



Public Finance Goes Digital

Technology is reshaping how governments raise and spend money

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In Kenya, people can pay their taxes on their mobile phones. In India, they receive subsidies and welfare payments directly into their bank accounts, which are linked to unique biometric identifiers. In several advanced and emerging market economies, tax authorities collect information on sales and wages in real time, which gives them immediate insight into the state of the economy. Public finance, like so much else, is undergoing a digital revolution.

Public finance is the art of raising and spending money to deliver services and benefits, redistributing income, and smoothing the ups and downs of the business cycle. How effectively governments do these things depends crucially on their ability to collect, process, and act on a vast array of information: how much companies and workers earn, how many people are unemployed, who qualifies for government benefits.

Digitalization is starting to reshape this informational core of the way tax and spending policies are designed and carried out. It offers tools not only to improve the effectiveness of existing policies but also to introduce entirely new ones. But there's a dark side: digitalization has intensified concerns about privacy, confidentiality, and cybersecurity while adding to the larger debate over inequality and redistribution.

Rich troves of information

Through digital systems, standardized reporting formats, and electronic interfaces, tax authorities are better able to access the rich troves of information collected by the private sector on such things as bank transactions and interest income. Authorities in Australia and the United Kingdom, for example, receive real-time data on wages paid by employers. In Brazil and Russia, electronic invoicing systems allow immediate access to data on firm sales.

Better data collection, combined with increased processing power, allows governments to improve existing ways of collecting taxes. Electronic filing makes it easier and cheaper for taxpayers to fill out tax returns and for governments to process them. Access to third-party information is now so complete that a small but growing number of tax authorities prepopulate tax returns, so that taxpayers need only verify the information presented to them.

In Brazil, the Public System of Digital Bookkeeping allows authorities to determine a company's income tax obligation. China uses invoice-matching technology to verify that merchants seeking value-added tax (VAT) refunds were in fact charged the tax, a large step toward solving a problem that has long stymied tax collectors around the world.

Digital footprints

Data on individual taxpayers can now be aggregated in powerful ways. In the United Kingdom, HM Revenue and Customs' Connect computer system draws on a wide range of government and corporate sources, as well as individual digital footprints, to build a profile of taxpayers' total income, which can then be used to assess the accuracy of the information they report. Such increased data processing capabilities can also be used to improve revenue forecasts. And with increased capacity to store and analyze data, governments can exploit the correlation of tax receipts with the business cycle to anticipate, and perhaps forestall, an economic crisis or monitor their cash balances to assess liquidity and borrowing needs.

The growth of the peer-to-peer business model, which allows buyers and sellers to transact across a digital platform, is also offering new opportunities to improve tax collection. In Estonia, Uber Technologies can report income earned by drivers directly to the country's tax administration (see Box 1). Peer-to-peer platforms can also act as custodians; an example is Airbnb, which withholds hotel taxes on behalf of the property owners who use the platform in 10 advanced and emerging market economies.

Digital technologies, including electronic payment systems, are not only lowering the cost of collecting taxes but also creating the potential for expanding tax bases (for instance, by improving the identification and monitoring of taxpayers and making it easier for taxpayers to comply by such means as the use of mobile technology). They

are also improving the delivery of social welfare payments. Digitalizing payments has significantly reduced the cost of administering programs such as Ti Manman Cheri in Haiti, which helps mothers support their families, and 4Ps in the Philippines, which provides cash grants to the poorest families.

Biometrics

India has led the way in the use of biometric technology to extend social benefits to a larger number of people (see Box 2). Technology that monitors and records biometric characteristics, such as fingerprints and iris scans, allows more accurate and cheaper authentication of an individual's identity, ensuring that benefits reach only the intended recipients. McKinsey & Company has estimated that digitalizing government payment processes (both revenue and expenditures) could deliver savings of at least 1 percent of GDP in developing economies. This estimate overlooks second-round beneficial effects of improvements in public service delivery and widening the tax base. For example, the introduction of the new tax on goods and services in India has increased the number of registered taxpayers by 50 percent in less than one year.

Developing economies are also starting to tap the vast potential offered by mobile technology. In

BOX 1: ESTONIA PAVES THE WAY WITH X-ROAD

At birth, every Estonian is assigned a unique string of 11 digits and given a digital identity card. Citizens use these cards to vote online; consult medical records; access public, financial, and medical and emergency services; and file taxes. All told, the government provides more than 600 such services online.

In 2011, Estonia introduced X-Road, a platform that enables the secure exchange of Internet-based data between information systems. Public and private sector firms and institutions can connect their information systems with X-Road without a fee. The system has enabled digitalized income-tax declarations by linking citizens' employment and tax records.

X-Road saved the equivalent of 820 years of work in 2016, according to government estimates. Digital signatures have been estimated to permit a one-time savings of about 2 percent of GDP, the equivalent of one workweek a person.

sub-Saharan Africa alone, there were 420 million unique mobile subscribers in 2016, a number that is expected to increase to 535 million (roughly one subscriber for every two people), according to Groupe Speciale Mobile Association, an international trade organization. Kenya has been a pioneer in the adoption of mobile payments technology. Its M-Pesa system, launched in 2007, can be used to pay taxes. Such solutions may be particularly promising for fragile states, where conflict and corruption hamper tax collection and benefit payments. Mobile technology can also be used to deliver better public services, track medical records, and disseminate information.

The use of biometric authentication and digital payment systems to better target subsidies may reduce reliance on blunt redistributive instruments. One example is the application of reduced VAT rates for necessities, which, while aimed at the poor, benefit the wealthy even more. Better-targeted payments that can reliably provide relief to

the poorest would be more efficient and effective. More controversially, technology has the potential to create new sources of tax revenue. Many companies, such as Facebook and Alphabet's Google, now collect hugely valuable information on their customers when they interact with them online. If it's true, as some say, that "data is the new oil," do we need a special regime to tax it, as we would a natural resource?

