. Literate participants were more likely than others to choose to receive a small grant through mobile rather than in cash.

Smartcards for employment guarantee payments in Andhra Pradesh⁵⁰

In 2006, the government of Andhra Pradesh, a state in southern India, launched a biometric smartcard system to pay workers in India's National Rural Employment Guarantee Scheme (NREGS), which provides rural households with 100 days of paid employment annually. Payments were previously distributed publicly in physical cash at village-level meetings in the presence of local officials and the beneficiaries, a method used by many other programs such as in TASAF in Tanzania and the PSSN in Ethiopia. By transferring wages directly to recipients' bank accounts and verifying their identities using fingerprint readers at the time of disbursement, the system was intended to ensure that (a) only genuine workers were paid, (b) they could withdraw their wages conveniently from customer service points located in each village, and (c) "leakage" of public expenditure would be eliminated and accountability of local officials involved in program implementation would be increased.⁵¹

Digital technology was embedded in the program at three points: obtaining biometric data (fingerprints and photograph) of registered NREGS workers to produce smartcards, transferring wages electronically to workers' bank accounts, and deploying fingerprint and smartcard readers at the withdrawal point. This intervention was studied intensively over a period of two years (Muralidharan et al., 2018a) using a random assignment of 296 subdistrict locations and comparing the impact on payment logistics, leakages, and program access across treatment subdistricts, which used smartcards, and control subdistricts, where smartcards were introduced after the evaluation. After two years, two-thirds of the villages in the treatment group were actually using smartcards and half of all

50. This case draws on Muralidharan, Niehaus, and Sukhtankar (2016, 2018a).

51. It should be noted that this was by no means the first use of such technologies to deliver social payments in a development setting. The earliest example known is from the mid-1990s: the payment of social pensions in rural Kwa-Zulu-Natal, South Africa, using mobile ATMs linked to biometric fingerprint readers (Gelb and Diófasi Metz, 2018).

payments were made using the new system. Incomplete implementation was mostly due to the challenges of enrolling beneficiaries and linking smartcards with bank accounts that, in many cases, were the first accounts held by the beneficiaries.

Even with partial implementation, the smartcard intervention showed several positive impacts on the efficiency of program delivery. First, the time taken to receive and collect wages went down. Bank transfers reduced the lag between completion of work and receipt of wages by 6–10 days, and workers spent 20 percent less time in withdrawing their wages compared to the earlier system of physical cash distribution at public meetings. Second, the study estimated a 41 percent decrease in the leakage of NREGS funds in treatment subdistricts, but no such evidence for the control group, suggesting that biometric authentication reduced the opportunity to divert cash to fictitious workers on the muster roll. Third, beneficiaries overwhelmingly supported the new system. Ninety percent of NREGS participants surveyed after the intervention was carried out preferred smartcards to the old system, largely due to the convenience of collecting their wages and reduced corruption. There was no evidence of exclusion of vulnerable groups due to the introduction of technology. Finally, the intervention had a high rate of return on investment. Savings to the government from reduced corruption were estimated at \$34.5 million annually, against a one-time cost of \$4 million to set up the smartcard infrastructure. The intervention was estimated to pay for itself even if one only considered the savings in the time cost for beneficiaries to access their wages.

The Andhra Pradesh smartcards case is an example of an appropriate use of technology to improve effectiveness at scale. It showed that use of electronic bank transfers and biometric authentication at cash disbursement points using a specific-purpose smartcard can improve convenience and reduce corruption without excluding vulnerable households. But the logistics of introducing new technology and payment mechanisms can be difficult. Several of the subdistricts that were initially chosen

to be part of the program could not continue due to significant implementation challenges, particularly related to enrolling beneficiaries into the program, thereby reducing its scale and overall impact.

Women, transfers, and biometric authentication in Pakistan

Pakistan has a long history of using a combination of biometric authentication and smartcards to deliver social transfers to displaced people and refugees, to victims of flooding, and, since 2008, to poor women under the Benazir Income Support Program (BISP), which provides transfers to some 5.3 million poor families. Technology has helped to deliver these benefits, including through ensuring that the beneficiaries are unique. Conversely, social programs, notably BISP, have been a major demand-side driver for registration into the ID system, particularly for women, and to help update the social data used in targeting (Malik, 2014). This is consolidated into the National Social and Economic Register (NSER), a joint initiative of the National Database and Registration Authority (NADRA) and BISP. The NSER includes information on some 90 percent of Pakistan's households; it is updated periodically and can also be revised using information collected in the course of delivering social benefits. For example, a massive 2010 program to provide flood relief through smartcards (the Watan program) uncovered individuals who needed to be registered, and cases where data on family structure had not been updated.

As discussed in Chapter 2, Pakistan has one of the widest gender gaps in access to mobile phone ownership and financial inclusion. Only 7 percent of women had financial accounts in 2017, little up from 3 percent in 2011. This reflects widespread social and economic constraints on women imposed by Pakistan's patriarchal society. Increasing the rate of women's ID registration, for example, has required NADRA to innovate by introducing female-only registration units; without this, many women would not have been permitted to register. The low literacy levels of women have posed

an additional challenge to the delivery of social benefits, including through digital mechanisms. As a result of the restrictions placed on them, women have limited agency to operate independently.

BISP has experimented with several approaches to distributing social transfers, including cash deliveries to homes through the post office, disbursements through smartcards, payments through mobile banking, and the Benazir debit card. Under this last approach, implementing partner banks (IPBs) have used BISP's data to issue debit cards to beneficiaries. They are then able to withdraw their transfers at ATMs on a quarterly basis.

All these methods have experienced difficulties (Innovative Development Strategies, 2017). Post office payments have been misappropriated by functionaries and others, and unlawful commissions have been levied as a condition of delivery. A survey found that, while travel time and costs to access the grants were low, the average payment actually received was less than 60 percent of the intended payment (Cheema et al., 2014). Beneficiaries have been denied smartcard payments and subjected to extortion as a condition to cash out their entitlements, and mobile banking beneficiaries have been similarly harassed. While the debit card mechanism was designed to minimize human interaction, many women lacked proximity to ATMs or the capability to use them. In Baluchistan, for example, only 23 percent of beneficiaries withdrew their allowances themselves from ATMs, and only 25 percent from other points of service. Extortion was again present, and, in addition to social constraints, lack of literacy was a constraining factor.

Recognizing the difficulties, BISP moved towards a biometric verification system for cashing out payments, with pilots in early 2016, followed by wider implementation. An initial assessment of this approach later in the year revealed numerous difficulties. Many beneficiaries were poorly informed about the new approach. Travel times, waiting times, and costs to collect the stipends were considerable, and only 74 percent reported that their biometric verification had been successful. Only 40 percent of those who experienced biometric

failure were guided on the action they needed to take for their next visit. Only around half of the beneficiaries expressed satisfaction with the overall experience of obtaining their benefits. Nevertheless, a significant majority (88 percent) expressed a preference for receiving payments after biometric verification, almost all because of the belief that this approach enabled them to receive the payments themselves. Only 6 percent were opposed to the new system.

Pakistan's experience raises questions about how best to design digital delivery systems to serve severely disadvantaged groups. Despite the difficulties, BISP programs appear to have had significant positive effects in reducing severe poverty and malnutrition, as well as helping to improve the status of women in the household (Cheema et al., 2016). In addition, the increased enrollment of women by NADRA has been an important step towards enabling them to participate more broadly in economic activity and to vote in elections. However, the transfers have not led to broader financial inclusion; the accounts set up to pay benefits have been transmission accounts and have not offered payments, savings, or other services. Neither has the program had much impact in supporting wider ownership of mobiles, another step that could open the way to greater independence and autonomy for women.

Moves are under way to broaden the range of services available through the accounts and to build on the transfer system to reduce the gender gap, including in the growing area of mobile digital payments. There is much room for improvement—in 2017, 29 percent of men had made or received a mobile payment, compared with only 5 percent of women. As confirmed by the analysis in Chapter 2, which finds access to mobile an important correlate of the gender gap in financial inclusion, this is a productive agenda for the future.⁵² At present, however, Pakistan's experience suggests that active measures will be needed to support severely constrained and disadvantaged beneficiaries to help them

52. Even when women have access to a mobile phone, it is not likely to be registered under their own name; individuals can register up to five voice connections and three data connections under a single NADRA ID.

access and use mobile communications and payment systems, and to assert their interests in the interim.

Pensions in Andhra Pradesh

Noncontributory social pensions are an important element of social protection systems in many countries, often with the objective of reducing poverty in old age and providing a social protection floor for the most vulnerable sections of the population, especially widows and the physically challenged (Barrientos, 2009). In low-income countries, these payments have traditionally been delivered in physical cash to beneficiaries listed under the program, either at their doorstep or at a local government office. Payments were often delayed or not paid in full, causing hardship to a particularly vulnerable section of the population.

Over time, lack of strong verification and authentication mechanisms has meant that beneficiary lists have come to include duplicates and nonexistent persons, providing opportunities for corrupt practices and siphoning off public funds from social pension programs.⁵³ With greater use of unique digital identification and digital payments, many programs have been moving towards direct transfer of pensions to bank accounts on the basis of verified beneficiary lists and authenticated transactions.

India's social pension system provides a monthly subsistence payment to persons who qualify for old age, widow, or disability benefits per the norms of the National Social Assistance Program. State governments can supplement the base amount provided by the national program and can determine the mode of delivery. Compared to other states, Andhra Pradesh maintains a generous social pension system, with the state government providing additional funds from its own budget. It offers another interesting case of experiments with different delivery mechanisms:

53. The government of India claims to have eliminated nearly half a million duplicate, nonexistent, and ineligible pension beneficiaries following the introduction of direct benefit transfers. See <https://dbtbharat.gov.in/page/frontcontentview/?id=ODM=>.

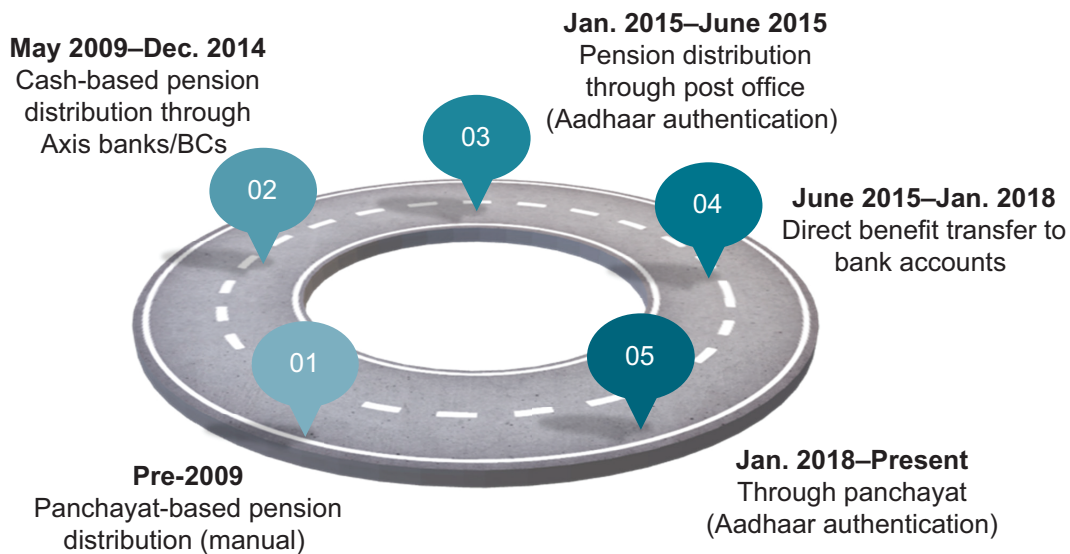
Figure 5.1 summarizes the different social pension delivery modes from 2009 to 2019.

Traditionally, gram panchayat (village government) offices had distributed monthly pensions directly, but the process was marred by complaints about lack of timeliness of payments, bogus beneficiaries, and petty corruption. From May 2009, the system changed to direct deposits into a designated private bank, requiring beneficiaries to open accounts in order to receive their pensions. In 2015, pension distribution shifted to post offices, a change that was preceded by a major increase in the amount of the pension from Rs.200 to Rs.1,000 in the previous year, following the election of a new government.⁵⁴ However, the 2 percent commission charged by the postal department was considered too high by the state government. Within six months of initiating the change, the government shifted back to direct benefit transfers to Aadhaar-linked bank accounts (DBT), resulting in uncertainty and disruption of the system. The intention was to enable pensions to be withdrawn close to home through mobile business correspondents (BCs). But the negotiated fee structure, a commission of only 0.2 percent, left BCs inadequately incentivized to serve pensioners. Limits on the float that any BC was able to take out at one time severely limited the number of pension payments that could be made before the need for a long trip back to the bank to replenish the float. This resulted in inconvenience, especially to the elderly and infirm, who would need to visit sometimes-distant bank branches to cash out.

One option could have been to renegotiate the commission to the BCs to a level that would have provided adequate incentives. But in January 2018, the government made a further, and most recent, change: it reverted back to the earliest system of direct pension distribution from panchayat offices, but this time requiring Aadhaar authentication at the point of pension delivery, using technology to verify physical cash

54. On January 25, 2019, Andhra Pradesh revised its pensions: old age and widow from 1,000 to 3,000, and disabled from 1,500 to 3,000.

Figure 5.1. Alternative modes of social pension delivery in Andhra Pradesh, 2009–2019



Source: Replicated from Aadil et al. (2019)

distribution. To minimize the risk of exclusion, local-level village revenue officers (VROs) were authorized to authenticate on behalf of beneficiaries unable to do so themselves.

Aadil et al. (2019) conducted a survey of pensioners in Krishna district to ascertain their perceptions and experience with different delivery modalities. Respondents expressed strong preferences for the panchayat system. Eighty-six percent preferred it to the bank/BC delivery method. For those who had experience of the post office system, the reaction was similar: 84 percent preferred the panchayat-based cash distribution. Pensioners valued the predictability of disbursements and receiving the correct amount as the major factors for preferring the new system. They noted that officials would also visit the homes of disabled pensioners to serve them. There were only a few complaints regarding irregular panchayat office hours and the need to make multiple visits. Very few reported pension skimming by officials or other corruption, practices that had been complained of under the previous pre-Aadhaar manual system. The main reason for this improvement appears to be the systems set up to survey beneficiaries of social programs and elicit

complaints, innovations discussed in Chapter 6 in the context of real-time digital governance. A portability option had been introduced, enabling pensioners to be paid at any panchayat office in the state, but few seemed to be aware of it.

The reversion to direct payment appears to run counter to the India-wide trend towards payment through bank accounts. In this case, it appears that the banking channel was not working as effectively as expected; not all villages were served by BCs, and the low pension delivery fee negotiated between the state and the banks provided insufficient incentive for them to effect last-mile delivery to pensioners. In addition, if biometric authentication failed—an event more likely for the elderly, who have greater difficulties in providing high-quality fingerprints—the VRO would be on hand at the panchayat office as a mandated backup to authenticate on behalf of the pensioner.

