CHAPTER 13

The Value of Digitalizing Government Payments in Developing Economies

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In 2009, Afghan police officers were surprised that, when the government started delivering their salaries digitally—by mobile phone rather than in cash—the payment method was not the issue. Rather, the electronic bank account deposits were significantly larger than they had ever been. Some officers thought it was an error; others took it as an unexpected pay raise.

The real surprise: the officers were receiving their full pay—for the first time.

The new digital delivery stymied superior officers and clerks who had been routinely skimming off some of the payroll cash passing through their offices—taking up to 30 percent of some officers' earnings (USAID 2014). Government paymasters were equally surprised to discover that as much as 10 percent of the country's police force consisted of "ghost cops"—nonexistent entities created solely to let corrupt authorities collect money they did not earn (World Economic Forum 2014).

This story illustrates the potential for governments in developing countries to use digital payments to plug leaky payment systems. Money is lost on its way into government accounts as well, as tax collectors accept bribes to underreport taxes owed or skim from payments by businesses and individuals. Digital transactions complicate fraud and eliminate leakage in government expenditures and receipts.

This chapter quantifies the potential value at stake when government payment transactions shift from cash to digital. The analysis here finds that digitalizing government payments in developing countries could save roughly 0.8–1.1 percent of GDP, equivalent to $220–$320 billion annually.[1] This is equal to 1.5 percent of the value of all government payment transactions and is more than all official development aid to emerging market economies in 2015.

[1]The chapter builds on research found in McKinsey Global Institute (2016a). The results are larger than those in the report, as the authors used updated data from 2015 and expanded the scope of the analysis to include a reduction in fraud and savings in payments processing as well as government-to-government transactions.

Moreover, these calculations are likely to underestimate the true value at stake, as there are substantial indirect benefits that we do not attempt to measure. Of the total value, roughly 0.5 percent of GDP, about $105–$155 billion, would accrue directly to the government and improve fiscal balances, while the remainder would benefit individuals and businesses as government spending reached its intended targets.

These figures are not meant to be a forecast, since capturing the value will depend on upfront investments and operational changes within governments. Incomplete data hamper the analysis; a range of estimates is presented of the potential value at stake. Nonetheless, the chapter provides one of the first comprehensive, cross-countries estimates of the potential benefits of digitalizing government payments, using the best available data. It is important to understand the potential magnitude of these benefits when weighing them against the cost of investments in information technology and hardware that will be required.

The chapter first looks at the extent to which government payments in developing countries are made in cash and digitally. It focuses on seven countries that span income levels and geographies: Brazil, China, India, Indonesia, Mexico, Nigeria, and South Africa. It then details the methodology for calculating the potential value from digitalizing payments to and from governments. Subsequent sections describe the data used, present the results of calculations, and discuss other potential benefits not included in the calculations. The conclusion discusses limitations to the calculations and reveals thoughts on future research.

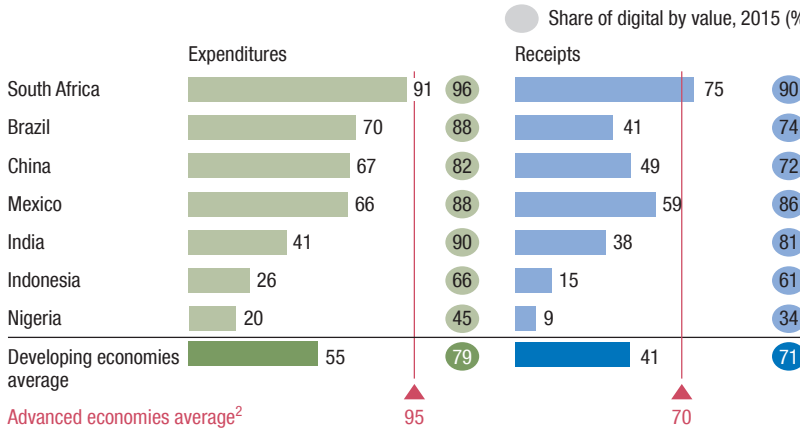
CASH IS COMMON IN GOVERNMENT EXPENDITURES AND REVENUE IN DEVELOPING COUNTRIES

In developing countries, a large share of government payment transactions to and from individuals and businesses and between government entities are transacted in cash or by check when payments are measured by volume or by the number of transactions. Digital payments—which include automated clearing house transfers directly between financial accounts, payments made by credit and debit cards, wire transactions, mobile money transactions, and other noncash payments—are still a small share in many countries (Figure 13.1). In Nigeria and Indonesia, for example, only 20 to 25 percent of government payment expenditures and about 10 to 15 percent of tax receipts were made using digital channels in 2015.[2] In Brazil, China, and Mexico, use of digital payments in government is more advanced. In South Africa, the share of digital payments in government transactions has already reached advanced-economy levels.

