

Integration of Government Digitalization and Public Financial Management—Initial Evidence

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Payments are central to how governments transfer financial resources for various programs. The ways such payments are conducted have largely been peripheral to developments in modern public financial management (PFM) systems. Nonetheless, some governments are striving to digitize payments as part of financial inclusion or efficiency agendas, as digitalization is understood to contribute indirectly to growth and poverty reduction.

This chapter argues that it is time to mainstream digitalization of payments as part of functional PFM to improve those systems and broaden reform goals.

Every year governments, the private sector, and development organizations make billions of dollars in cash payments to people in low-income and emerging market economies. It is estimated that in 2014 over a billion people were receiving government transfers and other payments and that the average developing country operated some 20 social safety net programs at an annual cost of 1.6 percent of GDP (World Bank 2015). Considering transfers, subsidies, payroll, and pension payments together, public payments to individuals typically represent 12 percent of GDP in developing countries and often far more.

Experience indicates that shifting from cash to electronic payments is generally safer, especially for women, and more efficient in reaching the financially excluded. The shift can provide a pathway to a broader range of financial services, and electronic payments can reduce costs and increase transparency for governments, development organizations, and corporations. What is more, this shift, and maximizing the benefits, can be done more quickly if the effort is part of a broader management of public resources aimed at meeting government goals and objectives.

Despite rapid progress in the technology for digitalizing payments and leadership by governments such as China and Mexico, results in other emerging economies have been mixed. For governments have been slow in adopting digitalization. This is in part because governments and companies have lacked a coherent and tailored framework showing them how to realize these gains, as the Better Than Cash Alliance noted in a recent report reviewing the experience of digitalization in 25 countries (Janis and Shah

2016).¹ Without a broad and cohesive analytical framework, governments and companies have been unable to leverage the experiences of other markets and players to implement digital payments effectively. The report identifies 10 steps, or “accelerators,” to implement digital payments effectively across an economy.² Of relevance for this chapter is the digitalization of government payments and receipts.³

Leaders committed to digitalization and inclusion at the Group of Twenty (G20) 2016 Hangzhou Summit and endorsed eight High Level Principles for Digital Financial Inclusion. These included the recommendation to provide incentives to digitize all payments to and from governments (where feasible) (GPMI 2016b).⁴ So far, however, digitalization has been pursued and largely implemented outside the complex network of systems and processes that constitute the emerging architecture of PFM (Cangiano and others 2013).

This chapter argues that digitalization of payments should become an integral component of a modern PFM system by presenting four case studies.

The chapter first defines digitalizing payments and its main objectives, then shows that digitalization and PFM are two sides of the same coin. It provides a cautionary tale from the challenges of developing and implementing large financial management information systems and presents case studies for Estonia, Ghana, India, and Mexico.⁵ These studies show that successful joint implementation of digitalization of payments and PFM holds significant benefits. The chapter concludes with a look at the important lessons from the case studies and challenges and directions for future research.

WHAT DOES DIGITALIZATION OF PAYMENTS MEAN?

Governments, businesses, and international organizations distribute and receive billions in cash payments worldwide in payrolls, benefits, pensions, social programs, humanitarian aid, fines, taxes, and much more. With the speed of mobile phone distribution and usage, and the rapid expansion of innovative

¹The Better Than Cash Alliance was launched in 2012 in response to public and private sector demand for more strategic advocacy, research, and guidance on digitalizing cash payments to accelerate the shift from cash to electronic payments. It is funded by the Bill & Melinda Gates Foundation, Citi, MasterCard, Omidyar Network, United States Agency for International Development, and Visa. The UN Capital Development Fund is the secretariat.

²Transaction volumes in the 25 countries grew an average of 32 percent annually over the past decade.

³The literature classifies these financial flows as government to person (G2P), government to business (G2B), and vice versa (P2G and B2G).

⁴The Better Than Cash Alliance is an Implementing Partner of the G20 Global Partnership for Financial Inclusion, working closely with the Markets and Payments Systems Subgroup.

⁵Ghana, India, and Mexico are members of the Better than Cash Alliance.

Box 12.1. Electronic Payment Instruments: Definition and Classification

The Bank for International Settlements' Committee on Payments and Market Infrastructures (CPMI) promotes the safety and efficiency of payment, clearing, settlement, and related arrangements for financial stability and the wider economy. CPMI (2015, 12) recognizes that "payment services providers include banks and other deposit-taking institutions, as well as specialized entities such as money transfer operators and e-money issuers." It classifies electronic payment instruments in three broad categories:

- **Electronic funds transfer-based instruments:** These are direct (that is, account-to-account) credit transfers and direct debit transfers. As account-to-account payments, these instruments can be processed fully electronically.
- **Payment card-based instruments:** These include credit, charge, and debit card payments, and typically still involve a plastic card. With few exceptions, payments with cards are initiated, authorized, authenticated, cleared, and settled fully electronically.
- **Electronic money (e-money)-based instruments:** In general terms, these instruments involve the payer maintaining a prefunded transaction account with a payment service provider (PSP), often a nonbank. Specific products include online money when the payment instruction is initiated by internet, mobile money when by mobile phone, and prepaid cards.

Source: CPMI 2015, page 13.

payment options with internet access, the possibility of digitalizing each of these is expanding rapidly.⁶

This chapter sees digitalization of payments as the shifting of cash payments to some form of electronic or digital payment (BTCA 2012). Box 12.1 presents the definition and classification of electronic or digital payments of the Committee on Payments and Markets Infrastructures.

Table 12.1 provides a framework for understanding the multiple types of payers and payees. It includes payments from governments to businesses and individuals as well as between government agencies and from businesses and individuals to governments.

⁶In the first quarter of 2000, there were 467 million unique mobile phone subscribers (7.7 percent of the population). By the same quarter of 2017, there were 4.97 billion unique subscribers (66.3 percent), for 15 percent annualized growth (GSMA 2017). In 1995, 1.6 mobile subscriptions existed for every 100 people in the world. By 2015, that number had reached 98.3 (23 percent annual growth), and today there are more mobile subscriptions than there are people in the world (International Telecommunication Union through World Bank, World Development Indicators). Compared to growth in ownership of mobile phones, the International Telecommunication Union estimates the number of internet users per 100 people increased from 0.8 in 1995 to 43.8 in 2015.