Andhra Pradesh's experience provides a useful reminder that digital reforms benefit from being flexible and adaptable depending on the context and beneficiary experience with the new systems. This can be achieved by building effective monitoring and feedback into the

program design, including through increasing beneficiary choice and voice. These are areas where Andhra Pradesh has been a leader, as discussed in Chapter 6. Its experience also shows that incentives need to be adequate through the full delivery chain for this to be effective. Setting aside the desirability of leveraging government payments to encourage the buildout of multipurpose financial infrastructure, it is not clear that the incremental costs of direct payments through panchayat offices is less than the level of bank commissions needed to incentivize pension delivery. As governments seek to use technology to make social pension payments more efficient, attention to the economics of last-mile delivery is critical, including access to banking correspondents or other service points and the capacity of recipients to transact through new digital mechanisms.

Education scholarships via mobile money in Bangladesh

Conditional cash transfers (CCTs) continue to be an important strategy to improve human development outcomes in many developing countries. While some well-known CCTs, such as Bolsa Familia, have transferred funds through smartcards, until recently many programs in poor countries have used physical cash as the main mode of payment, disbursed at schools or health centers after verification of eligibility and certification of compliance with the conditionalities of the program. Physical cash payments place a significant administrative burden on frontline service staff and can also open up opportunities for clientelism and corruption. They also risk allegations of financial impropriety, which may be difficult to disprove if false.

With the rapid spread of mobile phones across the developing world, governments are increasingly using mobile money to transfer CCTs. Since women are designated as beneficiaries of many of the programs, this can also have positive spillovers for financial inclusion and reducing the gender disparity in access to mobile phones, as noted in Chapter 2.

In Bangladesh, the country's thriving mobile financial services (MFS) sector has played a key role in supporting the government's policy to transfer benefits digitally instead of as physical cash payments. One of the most significant applications is the Primary Education Stipend Program (PESP). Started in 2001 in its present form, the objective of the PESP is to increase educational participation—enrollment, attendance, persistence, and performance of primary school-age children from poor families—in both urban and rural areas. The program provides a stipend of taka 100 (US\$1.20) per month per child to mothers in need of financial support, conditional on their child's school attendance.

Disbursement of the stipend has traditionally been in the form of physical cash distributed from a designated school in the vicinity of the beneficiary's residence. Consistent with the priorities of the 2011 "Digital Bangladesh" strategy,⁵⁵ in June 2017 the government moved to transfer the stipends for nearly 13 million children enrolled in the program directly to mobile banking accounts for their nearly 10 million mothers. Although the mobile money market leader was bKash, a subsidiary of BRAC bank, the government chose to use SureCash, a public-sector MFS company.⁵⁶ How has this move from physical cash to digital affected beneficiaries? How do they perceive the new system vis-à-vis the previous one? What challenges do they face in accessing the stipends? Do mothers have more control over the funds than before? Are they able to navigate the new digital environment, especially those who do not own mobile phones and have limited digital literacy themselves?

Gelb et al. (2019) report on a field survey using both quantitative questionnaires and qualitative assessments, with separate modules for school headmasters and mothers whose children are enrolled in the program. The conclusions are broadly positive. An

55. https://a2i.gov.bd/wp-content/uploads/2017/11/4-Strategy_Digital_Bangladesh_2011.pdf.

56. SureCash started operations in 2015; it is owned by several banks, including one of the largest state-owned banks.

Figure 5.2. Being able to read and/or write SMS is associated with:



Source: Replicated from Gelb et al. (2019)

overwhelming majority of both mothers and headmasters prefer the new system. For mothers, greater convenience in access to funds and more control over them are the main reasons for their stated preference, with the major factor being the flexibility to withdraw money at a convenient time and location, rather than having to travel to a school on a specified day and wait in line to be paid. Rural mothers are more likely than urban mothers to say the new system is better.

The program has had a substantial impact on financial inclusion, at least in terms of ownership of mobile money accounts. Only 31 percent of the mothers had any other mobile money account. Views are mixed on the selection of service provider; just over half of the mothers who had a bKash account would prefer to receive the stipend in their existing account, but the others are happy using SureCash. The use of SureCash as the sole distribution channel might impose some additional inconvenience from the perspective of wider use of financial systems. bKash and SureCash are not interoperable, and the former has far wider acceptance among the general population. However, virtually none of the recipients has graduated to doing more with their mobile accounts than cashing out the grant; over 90 percent cash out all the stipend they receive. This suggests that limited interoperability is not at the level where it is an overwhelming factor in preference for the new system. Perhaps more important for the beneficiaries is that they do not pay any cash-out fee for using their special accounts, whereas

cash-outs of mobile money normally incur fees. The government is working towards a choice architecture to enable recipients to choose their payment service provider; this will require resolving the tension between providing incentives for agents while not burdening poor beneficiaries with delivery charges (Chapter 3).

The survey confirms the importance of digital literacy. Mothers with the ability to read and write SMS have significantly better opinions of the new system than those unable to do so; they probably have more confidence that the payments are correct because they are able to check on them (Figure 5.2).⁵⁷ Mothers who do not own a mobile phone themselves are also more likely to say the new system is worse. Ownership of a mobile phone is related to having more control over the stipend transfer: two-thirds of mothers who own mobiles reported having greater control over the stipend, compared to 57 percent of those who do not. As in the case of Pakistan, though apparently to a less significant degree, having male family members control access to the benefits reduces the ability of the mothers to operate with autonomy. This points to the challenge of inclusivity, both in access to mobile technology and in the use of digital mechanisms.

57. The relationship is statistically significant at the 95 percent confidence level using a Fisher's exact test. Other digital applications, such as interactive voice technologies, could possibly help to bridge the capacity gap.

For headmasters, digital transfers reduce the staff time spent on administration of physical cash distribution; they also reduce the risk of allegations of financial mismanagement that might be levied against them, even if no impropriety has occurred. Their views are therefore very favorable. There were drawbacks: 28 percent noted receiving complaints when there were problems with the payments, and one in five mentioned difficulties correcting mistakes. Nevertheless, there was overwhelming consensus that more transfers should be done through mobile payments. This appeared to reflect more their own experience than strong views on the impact on mothers and students; only a third held the view that the new system increased children's attendance.

To summarize, the digitization of PESP payments has been a win-win for both mothers and headmasters. For the mothers, it is more convenient to withdraw cash through agents whenever they choose to do so. There have been gains in closing the financial inclusion gender gap, at least in terms of expanding access to accounts; over time, this opens up the possibility that the mothers will use more financial services in the future. This is a long haul but would be facilitated by choice of payment service provider and interoperability between mobile money providers and the banking system. The main constraint to still more beneficial impact appears to be uneven access to digital devices and the capacity to operate them. Bangladesh, like other poor countries, will need to grapple with this problem as it seeks to move its administration of G2P transfers, and programs more generally, into the digital era.

Reforming in-kind transfers through technology: The case of PDS in India

While cash transfer programs have undoubtedly become more important for social protection systems, in-kind and voucher-based food assistance is still an important modality in low- and middle-income countries. Based on administrative data from 108 countries, the World Bank estimates that these programs cover an

average of 20.4 percent of the population, compared to 7 and 3.1 percent, respectively, for unconditional and conditional cash transfers, and 2.3 percent for social pensions. Taken together, food assistance programs reach nearly 1.5 billion people worldwide (Alderman et al., 2017).

As explained in Chapter 1, there is a large literature that compares cash transfer programs with food support programs, whether through vouchers or in-kind provision. The aim here is not to come to a conclusion; it is, rather, to consider how digital ID, mobiles, and payments can increase the capacity of governments to implement in-kind service and benefit programs. This area has been less intensively studied than cash transfers, but, used appropriately, the same technologies can help to tackle leakage and corruption in in-kind programs by digitizing beneficiary databases and supply chains and authenticating delivery. Beneficiaries can be empowered to choose their service providers and to offer feedback through digitally enabled grievance redressal systems. However, these gains are not automatic; they depend on the way in which the reforms are implemented as well as their objectives.

These principles can be applied to a range of in-kind services. One example is the work of Simprints in Bangladesh to track and confirm the delivery of maternal health services by community health workers (Storisteanu, Norman, Grigore, and Norman, 2015). Without such a monitoring mechanism it is difficult to know whether services have actually been rendered to the intended beneficiary or, indeed, whether the health worker has had contact with her. It is also difficult to provide continuity of care and to match up visits to patients with the treatment priorities indicated by health records.

With differing reforms of its food ration system across several states, India provides a laboratory for addressing the use of digital mechanisms for in-kind programs. India's public distribution system (PDS) has been in place for over half a century and reaches nearly 800 million beneficiaries—two-thirds of the country's

population and over half of the global coverage of food programs. As with other social protection schemes, PDS has undergone periodic reform, most recently with three major changes: (a) the enactment of the National Food Security Act (NFSA) in 2013, followed by (b) the digitization of ration cards and (c) the move to distribute food entitlements through biometric authentication at the distribution points in states that decide to do so.

The impact of the three initiatives has been significant. PDS has traditionally been a family-based entitlement, but the NFSA changed the modality to an individual-based system. To comply with the NFSA provisions, erstwhile below poverty line (BPL), above poverty line (APL), and Antodaya Anna Yojana (AAY, the most destitute) families had to be reclassified into priority households (PHH) and non-PHH categories, with AAY households automatically included in the revised list of beneficiaries. Only PHH and AAY households are eligible for assistance in terms of the legal entitlement specified under the Act. The central government provides funds to finance the cost of the food subsidy, with state-level coverage limits set at 75 and 50 percent of the rural and urban population, respectively. States that decide to cover a greater share of the population can top up the cost of PDS provision using their own budgetary resources.

This reclassification exercise coincided with the latter two initiatives. Digitization of ration cards and “seeding” of Aadhaar numbers into the beneficiary lists have been carried out in almost all states. Some use Aadhaar authentication only, equipping FPS with biometric fingerprint readers and drawing up protocols for the management of cases where authentication fails so that beneficiaries are not denied their legal entitlement. Others use an electronic point-of-sale machine (ePOS) without Aadhaar or continue with the old manual system of distribution, but on the basis of digitized ration cards. Within the overall policy and financing framework determined by the center, states in India therefore have considerable flexibility in PDS delivery, especially with regard to coverage, supply chain

management, and the use of Aadhaar authentication. There have also been a number of pilots to reform the system, moving away from in-kind provision towards cash transfers or vouchers, with varying results.⁵⁸

Post-NFSA, states had differing motivations for digitization. One was to create a clean beneficiary list by removing duplicate ration cards and fake and non-existent entries through Aadhaar seeding. Second, due to the fiscal constraint imposed by the center, many states had to reduce the number of households that were eligible under the earlier system. Households that were deemed eligible had to list each member of the family in order to obtain the individual-based entitlement—a process that also involved linking their Aadhaar numbers to the family ration card. Third, several states have engaged digital technology to improve the program in other ways, to reform supply chains, to deploy Aadhaar authentication at the point of service, aiming to reduce losses due to leakage from the fair price shops, and to empower beneficiaries through enabling portability and soliciting feedback. Three states have been studied in some detail: Jharkhand, Rajasthan, and Andhra Pradesh.⁵⁹ To better understand the effects of digital technology, we compare their experiences.

Jharkhand

PDS in Jharkhand has been notorious for its inefficiency and corruption. According to some estimates, in 2004–2005, almost 85 percent of food grains were siphoned off before reaching the FPS (Drèze and Khera, 2015). Inspired by PDS reforms in the neighboring state of Chattisgarh (Alderman et al., 2017), from

58. For a review of several cases, including a more detailed assessment of the pilot to replace food price subsidies with cash transfers in Nagri, Jharkhand, see Giri, Rautela, Sharma, and Sampath (2019). That pilot faced a number of difficulties: beneficiaries faced high transaction costs to access their subsidies; dealers, too, found the new system more demanding. The pilot was terminated following the assessment.

59. The 2019 *State of Aadhaar* report provides a broad survey-based perspective on Aadhaar and its use. It found that 95 percent of adults had Aadhaar, 92 percent expressed satisfaction with it, and 80 percent felt that it had improved the reliability of access to food rations, social pensions, or work-based social payments. Updating personal information and correcting errors emerged as the main difficulties (Totapally et al., 2019).

the mid-2000s, successive governments in Jharkhand undertook measures to improve the functioning of PDS, which provided food security to over 80 percent of the rural population of one of the poorest states in India.

The most recent phase of the reform, following the implementation of NFSA in 2014, tried to tackle both the demand- and supply-side problems with a heavy focus on saving public resources. On the demand side, Jharkhand rolled out digitized ration cards and introduced electronic point-of-sale machines at FPS to distribute food grains to beneficiaries on the basis of Aadhaar authentication. On the supply side, it introduced a system of stock reconciliation at the FPS level to reduce leakage of food grains at distribution points, on the assumption that the technology-based monitoring system would improve the overall efficiency of PDS in the state. Unlike the reforms in Rajasthan and Andhra Pradesh (below), there was no move to widen the low dealer margins to compensate for the anticipated effect of tightened controls on the ability to divert rations to the market.

Independent research did not find evidence of any significant improvement in the efficiency of PDS following the digital reforms (Drèze, Gupta, Khera, and Pimenta, 2018).⁶⁰ Digitization of ration cards did not seem to find much redundancy in beneficiary rolls—they seem to have already been cleaned. There was also no significant impact on diversion by dealers—as before, beneficiaries received around 10 percent less than their allocation and did not have the bargaining power to prevent dealers from diverting rations in the absence of an effective grievance redressal system.

At the same time, the studies highlight an increase in exclusion due to authentication problems. Connectivity is a challenge, especially in the remote, forested areas of the state. Smaller households (often also the poorest) did not have enough POS-able members⁶¹

60. In a forthcoming study, Muralidharan, Niehaus, and Sukhtankar also investigate the Jharkhand case, having summarized their main findings in 2018 in Muralidharan et al. (2018b).

61. No POS-able member available refers to when no member whose biometrics usually works on an ePOS machine is available to collect the ration.

who could provide alternative authentication options. This problem was particularly acute for the elderly and the physically challenged. Despite directives from the central government that technology failure should not lead to denial of benefits, there was little evidence of the use of backup alternatives, such as iris and mobile OTP when fingerprint-based Aadhaar authentication failed. The estimated exclusion rate was five times higher for those FPS using online authentication compared to the “offline” system where beneficiaries were allowed to access their food rations without it.⁶²

As mentioned above, leakage of food grains from FPS has been a major source of corruption. Since there is always some slack between total beneficiaries and those who actually take rations, almost every FPS would have unclaimed stocks left over at the end of the month that could be sold off in the open market. Accurate knowledge of sales to beneficiaries from Aadhaar authentication records enables stocks and flows to be reconciled, so that deliveries replenish stocks only as much as needed. In August 2017, the Jharkhand government decided to initiate “stock reconciliation” by deducting the closing balances it had estimated the dealers had accumulated out of their allocations in the months following the introduction of ePOS machines. Data suggested that the diversion had, indeed, been large; indeed, the cumulative balances estimated over several months were so large that they amounted to almost an entire monthly allocation. However, more often than not, these were notional balances. The actual stocks had long been sold off in the market.