[2]The analysis here includes all levels of government—central, state or provincial, and local—to the extent that such data are available.

Figure 13.1. Developing Economies Have a Significant Opportunity to Digitalize Government Payments

(Share of digital in government payments by number, 2015, percent[1])



Sources: McKinsey Global Institute analysis; and McKinsey Payments Map 2015.

[1]Total excluding cash, checks, and paper-based transactions by number. Total excluding cash and checks by value. G2G transactions not included.

[2]Based on data from 20 advanced economies. Weighted average.

When we measure government payments by value rather than by volume, the share of digital transactions increases significantly. This is not surprising, as the largest payments, particularly between governments and businesses and between different branches of government, are already digital. The columns of figures in circles in Figure 13.1 show the share of payments by value that are digital today. In Nigeria, for example, roughly half of the value of government expenditure was transacted with digital payments, although only 20 percent of the volume of transactions was digital. Similarly, an estimated 34 percent of tax receipts were collected through digital payments in 2015, while only 9 percent of transactions were digital. On average, 79 percent of the value of government expenditures and 71 percent of tax receipts were digital in 2015 in the seven developing countries shown in the figure.

While governments around the world have begun shifting their payments to digital channels, scope remains for further digitalization. This is not surprising, given that many advanced economies adopted widespread use of digital payments for government transactions only in the past decade or so. In the United States, for example, the federal government completely phased out paper checks for recipients of Social Security, veterans' benefits, and other federal assistance in 2013. In Spain and Italy, 8 percent and 7 percent, respectively, of all government expenditures by value still occur in cash or by check.

METHODOLOGY FOR CALCULATING VALUE FROM DIGITALIZING GOVERNMENT PAYMENTS AND RECEIPTS

Digital payments promise to plug a variety of government expenditure and revenue "leaks." Cash payrolls, for example, only invite clerks, bosses, and others to skim off wages before employees receive them. The same is true of social security and pension benefits and payments to vendors. Revenue streams are also vulnerable to leakage: value-added tax can be collected in cash and never reported to the government. Income taxes and fees paid in cash can also be stolen before reaching the government. Beyond plugging such leaks, moving from manual cash processing of payments to digital processing can result in significant operational gains. In this analysis, we attempt to measure the full set of benefits across both government expenditures and tax receipts.

Framework for Measuring the Value

Moving from cash to digital for government payment expenditures and receipts yields three main types of benefits: reducing leakage, eliminating fraudulent payments and tax evasion, and reducing the costs of payment processing within the government. Table 13.1 describes these three sources of value in government expenditures, government receipts, and payments in different government organizations. Many studies from around the world provide estimates of the size of these effects and the value obtained by digitalizing payments. This research section describes some of this work.

Reducing leakage in government payments and tax receipts

A system that pays workers, pensioners, vendors, and household social programs in cash is vulnerable to losses through corruption. In addition to embezzlement, risks include robbery and simply misplacing currency. Electronic payment transfers greatly reduce the risk of funds being skimmed by officials or bribes paid by users. This leakage can be quite costly. Using a randomized control trial, researchers in India found that after digitalizing wage payments for workers in the National Rural Employment Guarantee Scheme, the leakage rate in Andhra Pradesh fell from 30.7 percent to 18.5 percent on average (Muralidharan, Niehaus, and Sukhtankar 2016).

In Côte d'Ivoire, after that country's 2011 civil war, school fees were paid almost exclusively in cash and were subject to high levels of bribery, theft, and other security issues, eroding the quality of the education system. Between 2011 and 2014, the Ministry of National and Technical Education began requiring that school payments be made digitally, with most parents using mobile wallets to do so. In 2014, 99 percent of secondary school students paid their fees digitally. The result was a significant reduction in lost payments, fraud, theft, and the administrative burden of managing cash (Frydrych, Scharwatt, and Vonthron 2015).

Table 13.1. The Three Main Sources of Potential Savings in Government Payment Transactions

		Potential Sources of Savings		
		Leakage	Fraud and Tax Evasion	Processing Costs
Expenditures	To public employees	• Salaries skimmed or stolen by government finance employees	• Fake or deceased employees to whom salaries are paid	• Back-office cost savings from automated payments (including FTE cost for processing and transportation, paperwork, errors, and rework)
	To individuals	• Subsidies and pensions skimmed or stolen by government finance employees	• Transfers to individuals who do not qualify for the subsidy or pension	
	To businesses	• Subsidy payments or payments for procurement contracts skimmed or stolen by government finance employees	• Overbilling for goods and services • Billing for work not performed	
Receipts	From businesses	• Income tax payments skimmed or stolen by tax collectors or government finance employees	• Value-added taxes collected by business but not paid to government • Tax evasion in informal economy	
	From individuals	• Income tax payments skimmed or stolen by tax collectors or government finance employees	• Income tax evasion by individuals	
Intragovernmental payments	Between government entities	• Public sector institutions and municipalities do not receive full transfers • Payments for public goods and services (e.g., parks, museums) not reported and transferred to budgets	• n/a	

Source: McKinsey Global Institute analysis.