Table 12.1. Payment Grid: Types of Payments by Payer and Payee

		Payee		
		Government	Business	Person (individual)
Payer	Government	G2G Budgetary allocations, funding	G2B Grants, payments for goods and services	G2P Welfare programs, salaries, pensions
	Business	B2G Taxes, fees for licenses	B2B Payments for goods and services	B2P Salaries and benefits
	Person (individual)	P2G Taxes, utilities	P2B Purchases	P2P Remittances, gifts
	Development community	D2G Taxes	D2B Payments for goods and services	D2P Cash transfers

Source: Better Than Cash Alliance (2012).

Note: B = business (nonfinancial private sector); D = development community partner; G = government; P = person. For further explanation of the payment grid, see Better Than Cash Alliance (2012).

By digitalizing payments, a government aims mainly to foster a modern and inclusive economy.⁷ The benefits of digitalizing payments for governments—enhanced transparency and accountability⁸ and cost savings—have been well identified by the G20 (Klapper 2014). It is also clear that the transparency of payments under digitalization enhances accountability between governments and citizens, more clearly linking the services governments provide and taxes levied (Pillai 2016). In addition, the opportunity for driving financial inclusion through digitalization of payments, such as in Kenya,⁹ benefits households (Suri and Jack 2017) and entire economies.¹⁰

DIGITALIZATION OF PAYMENTS AND PUBLIC FINANCIAL MANAGEMENT: COMPLEMENTARITY AND CAUTION

Complementarity—Two Sides of the Same Coin

Digitalization of payments should be integrated into complex government PFM systems to leverage the full potential gain in effectiveness and functionality

⁷Digitalization of payments may be a key element of a government's digital economy initiatives. Open data portals, which provide open access to government data online (of which Mexico is a good example, OECD 2016), are another digital government initiative. Importantly, while neither initiative is synonymous with a digital economy, they are both helping build a digital economy.

⁸On transparency, Rogoff (2016) is an outspoken advocate for digitalization to overcome shadow economies worth billions of dollars.

⁹Johnson (2016) provides valuable ethnographic insights into Kenyans' use of mobile money.

¹⁰According to IMF Managing Director Christine Lagarde: "greater financial inclusion has tangible economic benefits, such as higher GDP growth and lower income inequality. By providing access to accounts, credit, infrastructure, women and low-income users, financial inclusion helps make growth more inclusive" (Opening Remarks—IMF CGD event, "Financial Inclusion: Macroeconomic and Regulatory Challenges." April 11, 2016).

these systems offer.^{11,12} When integrated with PFM, digitalization of payments can benefit governments both directly and indirectly. Directly, effective digitalization expedites basic PFM functions—payroll management, reaching correct beneficiaries, accounting and reporting through faster reconciliation with government bank accounts—and strengthens accountability by providing a more reliable audit trail.

Digitalization can also be important in enhancing the quality of information from fiscal events.¹³ Indirect benefits include accelerating the production of in-year budget execution reports, providing more timely information on the government's cash position (enhancing cash management functions), and greatly facilitating the reconciliation of above-the-line information for a bank's transactions (see Chapter 6 for further discussion of these issues).

By drastically reducing the use of cash, digitalization can also help shrink the size of shadow economies and, hence, opportunities for tax evasion (Rogoff 2016). Similarly, it can help shift remittances away from informal mechanisms and money transfer operators, closing a notorious leak in balance of payment transactions—another avenue for tax evasion. P2P digital remittances between identified participants could also strengthen compliance with the recommendations of the Financial Action Task Force and reduce the likelihood of “de-risking” by correspondent banks.¹⁴

Although digitalization initiatives can emerge within government or the private sector, it is only the combination and coordination between the two spheres that maximizes benefits within and across countries. This allows governments to not only recognize that digitalization of payments fully

¹¹In essence, PFM “relates to the way governments manage public resources (both revenue and expenditure) and the immediate and medium- to long-term impact of such resources on the economy or society. As such, PFM has to do with both process (how governments manage) and results (short, medium, and long-term implications of financial flows)” (Andrews and others 2014, 1). The modalities by which payments and transfers are carried out are often overlooked. It is not by chance that in the wave of PFM books and publications (such as Allen, Hemming, and Potter 2014; Cangiano, Curristine, and Lazare 2013) of the past five years the very word “digitalization” is hardly found.

¹²This definition raises the question, what makes a PFM system effective in pursuing its objectives? Andrews and others (2014, 6) clarify that a “. . . PFM system needs to record and distribute (financial resources) to the right places in a reliable and timely manner so that they can be audited (to ensure that) money is being used properly.” In the same paper, Andrews and associates characterize a functional PFM system as one that promotes (1) prudent fiscal decisions, (2) credible budgets, (3) reliable and efficient resource flows and transactions, and (4) institutionalized accountability. Digitalization of payments falls squarely under the last two factors since it helps ensure that payments and transfers are processed efficiently and effectively.

¹³Quality of fiscal information is at the core of fiscal transparency. In reformulating its 2014 Fiscal Transparency Code, the IMF defined it as the comprehensiveness, clarity, reliability, timeliness, and relevance of public reporting on the past, present, and future state of public finances.

¹⁴De-risking is the withdrawal of correspondent banking relationships in response to perceived risks of sanctions for violating anti-money laundering and combating the financing of terrorism regulations (Center for Global Development 2015).

supports PFM and is indeed the other side of the same coin, but to take leadership in integrating digitalization agendas to better serve government goals.