The abrupt introduction of the stock reconciliation policy—based on the contradictory premise that supplies known to have been diverted were actually available—therefore provoked a crisis. With a sudden cut in deliveries, dealers could only distribute a fraction of the entitlement to beneficiaries. In the worst-case scenarios, they excluded them completely. Unrealistic implementation of the policy therefore dealt a serious

62. Under the offline system, transactions are recorded on the ePOS machines along with Aadhaar numbers. Beneficiaries get an electronic receipt and data uploaded when network connection is available.

blow to the performance of the Aadhaar-based system. It was quickly abandoned without having had any significant impact on fiscal savings.

As a result, both studies found significant opposition to the adoption of biometric authentication. Even before the confusion over stock reconciliation, over half of the beneficiaries surveyed by the two studies had responded that the new system was less convenient than the previous one and that it should be discontinued.⁶³ The same view was echoed by the FPS dealers—a majority of those surveyed felt that the ePOS system had made their jobs more difficult and had worse outcomes for the beneficiaries at the same time.

The Jharkhand experience shows that without a clear vision, appropriate design, proper implementation, and realistic baseline assumptions, technology itself is not a panacea. Improving efficiency and beneficiary experience requires identifying relevant problems, addressing them carefully, and continuous effort to make the system work better. It also shows that without a focus on improving beneficiary experience and implementation, more rigorous authentication requirements and reliance on connectivity can lead to additional barriers to service delivery. This is an important lesson for other cases, especially when compared with Andhra Pradesh, where we find evidence of both better beneficiary experience and fiscal savings (see below).

Rajasthan

PDS reform in Rajasthan is one component of the overall digitization and reform of the social protection delivery system known as the Bhamashah program. As far as we know, it is the first nuclear family-level identity system in India, conceptualized by the Rajasthan government in 2008 and rolled out at scale from 2014 onwards. The Bhamashah scheme registers each nuclear family with a unique family ID number and

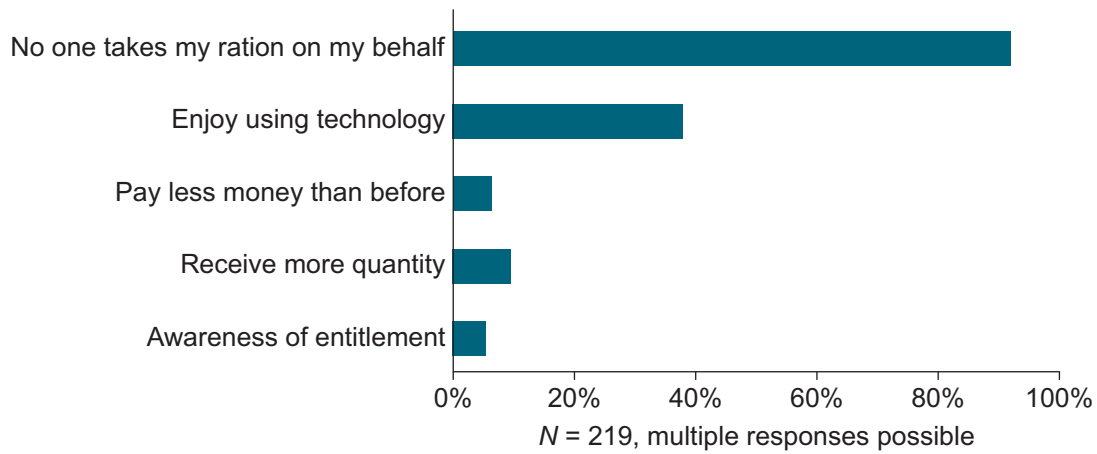
issues a family card that lists individual members along with their Aadhaar numbers. It also captures other socioeconomic and demographic characteristics during the registration process, thereby creating a comprehensive database for residents of Rajasthan, following the principle of “one family, one identity.” Women are designated as the heads of households for benefit purposes, with financial transfers directed to their Aadhaar-linked bank accounts—a symbolically important step for a famously patriarchal state.

From a state-level survey and focus group discussions, most households found enrollment into Bhamashah relatively easy (Gelb et al., 2018). But digitization errors, mostly in the form of manual data entry errors during enrollment, caused difficulties for many existing beneficiaries. Moreover, the digitization process interacted with the shift towards applying the NFSA, which sowed confusion and anxiety. Starting in 2012, local workers and officials had assisted the government in digitizing ration cards; in the process, the number of eligible BPL beneficiaries had reached 53 million compared to the NFSA limit of 44.6 million. The government then conducted a large-scale verification exercise in parallel with the Bhamashah registration process and eliminated approximately 9 million households. The combination of errors and the influence of local politics during the verification process probably resulted in significant exclusion of legitimate beneficiaries, or at least of people who believed themselves to be eligible for programs.

On the delivery side, as in Jharkhand, the new system requires beneficiaries to biometrically authenticate themselves at the FPS and directly interact with the new technology-enabled framework. In contrast to Jharkhand, dealer margins were increased several-fold to roughly 5 percent of the market prices of the ration products from their previously very low levels, to compensate for the smaller degree of diversion expected from the new system. Without this increase, many dealers would have ceased to be in the business of distributing rations.

63. The figures are 55 percent against the new system in Muralidharan et al. (2018b) and 64 percent against it in Drèze et al. (2018).

Figure 5.3. Reasons for better perception of new PDS system



Source: Replicated from Gelb et al. (2018)

Evidence from two field surveys suggests that the introduction of technology has improved the perception and experience of the majority of beneficiaries vis-à-vis their access to PDS entitlements, but that exclusion remains a challenge. Gelb et al. (2018) find that just over 40 percent of PDS beneficiaries prefer the new system to the old one, 12 percent find it worse, with the rest not expressing a preference either way. Figure 5.3 lays out the reasons cited by respondents for preferring the new PDS system. These findings are corroborated by the *State of Aadhaar* report (Abraham et al., 2018), which found that two-thirds of rural PDS beneficiaries in Rajasthan supported the use of Aadhaar authentication, thereby expressing strong preference for the digital reforms.

Why do they express these views? In both studies, almost all of those who preferred the new system cited increased agency—that under the new system no one was able to take their rations. This does not, of course, prove that rations were actually diverted under the old system (the studies did not actually measure changes in how much they received), but it indicates concern that under the previous system some part was not reaching the entitled beneficiaries. The second most frequent reason cited was satisfaction with using new technology. Despite frustrations with the new system

(as further discussed below), this suggests a good deal of support for digital governance more broadly.

The most important determinant of negative perception appears to relate to the beneficiaries' experience with the biometric authentication process. Responses suggest that barely a quarter of the beneficiaries are authenticated on the first attempt, although 96 percent said that they were usually authenticated in four attempts or less. The option to use a mobile OTP does not seem to have been used frequently; however, not one of the four respondents who cited the use of the OTP rated the new system as worse.

In response to the question of what happens if authentication fails, 82 out of 535 respondents stated that they would be “denied rations.” However, there is no relationship between “denied” and the number of fingerprint authentications needed; many answered “denied” even when they said that authentication works after one or two attempts. This suggests that some answered the question as a hypothetical “what if.” Some who cite “denied” also consider that the new system is better than the old one, and many consider it neither worse nor better. Respondents could check several responses in addition to “denied,” such as “bring another family member” or “come back another day,” suggesting that

“denied” may, in some cases, have been interpreted as a temporary delay in obtaining rations. Nevertheless, there is a clear and significant relationship between “denied” and the view that the new system is worse, suggesting that the response does indeed, at the very least, reflect a negative experience for many.

Results from the *State of Aadhaar* report point to similar conclusions. They estimate a monthly exclusion rate of 9.9 percent, of which 2.2 percentage points were due to Aadhaar-related reasons (authentication failures, problems with Aadhaar seeding, etc.). This suggests that the predominant reason for exclusion is nonavailability of the ration, a legacy problem that needs to be addressed separately. Nevertheless, there does appear to be some evidence of technology-based exclusion. The Rajasthan example is a case where digital reforms have, in general, improved control and agency as perceived by most beneficiaries, but there is still an issue of ensuring accountability for service, including by implementing rapid exception-management protocols when technology fails.

Andhra Pradesh—Krishna District

The state of Andhra Pradesh is recognized as a leader in using technology to improve the delivery of public services, programs, and subsidies. Many of its innovations were piloted in Krishna district, which has been visited by development agencies and delegations from many countries. Aadil et al. (2019) report on a field survey of households and FPS representatives at the district level to ascertain the perception and experience of digital reforms in PDS for both beneficiaries and service providers. This case provides an insight into the functioning of digital reforms in a district at the frontier of administrative and technological capacity, with lessons for other states in India and globally.

Compared to most other states in India, Andhra Pradesh maintains a generous social protection system with significant budgetary allocations to augment transfers from the central government. PDS is a case in point—although a comparatively rich state, it has

offered almost universal access to food rations to its residents irrespective of their economic status, and this policy has continued through the period of digital reforms. In contrast to Jharkhand and perhaps also to Rajasthan (as seen in the response to the introduction of the NFSA), the prime driver for Andhra’s reforms has not been to save money by cutting welfare rolls. It has, rather, been to improve the efficiency of the system, and to derive savings from doing so. In order to accomplish this, Andhra’s digital reforms have conformed to a set of principles:

Full coverage: Aadhaar is held by virtually all residents and integrated into all public programs, effectively making it mandatory to receive any kind of services, subsidies, and transfers.

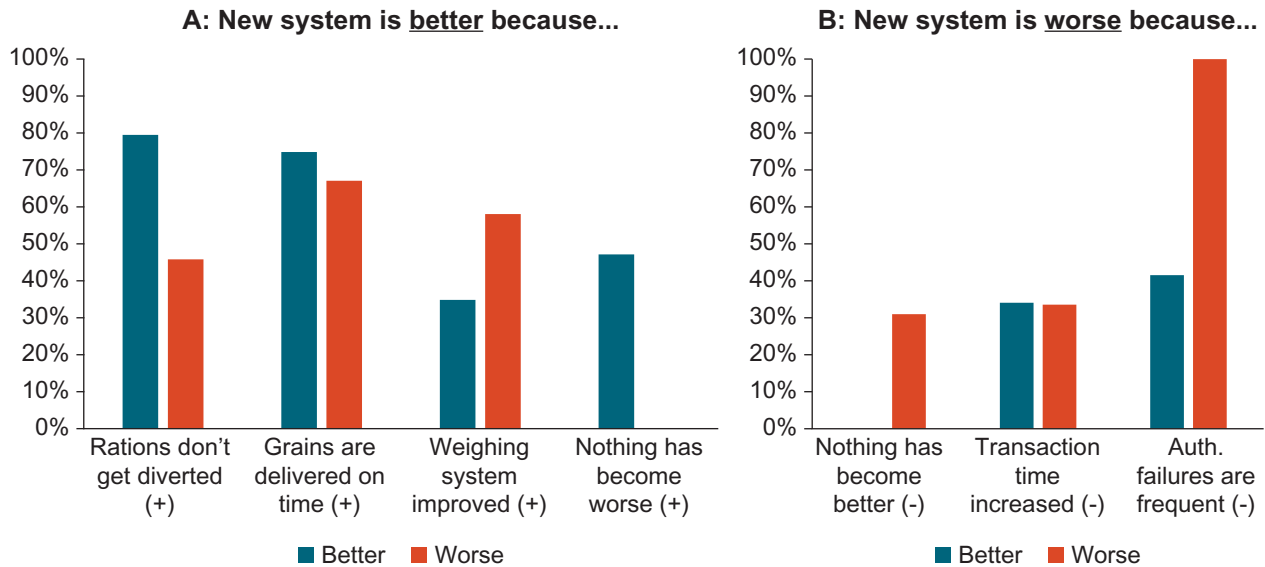
User choice via portability: Beneficiaries can collect their food rations from any service point in the state; the objectives are to enable them to shift towards better service providers and to facilitate mobility. This would not be possible without stock-flow reconciliation as it would open up a gaping hole for dealers to divert delivered rations to the market. Accurate deliveries from warehouses to service points are essential for reconciliation to be effective; to achieve this, Aadhaar verification of grain deliveries has been introduced throughout the PDS supply chain.

Accountability for service access: This includes the use of iris scanners as a backup and clearly mandating the village revenue officer to authenticate as a human backup on behalf of beneficiaries if technology fails.⁶⁴

User voice through real-time feedback: Real-time administrative data on service delivery, including the details of all transactions, is complemented by a feedback mechanism to identify problems through timely beneficiary surveys. As further discussed in Chapter 6, these efforts have evolved

64. This introduces a degree of administrative discretion which Andhra is trying to further limit through the use of face recognition for the few cases unable to be authenticated through fingerprints or iris scans.

Figure 5.4. Trade-offs in beneficiary experience of PDS reform



Source: Replicated from Aadil et al. (2019)

Note: Denominators for each column represent the number of respondents who said that the new system was better ($n=390$) or worse ($n=155$)

into a real-time governance system (RTGS) that aims to track all digital transactions in real time.

In the survey results of Aadil et al. (2019), 70 percent of beneficiaries responded that the new system was better than the previous one, while 28 percent viewed it as worse; in contrast to Rajasthan, very few respondents were indifferent between the two systems. Both groups cited the elimination of diversion of rations and the timeliness of delivery as gains, with some noting improvements in the weighing system due to the introduction of electronic scales linked to transactions. Figure 5.4 shows the perceived improvements and problems with the new digital systems by whether respondents thought the new systems are better or worse overall. Beneficiaries are clearheaded about the trade-offs of the new system, pointing out a similar set of benefits and faults regardless of their overall perception. As in Rajasthan, the main factor driving views of “worse” was difficulties experienced with the biometric authentication system, either mismatches or connectivity problems. Preferences do not differ appreciably across gender, age, and other characteristics. Those

most dependent on the system for food tend to rate the digital PDS a little less favorably, but no subgroup majority considers the new system as worse.

In sharp contrast to Jharkhand and Rajasthan, the backup systems for managing technology failures appear to be working. Two percent of respondents reported being denied rations at some point due to biometric authentication failure. These results may appear a little higher than those in the 2018 *State of Aadhaar* report, which reports average monthly exclusion from PDS in Andhra Pradesh at 1.1 percent, of which 0.8 percentage points are due to Aadhaar-related reasons only. However, follow-up questions ascertained that almost all of these cases saw their problem resolved speedily, mostly through the actions of the VRO. Exclusion did not emerge as an issue either in focus group discussions, and these flagged several other policies to limit exclusion, including allowing infirm beneficiaries to nominate someone to pick up rations on their behalf or the delivery of food grains at their doorstep. Assigning clear accountability for delivery to local officials, together with the beneficiary

feedback mechanisms discussed in Chapter 6, appears to have been working to ensure that technology failure did not lead to denial of rations.

On the supply side, virtually all dealers endorsed the digitized supply-chain reforms because they now received the correct amounts of grain.⁶⁵ Even though their margins had been increased several-fold, many considered that the reforms had reduced their incomes. Portability was strongly endorsed by both beneficiaries and dealers; 12 percent of beneficiaries had taken advantage of it, either to get better service or for geographic flexibility, while most dealers had served customers from outside their mandals. Most dealers cited the possibility of attracting more customers because these now had the option of collecting their rations from any FPS, not just the one near their place of residence.