The Ebola virus outbreak in 2014 exposed the weaknesses of Sierra Leone's use of cash to pay health care workers. Some emergency responders had to leave patients for days and walk many miles to collect their pay from a regional office, sometimes to discover that someone else had claimed their cash before they arrived. The country introduced e-payments through mobile wallets in December

2014, saving the government and health care workers $10.7 million over the last 13 months of the outbreak (Bangura 2016).

Relying on cash or even checks as payment for taxes and fees is often just as troublesome, as some of the revenue generated ends up in the pockets of tax officials themselves rather than in the national treasury. In Tanzania, authorities sought to stem corruption by tax collectors by printing receipt books and requiring collectors to document every payment and deliver the amount documented before they received another book. By the year's end, 30 percent of the books—and 35 percent of expected revenue—were missing (Fjeldstad and Semboja 2000). Collecting taxes through digital payments rather than cash would eliminate this leakage, boosting government revenue.

Reducing fraudulent payments and tax evasion

Fraud is a second problem in government payments. This includes paying salaries to fake or deceased employees, payment for work not performed by vendors and contractors, and other fraudulent payments. In Zimbabwe, an estimated 40 percent of the central government payroll consisted of fake employees in 2011 (BBC 2011). In Honduras, nearly one-quarter of teacher salaries go to so-called ghost workers (World Bank 2010). Sometimes the extent of the problem is not apparent until a government takes steps to eradicate it. After Botswana, South Africa, and the Indian state of Andhra Pradesh adopted biometric identification to weed out nonexistent claimants from their benefit rolls, for example, the number of beneficiaries dropped 12–25 percent (Gelb and Decker 2012). Digital payments allow government auditors to better spot fraud, since such payments create a data trail that they can analyze. The examples in Table 13.2 illustrate the extent of the problem.

Fraud also occurs in revenue collection, mainly through tax evasion. Examples include retail sales and professional service fees paid in cash that are not reported to tax authorities, businesses that fail to collect or pay value-added or sales taxes, and individuals who underreport their income. By definition, knowing the extent of tax evasion is difficult. If citizens pay with credit or debit cards, or business owners are required to record cash sales electronically, they create a digital trail that tax authorities can follow. In this analysis, we do not attempt to measure tax evasion because of a lack of data on its magnitude and because reducing it requires digitalizing payments by individuals and businesses throughout the economy.

Cost savings to government operations from digitalizing payment processing

Digital payments relieve governments of many burdens associated with cash, which in turn can create considerable savings. This includes the manual processes involved in collecting, counting, recording, and transporting cash—all of which can happen almost instantaneously and at zero marginal cost once digital payment infrastructure is in place. The US government cut the cost of issuing

Table 13.2. Leakage and Fraudulent Payments Can Reach Half of Government Transfers to a Particular Group of Individuals

	Examples
Fraudulent Payments for Ghost Workers	40% of central government payroll, Zimbabwe 23% of teachers in Honduras 19% of Nairobi city payroll, Kenya 18% of National Rural Employment Guarantee Scheme, India (ranges from 5% in Chattisgarh to almost 80% in Uttar Pradesh) 15% of teachers in Papua New Guinea 10% of police in Afghanistan 10% of civil servants in Ghana
Leakage in Government-to-Government Payments	87% of schools' nonwage spending in Uganda 76% of discretionary education spending in Zambia 73% of nonwage recurrent spending budgeted for regional health directorates in Chad 40% of Ngorongoro Conservation Area revenues, Tanzania 38% of health spending in Kenya 8% of municipal spending in Brazil
Leakage in Household Subsidies	58% of targeted Public Distribution System food subsidies, India 44% of social programs, India 31% of National Rural Employee Guarantee Scheme, Andhra Pradesh, India 25–50% in IAY (social welfare program) subsidies to build and renovate houses, India

Sources: Arze del Granado, Coady, and Gillingham 2010; Banerjee 2015; BBC 2003, 2011; Ghana Ministry of Finance 2012; Government of India 2005; McKinsey & Company 2010; PricewaterhouseCoopers 1999; Reinikka and Svensson 2004, 2006; World Bank 2004, 2010; World Economic Forum 2014.

federal benefits payments by more than 90 percent after it began requiring all recipients to receive federal benefit payments electronically in 2013 (US Treasury 2011). The Philippines saved $0.51 per transaction by digitalizing payments distributed through its 4Ps social-benefits program—electronic transaction costs $0.45, while cash costs $0.96 (Zimmerman, Bohling, and Rotman Parker (2014).[3] In Haiti, where an electronic transaction costs $0.50, the government saved $1.17 per transaction for the Ti Manman Cheri social assistance program (Zimmerman, Bohling, and Rotman Parker 2014).

