

TRANSLATIONAL ARTICLE

Govtech against corruption: What are the integrity dividends of government digitalization?

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Abstract

Does digitalization reduce corruption? What are the integrity benefits of government digitalization? While the correlation between digitalization and corruption is well established, there is less actionable evidence on the integrity dividends of specific digitalization reforms on different types of corruption and the policy channels through which they operate. These linkages are especially relevant in high corruption risk environments. This article unbundles the integrity dividends of digital reforms undertaken by governments around the world, accelerated by the pandemic. It analyzes the rise of data-driven integrity analytics as promising tools in the anticorruption space deployed by tech-savvy integrity actors. It also assesses the broader integrity benefits of the digitalization of government services and the automation of bureaucratic processes, which contribute to reducing bribe solicitation risks by front-office bureaucrats. It analyzes in particular the impact of digitalization on social transfers. It argues that government digitalization can be an implicit yet effective anticorruption strategy, with subtler yet deeper effects, but there needs to be greater synergies between digital reforms and anticorruption strategies.

Policy Significance Statement

Corruption is one of the greatest policy challenges of emerging economies. Digitalization has become a potent driver for state modernization and public governance, boosted by the smarter use of data by integrity actors. Yet, beyond the hope and the hype, policymakers lack actionable frameworks to fully harness the integrity dividends of going digital. This article puts forward policy recommendations to devise comprehensive digital strategies against corruption. It analyzes the rise of integrity-tech solutions based on data analytics focusing on public finances. It looks at the extent to which broader government digitalization helps reduce corruption vulnerabilities, especially in social transfers. The article contributes to the growing literature on the value of digitalization for better public policies.

1. Moving Beyond Hope and Hype

Digitalization is one of the most promising tools for combating one of the world's most enduring challenge: corruption. The coronavirus crisis has accelerated the digital transformation of governments around the world, providing a renewed impetus to reinvent government centered on citizens (Santiso, 2020c). It is also boosting the global fight against corruption, propelled by smarter use of data and the rise

of integrity analytics by tech-savvy integrity institutions and oversight bodies. The pandemic has made salient the importance of agile, accessible, and seamless government services built upon a foundation of integrity. It has also exposed the enduring corruption vulnerabilities of analog systems in the health sector in particular, as the pandemic response entailed a heavy recourse to emergency rules for government procurement (Cetina, 2020a).

For policy reformers in emerging economies, digital technologies are rapidly becoming their strongest ally in the fight against corruption and advancing better government. Digitalization can improve government efficiency, service delivery, and citizen engagement. Digitalization reduces red tape and bribe solicitation risks in bureaucratic procedures by automatizing government procedures, streamlining processes, and limiting in-person interactions. It also enhances oversight by tech-smart accountability institutions and data-savvy civil society. As such, it facilitates the development and deployment of integrated approach to reducing corruption vulnerabilities in government operations particularly exposed to corruption risks, such as tax administration and public procurement.

Governments have intensified their digital transformation in the past decade, through end-to-end digitalization of public services, integrated government service portals, as well as critical enablers such as digital identity, data sharing, and digital payments. These are complex reforms requiring political heavy lifting that had often been held back for political or budgetary reasons. They are now unlocked and accelerated. Digitalization has become central to governments' postpandemic recovery plans as part of the twin green and digital transition. For example, the European Union has allocated 20% of its €750 billion recovery package toward investments in digital transformation in what has been labeled a "digital decade".¹

Recovery packages around the world reflect a sharp increase in the role of the state with massive fiscal injections. Managing them effectively and efficiently requires more agile models of governance, while ensuring integrity. Digitalization is also resetting the relationship between states and citizens, contributing to placing citizens first and at the center of government, to deliver better, faster, and seamless services. Digital natives, equipped with better data and analytics capabilities, are expecting more participation in public policies and integrity in government. In that context, digitalization is a critical strategy to transform both internal machinery of government in terms of its operating processes and external relationships with its key constituencies, citizens, and businesses (Shim and Eom, 2008). Refitting governments for purpose in the digital era has thus gained prominence in the global agenda, in particular on the need for better international regulation of new technologies.

Yet, despite all the hype and the hope, we know little about the relationship between government digitalization and corruption control. At a macro level, the correlation between government digitalization and corruption reduction is well established, but little is known about the specific policy channels through which digitalization reduces corruption, which types of digital reforms impact which types of corruption risks, and what other institutional and regulatory reforms are needed to make integrity analytics work. These relationships and effects are particularly hard to untangle, as corruption itself is fraught with immense measurement challenges.