Based on official data on PDS beneficiaries and stock management, digitization appears to have led to substantial fiscal savings. Even while maintaining generous access to the PDS system, seeding rolls with Aadhaar resulted in the elimination of duplicates and ghosts. Gains also came through stock-flow reconciliation, which prevents dealers from diverting unclaimed rations. Together, and after allowing for the increase in dealer margins to compensate them for reduced opportunity to gain from diversion, the digital reforms are estimated to have saved about 33 percent of the cost of the program. The cost of the devices required to digitize the PDS system, including the supply chain, would be covered by about two months of these savings. This does not cover all costs of setting up and operating the new approach (and some components, such as the call center, service many programs), but the comparison suggests that overall savings are considerable.

The overall picture that emerges from this case is highly favorable. Digital technology has provided some important benefits, in terms of both efficiency and inclusion. It also appears to have led to substantial

fiscal savings, at least in the case of PDS. The available evidence points to some areas of continuing difficulties; remote biometric authentication is still uneven, a concern considering the sustained efforts that Krishna and Andhra Pradesh have made to improve connectivity and performance in this area. Not all aspects of Andhra Pradesh's reforms may be easily replicable by other jurisdictions; as further discussed in Chapter 6, it embarked on its digital reforms from a relatively favorable position in terms of institutions and capacity. However, it does appear to offer a good example of a technology-savvy government using high-level goals to drive the application of digital technology to improve service delivery.

Transfers to promote financial inclusion and women's empowerment

An emerging body of evidence indicates that designating women as beneficiaries of financial transfers enhances their bargaining power within households, ultimately resulting in better outcomes for both for them and their families (Almås, Armand, Attanasio, and Carneiro, 2015; Cheema et al., 2016; Skoufias, Unar, and de Cassio, 2013). Decision making within households is not unitary—men and women have different preferences shaped by both control over resources and social norms (Attanasio and Lechene, 2014). Transfers that are targeted towards women represent access to resources and a degree of agency over them, instruments to enhance empowerment, with the hope that over time this will help change social norms that restrict women's economic opportunities standing in the society more generally.

There is also emerging evidence that the use of digital mechanisms to deliver the transfers can increase women's agency. In a randomized controlled trial in Madhya Pradesh, India (Field et al., 2016), women's wages from the National Rural Employment Guarantee Scheme were deposited directly into a subject group of workers' individual bank accounts instead of into those

65. Andhra Pradesh, as elsewhere, saw some turnover of dealers with the introduction of the new system; some exited, while others were recruited.

of their husbands, with a subsample also receiving basic training on how to operate their accounts. One year later, the women who received direct deposits into their own accounts plus account training had increased their participation in both the public- and private-sector labor markets despite there having been no change in market wages. Directing payments into women-held accounts improved incentives for them to participate in the NREGS workfare program. This, in turn, affected social norms concerning women's work more broadly, promising to unlock the economic potential of women beyond the NREGS program itself.

In developing countries with sparse banking infrastructure, the rapid spread of mobile money with extensive agent networks reaching into many rural areas has increased access to cash-out points, providing governments with a new channel to disburse funds to women. A study in Niger on transfers to households as part of a drought relief effort (Aker et al., 2016) showed that switching from physical cash transfers to digital transfers led to increases in measures of women's empowerment, including more discussion within the household on how they would be spent, and ultimately to higher diversity in diets and more meals consumed by children. Program recipients, all of whom were women, reported that the mobile transfer was less observable to other household members than physical cash. The study also found that the mobile money recipients were more likely to obtain the transfer on their own, to travel to weekly markets, and to be involved in selling household grains than their physical cash counterparts. The results, taken together, suggest that the mobile transfer technology had probably increased women's bargaining power within the household while improving nutritional outcomes.

While these initiatives have increased women's agency and control over resources, unequal capabilities and access to mobile technology, as well as social norms, still dictate whether and how poor women are able to negotiate the new tools and navigate the digital ecosystem. Two examples described previously are the PESP program in Bangladesh and the Bhamashah program in

Rajasthan. Mothers in Bangladesh had progressed in terms of financial inclusion, but many depended on a male relative with a mobile phone to access education supplements for their children. The Bhamashah program also spurred a major step towards financial inclusion for women; nearly two-thirds of the surveyed women heads of households (Gelb et al., 2018) had opened a new account in response to the government policy. By the time of the survey, many had started to transact on their accounts by withdrawing funds, although they were often accompanied by a male family member due to transport difficulties or because they were not sufficiently literate to undertake financial transactions on their own. As in Bangladesh, digital literacy was a serious constraint: 80 percent of women heads of households could not read or write text messages or even make a call using mobile phones, which were still overwhelmingly seen as the province of men.⁶⁶

Moving from government transfers to private digital payments, few of the women in these programs had made the progression towards transacting on their financial accounts beyond receiving transfers and cashing them out. Evidence from Kenya suggests the potential of further steps towards deepening the use of financial accounts (Chapter 3). Kenya has been at the forefront of the digital financial inclusion revolution, with 82 percent of adults reportedly owning a financial account. This has largely been driven by the success of M-PESA, which provides one of the most extensive mobile money platforms anywhere in the world. Its impact has been significant, especially for women. Suri and Jack (2016) estimate that access to M-PESA, including its extensive agent network, which has greatly increased access to service points, reduced extreme poverty in Kenya, lifting an estimated 194,000 households (2 percent of Kenyan households) above the extreme poverty threshold. These impacts are driven by improvements in financial resilience and increased savings and are significantly larger for

66. In the analysis in Chapter 2, access to mobile phones was one of the more important endowment-related factors associated with the male-female financial inclusion gap.

female-headed households. This could be for several reasons: M-PESA allows individuals more privacy in their financial transactions, which, in the case of women, may have increased their control over funds sent directly to them from friends and family. Having a mobile money account also makes it easier for women to save as well as to shift from subsistence to income-generating activity; they can receive payments from customers directly into their M-PESA accounts, increasing their control over their income and bargaining power within the family.

Finally, while we have focused here on the roles that digital technologies can have in boosting women's empowerment, they are not the only marginalized group or identifying factor facing extra challenges to financial inclusion. Applying an intersectional lens to this question reveals that other barriers can simultaneously impede uptake of the mediating technologies as well as dampen the positive impacts of them. For instance, ethnolinguistic minorities may find it difficult to navigate a majority-language payment platform, while differently abled people may be unable to access the service entirely without assistance. Likewise, certain religious minorities may have fundamental objections to the use of digital technology (Malik, forthcoming 2020). Technology has a role to play in including these groups, but will require deliberate, human-centered design approaches to ensure these groups are fully included.

Lessons from the cases

The cases covered in this section offer lessons in how the use of digital technology, particularly in the areas of ID, mobiles, and payments, can contribute towards improving systems of social protection and increasing capacity to achieve several important SDGs. As already stressed, the objective has not been to go deeply into policy debates on the optimal type of social protection system—on conditionality, and whether assistance should be through financial transfers, vouchers, or in kind. It has, rather, been to look across a diverse set of

examples and mechanisms and to seek to understand how technology has been used and with what results.

In considering this, it is particularly important to take into account the experience of beneficiaries, especially the poorest and most disadvantaged. Measures of administrative efficiency and fiscal savings are also useful, but single-minded emphasis on this area risks an imbalance in the application of digital technology that can result in more, rather than less, exclusion and deterioration of service quality.

On financial transfers, the cases involve a variety of transfer modalities. They are generally favorable, with some offering evidence of multifaceted gains. These can be in the form of beneficiary experience (AP smartcards and pensions, Bangladesh education supplements, Pakistan BISP payments), less leakage (AP smartcards), or lower administrative costs and less risk for providers that they will wrongfully be accused of corruption (Bangladesh). One important issue, flagged especially in the case of pensions in Andhra Pradesh, is the importance of ensuring adequate last-mile incentives to deliver benefits through the financial sector. Without this, beneficiaries may prefer to receive physical cash. Another important point is the importance for beneficiaries of having at least a base level of literacy and capacity to work with digital systems.

The cases also offer some insights into the trade-offs between using specific social protection delivery mechanisms versus general-purpose accounts that can be used more widely to increase digital and other financial payments across the economy. While both have similar benefits from a public financial management perspective, the latter are clearly desirable in principle and as a longer-run objective. However, the cases suggest that specific mechanisms may be needed in some cases and that the path from receiving social transfers by digital means towards wider payments, savings, and credit will be a long one for many beneficiaries.

Turning to in-kind programs, the results of introducing digital technology depend on both the design of reforms and their implementation. Table 5.1 summarizes the

Table 5.1. Comparison of Aadhaar-based PDS reforms in India

	Better average beneficiary experience	Clear accountability for service delivery	Client exclusion	Choice and voice	Improved incentives to service providers	Fiscal savings
Jharkhand	No	No	Yes	No	No	No
Rajasthan	Yes	No	Yes	No	Yes	NS
Andhra Pradesh	Yes	Yes	No	Yes	Yes	Yes

NS: Not assessed in study

studies of food rations in three Indian states. In two of them, survey responses suggest that, on average, beneficiaries' experience has improved, with respondents citing more control over their entitlements and less ability of providers to divert their rations. In the third it deteriorated, with additional difficulties and costs of digital authentication for both beneficiaries and service providers. In two of the three cases there appears to have been at least some increase in exclusion as well as inconvenience to some beneficiaries. There were also start-up problems, for example, in reconciling different data sets in Rajasthan, which was not made easier by combining the digitization of beneficiary rolls—already a complex process—with aggressive efforts to cut the rolls to conform with the guidelines of national policy.

Several differences stand out when comparing the best- and worst-performing programs. Reforms in Andhra Pradesh set out to improve efficiency and service rather than simply to save fiscal revenues; that they appear to have also achieved savings has been a by-product of efficiency improvements. Andhra's reforms embodied several clear principles: access, clear accountability, including in cases of technology failure, and empowering beneficiaries through choice and voice (Chapter 6). In addition, service margins were widened from their previously low levels to reduce the need of providers to rely on diverting rations to stay in business. Reforms in Jharkhand were driven by the desire to save resources and embodied none of these features. Authentication failures were not followed up by prescribed procedures to ensure that legitimate beneficiaries were served. Dealer diversions continued as before, with no mechanism for empowering beneficiaries to resist or report service failures. These cases point again to the fact that

technology is only a mechanism; its effect depends on the purposes to which it is applied and how it is applied; it does not in itself create the political drive to improve service delivery. However, once engaged for this purpose, it can improve the delivery of in-kind benefits in important ways.

Finally, considering the cross-cutting goals of financial inclusion and women's empowerment, the cases indicate both the potential of technology and its limitations. Channeling benefits to women and through financial payments mechanisms rather than physical cash can offer many advantages, including more convenience and privacy for beneficiaries, less corruption and diversion, and a more accountable delivery chain. These benefits may be particularly valuable to women, who appear to benefit more widely from their increased agency, including in the area of intrahousehold decision making. At the same time, there are limits to what can be achieved. Many beneficiaries lack access to mobile technology or the digital and financial literacy needed to transact on their accounts, so that complementary measures are needed in these areas. Even with payments through general-purpose accounts, many beneficiaries will be slow to transition from cashing out their benefits to deeper financial inclusion.

Intensive onboarding and continuing support, including education and digital and financial literacy training, will be necessary to unlock the potential of technology for marginalized groups. Without these active interventions, digital systems and payments may do little to reduce existing vulnerabilities. In this area, accelerated use of the JAM trinity should be seen as one of several building blocks for social and economic progress.

Chapter 6.

Towards Responsive Real-Time Digital Governance

Improving the efficiency, quality, and impact of public services is one of the most critical challenges of public policy. As governments around the world use digital technology to reform governance and service delivery, these new systems should not only increase efficiency but also empower citizens by providing users choice, amplifying their voices to enable them to participate more effectively in the development process, and enhancing the accountability of service providers. These objectives are consistent with the SDG goals of promoting peaceful and inclusive societies and building effective, accountable, and inclusive institutions, noted below:

Goal 16.5: Substantially reduce corruption and bribery in all their forms.

Goal 16.6: Develop effective, accountable, and transparent institutions at all levels.

Goal 16.7: Ensure responsive, inclusive, participatory, and representative decision making at all levels.

The SDGs also provide indicators that governments can use to track progress towards the goals:

Target 16.6.2: Proportion of the population satisfied with their last experience of public services.

Target 16.7.2: Proportion of population who believe decision making is inclusive and responsive.

Ideally, service delivery mechanisms would incorporate the SDG principles and goals from their inception. However, many do not; legacy systems are also difficult to overhaul completely, due to administrative and

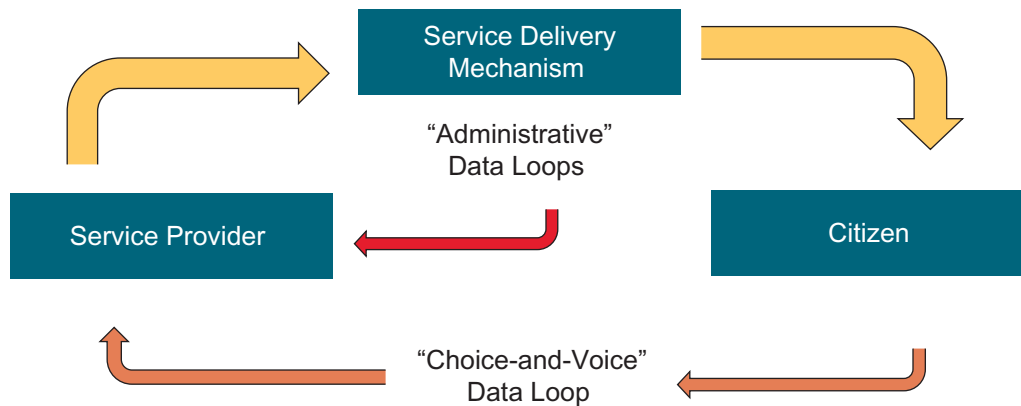
political factors. Effective use of feedback mechanisms provides an opportunity to reorient existing service delivery systems as well as shape new ones.

Feedback mechanisms available to citizens to report the quality of public services they receive are often perfunctory at best, with no clear lines of accountability or time line for the redressal of grievances. With digitization, this aspect of the citizen–state relationship can change rapidly. Several cases show that digital governance systems, appropriately designed and implemented, can incorporate three interventions to help improve beneficiary experience with public service delivery (Figure 6.1). The first stems from individualizing subsidies and benefits, making them portable and enabling beneficiaries to choose between providers. This may not always be practicable, but where it is, it reduces asymmetry in power relationships and provides a market-based indicator of performance. The second involves the use of the vast quantity of real-time administrative data that digital delivery systems can generate to reduce the transaction costs of accessing information and monitoring implementation. The third is to solicit views from beneficiaries to help support accountability at appropriate levels and complement the administrative data to help enforce service delivery standards.

We do not attempt an exhaustive review of the large literature on how countries can achieve better service delivery outcomes.⁶⁷ Our objective is to consider how countries can use digital technology—including the

67. For an early but comprehensive review, see *World Development Report 2004: Making Services Work for the Poor* (World Bank, 2003).