Methodology for Calculating the Potential Value of Digitalizing Government Payments

The following equation calculates the potential value of moving from cash to digital payments for governments:

$$V_{i,t} = \sum_k (PV_{i,k,t} * c^v_{i,k,t} * \rho_k + PN_{i,t} * c^n_{i,k,t} * \Phi)$$

where i represents country i, t the current year, and k the type of government payment transaction.

[3]4Ps refers to the Filipino-language Pantawid Pamilyang Pilipino Program.

$V_{i,t}$ is the total value of savings for the government and for individuals and businesses in the economy from digitalizing government payment transactions that today are made in cash. This includes prevention of leakage and fraud as well as reducing payment processing costs.

The first component in the equation measures the potential savings from reducing leakage and fraud.

$PV_{i,k,t}$ is the value of government payment transactions of type k for country i for year t.

$c^{v}_{i,k,t}$ is the share of government payment transactions by value of type k that are made in cash or check.

ρ_k is the percent savings from reducing leakage and fraud for payment type k. We use a range for ρ_k based on empirical estimates found in the literature, discussed below.

The second term in the equation measures the reduction in processing costs by moving from cash to digital payments.

$PN_{i,k,t}$ is the number of government payment transactions of type k for country i for year t.

$c^{n}_{i,k,t}$ is the share of government payment transactions by number of type k that occur in cash or check (that is, non-digital).

Φ are the savings per transaction from increasing processing efficiency by moving from cash to digital. We use a range of values for Φ based on empirical estimates found in other studies, discussed below. We assume the value of Φ is the same for all payment types.

This analysis distinguishes between five types of government payments (represented by k in the equation above):

- G2C: payments from governments to consumers. This includes payments of salaries to government employees, cash subsidies to households and individuals, and other government payments to individuals.
- G2B: payments from governments to businesses. This includes government procurement costs paid to vendors, contractors, and other suppliers of goods and services to the government.
- C2G: payments from consumers to the government as income and other taxes and fees.
- B2G: payments from businesses to the government, from corporate income taxes, value-added taxes, and other fees.
- G2G: payments from one government entity to another, such as payments from a central government to state or local governments, or transfers to public educational and health care institutions.

A key variable in our analysis is ρ_k, which represents the magnitude of leakage and fraud in government expenditures and receipts that can be eliminated from digitalizing government payments. We reviewed the available literature for empirical estimates of the scale of leakage and fraud for different types of payments. Admittedly, only a limited number of such studies exist, and there is a wide range of reported figures for

the scale of such leakage. Table 13.2 shows examples from the literature on the scale of leakage for government payments to individuals and businesses.

This analysis uses a range of values for ρ_k, reflecting the uncertainty of the true size. For government payments to consumers (mainly salaries of government employees and household subsidy payments), we assume that leakage and fraud amount to 15–25 percent of the total value of payments. For government payments to businesses (mainly for procurement of goods and services purchased by the government), we assume that the leakage rate is smaller at 5–15 percent of the value of such payments. This reflects the fact that such payments are typically larger in scale and more likely to be audited today. For payments between government entities, we similarly assume that 5–15 percent of the value of payments is lost, for similar reasons.

Finally, for payments from consumers to the government and from businesses to the government (taxes and fees collected), we assume that 5 percent of payments are skimmed by officials or lost to bribery, based on the few reports we could find. This figure may be an underestimate. Moreover, importantly, it does not include the far larger amounts of government revenue that may be lost to tax evasion—in other words, underreporting individual or business income or sales. We do not attempt to measure the value of tax evasion, because reducing such evasion requires digitalizing incomes of individuals and businesses from all sources, which is beyond the scope of the chapter. In the section below on other potential benefits not included in our analysis, we discuss how more widespread use of digital payments across an economy could reduce tax evasion.

Another key variable in our analysis is Φ, which represents the reduction in processing costs per payment transaction from moving from cash to digital payments. As discussed above, estimates of the processing cost reduction vary. Estimates from advanced economies, such as the United States and European Union, tend to show higher cost savings of $2–$3 per payment transaction, reflecting higher labor costs in those areas. In developing countries, where labor costs are lower, the cost savings are less. Based on the experience of the Philippines and Haiti, we choose a range of $0.50 to $1.20 as the cost savings per transaction.