This article thus seeks to unbundle the integrity benefits of digitalization and the digital strategies deployed by governments and integrity actors to prevent corruption. It deploys a typology of the policy channels through which digitalization helps prevent, detect, and deter corruption, first by generating actionable data on corruption vulnerabilities in high-risk policy arenas; second, but building up capabilities to use this data effectively, within government itself but also by integrity actors; and third by reducing corruption risk upstream through the automation of bureaucratic procedures, the reduction of red tape, and the mitigation of bribe solicitation opportunities in government transactions and social transfers. The article concludes with key policy recommendations to better leverage digital transformation for

¹ On Europe's so-called "digital decade," see the digital targets set by the European Commission for 2030 in European Commission, 2021.

anticorruption, as digitalization alone does not automatically translate into positive anticorruption outcomes. As such, greater synergies between digitalization reforms and anticorruption strategies should be pursued.

2. Unbundling the Integrity Benefits of Digitalization

The correlation between digitalization and anticorruption is well established at a macro level (Gallego 2002; World Bank, 2016, 2020a,b,c; Rustiarini, 2019). Government digitalization, measured by the expansion of government digital services,² has been shown to reduce corruption³ (Andersen, 2007; Mistry, 2012; Choi, 2014; Zhao and Xu, 2015; World Bank 2020c), improve government effectiveness⁴ (World Bank, 2020a,c), and ameliorate the business environment (Martins et al., 2018). For example, examining evidence from 127 countries, Shim and Eom (2008) show that e-government mitigates corrupt behaviors by bolstering internal managerial controls, while e-participation enhances government transparency and accountability. Interestingly, these variables have greater effects on corruption control than bureaucratic professionalism, bureaucratic quality, and law enforcement.

However, the causality of this relation remains an unsettled matter and evidence on the impact of digitalization on corruption is still embryonic and largely anecdotal. Furthermore, it is not easy to untangle the corruption gains of digitalization, from its broader efficiency gains. At a more policy level, it is still difficult to untangle the effects of specific digitalization reforms on different types of corrupt behaviors. A better understanding of which specific policies impact which types of corrupt behaviors would help policymakers devise more effective anticorruption solutions. This article will not delve into causality relations between digitalization and corruption in econometric terms; rather, it reviews in a systematic manner existing evidence on the policy channels through which digitalization impacts on anticorruption, in particular “petty” bureaucratic corruption.

When assessing the impact of digitalization in the fight against corruption, there are important preliminary considerations to bear in mind, however. First, digitalization has long been a tool for state reform and government modernization. Governments have leveraged new technologies to modernize the machinery of government for decades, in particular in central policy areas of public finances such as tax administration, treasury operations, government procurement, and expenditure management (Gupta et al., 2017), through integrated financial management information systems. Govtech reforms have included integrated financial management information systems, electronic tax invoicing, and e-procurement platforms. In turn, government digitalization has enabled and accelerated the push for transparency, access to information, and open data. What is different now is the role of disruptive technologies, the exponential growth of data, and the expansion of analytics capabilities facilitated by developments in computing power.

Second, it is important to keep in mind that integrity is not usually the prime driver for digital reforms and anticorruption not the primary objective of digital government reforms. Government digitalization has traditionally been driven by efficiency considerations to rationalize public spending, especially in times of crisis and budget restrictions, improve the agility and responsiveness of government services, and increase users’ experience and satisfaction with public services. In this context, automation helps optimize the cost-effectiveness of government operations, improve the quality of public services, and better meet citizen expectations, especially among the young, tech-savvy “digital natives.” If integrity is not the stated goal of digital reforms, the question then becomes whether government digitalization produces anticorruption positive externalities. It also begs the question as to whether its anticorruption intent is implicit, yet intentional, as a tactical approach deployed by reformers seeking to lessen resistance to more explicit anticorruption strategies.

² Measured by the United Nations’ e-government development index.

³ Measured by Transparency International’s corruption control index.

⁴ Measured by the World Bank’s worldwide government indicators.

Third, it is also important to untangle the specific integrity benefits of different types of digital reforms. Digitalization upsets the “corruption equation” (Klitgaard, 1988) by reducing unchecked discretion, increasing transparency, and enabling accountability (Basel, 2017). It reduces opportunities for rent-seeking by self-interested officials seeking bribes to speed up bureaucratic procedures through the automation of tasks, the digitalization of services, and the reduction of in-person interactions. But corruption has many faces and shapes (Campos and Pradhan, 2007), from petty bribery and grand theft to subtle forms of undue influence through wheel greasing and access money (Ang, 2020). Hence, the anticorruption potential of digitalization may vary depending on the roots, nature, and symptoms of a given type of corruption.