Cautions—Learning from FMIS Implementation

A government's Financial Management Information System (FMIS) tracks financial events and summarizes financial information (Diamond and Khemani 2015).¹⁵ Core FMIS may or may not contain the payment/transfer functions, including tax collection, that are relevant for a functional PFM system.¹⁶ The World Bank, IMF, and Inter-American Development Bank have produced several studies assessing the relative strengths and weaknesses of integrated FMIS introduction across many countries.¹⁷

The World Bank Independent Evaluation Group's evaluation (IEG 2016) and Hashim and Piatti (2016) identified the following prerequisites for successful FMIS project implementation:

- improved budget classification
- a unified chart of accounts integrated with budget classification
- better treasury single-account operations
- commitment control and monitoring mechanisms
- establishment of cash management functions

Another crucial prerequisite for successful FMIS implementation, directly applicable to digitalization, is a unitary vision of government objectives within public financial management architecture. If that is not in place, governments risk confusing ends with means, processes with objectives, and procedures with

¹⁵Diamond and Khemani (2015) define an FMIS as the “computerization of public expenditure management processes including budget formulation, budget execution, and accounting with the help of a fully integrated system for financial management of the line ministries and other spending agencies. The full system should also secure integration and communication with other relevant information systems.” They also clarify that “because of the integration requirement, the FMIS is commonly characterized as an integrated financial management information system. Unfortunately, using the term ‘integrated financial management information system’ can sometimes be erroneously interpreted as describing a system that can capture all the functional processes, and the relevant financial flows, within public expenditure management.”

¹⁶According to Khan and Pessoa (2010); Diamond and Khemani (2015); Dener, Watkins, and Dorotinsky (2011); and Una and Pimenta (2016), “core” modules typically include general ledger, budgetary accounting, and accounts payable and receivable. “Noncore” modules include areas such as payroll, procurement, project ledger, and asset registry.

¹⁷During 1984–2010, the World Bank financed 87 integrated FMIS projects in 51 countries with an average cost of \$25 million (Dener, Watkins, and Dorotinsky 2011; Dorotinsky and Watkins 2013). In Latin America, the Inter-American Development Bank has funded 47 PFM reform projects envisaging the adoption of an integrated FMIS at an average cost of \$26 million (Una and Pimenta 2016). Both studies put the average length of such projects at six to seven years, thus often crossing more than one political cycle.

Box 12.2. Malawi FMIS Project

Malawi set up and rolled out a Financial Management Information System (FMIS) starting in 2010, covering most of the budget and the key core modules, including a commitment control system. A recent review of this World Bank-funded FMIS project shows how even a well-managed FMIS project may not by itself be conducive to a well-functioning public financial management (PFM) system (IEG 2016).

The review found that while the FMIS was under development, the complementary PFM environment, although satisfactory on paper, did not change behaviors. For instance, even though controls were in place, commitments continued to be processed outside the system; spending units were reported to maintain an off-FMIS registry and upload funding limits on an as-needed basis; and evidence suggests that spending units generated local purchase orders and payment vouchers simultaneously, using pro-forma invoices despite directives to the contrary. Over time, large payment arrears accumulated, to an estimated 9.2 percent of GDP in 2014, and \$32 million was embezzled in the so-called cashgate scandal.

Weaknesses in PFM systems, processes, and controls around the FMIS environment caused these outcomes. IEG 2016 notes that a few technical factors were at play that were more directly associated with the FMIS, such as weak system access controls, inadequate data capture, poor system performance due to erratic power supply, inadequate server capacity, and unreliable connectivity. But these were not crucial in explaining the outcomes. It was a more diffuse disregard of the regulatory framework and a breakdown of internal controls that were at the root of the problems. These in turn reflected a general lack of understanding of the overall PFM architecture and the interrelationship among its many components that failed to focus on basic control procedures, such as bank reconciliation.

The independent review of Malawi's FMIS project provides two main lessons:

- Information technology solutions cannot be pursued without addressing fundamental PFM problems in parallel. In Malawi, as elsewhere, unrealistic expectations that the FMIS would solve all the issues created a tendency to blame FMIS when problems occurred.
- Even a well-designed and functioning FMIS is not sufficient to support good public financial management. The breakdown of the accountability chain that led to a major corruption episode in Malawi was chiefly because of a disregard of processes rather than a technical failure of the FMIS.

functions. Unless mindful, a digitalization agenda can also fall into this trap. The Malawi story in Box 12.2 illustrates the point.

As noted above, digitalizing payments and transfers should acknowledge the lessons of FMIS implementation. Diamond and Khemani (2015) have found that computerization promotes two kinds of reform: efficiency reforms that accelerate the operation of existing procedures, and effectiveness reforms that change existing procedures. Information technology (IT) truly pays off when it makes organizations more effective, not simply more efficient.

Digitalization cannot be IT-driven or donor-driven. Rather, to realize its potential for boosting effectiveness, it needs to be driven by the functionalities

that can address problems while keeping in mind the medium- to long-term objectives. Those using digitalization should accept a certain degree of endogeneity and learning by doing, in which capacities and capabilities have to be developed in parallel with the proposed solutions, as argued by Andrews (2013). It should also accept that the need for some cash transfers will persist in the face of challenging contextual factors (ODI 2016; Sturge 2017).

Since the core function of government digitalization is processing payments and collecting revenues, the risks of developing “silos”—in which different systems and IT infrastructure become an impediment to reconciling the *whole* relationship between the government and the citizen—should be avoided.

Finally, very little work has been done on the cost benefit of introducing large computerization systems, meaning that the importance of building in the assessment of the efficiency and effectiveness at the beginning of digitalization efforts is another valuable lesson.¹⁸

SELECTED COUNTRY CASES

The four country case studies described in this section illustrate how PFM and digitalization of government payments are indeed two sides of the same coin, and point to the factors that have helped determine their success.

Table 12.2 summarizes the country cases. Although each case is different, they point to very similar factors that the previous section identified as desirable to any computerization project: identifying problems and needs, developing customized solutions, and strengthening institutional capacity. Perhaps most importantly, the cases also point to the way problems beyond the specific ambit of the existing PFM systems were addressed and how digitalization contributed to a unitary vision of government priorities and objectives.