Focus Countries and Extrapolation of Results to All Developing Countries

As noted, the analysis focuses on seven developing countries that span geographies: Brazil, China, India, Indonesia, Mexico, Nigeria, and South Africa. The choice partly reflects the quality and granularity of available data, as well as the ability to have payment experts within each country check the results. While we would have liked to include more low-income countries in the sample, incomplete data prevented that.

The seven focus countries account for 61 percent of GDP of all developing countries. To estimate the potential value for all developing countries, the analysis extrapolates the results using their share of GDP. Ideally, we would have granular data on the share of cash versus digital payments in all developing countries,

which would make the extrapolation more precise. But lacking such data, we instead make the simplifying assumption of extrapolating results from the seven countries to all developing countries based on their GDP. This puts a downward bias on the results, as low-income countries are more likely to be using cash payments today and thus may derive a larger benefit from digitalizing government payments.

THE DATA

We draw data from two main sources. We obtain data on the value of different types of government expenditures and receipts in 2015 from national income accounts. We get these data from Haver Analytics, which sources the data directly from country financial statements. It covers data on all levels of government—central, state or provincial, and local. Data on government expenditures include, among others, social services, payroll, subsidies, and grants to individuals and businesses as well as public security expenses. Data on government revenue primarily include tax revenue, revenue from fiscal services, and other dividends and payments. We cross-checked and enriched these data based on the International Monetary Fund *Fiscal Monitor* and the World Development Indicators database of the World Bank.[4]

The McKinsey Global Payments Map is another key source of data. McKinsey & Company created this proprietary database to provide a granular view of the global payment business. The data are drawn from both public and private sources, with more than 200 in total. The data include, among other things, payment flows (volume and value) between individuals, businesses, and government entities; the channel for each payment flow (for example, cash, check, prepaid cards, credit cards, debit cards, automated clearing house payments [credit transfers and direct debits], wire transfers); the revenue and costs for providers generated through payment activities (various types of fees and interest income); and stocks of payment-related equipment (for example, number of credit and debit cards). The database covers 45 countries around the world. By applying consistent definitions and measurements across different geographies, the map is able to provide a globally consistent view of the payment industry. This chapter used the most recent release of the map, with data through 2015.

For the analysis, we obtain two key data series from the McKinsey Global Payments Map. First is the number of government payment transactions of different types, including payments both to and from the government. We also obtain estimates of the share of government payments that are made in cash and digitally. In the map, these shares are estimated using a variety of sources, starting

[4]Figures on government expenditure receipts differ from the IMF *Fiscal Monitor* for Brazil and India. For Brazil, figures are lower, as we exclude state-owned enterprises such as Petrobras. Figures differ for India because we include state government expenditures and receipts as well.

with the Bank for International Settlements *Red Book* and incorporating national data for each country drawn from industry sources.

RESULTS: THE VALUE OF DIGITALIZING GOVERNMENT PAYMENTS

Our calculations show that digitalizing government payments could create value of roughly 1 percent of GDP for most countries, equivalent to $220–$320 billion of value annually for all developing countries (Figure 13.2).[5] This includes the value of reducing leakage and fraud, and increasing efficiency of payments for governments. The range reflects different assumptions about the potential savings of each of the sources.

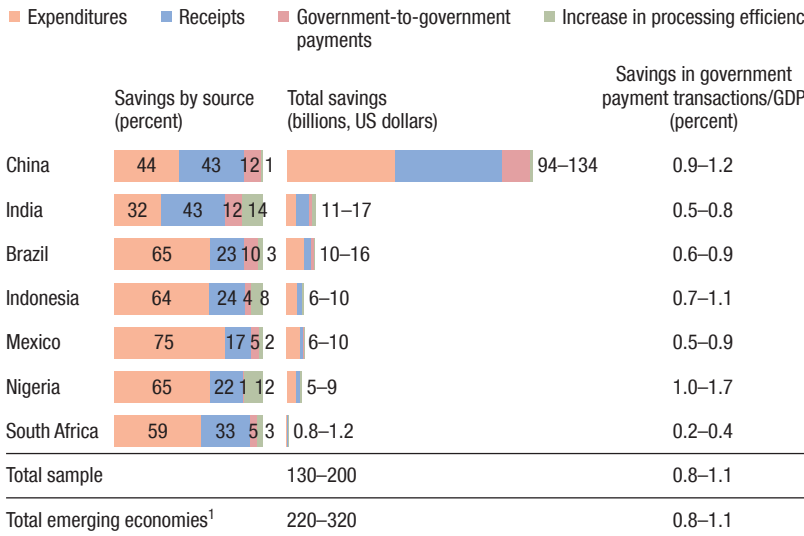
Nearly half of the total value—approximately 0.5 percent of GDP for most countries and $105–$155 billion across all emerging markets annually—accrues to governments, by reducing processing costs, leakage in tax receipts and government-to-government payments, and fraudulent payments (Figure 13.3). Of these sources, reducing leakage in tax receipts and reducing fraudulent payments account for roughly two-thirds of the value in most countries. This money directly boosts fiscal balances and could be used to reduce deficits, invest in infrastructure, fund social programs, and more.