In this article, we distinguish three ways through which government digitalization and new technologies help detect and deter corruption: (a) first, increasing actionable transparency by improving the quality and availability of data in terms of access to information and transparency by design; (b) second, detecting corrupt behaviors and suspicious patterns, by enabling the reuse of data for analytics purposes and generating better intelligence on corruption risks; and (c) third, reducing bribe solicitation risks by making transactions impersonal and automatizing bureaucratic procedures.

3. Increasing Actionable Transparency

In the wake of the global coronavirus crisis, the acceleration of digital transformation is permeating the integrity space in many different ways, in particular through greater transparency and better data. Actors within the integrity ecosystem—within and beyond government—are increasingly using disruptive technologies and data analytics as anticorruption devices, exploiting the greater availability of better data. Prominent among these actors are government entities that manage public resources, such as finance ministries, tax authorities, procurement agencies, and accountability institutions, such as audit offices, civil society and, increasingly, civic-tech start-ups (Santiso, 2020a). In Denmark, for example, the application of data analytics in welfare fraud detection led to savings of over 60 million euros in 2019 (European Commission, 2020).

In particular, the combination of greater government transparency and access to government data is providing integrity actors greater insights on corruption risks and enabling leveraging data for analytics purposes. The exponential surge of data in reusable formats, in terms of volume, variety, and velocity, combined with increasing computational power, endows integrity actors with information that is more actionable for policy purposes. Integrity-tech and fraud analytics refer to digital and data technologies that are specifically used to detect, disrupt, deter, and prosecute corruption. The insights and intelligence derived from data-powered integrity analytics, often using artificial intelligence and machine learning technologies, provide powerful tools for more targeted, risk-based approaches to corruption control. Integrity-tech builds on previous gains in access to information and open data, as part of the open government agenda since the early 2010s. As such, propelled by the “data revolution,” fraud analytics is a game changer in the integrity space, both within oversight agencies in the public sector and amongst compliance officers in the private sector (United Nations, 2014).

Nevertheless, the effective deployment of integrity analytics also presents various challenges. Some are related to the underlying data infrastructure in terms of the availability, quality, and integrity of data. The Open Data Charter (2018) identifies 30 datasets that are critical for anticorruption, ranging from government contracts and asset declarations to tax payments, lobby registers, and corporate ownership. These datasets are, at best, uneven and incomplete, which prevents integrity actors from fully leveraging their anticorruption potential. Other challenges are linked to data governance in terms of privacy protection, regulatory hurdles, and data interoperability. Fully exploiting the value of data for anticorruption requires triangulating datasets from various government entities and independent agencies, some of which are particularly sensitive and with strong data protection guarantees. As such, the integration of government data within government is particularly challenging, required breaking data silos across public bodies. Still, what are likely today’s most important challenges relate to the policy actions to be taken based on the evidence generated by integrity analytics—that is the

translation of data analytics into targeted integrity reforms, regulatory improvements, and judicial investigations.

A high-corruption risks era that is benefitting from greater transparency and better data concerns public registries and in particular property and land registries. Digitalization is proving useful to mitigate corruption risk in the management of land assets and property registries. In developing countries, conflict over land ownership gives rise to a range of corruption risks and is often a source of conflict over the ownership of land assets and their trading. In Rwanda, where land administration has traditionally been riddled with corruption, the government introduced digitally enabled reforms in 2008. The first phase focused on land mapping and titling, and a second phase, which started in 2012, focused on managing a digital land registry. These efforts resulted in a reduction in bribery and petty corruption, according to Shipley (2020). New technologies such as blockchain help ensure the integrity and immutability of the information on property rights and land tenure. In Georgia in 2018, 1.5 million land titles were published on a blockchain-based platform, which helped strengthen the integrity of the land registry system by providing an immutable chain of records on the ownership and value and an unalterable history of transactions of land titles (Santiso, 2018; Shang and Price, 2018). It remains to be seen, however whether these solutions can scale to have a systemic impact.