India’s fast-track digitalization approach combining the unique identity, Aadhaar, and financial inclusion to drive both efficiency and effectiveness in

¹⁸The IEG (forthcoming) review of reforming FMIS concludes that “researching available options and carefully weighing benefits against risks and costs is crucial for selecting an appropriate country specific strategy for application software development (off the shelf versus developing an application in house” and that “the attribution to improved PFM outcomes can be facilitated through good monitoring and evaluation frameworks.”

government benefits has generated noteworthy gains by reducing the number of illegitimate beneficiaries under social welfare programs (see Chapter 11).^{19,20}

Mexico's long-term development of its single treasury account and the digitalization of payments—developed at first in parallel before becoming aligned—significantly improved efficiency and effectiveness and both are now contributing to inclusion goals. Estonia's infrastructural digitalization has significantly benefited the government's effectiveness. And Ghana's efforts to standardize digital identification and shift away from a cash-based economy are still facing challenges, but ghost workers from public payrolls have largely been eliminated where the approach has been applied.

Together, these cases (representing four continents) illustrate the many common challenges in aligning PFM and digitalization. While substantial, the estimated savings from the initiatives set out in Table 12.2 are nonetheless indicative, as they are not always grounded in rigorous analysis and are not comparable. Far more rigorous, comparable research is needed to reveal the economic impact of digitalization, including in developing economies.

India

In 2009, India created the Unique Identification Authority of India with the mandate to issue a unique identifying number, the Aadhaar, to every resident. *Aadhaar* was introduced, together with digital payments, as part of an ambitious project to shift the country toward an inclusive digital economy, with a strong initial focus on reforming and rationalizing a massive array of subsidy and payments schemes. Together these accounted for some \$60 billion in annual public expenditures, with studies suggesting huge leakage and diversion in many programs. The strategy was to link subsidies and benefits to identified individuals and to pay all benefits and transfers through financial accounts, and then to provide additional financial services such as savings and insurance so those accounts could be used.

By early 2017, the number of people enrolled had topped 1.1 billion, largely achieving the objectives. The program now includes almost all adults and is being extended to children. Aadhaar relies on digital technology and biometrics to uniquely identify people and to enable them to authenticate themselves for transactions. It is the largest identity management program in the world.

¹⁹Many countries tried increasingly to consolidate their safety-net programs, or at least to rationalize them by moving toward an integrated register of beneficiaries. This requires consistent and unique identification of beneficiaries while integrating payment mechanisms to reap economies of scale and prevent overlap and duplication. However, non-government organizations focused on privacy have questioned the desirability of a common identification system, often a national ID or similar nationwide system, because it represents coercive enrollment, since the poor beneficiaries have little option, in practice, but to sign up.

²⁰Many other countries, including Pakistan and South Africa, have moved toward digital identification and payments to deliver social grants more effectively. For more on such cases see Gelb and Decker (2012) and Gelb and Diofasi (forthcoming).

Table 12.2. Summary of Country Cases

Country	Years	Main Objectives	Main Reforms	Indications of Effect	Estimated Savings
India	2009–ongoing	Financial inclusion, reducing leakage and corruption, rationalizing subsidy programs, improving tax collection	Unique digital identification, financial inclusion, reforming subsidies and transfers, enhancing payments and interoperability	More than 1.1 billion enrolled, 280 million accounts by March 2017, comprehensive reform of liquefied petroleum gas subsidies including elimination of duplicates, rollout of subsidy and payment reforms across states	\$7 billion over 2.5 years
Mexico	2007–13 and ongoing	Modern public financial management transparency, cost savings, financial inclusion	Single treasury account, digital payments, measures to enable financial inclusion	Payments now through single treasury account and digital at federal level	\$1.27 billion per year
Estonia	2001–ongoing	Efficient government, inclusion in economy, digital platform for private economy	Unique universal identification, X-road: a digital data framework and regulatory regime	Unique virtual identity for all, X-Road connects 170 public sector databases for 1,571 public and private services, 98% digital tax filing	820 years' working time, 2% of GDP from electronic signatures
Ghana	2008–ongoing	Financial inclusion, eliminating ghost workers, improving tax collection	e-Zwich smart-card system, de-duplication of identities, public wage payments through e-Zwich	Increasing use of e-Zwich to deliver payments, elimination of 40% of public payroll where applied	\$35 million per year from one application

Source: Authors' compilations.

To enable this, the JAM strategy links (1) financial accounts under the Pradhan Mantri Jan Dhan Yojana program²¹ (hence the J from Jan), (2) Aadhaar (hence the A), and (3) a mobile number (the M). Digital identity and payments come together in several ways. First, digital know-your-customer procedures have drastically reduced the cost of gaining new bank customers and enabled the opening of some 280 million Jan Dhan accounts by March 2017, used to receive digital transfers. Electronic know-your-customer has also helped expand mobile banking and create new payment banks, an essential step to increase the density of the payments infrastructure.

Second, with Aadhaar Payments Bridge G2P, payments are easily made to any identified individual without having to key in the details of his or her account.

²¹See the Pradhan Mantri Jan Dhan Yojana website for more information: <https://pmjdy.gov.in/>.

Third, extending this further, the Aadhaar-Enabled Payments Service enables seamless P2P digital payments between any two accounts linked to Aadhaar numbers or the associated mobile numbers, even if they are with different banks.

Partly because of the way in which Aadhaar was introduced—as a voluntary credential or authentication service—debate is ongoing about the appropriate scope of this digital system, and it faces several challenges in the Supreme Court. But its use is being expanded to other areas relevant for PFM, most recently to strengthen tax administration. For instance, in April 2017 it became compulsory for all tax filings to be accompanied by an Aadhaar number (if the person had no Aadhaar number it was not compulsory to obtain one) and further measures are under way to integrate Aadhaar into asset registration. This will make it possible to build a full economic profile of an individual, helping to identify potential taxpayers who have chosen not to file.