The remainder of the value, or $115–$165 billion annually or roughly 0.5 percent GDP at the country level, comes from reducing leakage in payments to a wider range of actors across the economy. Individuals would derive some of the benefit, receiving their full salaries and subsidy payments. Businesses would benefit from preventing officials from skimming payments for their goods and services. Society would also benefit as more public spending reached its intended targets—for instance, roads and other infrastructure, health care, and education.

The potential value of digitalizing government payments varies by country, reflecting the value of government expenditures and receipts that are paid in cash or by check today. The value is particularly large in countries with a low share of digital payments in government transactions, such as Indonesia and Nigeria. Indonesia could gain $6–$10 billion annually, or as much as 1.1 percent of GDP. This reflects the large share of government subsidy programs and other payments and receipts still made in cash. This value is comparable to the annual value added of Indonesia's mineral-based products industry. Nigeria similarly has a high share of cash payments and receipts. Digitalizing government payments could generate $5–$9 billion in value each year for Nigeria, equivalent to 1.7 percent of GDP for the high end of that range.

[5]The results in the chapter are larger than those in McKinsey Global Institute (2016a), the *Digital Finance for All* report of September 2016. The chapter uses updated data and expands the analysis to include a reduction in fraud and savings in payments processing, and includes G2G transactions.

Figure 13.2. The Value of Digitalizing Government Payments in Developing Countries is $220 Billion to $320 Billion Annually
(Annual savings in government payment transactions)



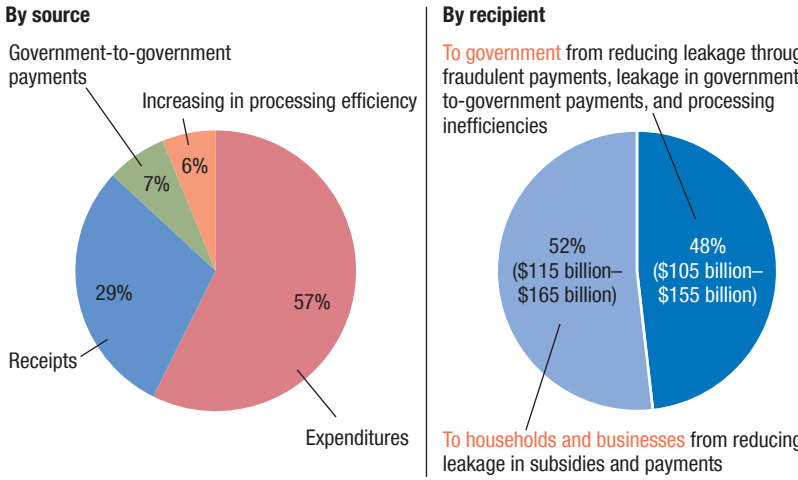
Sources: McKinsey Global Institute analysis; and McKinsey Payments Map 2015.
Note: Numbers may not sum due to rounding.
[1]Extrapolation on potential savings based on the share of sample in total GDP.

In South Africa, the share of digital government payments is comparable to the share in advanced economies, and there is less room for further gains. Still, our analysis suggests that South Africa's government could reap up to $1.2 billion annually (0.4 percent of GDP) by digitalizing government payments that are still in cash.

OTHER POTENTIAL BENEFITS NOT INCLUDED IN THE ANALYSIS

Our estimate of the potential benefits obtained from digitalizing government payments, while large, is likely a conservative figure in that it does not attempt to quantify potentially significant second-order effects. There are three important categories: improving government service delivery, for instance by improved targeting of social subsidies and reducing absenteeism; encouraging more widespread adoption of digital finance by businesses and individuals throughout the economy; and reducing tax evasion and shifting economic activity from the informal economy to the official one.

Figure 13.3. Almost Half of Savings from Digitalizing Government Payment Transactions Accrues to Government
(Annual savings in government payment transaction in developing countries, 100% = $220 billion–$320 billion)



Sources: McKinsey Global Institute analysis; and McKinsey Payments Map 2015.