Tax administrations are using digital technologies and data intelligences to make the process of paying taxes easier and more transparent, based on the analysis of increasingly granulate tax data. They have long been intensive users of new technologies to increase voluntary tax compliance and prevent tax fraud. Red tape in taxation is indeed considered a major hindrance to economic efficiency and a critical source of corruption. Making tax payments less complex and burdensome can generate significant fiscal and governance benefits, especially in informal economies. Colombia, for example, is undertaking a major digital overhaul of its tax administration that includes the creation of an analytics department (Inter-American Development Bank, 2020). In Korea, the Chungcheongnam-do provincial government, a recipient of the United Nations Public Service Award in 2018, has strengthened the disclosure of budget status, revenues, and expenditure on its website (United Nations, 2018).

The digitalization of tax administration is contributing to improve the quality of tax services by facilitating tax payments and encouraging voluntary compliance. Evidence shows that the e-filing of tax obligations lowers tax compliance costs,⁵ improves tax collection, and reduces tax fraud (World Bank, 2016; Kochanova et al., 2020). It also reduces opportunities for the solicitation of bribes by tax officials, in particular those interacting with tax payers. Other reforms, such as the digitalization of tax administration procedures, pre-filled tax returns, and online tax payments, have also been found to reduce tax compliance costs (World Bank, 2016; World Bank and PwC, 2020). Interestingly, the integrity impacts of e-filing tend to increase when combined with complementary reforms such as digital payments.

In Kenya, Ndung'u (2017) found that the introduction of a digital platform, combined with the implementation of an integrity program, has enabled the tax authority to increase transparency in its operations and reduce opportunities for corruption. Ndung'u assesses the impact of the introduction of M-Pesa, a money-transfer program that facilitates tax payments. M-Pesa utilizes web-enabled application systems for the administration of domestic taxes (the iTax system) and a mobile phone application that facilitates tax payment and taxpayers' access to tax information (the M-Service platform). Ndung'u shows that digitalization has reduced face-to-face interactions between taxpayers and tax officers and, as a result, opportunities for bribery. It has also allowed the revenue authority to reduce tax collection costs, with many small and previously undocumented businesses starting to use mobile phones for tax payments.

The automation of tax administration is also generating a wealth of data to better detect vulnerabilities and irregularities. Data mining, artificial intelligence, and social networking analysis are boosting revenue authorities' ability to detect tax evasion, especially in high-risk sectors, such as the construction, real estate, and art industries. In Britain, for example, the revenue agency has extended its data analytics power

⁵ Tax compliance costs include the number of tax payments, the time required to pay taxes, the probability of tax inspections, and the perception of tax administration as a hindrance to doing business.

to reduce the “tax gap.” Its Connect system analyzes taxpayer data and monitors discrepancies through social network analysis to identify potential tax evaders (Financial Time, 2017). Its predictive algorithm then identifies people most at risk of committing tax fraud and helps devise preemptive actions through behavioral nudges. It is estimated to have secured £3 billion in additional tax revenue between 2008 and 2014. Taking into account the £80 million costs of the system, this represents a 37.5–1 return on investment in its first 5 years.⁶

Combined with artificial intelligence, machine learning has become another powerful tool to disrupt fraud, drawing out patterns not directly seen by humans (Kaiser, 2020). Mexico’s tax authorities identified 1,200 fraudulent companies and 3,500 fraudulent transactions within 3 months of deploying an artificial intelligence tool (Aarvik, 2019). Similarly, *India’s Union Finance Ministry Project Insight* monitors data from various sources, including social media, to detect spending patterns and compares the same data with tax records (Kaiser, 2020).

4. Leveraging Integrity Analytics

Equipped with better and more actionable data, integrity actors can leverage it using advanced analytics and artificial intelligence to detect suspicious patterns, identify risks, and uncover corruption. Integrity institutions and civil society are not the only actors benefiting from greater insights and better intelligence on corruption risks. Integrity analytics is also a potent tool in the hands of central government agencies that are responsible to enforce government policies and regulations across government sectors, especially at the subnational level.