A particularly interesting feature of the digitalization program is how it has been rolled out. While the Aadhaar itself, its associated Aadhaar Payments Bridge, and Aadhaar-Enabled Payments Service are integrated technology projects, individual states and even some districts have been free to adopt it in their own way, applying the technology toward problems and priorities they have identified. Reforms are moving forward rapidly in some areas but more slowly in others, and may involve a good deal of experimentation and innovation in implementation. In the most advanced states, reforms have been ongoing for five years or more; in the least advanced, they have barely gotten off the ground. Incentives also exist to move forward at the state level, where discretionary spending power is increasing as more tax revenue is devolved to states thanks to awards by the Fourteenth Finance Commission.²²

States that save money by strengthening the administration of their social programs will have resources available for other purposes. Krishna District, Andhra Pradesh, offers perhaps the most advanced example of these reforms. The subsidy, benefit, and pension system has been digitized, as has the supply chain for subsidized commodities provided through an extensive system of Fair Price Shops. This enables real-time monitoring of payments and subsidies effected through the system.

The disbursement of payments and subsidized rations can be monitored in the aggregate, by town, by individual bank, or by “Fair Price Shop”—and, drilling down, even by individual beneficiary—creating a complete audit trail for each transaction. No longer can shopkeepers divert unclaimed products for private gain; the system reconciles stocks and flows to ensure that they are held over for the subsequent month’s distribution.

Krishna District also offers examples of adaption and innovation, for example, to improve connectivity of mobile point-of-service devices (sometimes referred to as mobile ATMs, although they are capable of multiple functions) with portable aeriels and dual subscriber identity modules (typically known as SIMs).

²²For more information, see <http://indiabudget.nic.in/es2014-15/echapvol1-10.pdf>.

Krishna and other regions also offer lessons for how to address opposition to reforms from vested interests that have benefited from the previous system. These may include entities on the front line of delivering payments, subsidies, and services that are no longer able to divert public spending for their own advantage. In some cases, they can be bought off with increases in service margins—if these are not set at reasonable levels there will be no incentive to implement the transfers. In other cases, they can be bypassed by concluding new contracts with competitors enthusiastic about providing services under the new systems.

As with FMIS, implementation involves far more than technology. It requires vision, clear objectives, and sustained commitment.

Another example of the application of these systems in India is the area of fuel subsidies. For reasons of equity, and to cushion households against volatile prices and reduce deforestation, the country has long provided subsidized fuel to households. Liquefied petroleum gas (LPG) is a favored clean fuel, relative to kerosene. In the first stage of reform, the Pratyaksh Hanstantrit Labh scheme changed the form of subsidy on LPG cooking gas cylinders, transferring this directly into the financial accounts of beneficiary households for up to 12 cylinders per year. This allowed market forces to set pricing of the cylinders rather than reflecting the subsidized price. The reform is known to have weeded out a considerable number of duplicate and fake connections and to have reduced diversion to unsubsidized commercial users. The second stage involves a massive rollout of the LPG program (the Pradhan Mantri Ujjwala Yojana *Ujjwala* scheme) to more households.²³

Among various estimates of the fiscal savings of these digital systems, the Ministry of Communications and Information Technology in March 2017 put savings at Rs 49,000 *crore*, (about \$7 billion) over the previous two and a half years. The detailed basis for this estimate has not been made available and it is probably optimistic, but even a modest fraction of such savings would represent an enormous return on the investments made in digital technology.²⁴

Several factors complicate estimates of savings, however, including difficulty specifying the counterfactual and whether savings are to be considered *ex ante* or *ex post*. Savings from the LPG reforms, for example, depend highly on the per-cylinder subsidy, which fell sharply with a sharp decline in world energy prices as the reform moved forward. Energy markets are unpredictable, nonetheless, and the reform has put in place a system that will better enable the government to respond to future price shocks.

Another complication is that the objective of that reform was not simply to cut subsidies—it was to strengthen the administration of the program so that it could be rolled out more widely across India. As the scheme is rolled out, subsidies increase proportionately, but more slowly than they would have done

²³The Ujjwala program is a scheme rolled out under Prime Minister Narendra Modi in 2016 to expand access to LPG—a clean cooking fuel—by poorer and rural households.

²⁴The costs of the Aadhaar system through its first billion-plus registrations were about \$1.16 per head. The overall costs have been projected at about \$2 billion. For more discussion of costs and benefits, see Gelb and Diofasi (forthcoming 2017).

without the elimination of spurious connections. The use of the common identifier also enables households that had previously received kerosene subsidies to be struck off the list as they are provided with LPG connections. This generates further savings relative to the counterfactual of providing subsidies through controlled prices rather than direct transfers into identified financial accounts.

Public savings are, of course, not the only relevant measure of successful digitalization. Equally important is whether the reforms have improved service delivery. This is still an open question for many programs. Especially at the start, some beneficiaries are likely to experience inconvenience as the new systems settle down. But there is little doubt of the potential gains.

One rigorous study evaluates the impact of the adopted biometrically authenticated payments infrastructure (known as Smartcards) on beneficiaries of employment (the National Rural Employment Guarantee Scheme or NREGS) and Social Security Pension (SSP) schemes. A large-scale randomized control trial was carried out for the rollout of Smartcards over 158 subdistricts and 19 million people. The new system delivered a faster, more predictable, and less corrupt NREGS payments process without undermining program access. For each of these outcomes, treatment group distributions first-order stochastically dominated those of the control group. The investment was cost-effective, as time savings to NREGS beneficiaries alone were equal to the cost of the intervention. Leakage of funds between the government and beneficiaries in both NREGS and SSP programs was also significantly reduced. Beneficiaries overwhelmingly preferred the new system for both programs (Muralidharan, Niehaus, and Sukhtankar 2014).

Mexico

Mexico clearly illustrates the benefits of combining PFM modernization with the digitalization of government payments to drive efficiency and financial inclusion.²⁵ The Mexican government's 2013 National Digital Strategy, known as Digital Mexico, was championed by the president as part of the 2013–18 National Development Plan. It included a commitment to “encourage the innovation of digital services through the democratization of public spending” and to financial inclusion. This 2013 strategy reflected over 15 years of successive presidents' commitments to centralization through a single treasury account, the digitalization of government revenues and expenses as part of building a modern PFM system, and a more recent government focus on financial inclusion.²⁶

²⁵This section draws from Babatz (2013).