Improving Government Service Delivery

Shifting to digital payments enables governments to improve delivery of services in several ways. First, digital payment of salaries for teachers, health care workers, and other government employees allows them to receive their wages regularly rather than sporadically. This simple act has been shown to reduce absenteeism of government workers. In India, for example, one study found that teachers' attendance rate is 90 percent in states with reliable digital salary payments, but only 60 to 80 percent in other states (McKinsey & Company 2010). Higher attendance by teachers improves the quality of education delivered and enables students to learn more, lifting the quality of human capital in the economy. The same effect has been observed in systems that pay health care workers digitally. Over the long term, improvements in human capital have been shown empirically to have a strongly positive effect on GDP growth.

Digital payments also enable governments to target social benefits to the poorest households. Brazil, for instance, improved the delivery of aid to its poorest citizens by switching to digital payments after consolidating four existing cash-transfer programs into one, called *Bolsa Família*, in 2003. The new system delivers 80 percent of its benefits to the poorest quartile of Brazilians, up from 64 percent under previous arrangements (Lindert and others 2010). At the same time, the administrative cost of serving Bolsa Família's 12.4 million eligible

households has declined by more than three-fourths—to 2.6 percent of the benefits delivered from 14.7 percent for its predecessor agencies (Pickens, Porteous, and Rotman Parker 2009). A final benefit of digitalizing subsidy payments has been to increase financial inclusion. In 2000, about 20 percent of Brazilian adults had bank accounts (von Mettenheim and de Lima 2014). By 2014, that had risen to 68 percent for the general population—and 99 percent for adults in families served by Bolsa Família.

Throughout the developing world, it is common for governments to use price subsidies rather than delivering cash to those in need. Using digital payments to help poor households buy basic commodities avoids market distortions that can come from direct subsidization of food, fuel, and other commodities, and significantly reduces the cost of the program. IMF researchers estimate that 43 percent of the benefit of fuel subsidies around the world went to the wealthiest quintile, because of their relatively higher consumption, while only 7 percent of the benefit went to the poorest quintile (Coady and others 2015). Globally, the research finds that ending fuel subsidies could raise government revenue by $2.9 trillion while cutting global carbon dioxide emissions by 20 percent and reducing premature deaths related to air pollution by 55 percent.

Finally, digital payments to households in need can also replace subsidies that have been distributed in kind, such as programs that deliver wheat, rice, and other grains to the poor. These programs create massive logistical challenges and are subject to leakage. The government of India, for example, spends $21 billion annually on food subsidies—but 54 percent of subsidized wheat, 48 percent of subsidized sugar, and 15 percent of subsidized rice is lost as leakage before it reaches the poor (Radcliffe 2016). Providing households in poverty with digital cash transfers instead dramatically lowers these costs. A randomized control trial in four countries (Ecuador, Niger, Uganda, and Yemen) found that cash transfers via debit cards resulted in better nutritional outcomes in all countries except Niger, and resulted in savings in all four countries that ranged from $2.96 per transfer in Uganda to $8.91 per transfer in Niger (Hoddinott and others 2013).

Spurring Broader Use of Digital Payments by Individuals and Businesses

Beyond the direct value of digitalizing government payments, a potentially larger benefit is to spur development of digital payment infrastructure across the economy and prompt broader adoption among businesses and individuals. To accelerate this process, India launched the Pradhan Mantri Jan Dhan Yojana financial inclusion initiative in 2014, leading people to open more than 280 million new bank accounts to receive government subsidy payments digitally (Government of India 2017). In November 2016, India went further by removing 500 and 1,000 rupee notes from circulation. The surprise move created short-term disruptions in supply chains based predominantly on cash, but it has also prompted millions of individuals and small businesses to sign up for mobile payment programs. Paytm, a mobile wallet provider, added 50 million new

subscribers in the three months after the cash ban was imposed, bringing its total user base to over 200 million by March 2017.

MGI Research has estimated that widespread adoption of digital finance by individuals, businesses, and governments could raise the aggregate GDP of emerging market economies over 10 years by $3.7 trillion, or 6 percent (McKinsey Global Institute 2016a). This is because shifting to digital finance produces enormous time and cost savings for businesses, financial institutions, and individuals as they conduct economic transactions. Nearly two-thirds of the GDP increase would come from raising the productivity of financial and nonfinancial businesses, as well as governments, because of digital payments. One-third of the impact comes from the additional investment across the economy that results from broader financial inclusion of people and micro, small, and medium-sized businesses. The small remainder would come from time savings by individuals enabling more hours of work. Given these enormous economy-wide benefits, the cost and investment needed to digitize government payments seems modest.