Figure 6.1. Administrative and choice-and-voice feedback loops



combination of digital ID, payments, and mobile communications—to implement feedback systems that improve the design, efficiency, quality, and experience with public services, helping providers achieve the SDG goals listed above. After considering how digitization can improve on analog processes, we examine the new, information-based approach in the context of India’s LPG cooking gas subsidy reform. We then consider the case of Andhra Pradesh, where digital processes are being used more broadly to support a real-time governance framework that incorporates both real-time administrative data and citizen feedback. We conclude with some reflections on the lessons from these cases, including some cautions and limitations, when we come to consider their applicability in a wider context.

Feedback loops

The growing use of digital technologies, including mobile connectivity and the internet, offers new opportunities to institute a range of scalable feedback mechanisms that are far speedier, and probably less costly, than traditional approaches. Rapid, more granular feedback can help in the early design phases as well as in the reform of legacy systems where major redesign may be costly. Bottlenecks can be alleviated and accountability improved, often without the need to fully replace the system. Some NGOs have pioneered

efforts to build on digital technology to strengthen citizen feedback,⁶⁸ and many governments have taken steps to incorporate the use of digital technology, including payments, into service delivery. However, few government programs have yet harnessed the potential of the vast amount of information generated by digital systems to assess service quality and empower citizens.

Feedback systems, whether through surveys, social audits, scorecards, or other mechanisms, have a long history. They are a critical element in the “short route” of accountability between clients and service providers.⁶⁹ Sometimes they are ineffective; they might require effort on the part of citizens; long delays in soliciting inputs or slow responses to grievances and problems may discourage submissions. Feedback gathered through some mechanisms may not be sufficiently granular or tailored towards individual service interactions; problems may not be assigned to the appropriate level of administration for attention and

68. One example is Ushahidi (<https://www.ushahidi.com/>), an organization originally set up to map violence in Kenya after the post-election violence of 2008. Another is FixMyStreet (<https://en.wikipedia.org/wiki/FixMyStreet.com>), a platform to help people inform local authorities of potholes and other problems needing attention. Dodge et al. are also studying the effectiveness of personal tools for administrators to track payments in real time: https://www.povertyactionlab.org/sites/default/files/publications/Have-it-at-hand_Dodge-et-al_May2018.pdf.

69. The “short route” is in contrast to the “long route” of accountability where, through elections and other mechanisms, citizens influence policy-makers who, in turn, manage and influence the service providers. See World Bank (2003).

resolution. They may also be limited in terms of being representative across geography or time. They may not pick up large variation in performance and feedback across locations and between discrete measurements.

Digital feedback loops can be more than a computerized version of existing analog processes. By leveraging technology, they enable the collection of large volumes of data in almost real time, including crowdsourcing suggestions and ideas at the planning stage. Data collection and analysis can be far timelier and more transaction-specific than that from retrospective audits based on paper-based records or periodic field surveys. Reporting costs and burdens can be eased by using a range of response modalities, including text messages and robocalls. Handheld voting devices and audience response systems can offer individuals the opportunity to express their views while preserving their anonymity and ensuring that the opinions are submitted by genuine clients.⁷⁰

Speed is a great benefit. On the user side, rapid feedback and response is important to encourage further involvement.⁷¹ On the provider side, more timely information, including from administrative data, can help to correct shortcomings while preempting frequent bureaucratic obfuscations of ex post audits—that the problems exposed are old ones, that they had been recognized before the audit, and that corrective action has already been taken.

70. Academic literature on the use of mobile feedback for real-time governance dates back about 15 years. Janssen and van Veenstra (2005) describe five stages of technical systems architecture that would be needed to implement a real-time governance system. El Kiki and Lawrence (2006) subsequently described the potential benefits from a real-time mobile government model using mobile technology to deliver public services. Song and Cornford (2006) describe a mobile governance pilot project by the Beijing city government that equipped officials with mobile phones to relay citizen issues directly back to a supervision center. While this was an officially mediated feedback mechanism, follow-up for each individual report was confirmed by a photo taken on the mobile phone.

71. Ringold, Holla, Koziol, and Srinivasan (2012: 85) note that the public needs to expect a response in order to find complaining worth their time, especially for the most vulnerable beneficiaries, who “may not believe they are entitled to complain.” Alsaadi, Ahmad, and Hussain (2018) used focus groups and surveys to examine mobile government applications in the United Arab Emirates, Saudi Arabia, and Oman and found that users prioritized real-time responses over other service characteristics.

Some critical success factors for feedback

As for other areas of technology, digital feedback mechanisms are only tools. The enabling environment, design, incentives to participate, and the motivation and capacity to respond are critical to the success of any feedback loop.

Commitment

Feedback systems will have little impact in cases where there is no high-level commitment to improve service delivery or inadequate resources and capacity to respond to problems. If adverse feedback is treated as a sign of individual or organizational failure, it will probably be suppressed. High-level political leadership should convey a clear message to both providers and clients that feedback is valued, and its relevance should be demonstrated by visible improvements in service quality. Commitment can be demonstrated by linking feedback levels to incentives for service providers. At the same time, delivery agents need to be brought on board while putting in place performance metrics and incentives for better service, especially when, as is likely, reduced bureaucratic discretion constrains opportunities for diversion and corruption, enhancing resistance to change.

Transparency

The transparency of feedback to all stakeholders, both internal and external, can help to avoid the suppression of negative information and can also be taken as a signal of commitment. Transparency should extend to information on the resolution times for complaints.

Learning

Going beyond grievance redressal, learning organizations put in place processes to analyze information, identify actionable improvements in business processes, and shape the long-term service design

approach. This objective becomes more feasible with the large real-time data sets generated through digitized transactions coupled with tools such as data analytics.

Accessibility and safeguards

Even as digitized systems can reduce transaction costs for many people, they can also raise barriers for some. Requiring access to mobile data or the internet can exclude the poor and marginalized, biasing the distribution of feedback providers. Cultural norms (including gender), language abilities, and literacy levels can also constrain access. To overcome these capacity and resource challenges, digital feedback loops can allow feedback to be sent through trusted intermediaries (including reputable NGOs) as well as directly by citizens. Data analysis can also help to reconcile privacy concerns with the need to provide metrics of service performance.⁷²

Choice, voice, and control

Corrective action can be in the hands of the service provider or of citizens themselves. In *provider-controlled systems*, feedback can form the basis for corrective action only if the service provider chooses to act on it. In *citizen-controlled systems*, consumers are empowered to take action, including by changing their service provider. While portability across service providers may not always be practicable (in sparsely serviced areas, for example), it provides a powerful signal by fostering competition among delivery agents.

Proactivity

In *passive* systems, citizens must initiate the feedback process; in *active* systems, the service provider (including the government) reaches out for feedback. Systems can involve a combination of active and passive—for example, automated post-service calls to all clients

(followed by selective follow-up for those not satisfied with service) combined with passive feedback through a toll-free telephone number or website.

Richness

Feedback can range from a simple number code (SMS 1 for yes, 2 for no) to a text message through to richer media such as audio or video files. Increasingly, social media (Facebook, Twitter) and messaging platforms (WhatsApp) enable rich feedback; they have become powerful interfaces between citizens and states. Increased digital capacity in public systems signals a richer range of options in the future, with corresponding opportunities for learning and improving the delivery mechanism.

From principles to practice

India has become a laboratory for digitization, with reforms to a wide range of services and benefit programs. Two recent programs offer insights into the use of feedback mechanisms.

Consumer choice and voice in India's LPG cooking gas subsidy reform⁷³

India's system of cooking gas subsidies has long been plagued by diversion and inefficiency. As described in Chapter 4, starting in 2013, Project Lakshya⁷⁴ and later PaHaL introduced wide-ranging reforms in the allocation, distribution, and delivery of the cooking gas subsidy. Instead of paying a subsidized price for LPG cylinders, beneficiaries paid the market price and the government transferred the subsidy directly to their bank accounts after purchase. Savings from the reform facilitated the rollout of LPG to poor rural women (the Ujjwala program⁷⁵). Dealer margins were increased as part of the reform to reduce resistance due to higher

72. This trade-off and the use of data analytics are discussed in <https://aiepeq.github.io/website/tprc.pdf>.

73. This section draws heavily on Mittal et al. (2017).

74. <http://nisg.org/files/documents/UP1418304235.pdf>.

75. <https://pmuy.gov.in/>.

implementation costs and the elimination of opportunities for diversion.

Beyond the use of digital matching and ID to de-duplicate beneficiary rolls and eliminate ghost consumers, digital technology has been instrumental in several ways. One involved the GiveItUp program, which encouraged richer consumers to give up their subsidies to help finance assistance to poor households. The names of those who volunteered were inscribed on a “digital roll of honor,” each linked to the name of a poor consumer whose subsidy had been facilitated. Some 10 million gave up their subsidies; the public nature of this exercise then made it possible to leverage it to eliminate subsidies to those rich enough to file tax returns (“Your neighbors gave up their subsidy—why not you?”). Consumers were informed of the delivery of each cylinder and received a text message upon the transfer of the subsidy to their designated beneficiary bank account. They could now track their subsidy and deliveries by SMS and online portals.⁷⁶ Consumers were also invited to rate the service of their distributor, with ratings on five service parameters. At the same time, dealers were also rated based on delivery times through automated management information system data collected by the public-sector oil marketing companies, on a five-star scale.

Portability across LPG distributors provided another mechanism to reinforce accountability for efficient cylinder delivery. Consumers could shift to another dealer, taking cognizance of logistical constraints.⁷⁷ Together with public information on performance, this reversed the consumer–dealer power equation in favor of the beneficiaries. The “star ratings” were further linked to incentives by tying them to decisions on the renewal of dealerships. These ratings were transparently made available to the public as well as to other distributors, improving transparency and providing

76. www.mylpg.in.

77. In some rural areas where distribution centers are sparse, the Ujjwala program has moved towards licensing mini-distributors, local businesses capable of servicing a more limited number of customers than the large-scale ones traditionally associated with the LPG program (Jain et al., 2018). This is intended to create a denser distribution network.

opportunity for social audit. The online portal was hosted in several local languages to ensure that the feedback mechanism was widely accessible to people who were not conversant in English, thereby making the system “inclusive by design.”

The feedback loops in the new LPG system have increased consumers’ voice and the accountability of distributors, and improved service delivery. Not surprisingly, the combination of subsidy reform from prices to cash transfer (reducing leakage and diversion) and user empowerment appears to have led to a major improvement in the timeliness of deliveries. In user surveys, this has emerged as the leading factor in support for the reform.⁷⁸ No more do families need to wait for extended periods before their cooking gas cylinders are refilled.

Towards real-time governance: The Andhra Pradesh experience

As discussed in Chapter 5, the state of Andhra Pradesh (AP) in southern India has emerged at the vanguard of using technology to reform service delivery, and with generally good results, as indicated by beneficiary and user surveys. Its approach includes the principle of universal access—efforts to make Aadhaar available to all and to integrate it into all programs and administrative departments—as well as the principle of clear accountability to rectify cases of technology failure. At local levels, each community has a village revenue officer, the lowest level of the administrative service, who is authorized to deal with public resources and payments. These VROs are mandated to deal with the (few) exceptions and cases of technology failure, ensuring that the digital reforms do not lead to exclusion of genuine beneficiaries. In addition, it includes the same two elements as the LPG reform—choice, or the portability of benefits, and voice, with mechanisms to solicit the views of beneficiaries on the quality of services

78. In a survey of beneficiaries in Rajasthan, almost half found the new system better, while only a few considered it worse; see <https://www.cgdev.org/publication/what-a-new-survey-aadhaar-users-can-tell-us-about-digital-reforms-initial-insights>.

provided. This approach is being further evolved into a “whole of government” approach that aims to hold public officials accountable in a direct and rapid manner, and that possibly represents the frontier of real-time governance approaches in developing countries today.

In implementing this approach, AP starts with a notable advantage because it can draw on Aadhaar as the foundation for its digital governance framework. The fact that Aadhaar is de facto mandatory to receive any public services, subsidies, or transfers, and that authentication is online, makes every beneficiary and each transaction trackable in real time at the individual level. This immediacy of administrative data feedback might be more difficult to secure in less online environments.

The first digital feedback loop component introduced by AP uses the power of uniqueness and the trackability of transactions to facilitate portability. Public distribution system beneficiaries can obtain food rations from any fair price shop in the state. This benefits in-state migrants and offers an alternative to customers seeking better service—both features that are widely appreciated by beneficiaries, according to 2018 survey results.⁷⁹ As described in Chapter 5, portability would not be possible without an effective system to manage stocks and flows of rations in real time throughout the system, and at the level of each of the state’s 28,642 fair price shops.⁸⁰ Effective stock replenishment, in turn, requires computerization of the upstream supply chain, with deliveries to shops authenticated in real time by both drivers and shop owners. Social pension recipients, too, can now collect their benefits from any local government office, although many were not yet aware of this at the time of the 2018 survey. A further stage could be to open up portability to include the

options of both banks and administrative government offices, further reducing travel cost and inconvenience, especially important for the elderly. Customers can “vote with their feet,” making them less vulnerable to exploitation by frontline providers, sending market-based feedback signals to service providers.

Turning to the second loop, several states in India—such as Rajasthan—now collect real-time data on program delivery that can be used to drill down to the level of districts, subdistricts,⁸¹ and individual providers.⁸² Andhra Pradesh has gone beyond digitally recording administrative data to actively analyzing it to increase efficiency and accountability and to reduce exclusion. A central hub collates all service delivery data generated through Aadhaar-based transactions in real time, analyzes the data, and provides dashboards for monitoring implementation. This can include, for example, the records of beneficiaries’ efforts to authenticate, and whether these were followed up by measures to ensure that benefits were received. In one case cited in the survey, a dealer was contacted about 10 minutes after a failed fingerprint authentication effort, asked why no rations were provided, and instructed to reach out to the beneficiary and apply the appropriate protocol—iris scan, other form of identification, or referral to a VRO—to rectify the situation. This may not represent a routine use of data, but it demonstrates the power of real-time administrative information to pinpoint ongoing problems with the system.

On the third loop, actively soliciting user views on service quality and efforts to resolve grievances is at the foundation of AP’s real-time governance framework. Each beneficiary must agree to be part of a quality survey process and receives a feedback robocall on service quality every time they access a service. In the case of the food ration system, this would imply around 10

79. Survey data suggests that portability can not only be beneficial on the demand side but is also preferred by most supply-side agents, who see the possibility to gain customers through better service and also find that computerization of the supply chain has eased transactional difficulties (Aadil et al., 2019). Dealer margins were also increased from their previously low levels to compensate for the reduced ability to divert rations.

80. Data as of 2018. Of these shops, only 321 were still offline.

81. Known as “mandals” in Andhra Pradesh.

82. Dodge, Neggers, Pande, and Moore (2018) report on the effect of introducing PayDash, a mobile and web-based application to reduce the transaction costs of monitoring payment delays to workers in Madhya Pradesh and Jharkhand. Access to PayDash, in particular by supervisors, resulted in substantially shorter delays in the payments process. https://www.povertyactionlab.org/sites/default/files/publications/Have-it-at-hand_Dodge-et-al._May2018.pdf.

million calls per month, covering clients of every fair price shop in the state.⁸³ Those responding with negative feedback are rolled over to the second active feedback loop through a manual system to register complaints, which are then referred to the appropriate administrative unit and which must be resolved within specified periods. At the state level, a consolidated service delivery data hub collects information on grievances and tracks their resolution within a specified time frame, normally expected to be 24 hours, thereby fixing accountability and requiring a rapid response from the administration.