²⁶In 1997, President Ernesto Zedillo had mandated all *Dependencias* of the federal government to collaborate with the Ministry of Finance to implement the Sistema Integral de Administración Financiera Federal. This was the start of the process to develop both the IT infrastructure and the business process re-engineering for an efficient Single Treasury Account. In 2007, President Felipe Calderon and the head of the Treasury, Gina Casar, with the support of the Central Bank Governor Agustín Carstens, enshrined the Single Treasury Account into law. In 2010, a presidential budget decree mandated all government departments to shift to centralized electronic payments. This was the first time the “promotion of the use of electronic payments and the *bankarization*

Prior to the 2013 Strategy, Mexico's commitment to financial inclusion had been on a parallel track. The 2007–12 National Development Plan specifically cites the long-term objectives of increasing the number of people and enterprises with access to financial services and protecting such newcomers. In 2007, the Mexican Congress issued the new Transparency of Financial Services Law, which established more precise transparency standards for the fees charged by financial institutions, disclosure statements principles, and the obligation for banks to offer basic savings products. In 2008, the Mexican Congress approved reform of the Banking Law to enable the use of nonfinancial entities as banking agents (Goodwin-Groen 2010). A presidential decree in September 2011 created the National Council for Financial Inclusion. Then, as president of the G20 in 2011, Mexico led the Maya Declaration on financial inclusion. This all contributed to the launch of the president's National Financial Inclusion Policy in 2016, which clearly committed to merging both agendas by promoting the use of electronic payments for greater efficiency.

Mexico's experience clearly pointed to the synergies between digitalization and PFM when the two came together after 2013. It also indicated the role of consistent senior-level sponsorship and support and the need to coordinate across agencies. At a technical level, the shift was designed and supported by a core group of skilled senior civil servants within *Tesorería de la Federación* (the Mexican Federal Treasury), in cooperation with other key agencies such as the central bank. Without this technical competence, the complexity of the process may well have caused it to stall.²⁷ Overall, it has been estimated that the Mexican government is saving at least \$1.27 billion a year, or 3.3 percent of its combined spending on wages, pensions, and social transfers. The methodology and assumptions behind these estimates are carefully described in Babatz (2013),²⁸ but they are still estimates and as such should be understood as indicative, not definitive. Nonetheless, this order of magnitude of savings is hard to ignore.

Estonia

Estonia has prioritized digitalization across the whole government for almost 20 years. As Lindpere (2017) notes, the objective was to bring all citizens into the national digital economy to get the full cost-effectiveness benefit for the economy. Unlike many other countries with extensive legacy systems, as a newly

of beneficiaries," that is, financial inclusion, is mentioned as one of the objectives of developing a modern PFM system.

²⁷For instance, the 2011 presidential decree could not have forced the shift overnight. But it was a decisive moment, alongside sustained pressure by senior champions.

²⁸Cost savings estimates in Babatz (2013) were calculated for salaries, pensions, and transfer programs using data and assumptions on three line items: (1) the interest earned by not having to deposit funds in advance of payments (the cost of the float), (2) the savings through not having to pay fees to banks for effecting transfers, and (3) the estimated savings from reduction in losses due to unauthorized or incorrect payments.

independent country, Estonia was able to initiate its transition to a digital economy in a remarkably comprehensive way.

One essential step was the creation of the X-Road in 2001, a data exchange layer that enables secure internet-based data exchange between information systems. Public and private sector enterprises and institutions can all connect their information systems with the X-Road without a fee. This is shared infrastructure hosted by the government, making it easier for public and private institutions to innovate together, as they can leverage the existing infrastructure for data exchange, saving resources (Janis and Shah 2016).²⁹ Another essential step was the creation of an advanced digital identity system so that citizens could authenticate themselves for digital transactions. Estonia's system is the most highly developed in the world, allowing not only authentication, but also signing documents digitally and remotely. Currently, 1.1 million of 1.3 million citizens have an electronic ID or digital identity (Margetts and Naumann 2017).

Data on the cost-effectiveness of this initiative, which has been run as Estonia modernized its entire PFM system,³⁰ are compelling, even if not all estimates are the result of rigorous analysis against a fully specified counterfactual. By eliminating the need for in-person interactions, X-Road estimates it saved the equivalent of 820 years of working time in 2016 (Government of Estonia 2017).³¹

The digital tax return statistic also sets Estonia apart. In 2016, over 98 percent of returns came in through the e-Tax, the electronic tax filing system set up by the Estonian Tax and Customs Board, through X-Road (Margetts and Naumann 2017). X-Road has enabled a digitized income-tax declaration system by linking employment tax records to each citizen's tax records.

Ghana

Ghana offers an example of the use of digital payments to eliminate ghost workers. Despite many years of effort to implement public sector reforms, the country has long struggled to contain recurrent spending, which is high relative to GDP compared with countries at a comparable income level. Overstaffing is chronic and the public sector wage and benefits bill has been a particular

²⁹As of May 2017, X-Road had connected 170 public sector databases and provided 1,571 public and private services, all based on one standard, obligatory digital identity for each citizen. X-Road receives more than 1 million requests per day and processed more than 500 million transactions in 2016 (Government of Estonia 2017).

³⁰Estonia has been and remains a frontrunner in reforming its PFM systems since the 1991 restoration of independence. From an early adoption of results-oriented budgeting to accrual accounting and, more recently, accrual budgeting, reforms have been supported by an effective treasury and budget execution system and a remarkable degree of transparency and accountability.

³¹The 820 years number assumes that every request to the X-Road saves 15 minutes of an officials' time and 5 percent of requests submitted through the X-Road involve communication between people. Using e-services then helped save 7,182,262 working hours in the previous year (Government of Estonia 2017). These are obviously simplistic assumptions, but they usefully indicate the magnitude of savings.

challenge, absorbing over 9 percent of GDP. Another PFM challenge for Ghana has been the prevalence of cash-based payments across the economy, weakening tax administration and thus reducing tax collection.