Secure storage

Secure storage of sensitive data is another crucial area for fiscal authorities in developing and advanced economies alike. This is where blockchain, or distributed ledger technology, holds considerable promise. Blockchain increases trust in transaction systems by putting data into shared, distributed ledgers in a way that creates permanent records of transactions that cannot be lost, altered, or stolen. In the United Kingdom, the Department of Work and Pensions is experimenting with the use of blockchain to record benefit payments and reduce overpayment of claims.

While digital technology can be harnessed to improve existing tax systems, it also offers tools for devising new ones. One example: current income tax systems arbitrarily use a one-year period as the basis for assessment. But this is too short a time horizon, because people's well-being depends on their income over a much longer period—in principle their entire lifetime. It is also too short a horizon for tailoring benefits to immediate needs. Technology could enable collection of taxes and delivery of benefits over more appropriate time spans.

Big data too could be used to assess risks of noncompliance and predict the behavioral impact of new tax and spending policies. Widespread use of blockchain technology could in principle obviate the need for a VAT, which is charged at every stage of production, with businesses allowed an offset for taxes paid on inputs. An entire chain of transactions, securely recorded (a very big "if"), could allow a tax account to be maintained continuously at each stage of production. The tax could then simply be calculated and imposed at the point of final consumption.

Limits and pitfalls

Of course, there are limits to the benefits of digital technology. It is no substitute for the basics of getting procedures and operations right.

BOX 2: BANK ACCOUNTS AND BIOMETRICS IN INDIA

In recent years, several government initiatives have enabled large-scale digitalization of the Indian economy. A national biometric identity program, Aadhaar, has registered about 1.15 billion residents. A program to increase access to the financial system was introduced in August 2014. By March 2017, more than 280 million bank accounts had been opened.

India's government has capitalized on these initiatives to improve the delivery of social benefits. The Direct Benefit Transfer program, launched in 2013, significantly changed the way subsidies and payments are delivered by transferring them directly into bank accounts linked to beneficiaries' Aadhaar biometric identity. (One such program involves subsidies for cooking gas.) In April 2017, Indians were required to include their Aadhaar number in tax filings. More recently, they were required to link their individual bank accounts to Aadhaar. The 2018 budget has proposed an Aadhaar program for businesses as well.

Though estimates vary, the Ministry of Communications and Information Technology in March 2017 put savings from such programs at the equivalent of about \$7 billion over the previous two and a half years. The costs of the Aadhaar system through its first billion-plus registrations were about \$1.16 a person, or \$1.3 billion in total.

Prepopulating tax returns with erroneous information, for example, could encourage cheating because taxpayers have little incentive to correct mistakes that reduce their tax bill. Political, institutional, and human capacity constraints may hinder government innovation and uptake of advanced solutions. Corrupt bureaucrats and taxpayers might bypass digital systems, and cryptocurrencies might be used to evade taxes. And for all the talk of low-income countries harnessing new technologies to overtake more advanced economies, the potential for leapfrogging will be limited if large segments of the population lack access to the digital world. The past, it is worth remembering, is littered with unsuccessful and costly IT projects.

What's more, digital technology raises new concerns in the realms of cybersecurity, privacy, and fraud. The theft of data from US agencies such as the Internal Revenue Service and State Department have highlighted the vulnerability of government systems. Some European countries have faced multiple fraudulent VAT refund claims that are too small individually to draw attention but significant in the aggregate. We should expect the digitalization of public finance to involve an arms race in which victory may not always go to benevolent governments.

In the corporate sphere, digitalization has amplified challenges to the current system, which focuses on a company's brick-and-mortar presence. Companies such as Alphabet, Amazon, Apple, and Facebook can have substantial economic presence in countries without having much, or any, physical presence. Still more fundamental is a point touched on earlier. Many believe—and these are very contentious issues—that business models in which commercial value (not least for advertisers) is provided not just by the business itself but by the users of an online service fit poorly into current approaches. In response, some European countries have proposed taxing some element of turnover, rather than profits, when such user-generated value is significant. Singling out digital companies for special tax treatment is inherently problematic, however, as these technologies become critical to the operations of effectively all companies. Moreover, advances in artificial intelligence and robotics have aroused fears of rising unemployment and widening inequality. If these fears prove true, policymakers may face the prospect of a shrinking

tax base and rising social welfare payments. Some observers suggest taxing new labor-replacing robot capital. Others see that as in effect taxing progress and call instead for fairer distribution of capital ownership and taxing the profits generated through automation, which they say would preserve productivity improvements associated with new technologies. The idea of a universal basic income, while costlier than means-tested systems, is also gaining support.

Managing change

But these are issues that go far beyond public finance. The digital revolution presents markets, society, and governments with the challenge of adapting to continual change. For governments, both the positive and negative effects are likely to be profound. Given the speed of innovation by the private sector, the urgency of action to harness the opportunities and mitigate the risks

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is clear. Experience so far suggests that many benefits are within reach. To reap the full dividends of the digital revolution, countries must focus on solutions that address their most pressing priorities. Developing economies struggling to identify and help vulnerable populations may for instance benefit most from biometrics and information systems (social registries) used to implement social programs. Others may turn to electronic payment systems and mobile technology to reduce leakages. But all will need to take steps to avoid the pitfalls—digital exclusion, cyberattacks, fraud, privacy infringement. That will require strong fiscal, political, and governance institutions. **FD**

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This article draws on Digital Revolutions in Public Finance, published by the IMF in 2017 and edited by the authors. It can be downloaded from <http://www.elibrary.imf.org>