The data generated is then analyzed to rank districts, mandals, and villages, as well as service programs, scoring them on “happiness indexes” of service delivery, which are updated every three hours. These are not public (unlike the LPG dealer ratings) but can be used as a management tool by the state government to hold officials accountable. Lessons from feedback may be used to redesign delivery mechanisms to make them more beneficiary-centric—for example, the most recent shift to deliver pensions through panchayat offices, which many pensioners found to be more convenient than receiving pension through the banks (see Chapter 5).

This combination of real-time feedback and clear human accountability is intended to promote integrity and efficiency at each level of the administration, thereby increasing inclusion and trust in the system. We do not have sufficient evidence to judge the impact of the real-time governance system, but its elements seem to be well appreciated on both the beneficiary and service sides. On the beneficiary side, focus group comments indicate, for example, that officials are now far less likely to solicit bribes or make deductions from social payments than previously. On the supply side, officials appear to be well aware of the happiness ratings of their districts and of their targets for improvement. This approach is being further evolved into a

83. The rate of response to these calls was reported to be about 15 percent. For a typical fair price shop, this would translate into some 50–60 reports per month.

whole-of-government approach, which aims to hold public officials accountable in a direct and rapid manner, and which possibly represents the frontier of real-time governance approaches in developing countries today.

Preliminary lessons on the potential for real-time governance and its limitations

As noted in Chapter 1, in-kind assistance has not benefited as much from advances in digital technology and connectivity as cash transfers. Nevertheless, there are many ways in which the effectiveness and accountability of a wide range of services and benefits could be enhanced, as suggested by the LPG and Andhra Pradesh cases. The two cases share some common features as well as showing some differences. First, in terms of commitment, both the cooking gas reform and the real-time governance system of AP were high-level projects, strongly endorsed and supported by the prime minister and the state’s chief minister, respectively. Both have been able to draw on India’s digital infrastructure, including the Aadhaar system and exceptionally rapid advances in mobile communications. The fact that Aadhaar is de facto mandatory to receive specified public services, subsidies, or transfers, and that authentication is online, makes every beneficiary and each transaction generate granular feedback in real time. Both cases have involved learning, and have provided beneficiaries choice as well as voice; both have been proactive in seeking feedback, especially AP. In terms of transparency, the ratings generated by the LPG systems are in the public domain, while the happiness indices of AP are not; they are, however, assembled in the real-time governance center and available within the state government as a management tool.

Another point in common has been attention to the incentives facing service providers. Andhra Pradesh increased dealer margins to compensate for reduced opportunity to divert funds, although this did not

prevent some dealers from exiting, requiring others to be recruited. Dealer margins were also revisited for LPG as the program was rolled out at scale.⁸⁴

The approaches developed in these two cases are potentially applicable to a wide range of service and benefit programs. The question, then, is the conditions under which such feedback mechanisms are likely to be helpful in improving service delivery and governance towards achieving the SDGs. Recognizing that this can be framed as a very general question, it is useful to highlight three features of the context in which these two programs have been developed.

The first is the question of social choice, as concerns ID systems but also regarding the collection and use of extensive digital transaction data. Aadhaar is at the heart of India's digital service reforms. While its use for the provision of benefits has been approved by India's Supreme Court, such a system might not be politically acceptable in all countries, although it is also the case that almost all developing countries have, or have committed to, some form of national ID system. Some elements of the Krishna model could be adapted to different identification capabilities, but it is not clear whether comparable monitoring systems could be implemented in the absence of an Aadhaar-like ID system using real-time online authentication at points of service.

Related to this is the vast quantity of personally identifiable data and transaction records generated by such digitally enabled delivery systems. The Supreme Court of India, in its judgment on the right to privacy, acknowledges that digitally enabled systems "raise complex issues requiring delicate balances to be drawn between the legitimate concerns of the State on the one hand and individual interest in the protection of privacy on the other."⁸⁵ Furthermore, the Supreme

Court was of the view that the state may have justifiable reasons for collection and storage of data on socioeconomic programs to ensure that "scarce public resources are not dissipated by the diversion of resources to persons who do not qualify as recipients . . . but the data which the state has collected has to be utilized for legitimate purposes of the state and ought not to be utilized unauthorizably for extraneous purposes."⁸⁶ These observations point to the potential trade-offs in using data as a tool for improving state capacity to deliver public goods and services, and the checks and balances that need to be in place to ensure that people's fundamental right to privacy is not violated.

Digital governance mechanisms based on the ubiquitous use of unique identification break the delivery silos across sectors. Whole-of-government approaches, such as that being pioneered by Andhra Pradesh, require the ability to pool information across programs to provide a comprehensive citizen-based picture. This raises obvious concerns for data privacy, the degree to which users should have the right to control their data, and the mechanisms for them to do so. Estonia is, so far, the only country to implement a comprehensive approach towards managing government-held data, but more governments, including that of Andhra Pradesh, are grappling with this problem and are beginning to consider approaches to migrate towards a comparable system.⁸⁷

The second is the matter of capacity. The LPG program was able to build on a preexisting foundation of state oil companies and distribution networks, which continued through the period of reform. Andhra Pradesh is generally recognized as a state with above-average administrative capacity in India. With its former capital, Hyderabad, being a major tech hub, it is probably also ahead of most other states in the digital sphere. It began experimenting with digitized service delivery well before Aadhaar, for example, through the use of

84. An exception to this was the decision to move pension payments in Andhra Pradesh away from banks and towards panchayat offices rather than increase the very low fees offered for delivery.

85. *Justice Puttuswamy and Others v. Union of India and Others*, Writ Petition (Civil) No. 494 of 2012, Para. 176 (https://sci.gov.in/supremecourt/2012/35071/35071_2012_Judgement_24-Aug-2017.pdf).

86. *Ibid.*, Para. 181, p. 255.

87. For an outline of recent approaches, see Koshy (2019).

smartcards to pay NREGS beneficiaries, as described in Chapter 5. Its digital service delivery systems have required years of sustained effort and management pressure to reach their current capability, including the time and effort to roll out the foundations of identification and connectivity needed for the reforms. Andhra had also been the leading state in India in terms of the implementation of social audits, and so had institutionalized the practice of client feedback well before the digital revolution. Similar progress in implementing digital governance might not be achievable by less capable or less stable administrations.

This brings in the question of the extent to which digital technology can build new capacity as opposed to augmenting the impact of existing capacity. These cases suggest that there is probably some performance threshold effect for a real-time governance system to operate successfully. To offer choice to users, and also to strengthen the hand of government over dealers, the network of service points should be dense enough to offer alternatives. The incidence of complaints should be manageably low, and there needs to be capacity to respond. Negative feedback could otherwise overwhelm the system, leading to long queues of unresolved problems and undermining trust in the system.

Third, and perhaps most complex, is the political economy of service delivery—conditions under which a government or service authority will prioritize improvements in delivery over other objectives, including bureaucratic discretion. Here, too, there is an important parallel between the two cases. Both have benefited from stable funding and from strong support at the highest levels. India's LPG program has been one of the most visible schemes of the Modi government, with ubiquitous posters proclaiming its achievements and its benefits, especially for women's

health, time management, and income-generating possibilities. In Andhra Pradesh, together with the prioritization of ICT, there has been a consistent focus on strengthening service delivery. Ayliffe, Aslam, and Schjødt (2017) offer a multidimensional comparison with several other states and stress the importance of commitment from the highest levels of government, which is seen as essential to overcome a range of powerful local vested interests. In the NREGS initiative, for example, state-level political elites in Andhra Pradesh played a critical role in giving space to activist bureaucrats and civil society actors to innovate and experiment in areas that were aligned with the overall political narrative of transparency and accountability (Aiyar and Walton, 2015).

These features should not detract from the gains that are potentially achievable across a wide range of public services and programs, from building effective feedback mechanisms, and from the role that digital systems can play in enhancing the speed and comprehensiveness of such mechanisms. They do, however, reinforce the point made in previous chapters, that they will not transform service delivery in situations where the fundamentals are not in place—where there is no consistent political will to build the capacity needed for such systems to operate effectively or to provide stable funding, and little real commitment to improving service quality. Technology may expand the possibility set, but it provides no guarantee that countries or programs will move closer to the theoretical efficiency frontier. However, adaptations of the approach could be incorporated more widely and, at least from the technology perspective, many countries are moving in the same direction. There is ample space to adapt and apply the lessons in other contexts to support the SDGs.

Annex 1.

Note on JAM Data

Any effort to estimate JAM coverage faces formidable challenges, both conceptually and in terms of data coverage. The numbers of people covered by an ID system and with access to mobile communications and some type of financial account provide no indication of the quality of the services provided by these systems.

Limitations of Findex coverage

Findex is the only source that enables individual-level analysis of the three components of JAM. The 2017 survey covers 144 countries, and while it does include China, question gaps mean that there is no estimate of its mobile money account penetration. China probably has the world's single largest mobile money user base, estimated to be 527 million people at the end of 2017 (China Internet Network Information Centre, 2018) but part of this may reflect mobile payments services for people who already have a bank account. Another exclusion from the 2017 data is Somalia, where 37.1 percent of adults had a mobile money account in the 2014 round, accounting for 80 percent of the country's financial inclusion. By 2017 the rate was reported to be 73 percent; these rates are extremely high compared to other countries, and in all likelihood coverage has only increased (Altai Consulting, 2017).

In addition, 45 of the cases did not include the question on possession of a national ID. Most of these are high-income countries, but the list also includes large countries of interest such as the DRC, Ghana, Iran, Nigeria, and the Philippines. For analysis at the individual level, this leaves 99 countries with data for all three JAM components.

ID estimates

Different sources provide substantially different estimates of the coverage of identification systems. One question is whether to focus on registration or on the ability to actually prove identity, for example, by showing a card. Another is whether to focus on a particular system, such as a national ID, or to include alternative documentation. Especially in countries where national ID coverage is low, people may be able to use an alternative type of identification, such as a voter card, to authenticate themselves for services, but in some countries, voter cards are not widely accepted for uses beyond voting. The age at which coverage starts for adult citizens varies across countries. Further complicating the picture, while national ID authorities may know the number of cards issued, especially in countries with low rates of death registration, they are unlikely to have a clear idea of how many cards are still active.

The most extensive effort to measure global ID coverage is the World Bank's ID4D data set. For children, this relies on birth registration rates reported by UNICEF for the age cohort 0–5 and extrapolated for older cohorts, and for adults on reported administrative data on national ID coverage or voter registrations, depending on the country. Findex surveys only adults (those over the age of 15) and reports responses on whether the individual has a national ID or, as in the case of India, where the Aadhaar is used, a similar credential. Some countries pose particular challenges; in Ethiopia, for example, the kebele ID functions as the equivalent of a national ID but is issued in a decentralized manner by some 15,000 kebeles. Comparing Findex 2017 and the 2018 ID4D database, there are 21 countries where the difference in adult coverage is greater than 20 percentage points. Findex is lower in

12 cases and higher in 11 cases. For most countries in the first group, the difference is due to (suspiciously) high voter registration rates in countries with still-inadequate ID systems; for the second group, most cases are due to the converse situation.

The quality of services offered by different ID systems varies across countries. While over 90 percent of systems use digital technology (Identification for Development, 2018), very few are equipped to carry out full or remote digital authentication, whether through biometrics (India's Aadhaar) or cards, digital certificates, and PINs (Estonia). There is also considerable variation in the robustness of the credential, whether it is de-duplicated and easy to use. Some countries that have rolled out sophisticated ID systems have yet to put in place an authentication ecosystem capable of exploiting their capabilities.

Mobile access

Mobile access can be measured in several different ways, none of them perfect. The total global number of mobile subscriptions, at 7.9 billion (GSMA, 2019b), is now on par with the number of people in the world, but this information is of limited value because of multiple subscriptions. For some countries, the GSMA provides data on the number of unique mobile subscribers, but this can be difficult to monitor, particularly in countries with less than adequate ID systems. A third option, as used in Findex, is a survey-based question on possession of a mobile phone. This could serve several family members, each with their own SIM card, and so would be a relatively conservative access measure. Comparing publicly available unique subscriber data from GSMA with Findex mobile phone ownership shows that GSMA estimates are almost always higher (Figure A1.1), and some appear to be larger than the size of the adult population. This could be due to failure to recognize multiple subscribers or to the inclusion of business accounts. We have settled on the Findex measure for analytical purposes because it represents the most conservative and empirically verifiable estimate.

The strength and reliability of connectivity and the speed of mobile data are also important variables that can constrain the services that mobile can provide. In terms of conventional criteria for financial access—the ability to deposit and withdraw cash, to check balances, and to make and receive payments—access to 2G connectivity is sufficient, although 3G and higher facilitates more sophisticated services and more convenient user interfaces via smartphones (Perlman and Wechsler, 2019). However, poor connectivity can substantially impede transactions and weaken trust in the system, as users have to grapple with dropped transactions. Time-outs can also be a problem, particularly with complex USSD interfaces (Cook and Raman, 2019).

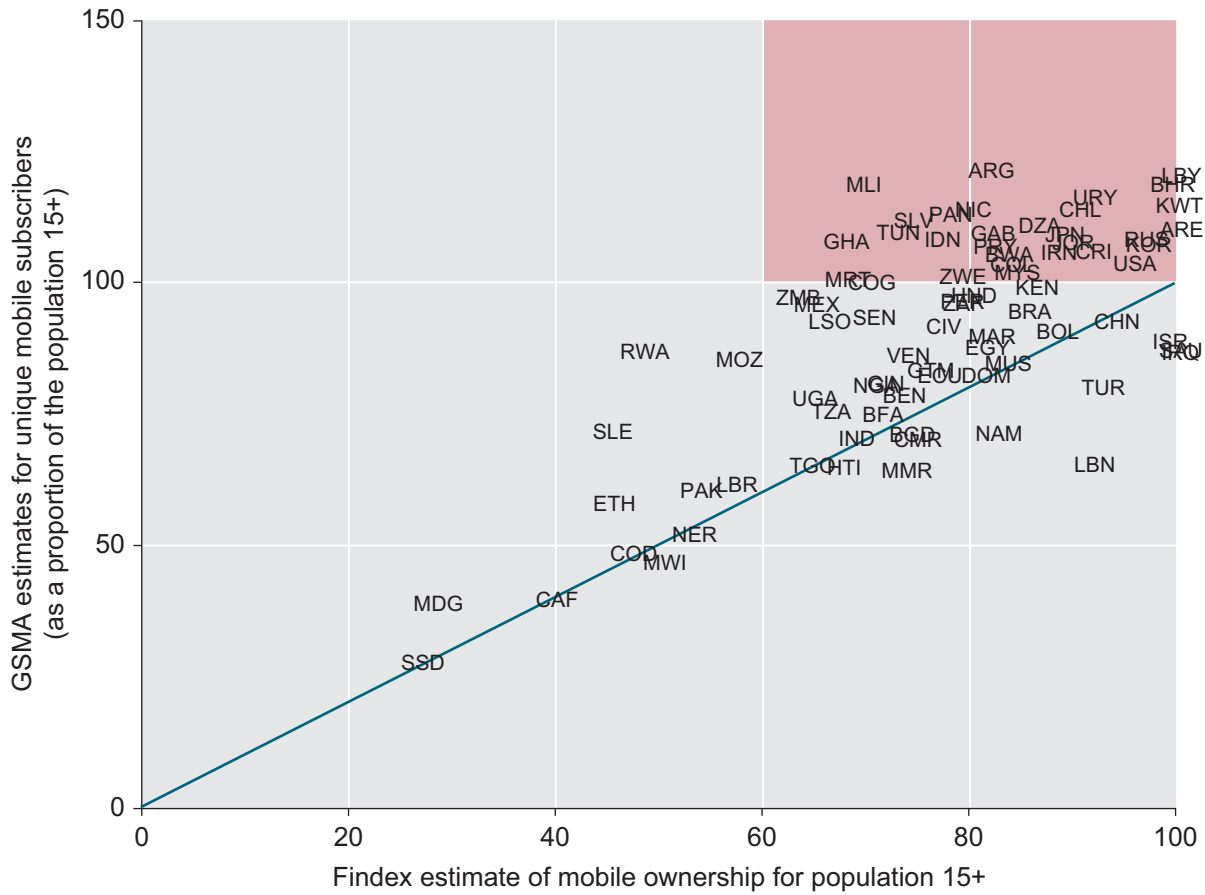
Financial accounts

Financial accounts can also offer variable bundles of services, as well as different levels of convenience to their holders. This can depend on the type of account, as well as on the features of the system—for example, access to points of service, and whether it supports interoperable payments across all payment providers. The value of having an account also depends on how widely payments will be accepted by merchants. Some accounts may be dormant, so that data on the number of people having an account may overestimate true financial inclusion measured in terms of use. On the other hand, surveys indicate that some people consider that they have access through sharing the account of a close family member, so that data on account ownership could understate access.