As Breckenridge (2010) explains, Ghana's e-Zwich payment system, "the world's first biometric money," drew on a technology developed in South Africa to transition toward digital payments even without full or reliable connectivity. It also aimed to extend financial inclusion to people who were not literate and less able to cope with personal identification numbers (PINs) for managing their transactions.

The e-Zwich system captures clients' fingerprints during enrollment, de-duplicates them, and stores the template on a smartcard. For each withdrawal from an ATM equipped with a biometric reader, for example, cardholders' fingerprints are checked against the template stored on their card. The system can work offline, reconciling the card balance with that of the underlying account when connectivity is available. To ensure an auditable trail, the ATM records the last 10 transactions on the card and the card records the last 10 transactions on the ATM.

The e-Zwich system was anticipated to serve two key PFM objectives. First, it would clean up government payrolls by consolidating all salary payments into a single, de-duplicated,³² digital system. This would immediately flag multiple payments, since the different accounts belonging to a single individual would all be mapped to the same identity. Second, as it was rolled out across the economy, initially to large employers, it was anticipated that it would strengthen tax administration by ensuring that a greater number of employees saw their wages and salaries being paid into digital accounts.

e-Zwich has been a mixed success. Its take-up has grown more slowly than anticipated, although growth has been higher in recent years. Transactions went up from 2.2 million in 2014 to 5.3 million in 2016 as its usage increased to pay beneficiaries of public programs (Citifmonline 2017). But as IMF (2016) notes, plans to use e-Zwich to pay all public salaries have encountered opposition, particularly from Ghana's public sector unions. They argue that the system imposes additional costs and inconveniences payees, in that it does not yet have a sufficiently dense network of service points.

In retrospect, it would have been better to have separated out the unique identification system from a particular financial technology, the approach taken by India. Nevertheless, it is reported that one single application, to Ghana's scandal-plagued National Service System, uncovered 35,000 fictitious employees—almost half the initial payroll of 75,000—potentially saving the Ghanaian government \$35 million a year.³³ This would only be a small gain rel-

³²A de-duplicated system is one in which identities are statistically unique, in the sense that the probability that any individual has two or more distinct identities is extremely small. De-duplication is possible even for very large populations through multimodal biometrics.

³³*B&FT Online*. 2016. "E-Zwich Helps Flush Out 35,000 Ghost Names from Payroll ... Saves Gov't GH¢146m." April 21, 2016.

ative to the \$3.5 billion public sector wage bill, but it would represent a huge rate of return on the initial investment in the e-Zwich program.³⁴

DIGITALIZATION CHALLENGES: WHAT CAN WE LEARN AND WHERE DO WE GO FROM HERE?

Traditional approaches to PFM have not paid detailed attention to the digitalization of payments, particularly to entities external to the government. However, as outlined in the case studies, the problems addressed using digital payments, together with (unique) identification technology, are highly relevant for the sound management of public finances. In fact, most of the questions about payments external to the government are essentially the same as for payments internal to the government and at the core of a functional PFM system (as discussed in the section *What Does Digitalization of Payments Mean?*):

- Are payments delivered securely, in a timely manner, and at reasonable administrative cost?
- Are there serious problems of ghost workers, leakage, or corruption?
- Can government “follow the money” in real time as resources flow through banks or other intermediaries to the ultimate recipients? Is there an auditable trail?

In addition, one needs to consider the wider role of digital payments in helping to shift away from a cash-based economy, which remains largely outside the tax net.

The four case studies—Estonia, Ghana, India, and Mexico—present a diverse range of approaches to developing a functional PFM that could meet such policy objectives.

Through consolidating payments services and going digital, Mexico aimed to rationalize payments and increase efficiency.

In Estonia, digitalization has gone far beyond payments, to encompass virtually all government functions and engagement with citizens. The aim, again, has been to govern effectively and inclusively at lower cost.

India’s digital transition is driven by multiple objectives, but the first and most important has been to improve the efficiency of its vast array of subsidies, transfers, and schemes by eliminating leakage and redundancy, as well as creating auditable trails. Financial inclusion has also been a major focus. Improving tax administration through facilitating digital payments more widely is emerging as the next priority.

³⁴Net-1, the provider of the system, was paid an upfront fee of \$20 million plus \$3 per card. Wide coverage, at about 7 million cards for the whole of Ghana, would involve payment of \$41 million (Gelb and Clark 2013). This does not of course include all costs of instituting the system, but it is indicative.

Ghana's program, though far more limited in scope, had similar objectives, in the first instance to substitute for shortcomings in managing public payrolls through channeling payments into biometrically enabled accounts. Building on financial inclusion, the next stage intended to focus on broadening the tax net to include all formal wages and salaries.

This transition toward digital payments and the wider digital economy is happening naturally to some extent with the adoption of new technology, but often far less rapidly and comprehensively than possible, especially in the countries where the potential benefits are greatest. The transition also needs to avoid common mistakes and draw from recent reviews of efforts to introduce large computerization programs within governments, as discussed previously.

In addition, the case studies largely confirm the need for high-level leadership, an integrated and comprehensive approach to digitalization and PFM whereby the former becomes a constituent element of the latter, and an appreciation of the risks and challenges. These key success factors are briefly discussed below.

High-Level Leadership

Only senior and sustained political and technical leadership that brings together these agendas and co-opts international expert agendas to support it can produce success. As Mexico and Estonia illustrate, these reforms take time. And, as India shows, senior political and technical leadership is required to deal with the various problems that will inevitably arise. These will include the need to neutralize the opposition of those who have benefited from the previous system. Technology alone is ineffective without political will. Ghana's inability to apply its digital payments system more widely across the public sector illustrates this point.

The approach in India shows how much more there is to these reforms than simply installing a new computer system or payments infrastructure. It is more about developing a strategy to use digital payments effectively, which requires a top-down view and a broad framework of reference. Digitalization is being driven largely at the subnational level, with the added spur of greater devolution of fiscal revenues to subnational levels.

The other cases mentioned above faced different problems and priorities, but they also had specific and broader PFM objectives in mind when developing aspects of their digital strategies.