Digitalizing Payments Enables Better Tax Enforcement and Can Reduce the Size of the Informal Economy

The predominance of cash transactions spawns a large informal, or "shadow," economy of businesses that do not register their entities, pay taxes, or comply with product- or labor-market regulations. The World Bank estimated that the size of the informal economy in 2007 ranged from about 18 percent of GDP in advanced economies to as much as 50 percent of GDP in developing countries (Schneider, Buehn, and Montenegro 2010). The costs of such tax evasion can be quite high. India, for example, says its aggregate shortfall in tax collections was $117 billion in 2016 due to tax evasion. That is equal to about 6 percent of the country's $2 trillion GDP and is more than the total amount—$90 billion—that the government planned to borrow in the capital markets that year (Kumar 2016). In Mexico, one report estimates that reducing the informal economy by just 1 percent would represent $560 million of new tax revenue with no changes to tax rates (Mazzotta and Chakravorti 2014).

Shifting from cash to digital payments for businesses and consumers creates a digital trail for tax auditors to review. By using new analytical tools that can detect patterns in the digital data trail of taxpayers, auditors can greatly enhance their ability to detect fraud. In most countries, tax authorities audit 5 percent of returns filed each year or less, but they do not know if they are targeting the biggest tax evaders. Digital payments can help by generating more transactional data. Using these data in analytical models can improve detection of likely tax evasion, thereby increasing the average additional revenue captured per audit case. New machine learning algorithms that continually improve their performance based on past results have shown extraordinary improvements in fraud detection as compared to earlier algorithms.

Beyond increasing tax revenue, bringing informal businesses into the formal economy can boost economy-wide productivity by giving these casual businesses

access to capital and enabling them to invest and grow—or to fold, opening opportunities for more efficient enterprises. Once businesses are in the formal economy, compliance with health and safety regulations also improves. Of course, governments will have to tread a fine line as they seek to expand digital payments while also reducing tax evasion: sudden step-ups in tax enforcement have been shown to have unintended consequences, including a reduction in the use of digital payments by informal firms.

CONCLUSION

Digitalizing government payments and receipts can help the public sector in emerging market economies substantially increase revenue without raising tax rates, and eliminate tens of billions of dollars in waste and fraud. In addition, digitalizing payments can help reduce corruption and bribery, enabling government spending to reach its intended target. This analysis estimates that the value for all developing countries is equivalent to around 1 percent of their GDP, or equivalent to more than all official development aid in 2015.

Our findings come with several caveats. First, while we employ the best data available, gaps exist, particularly in valuing cash payments by local and provincial governments. Second, important second-order benefits exist that we do not attempt to quantify, such as improving government service delivery, reducing tax evasion, and catalyzing broader adoption of digital finance among businesses and consumers. Calculating the value of these benefits, particularly over the long term, would increase the value of digitalizing government payments considerably. Finally, capturing the value of digitalizing payments requires more than investing in technology. While digital payments make it more difficult for officials to skim from government payments and increase the ability of governments to detect fraud, political will is required. The significant vested interests among those currently benefiting from corruption will resist change.

Digitalizing government payments is not a small task and will come with risks that need to be managed. Purchasing and implementing new accounting and payment systems is a significant undertaking in cost and time. For businesses as well as governments, the value of such systems is often derived from redesigning operational processes while implementing new systems. Risks include those associated with cybersecurity and IT robustness against crashes or even power failure. The shift toward digital payments also requires governments to establish thoughtful approaches to developing privacy laws to both protect and maintain the trust of citizens and other residents.

We recognize that this will be a major undertaking for governments, many of which already face unmet demand for public services and have large fiscal deficits. But the results of this chapter suggest that the potential value will far outweigh the costs and generate significantly positive returns for government fiscal balances and for society.

The need is considerable for further research on the impact of digitalizing government payments and the most effective ways to do so. Much of the evidence on leakage in payments for household subsidies comes from a series of studies in India since 2010. More research is needed on the impact of digitalizing government payments on reducing leakage, fraud, and program administration costs in more countries around the world. There have been at least two randomized control trials, but trials in different settings are important to see how local settings affect results. Research is also needed on the second-order benefits of digitalizing government payments, particularly in improving government service delivery, and the impact on education and health outcomes. Finally, new technologies are emerging, such as blockchains, which may open new avenues for efficiency in payments and in creating secure, transparent contracts of all kinds. Developing countries that currently lack digital payment systems may have an opportunity to leapfrog to the next generation of technologies.

Digital payments are the lifeblood of a modern economy, enabling efficient, secure transactions. Governments can improve their fiscal balances and play a positive role in catalyzing adoption of digital finance across society by adopting digital for their own payments—a win-win for all.

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