Limitations of a snapshot

On-the-ground realities are changing extremely quickly, and 2017 is already a long time ago in the digital world. The JAM picture can also change rapidly in any one country. Malawi rolled out its national ID in late 2017 and 2018, after the Findex survey. India, too, has seen a remarkable increase in the coverage of ID (Aadhaar) and mobile, as well as in the proportion of its

Figure A1.1. Comparing GSMA and Findex estimates for mobile phone coverage



Sources: Global Findex 2017 microdata and World Development Indicators; GSMA data scraped from latest available reports, including estimates from graphs

population with financial accounts, from 35 percent in Findex 2011 to 53 percent in 2014 and to 80 percent in 2017, largely closing the gender gap in the process. For the last Findex round in India, during April to June 2017, it was estimated that 19 million people had mobile money accounts. However, an Indian mobile money platform launched in May 2017 reported it had 350

million users by May 2019.⁸⁸ While change makes a snapshot of limited use in projecting future levels of inclusion, it can draw attention to important structural barriers, such as gender- or poverty-related constraints, that will need to be addressed to achieve full inclusion.

88. <https://www.wsj.com/articles/citigroup-ties-up-with-indias-digital-paytm-for-card-launch-11557863764>.

Annex 2.

Analysis of JAM Data from Findex 2017⁸⁹

For 99 countries, Findex provides a rich set of micro-data on access to IDs, mobile phones, and financial accounts, including bank and mobile money accounts. For 2017, this sample covers over 109,000 observations and represents 4.09 billion people.⁹⁰ Not all the information is available for 2011 and 2014, the years of previous surveys, so a detailed picture can cover only the most recent survey. We first apply cross-section logistic regressions to examine factors associated with financial inclusion, the lagging component of the JAM trinity (Figure 2.1), considering a range of personal attributes, as well as possession of an ID and a mobile phone, as factors that can shape financial inclusion. Robustness checks are performed for different country subgroups, with and without country dummies, and with alternative country weighting systems. The coefficients are significant (including when errors are clustered), of plausible sign, and relatively stable, suggesting substantial commonalities across countries. Both personal attributes and inclusion in the first two legs of JAM are associated with financial inclusion. The probability that an individual will have a financial account is very high when all factors are favorable and very low when they are unfavorable. Using this approach, we then consider the relationship between the receipt of government transfers—and how they are delivered—and financial inclusion.

89. We are grateful to Mead Over and David Evans for advice on this analysis.

90. While Findex data are also available for 2011 and 2014, creating a time series would require aggregating the data at the national level, losing richness in the process. Likewise, mobile money questions were only introduced in 2014, and then not universally. Therefore, we only use the 2017 microdata, although there is certainly scope for others to replicate our models using aggregate data in a time series.

Logistic regressions for financial inclusion

Our outcome variable is a dummy for whether a respondent has a financial account, including either a bank account with a formal financial institution or a mobile money account. We would expect that higher incomes and education levels and being in the workforce should increase the probability of financial inclusion, while women are less likely to be financially included. In addition to such personal attributes, having an ID and owning a mobile phone are likely to increase the probability of having an account; both are enablers, and ID is a general KYC requirement for both financial accounts and SIM registration.⁹¹ In line with the proposition that G2P payments can encourage financial inclusion, their receipt could also be a positive factor.

Estimation approach

We use four basic logistic regression models, which are, in turn, estimated over three country samples.

Model 1a estimates whether individual i in country r has a financial account A , regressed on dummy N for having a national ID and dummy P for owning a mobile phone. The “b” variant of each subsequent model adds vector C of country dummy variables.

$$1a) \quad A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + \varepsilon_{i,r}$$

$$1b) \quad A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + C_r + \varepsilon_{i,r}$$

91. We would also expect urban respondents to be more likely to be financially included, but the difficulty of consistently assigning respondents to rural and urban status means that this is not included in the microdata.

Model 2 adds dummies F for female, Y for income quintile, and W for being in the workforce.

$$2a) A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + \beta_3 F_{i,r} + \beta_4 Y_{i,r} + \beta_5 W_{i,r} + \varepsilon_{i,r}$$

$$2b) A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + \beta_3 F_{i,r} + \beta_4 Y_{i,r} + \beta_5 W_{i,r} + C_r + \varepsilon_{i,r}$$

Model 3 adds three more dummies E for education level (completed primary or less, secondary, and completed tertiary or more).

$$3a) A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + \beta_3 F_{i,r} + \beta_4 Y_{i,r} + \beta_5 W_{i,r} + \beta_6 E_{i,r} + \varepsilon_{i,r}$$

$$3b) A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + \beta_3 F_{i,r} + \beta_4 Y_{i,r} + \beta_5 W_{i,r} + \beta_6 E_{i,r} + C_r + \varepsilon_{i,r}$$

Model 4 includes dummy G for receiving a government transfer in the past 12 months.

$$4a) A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + \beta_3 F_{i,r} + \beta_4 Y_{i,r} + \beta_5 W_{i,r} + \beta_6 E_{i,r} + \beta_7 G_{i,r} + \varepsilon_{i,r}$$

$$4b) A_{i,r} = \beta_0 + \beta_1 N_{i,r} + \beta_2 P_{i,r} + \beta_3 F_{i,r} + \beta_4 Y_{i,r} + \beta_5 W_{i,r} + \beta_6 E_{i,r} + \beta_7 G_{i,r} + C_r + \varepsilon_{i,r}$$

Samples

Both “a” and “b” variants of each model are applied to Sample A, which includes all 99 countries. Thereafter, the “b” variant, which includes country dummies, is applied to Sample B, the 33 countries in the lowest tercile of the total JAM index, and to Sample C, the 24 countries classified by the World Bank as Low-Income Countries (LICs). Observations are weighted by country according to populations; we test the impact of weights in the Part II robustness check using uniform country weights.

Results

Table A2.1 presents the log odds ratios for the regressions. Coefficients are generally stable, and all have the expected sign. Although the pseudo R -squareds are not especially high, the attributes, taken together, explain a great deal of the variation in the probability of having a financial account. As expected, income quintile, education level, being in the workforce, and

receiving a government transfer in the last 12 months are positive factors for financial inclusion, while being female is negative. The steady progression across income quintiles suggests a broadly linear relationship with income; the relationship between financial inclusion and education level is slightly more progressive than linear. Even after allowing for these attributes, having an ID and owning a mobile are both positively associated with financial inclusion, a result consistent with the view that there are synergies between JAM components and that the factors that cause people to have one spill over onto the others.

The association with being female is modest, though slightly higher when the sample is restricted to the bottom tercile and LICs. This suggests that much of the gender variation is being captured by other associated attributes, such as lower levels of education or a higher probability of being out of the workforce, a conclusion consistent with the results of the Blinder-Oaxaca decomposition described in Chapter 2.⁹²

As a preliminary robustness check, we cluster standard errors at the national level; while this reduces z -scores for the coefficients, they remain significant. The results are robust to the inclusion of country dummies and are also stable when the country sample is restricted to the lowest tercile of JAM countries or to LICs.⁹³

Robustness check for country weighting

In modeling relationships of this type there is always the dilemma of whether to weight by population (thus approximating the global picture) or to treat each country as a separate and equally important case. Table A2.2 presents the Model 4 regressions both

92. Indeed, eliminating those variables causes the gender coefficient to increase appreciably.

93. There is some ambiguity as to whether or not clustered standard errors are called for in this cross-sectional, observational context. Abadie, Athey, Imbens, and Wooldridge (2017) tie clustering to the sampling process and assignment of the treatment to groups to clustered standard errors, suggesting that they apply in this case. McKenzie (2017) notes that there is also confusion surrounding the use of fixed effects that parallel assignment clusters, as we do with country dummies.

Table A2.1. Financial inclusion: Individual data

Model ID	(1) 1a	(2) 1b	(3) 1b	(4) 1b	(5) 2a	(6) 2b	(7) 2b	(8) 2b
Sample	A: All countries in JAM	B: All countries in JAM	C: Lowest JAM tercile	D: LICs in JAM	A: All countries in JAM	B: All countries in JAM	C: Lowest JAM tercile	D: LICs in JAM
Has a national ID	1.700*** (0.000)	1.253*** (0.000)	0.986*** (0.000)	1.098*** (0.000)	1.665*** (0.000)	1.147*** (0.000)	0.850*** (0.000)	0.956*** (0.000)
Owens a mobile phone	1.102*** (0.000)	1.149*** (0.000)	1.174*** (0.000)	1.250*** (0.000)	0.923*** (0.000)	0.915*** (0.000)	0.939*** (0.000)	1.048*** (0.000)
Respondent is female					-0.144*** (0.000)	-0.182*** (0.000)	-0.344*** (0.000)	-0.279*** (0.000)
Poorest 20%					Base case	–	–	–
Second 20%					0.185*** (0.001)	0.236*** (0.000)	0.146 (0.126)	0.330** (0.002)
Middle 20%					0.421*** (0.000)	0.527*** (0.000)	0.351*** (0.000)	0.445*** (0.000)
Fourth 20%					0.610*** (0.000)	0.769*** (0.000)	0.624*** (0.000)	0.651*** (0.000)
Richest 20%					0.882*** (0.000)	1.127*** (0.000)	1.086*** (0.000)	1.171*** (0.000)
Respondent is in the workforce					0.451*** (0.000)	0.542*** (0.000)	0.548*** (0.000)	0.560*** (0.000)
Edu: completed primary or less								
Edu: secondary								
Edu: completed tertiary or more								
Received government transfers in past 12 months								
Country dummies?	N	Y	Y	Y	N	Y	Y	Y
Constant	-1.779*** (0.000)	-3.578*** (0.000)	-3.363*** (0.000)	-3.524*** (0.000)	-2.206*** (0.000)	-4.207*** (0.000)	-3.822*** (0.000)	-4.111*** (0.000)
Observations	109,106	109,106	33,928	17,349	108,111	108,111	33,928	17,349
Pseudo R-squared	0.0736	0.180	0.109	0.167	0.0987	0.213	0.147	0.199

p-values in parentheses: * *p*<0.05, ** *p*<0.01, *** *p*<0.001. Outcome variable: Has a transacting account. All regressions use population weights.

Table A2.1. Financial inclusion: Individual data (continued)

Model ID	(9) 3a	(10) 3b	(11) 3b	(12) 3b	(13) 4a	(14) 4b	(15) 4b	(16) 4b
Sample	A: All countries in JAM	B: All countries in JAM	C: Lowest JAM tercile	D: LICs in JAM	A: All countries in JAM	B: All countries in JAM	C: Lowest JAM tercile	D: LICs in JAM
Has a national ID	1.624*** (0.000)	1.112*** (0.000)	0.847*** (0.000)	0.929*** (0.000)	1.604*** (0.000)	1.088*** (0.000)	0.829*** (0.000)	0.922*** (0.000)
Owens a mobile phone	0.828*** (0.000)	0.786*** (0.000)	0.809*** (0.000)	0.926*** (0.000)	0.808*** (0.000)	0.787*** (0.000)	0.832*** (0.000)	0.939*** (0.000)
Respondent is female	-0.131*** (0.000)	-0.168*** (0.000)	-0.329*** (0.000)	-0.221*** (0.000)	-0.137*** (0.000)	-0.172*** (0.000)	-0.342*** (0.000)	-0.219*** (0.000)
Poorest 20%	Base case	–	–	–	Base case	–	–	–
Second 20%	0.165** (0.004)	0.211*** (0.001)	0.122 (0.203)	0.307** (0.005)	0.194*** (0.001)	0.243*** (0.000)	0.142 (0.141)	0.336** (0.003)
Middle 20%	0.356*** (0.000)	0.439*** (0.000)	0.311*** (0.001)	0.413*** (0.000)	0.407*** (0.000)	0.491*** (0.000)	0.325*** (0.001)	0.426*** (0.000)
Fourth 20%	0.492*** (0.000)	0.612*** (0.000)	0.517*** (0.000)	0.567*** (0.000)	0.564*** (0.000)	0.689*** (0.000)	0.547*** (0.000)	0.602*** (0.000)
Richest 20%	0.681*** (0.000)	0.867*** (0.000)	0.898*** (0.000)	0.981*** (0.000)	0.768*** (0.000)	0.963*** (0.000)	0.935*** (0.000)	1.010*** (0.000)
Respondent is in the workforce	0.440*** (0.000)	0.507*** (0.000)	0.551*** (0.000)	0.582*** (0.000)	0.438*** (0.000)	0.513*** (0.000)	0.536*** (0.000)	0.563*** (0.000)
Edu: completed primary or less	Base case	–	–	–	Base case	–	–	–
Edu: secondary	0.405*** (0.000)	0.618*** (0.000)	0.513*** (0.000)	0.782*** (0.000)	0.424*** (0.000)	0.661*** (0.000)	0.544*** (0.000)	0.783*** (0.000)
Edu: completed tertiary or more	1.191*** (0.000)	1.655*** (0.000)	1.385*** (0.000)	1.840*** (0.000)	1.199*** (0.000)	1.718*** (0.000)	1.430*** (0.000)	1.867*** (0.000)
Received government transfers in past 12 months					1.187*** (0.000)	1.317*** (0.000)	1.278*** (0.000)	0.805*** (0.000)
Country dummies?	N	Y	Y	Y	N	Y	Y	Y
Constant	-2.241*** (0.000)	-4.262*** (0.000)	-3.914*** (0.000)	-4.366*** (0.000)	-2.372*** (0.000)	-4.360*** (0.000)	-3.973*** (0.000)	-4.401*** (0.000)
Observations	107,583	107,583	33,731	17,247	106,571	106,571	33,346	17,088
Pseudo R-squared	0.110	0.230	0.164	0.215	0.127	0.249	0.179	0.221

p-values in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Outcome variable: Has a transacting account. All regressions use population weights.