An Integrated, Comprehensive Approach

It is important to build a comprehensive digital and regulatory infrastructure that will permit an inclusive approach to PFM. Each of the examples provides compelling evidence of this—whether X-Road, E-Zwisch, or the India Stack. Notably, digitalization of government payments, as in Mexico and India, is only one stage of a wider transition toward digital (noncash) payments across the economy. It is a critical stage, however, since they often build and sustain a first round of infrastructure needed for wider P2P digital payments, including POS and cash-in-cash-out facilities. Digital government payments can also increase a

population's familiarity with digital systems, including through the opening of large numbers of accounts for new clients of the financial system. In the first years, many of these accounts will not be used for purposes other than receiving government payments, but this will slowly change.

Causality is not one-way, however. In turn, wider P2P digitalization complements the initial G2P stage to start to build the digital ecosystem. It reduces the need to cash out payments and transfers immediately and lowers reliance on cash-in-cash-out infrastructure. It also increases the transparency of payments and transactions across the economy to improve tax administration further down the road. If and when it is decided to actively reduce the role of cash in the economy, through eliminating large-denomination banknotes and other measures, the digital infrastructure will be ready (see Chapter 11 for a discussion of India's recent demonetization).

One regulatory priority is a telecommunications regime that encourages universal connectivity. Even with the astonishing spread of mobile devices—now almost one for every man, woman, and child on earth—some less densely populated areas of poor countries lack basic connectivity, and higher-capacity broadband internet is still costly in many countries.

A second regulatory requirement is a level playing field for financial providers, one that encourages entry and competition and facilitates the inclusion of low-income clients. For example, countries should apply a risk-based approach to know-your-customer, graduating the requirements so that small accounts that provide basic services to low-income clients face less stringent customer due diligence requirements.³⁵

Interoperability should be another strong focus to enable cross-provider payments with negotiated and low-interchange fees. There are advantages and disadvantages in setting up the equivalent of a regulated public utility. One example is India's Unified Payments Interface, the payment system launched by National Payments Corporation of India and regulated by the Reserve Bank of India that facilitates the instant transfers of funds between all users of the mobile platform. Interoperability can also help ensure a sufficiently dense network of financial agents to enable convenient cash-in-cash-out transactions and other services.³⁶

Based on these examples, unique identification is another prerequisite for a well-functioning digital payments system. And without a centralized database to verify identities, it is difficult to develop a strong digital payments ecosystem.

In Ghana, for example, 98 percent of people report having at least one form of ID, but market participants across the country struggle with the numerous forms of identification and identity databases. With nine separate biometric databases in use across government and public entities, it is difficult to perform efficient know-your-customer functions. To verify either the form of ID or the

³⁵For further discussion of financial regulation to improve financial inclusion, see Center for Global Development (2016) as well as GPFI (2016b).

³⁶It is logical to permit reasonable interchange fees for access to agents of another network, as this involves the provision of real (non-virtual) services.

holder of a current account, the company must be able to access the accompanying database. Yet, Ghana lacks a national, centralized identification method and database, hampering the development of its inclusive digital payments ecosystem (Janis and Shah 2016).

Indeed, such a system could benefit PFM in many other ways, and it is surprising to see governments sometimes supporting a diverse and costly range of identification systems that are not interoperable, rather than focusing attention on the core systems of civil registration and national identification.

Appreciation of the Risks

The movement toward a digitized economy also comes with risks, to both citizens and government systems. For citizens, digital transactions and interactions leave a trail—in contrast to cash, which is anonymous—potentially extending to all aspects of an individual's life. The “Responsible Digital Payment Guidelines” (2016), of the Better Than Cash Alliance, document eight good practices for digital payments that, if followed, would significantly reduce risks to citizens. Guideline 7 to protect client data, for example, should not be an issue for G2P payments, but it is a consideration for the wider payments ecosystem. Where one shops, what one buys, who one pays—all these become matters of record and translate into data of considerable commercial value.

Countries need to take steps to ensure the security and safety of these data, and to ensure that the growing digital cloud of information does not unduly compromise either the privacy of citizens or the privacy of classified government information, as both engage in the digital economy. This raises legal and regulatory issues that go far beyond the scope of this paper, but it is important to stress them since only about half of all developing countries have data privacy laws in place. The need for continuous upgrading of digital security is now a *sine qua non* for all such systems and the importance of qualified internal experts cannot be overemphasized.

Directions for Future Work

The very limitations of these cases from Estonia, Ghana, India, and Mexico serve to highlight the urgent need for more rigorous, comparable research to document, and then systematize, how governments are building inclusive digital economies in which the PFM and broader inclusion agenda work together. The speed of innovation in payments makes the importance of robust research all the more important so the learning is substantive, not superficial.

Perhaps more urgent, though, is the need for research on the counterfactual of not integrating PFM with the broader government digitalization agenda and of not digitally connecting the increasingly complex relations between government and citizens, for which PFM is the foundation. These examples also highlight the imperative for training national and international PFM experts to position a modern functional PFM at the center of the government's broader digitalization and inclusion agendas and address the evolving risks.

This is a call to action for the skills development agenda of the IMF, World Bank, United Nations, and bilateral funders active in this sector.

CONCLUSION

The train toward a digital economy has left the station and is moving rapidly. Its destination is a more inclusive society where everyone can benefit from lower costs, increased speed in processing financial transactions, and greater effectiveness in delivering government services.

That future can be reached faster if digitalization becomes a constituent element of a modern and functioning PFM and is combined with broader reform agendas such as financial and social inclusion or digital identification. When embarking on these initiatives, there is much to be learned from the record of large government computerization initiatives in managing risks and from the experience of leaders in digital services.

Digital payments are not a “silver bullet.” It will take significant intellectual capital and infrastructure investment. But if the digitalization agenda runs on a parallel track to PFM, the greater risk is a missed opportunity. The cases presented in this chapter from Estonia, Ghana, India, and Mexico are concrete examples of the components of an integrated approach between digitalization and more traditional PFM objectives and the benefits of integration. The call is to mainstream digitalization of payments as part of a functional PFM system that will, in turn, facilitate achievement of PFM goals and a broader inclusion agenda.

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