Table A2.2. Robustness checks: Population-weighted and uniform weighted country samples

Model ID	(17) 4a	(18) 4a	(19) 4b	(20) 4b	(21) 4c	(22) 4c	(23) 4d	(24) 4d
Sample	A: All countries in JAM	A: All countries in JAM	B: All countries in JAM	B: All countries in JAM	C: Lowest JAM tercile	C: Lowest JAM tercile	D: LICs in JAM	D: LICs in JAM
Uses population weights?	Y	N	Y	N	Y	N	Y	N
Has a national ID	1.604*** (0.000)	1.102*** (0.000)	1.088*** (0.000)	0.919*** (0.000)	0.829*** (0.000)	0.823*** (0.000)	0.922*** (0.000)	0.898*** (0.000)
Owns a mobile phone	0.808*** (0.000)	0.917*** (0.000)	0.787*** (0.000)	0.794*** (0.000)	0.832*** (0.000)	0.936*** (0.000)	0.939*** (0.000)	1.080*** (0.000)
Respondent is female	-0.137*** (0.000)	-0.130*** (0.000)	-0.172*** (0.000)	-0.162*** (0.000)	-0.342*** (0.000)	-0.212*** (0.000)	-0.219*** (0.000)	-0.220*** (0.000)
Poorest 20%	Base case	–	Base case	–	Base case	–	Base case	–
Second 20%	0.194*** (0.001)	0.222*** (0.000)	0.243*** (0.000)	0.270*** (0.000)	0.142 (0.141)	0.253*** (0.000)	0.336** (0.003)	0.325*** (0.000)
Middle 20%	0.407*** (0.000)	0.346*** (0.000)	0.491*** (0.000)	0.454*** (0.000)	0.325*** (0.001)	0.368*** (0.000)	0.426*** (0.000)	0.356*** (0.000)
Fourth 20%	0.564*** (0.000)	0.528*** (0.000)	0.689*** (0.000)	0.685*** (0.000)	0.547*** (0.000)	0.581*** (0.000)	0.602*** (0.000)	0.547*** (0.000)
Richest 20%	0.768*** (0.000)	0.799*** (0.000)	0.963*** (0.000)	1.062*** (0.000)	0.935*** (0.000)	0.996*** (0.000)	1.010*** (0.000)	0.936*** (0.000)
Respondent is in the workforce	0.438*** (0.000)	0.487*** (0.000)	0.513*** (0.000)	0.648*** (0.000)	0.536*** (0.000)	0.573*** (0.000)	0.563*** (0.000)	0.556*** (0.000)
Edu: completed primary or less	Base case	–	Base case	–	Base case	–	Base case	–
Edu: secondary	0.424*** (0.000)	0.720*** (0.000)	0.661*** (0.000)	0.602*** (0.000)	0.544*** (0.000)	0.672*** (0.000)	0.783*** (0.000)	0.817*** (0.000)
Edu: completed tertiary or more	1.199*** (0.000)	1.770*** (0.000)	1.718*** (0.000)	1.614*** (0.000)	1.430*** (0.000)	1.610*** (0.000)	1.867*** (0.000)	1.727*** (0.000)
Received government transfers in past 12 months	1.187*** (0.000)	1.341*** (0.000)	1.317*** (0.000)	1.129*** (0.000)	1.278*** (0.000)	1.174*** (0.000)	0.805*** (0.000)	1.118*** (0.000)
Country dummies?	N	N	Y	Y	Y	Y	Y	Y
Constant	-2.372*** (0.000)	-2.775*** (0.000)	-4.360*** (0.000)	-4.384*** (0.000)	-3.973*** (0.000)	-4.310*** (0.000)	-4.401*** (0.000)	-4.542*** (0.000)
Observations	106,571	106,571	106,571	106,571	33,346	33,346	17,088	17,088
Pseudo R-squared	0.127	0.175	0.249	0.273	0.179	0.200	0.221	0.249

p-values in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

population-weighted (as in columns 13 to 16 in Table A2.1) and with uniform country weights.⁹⁴ Once again, the patterns remain stable across the different specifications, samples, and models, suggesting that these relationships are quite robust and generalizable at a global level.

A closer look at government transfers and financial inclusion

The Findex survey asks, among other things, if respondents received any kind of nonwage support from the government. It also inquires into the channels for these transfer payments, although the sample narrows substantially as the detail of the question is increased.

Table A2.3 presents coefficients on the transfer variables using Model 4b and its vector of controls (including country dummies and using population weights), while iterating with different transfer variables and over several subsets of the overall sample. Column 25⁹⁵ compares the association with receiving a nonwage government social transfer with receiving a government pension (retirement) transfer in Column 26. Both have similar coefficients of reasonable size. Twenty-eight percent of the sample who report receiving a social transfer also say they receive a government pension, so that Column 27 excludes this overlapping group to ensure that they are not driving the association with financial inclusion. The positive and significant coefficient indicates there is still an association between social transfers and inclusion.

After this, the sample is further restricted with each set of questions. Column 28 tests whether receiving a transfer via a mobile phone (social or pension) increases inclusion among the subset of respondents

who receive either kind of transfer; unsurprisingly, the coefficient is very high.⁹⁶ Column 29 further restricts the sample to those who did not receive a transfer to either a mobile phone or a bank account. For this subset, there is no positive association with financial inclusion; indeed, the coefficient is reassuringly negative. Clearly, the channel for the transfer matters.

Finally, we return to the larger universe of observations to ask whether the same results hold for particular subgroups of the sample populations—for example, for the poor and for women. Column 30 restricts the model to the bottom two income quintiles of respondents and finds a similar positive association between government social transfers and inclusion. Column 31 additionally restricts this sample to women and yields the same outcome, with an even stronger coefficient. We also find the expected associations between government pension transfers among those same groups in final columns of the table. The relationships hold across the different samples and channels, providing further support for the proposition that transfers can be a useful tool for supporting financial inclusion.

Probabilities under different scenarios

To appreciate the implications of the logistic regressions, it is helpful to shift from estimates of log odds ratios to probabilities. For Models 3b and 4b in Table A2.1, Table A2.4 transforms the log odds ratios into probabilities taken at particular points in the distribution. Each model is estimated for the full 99-country sample, for the lowest JAM tercile country sample, and for the LICs.

The first three rows indicate the probability of financial inclusion for an individual with particular attribute sets. For the “High” profile, they have an ID and a

94. In the Findex survey, sample size can differ across countries. For example, Morocco has over 5,000 observations, India and China have around 3,000 each, most countries have around 1,000, and a few, like Haiti, have 500. Moving to uniform country therefore requires weighting individual observations by the inverse of their country sample size. They can then be reweighted according to country populations to derive a population-weighted sample.

95. Column 25 replicates column 14 of Table A2.1.

96. If anything, the most interesting part of this observation is that the coefficient is *not* entirely colinear with inclusion—theoretically, we expect that someone receiving a transfer via a mobile phone must have an account to go with it, but nonetheless four people in the entire subsample fit into this category.

Table A2.3. Financial inclusion: Relationship to type and modality of government transfer

	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)
Sample	All countries in JAM	All countries in JAM	All countries in JAM, excluding those who receive <i>both</i> a govt transfer and a govt pension	Subset of those who received <i>either</i> a govt transfer or a govt pension	Subset of those who received either a govt transfer or a govt pension, <i>but did not</i> receive payment directly to a formal or mobile phone account	Bottom two income quintiles in JAM countries	Women in bottom two income quintiles in JAM countries	Bottom two income quintiles in JAM countries	Women in bottom two income quintiles in JAM countries
Rec'd govt transfers in past 12 months	1.317*** (0.000)		1.259*** (0.000)			1.508*** (0.000)	1.563*** (0.000)		
Rec'd govt transfers in past 12 months: pension		1.375*** (0.000)						1.349*** (0.000)	1.232*** (0.000)
If rec'd govt transfers: through a mobile phone				4.131*** (0.000)					
If rec'd govt transfers: in cash					-0.966*** (0.000)				
If rec'd govt transfers: to a card									
Observations	106,571	106,627	102,875	21,203	9,580	37,677	22,752	37,685	22,736
Pseudo R-squared	0.249	0.243	0.246	0.237	0.238	0.222	0.228	0.205	0.205

p-values in parentheses: * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001. All regressions use Model 4b and its vector of controls (whose coefficients are not displayed here) and country dummies, and incorporate population weights.

mobile phone, are in the workforce, are male, and are in the uppermost income decile and education segment. For the “Low” profile, all of these attributes are unfavorable. The “Mean” profile takes the average of the high and low profiles—in effect, an individual with a 50 percent probability of being either High or Low on every attribute. This is not necessarily the profile of a representative individual in any given country but is

intended to illustrate probabilities around the middle point of the estimated logistic probability curves. As shown in the table, the probability of financial inclusion is very high when all attributes are positive—around 84 percent for the entire country sample and 70 and 82 percent respectively for the lowest JAM tercile and LIC subsamples. Having all attributes low predicts a very low probability of financial inclusion,

Table A2.4. Computed probability that an individual is financially included under different sets of conditions

Model ID	(34) 3b	(35) 3b	(36) 3b	(37) 4b	(38) 4b	(39) 4b	
Sample	B: All countries in JAM	C: Lowest JAM tercile	D: LICs in JAM	B: All countries in JAM	C: Lowest JAM tercile	D: LICs in JAM	
Probability of being financially included with . . .							
1	Favorable attributes (High)	0.84	0.70	0.82	0.82	0.69	0.81
2	Unfavorable attributes (Low)	0.07	0.04	0.05	0.06	0.04	0.05
3	Mean attributes (50 percent High, 50 percent Low)	0.39	0.25	0.33	0.35	0.23	0.32
4	ID and mobile phone with all other attributes Low	0.34	0.20	0.25	0.29	0.18	0.24
5	No ID or mobile phone and all other attributes High	0.44	0.31	0.42	0.41	0.29	0.41
6	Government transfers with Low attributes				0.19	0.13	0.10
7	Government transfers with Mean attributes				0.66	0.52	0.51

Note: All probabilities in the “b” models are calculated using the mean country intercept for that sample.

between 4 and 7 percent across the different cases. For the Mean profile, the probability of being financially included is around 39 percent for the full sample and 25 to 33 percent for the restricted ones. These results confirm that individual-level attributes play an important role in shaping patterns of inclusion and exclusion, in addition to country-level factors.

The next two rows show probabilities with differential access to the other two JAM components: ID and a mobile phone. Row 4 shows the case of an individual with all unfavorable attributes but with access to ID and mobile; row 5 presents the case for an individual with otherwise positive attributes but without access to these components. The effects are striking; for example, when all other factors are positive, not having an ID or a mobile reduces the probability of financial inclusion from 84 percent to around 44 percent; conversely, when all else is negative, having an ID and a mobile is associated with an increase in the probability of financial inclusion from around 7 percent to around 34 percent. This does not, of course, demonstrate that further rolling out ID and mobile will increase financial inclusion to a similarly large degree, but it does indicate the extent to which the three elements of the JAM trinity tend to be associated.

Finally, we consider the role of government transfers in promoting financial inclusion. The last two rows of Table A2.4 show how receiving a government transfer boosts the probability of financial inclusion. This will differ at different points along the logistic curves, so that it is necessary to define the other attributes of the individual. Since we have less interest in the case of people who are already very likely to be financially included, we consider the cases of individuals with Low and with Mean profiles. For the former, receiving a transfer is associated with a 19 percent probability of financial inclusion for the full country sample, compared to a 6 percent probability without the transfers—the government transfer increases the probability by about 13 percentage points. For the two more limited country samples, the probabilities are boosted by 9 and 5 percentage points, respectively, probably because more transfers are paid in cash in these countries, but the effect is still present. For an individual with a Mean profile using the full country sample, receiving government transfers increases the probability of inclusion from a baseline of 35 percent to 66 percent, a gain of 31 percentage points. For the other two subsamples, government transfers increase the probabilities by 29 and 19 percentage points, respectively.

Table A2.5. Country samples

Countries in $n=99$ sample with ID coverage			Additional countries in $n=144$ sample without ID coverage	
Afghanistan	Indonesia	South Sudan	Australia	United Arab Emirates
Albania	Israel	Sri Lanka	Austria	United Kingdom
Algeria	Jordan	Tajikistan	Bahrain	United States
Argentina	Kazakhstan	Thailand	Belgium	West Bank and Gaza
Armenia	Kenya	Togo	Canada	
Azerbaijan	Kosovo	Trinidad and Tobago	Central African Republic	
Bangladesh	Kyrgyz Republic	Tunisia	Congo, Dem. Rep.	
Belarus	Lao PDR	Turkey	Cyprus	
Benin	Latvia	Turkmenistan	Denmark	
Bolivia	Lebanon	Uganda	Finland	
Bosnia and Herzegovina	Lesotho	Ukraine	France	
Botswana	Lithuania	Uruguay	Germany	
Brazil	Macedonia, FYR	Uzbekistan	Ghana	
Bulgaria	Madagascar	Venezuela, RB	Hong Kong SAR, China	
Burkina Faso	Malawi	Vietnam	Iran, Islamic Rep.	
Cambodia	Malaysia	Zambia	Iraq	
Cameroon	Mali	Zimbabwe	Ireland	
Chad	Mauritania		Italy	
Chile	Mexico		Japan	
China	Moldova		Korea, Rep.	
Colombia	Mongolia		Kuwait	
Congo, Rep.	Montenegro		Liberia	
Costa Rica	Morocco		Libya	
Côte d'Ivoire	Mozambique		Luxembourg	
Croatia	Myanmar		Malta	
Czech Republic	Namibia		Mauritius	
Dominican Republic	Nicaragua		Nepal	
Ecuador	Niger		Netherlands	
Egypt, Arab Rep.	Pakistan		New Zealand	
El Salvador	Panama		Nigeria	
Estonia	Paraguay		Norway	
Ethiopia	Peru		Philippines	
Gabon	Poland		Portugal	
Georgia	Romania		Saudi Arabia	
Greece	Russian Federation		Sierra Leone	
Guatemala	Rwanda		Slovenia	
Guinea	Senegal		Spain	
Haiti	Serbia		Sweden	
Honduras	Singapore		Switzerland	
Hungary	Slovak Republic		Taiwan, China	
India	South Africa		Tanzania	

These large gains confirm that government transfers have been a powerful driver of financial inclusion, provided that they have not been paid in cash. There is no indication that the additional income from transfers has induced recipients to open accounts. The results do not, of course, argue that all transfers

should be paid through financial intermediaries. While there may be benefits to the recipients as well as important externalities for financial system development, each case will be different and requires evaluating alternative delivery options on their merits.

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