A policy area in which integrity analytics has been intensively deployed is government procurement, a particularly high-risk area (Neupane et al., 2012). Central government procurement agencies are deploying analytics tools more intensively and effectively in recent years, especially to control corruption in high-risk sectors and subnational governments. In South Korea, Georgia, Rwanda, and Estonia, changes in procurement policies have focused on increasing transparency and improving data quality in procurement processes. These reforms have been reinforced by advanced e-procurement platforms that have standardized processes and automated procedures along the procurement cycle and, in turn, have generated a wealth of procurement-related data. The integrity benefits of e-procurement range from greater predictability of the procurement process, reduced information cost and collusion risks, easier access to bidding information, improved market access and competition, greater oversight, and audit capabilities (Transparency International, 2014). By digitalizing procurement processes and bidding procedures, thus reducing paper-based processes that can be more easily fiddled with, e-procurement innovations tend to reduce corruption risks, although evidence remains mixed. These efforts have indeed led to substantial increases in the level of competition and greater transparency regarding the identity of bidders and contract winners. However, while e-procurement lowers administrative costs, increases bidder competition, and reduces the prices of contracts, empirical evidence on its impact on grand corruption remains inconclusive (Kochanova et al., 2020). This is partly due to the fact that fraudulent bidders are able to circumvent corruption controls and exert undue influence at less-monitored stages of the contracting process, such as contract renegotiations (Campos et al., 2021).

Gradually, public contracting agencies have moved beyond the digitalization of bidding processes to the use of contracting data to gather intelligence on corruption risks through risk-mapping and red-flagging. They have heavily invested in improving the quality, reliability, and reusability of procurement data for analytics purposes. The procurement agencies of over 30 national and subnational governments—including Australia, Chile, Colombia, France, and Ukraine—have adopted the open contracting data standard developed in 2015 by the *Open Contracting Partnership* to better structure the

⁶ The Connect system is estimated to have prevented £4.1 billion in lost revenue as a result of the criminal investigations it helped trigger between 2010 and 2014.

data they generate through their e-procurement platforms, making it possible to mine it for suspicious patterns and transactions.

South Korea has been a pioneer in procurement fraud analytics. Its *Bid Rigging Indicator Analysis System*, introduced in 2006, was the precursor of business intelligence systems deployed by public procurement agencies to uncover cartel activity and identify bid rigging. The system predicts the probability of bid rigging by analyzing large amounts of bidding data from a large number of public agencies. Similarly, in 2016, Ukraine made the use of its e-procurement platform mandatory to all public agencies and developed the ProZorro platform to scrutinize its 4,500 daily bids. In its first 2 years of operation, ProZorro saved the government US\$1.9 billion and increased competition in procurement (OECD, 2019). Nevertheless, as Aarvik (2019) shows, fraudulent bidders have been able to game the system. When Ukraine's state audit office developed 35 risk indicators that would trigger closer inspection, bidders adapted their behavior to avoid these fixed criteria.

The COVID-19 crisis has exposed new risks in government contracting related to the abuse of emergency procurement. Emergency procurement is often carried out through direct contracting, circumventing standard auction-based processes that tend to be more cumbersome and lengthier. Many countries have sought to mitigate these risks by releasing their COVID-19 spending in open data formats. For example, Paraguay, with support from the Inter-American Development Bank, created an open data platform that tracked in real time all COVID-19 spending, including emergency programs, government subsidies, public contracts, and donor grants. These developments are often part of comprehensive open data platforms designed to track the implementation of public investments along their entire value chain (Khan et al., 2018). Colombia, for example, developed an open data platform to track the use of mining royalties and the infrastructure projects that they finance. A recent evaluation by Lauletta et al. (2019) found that the platform increased the efficiency of public investment projects and reduced monitoring costs, both for independent overseers and within the government itself.

Oversight, audit and anticorruption agencies are another set of integrity actors that are becoming increasingly data-driven, often creating dedicated data units and innovations labs to leverage integrity-tech innovations for their own work. In the past decades, the gradual opening-up of budget and procurement data has enabled the development of business intelligence tools designed to detect corruption vulnerabilities. The audit agencies of Mexico, Colombia, and Brazil, for example, are using artificial intelligence to red-flag potential irregularities in government procurement. These initiatives have proven particularly useful during the pandemic by uncovering anomalies in the emergency procurement of health equipment, especially at the local level.

Audit offices have become increasingly savvy in their use of integrity analytics to identify high-risk transactions and implement risk-based approaches to government auditing (Cetina and Santiso, 2022). In 2017, the Brazilian internal audit office developed a machine learning system, *Alice*, that automatically analyzes bidding contracts to detect suspicious patterns and identify irregularities. In 2018 and 2019, *Alice* was used to monitor contracts totaling US\$600 million (Cetina, 2020b). In Colombia, the audit office developed an analytics platform, *Océano*, that triangulates contracting data with company registries in order to detect anomalies and flag suspicious transactions. Between 2014 and 2019, *Océano* exposed the concentration of 27% of the seven million large government contracts in a limited number of bidders, a trend which was more acute at the municipal level (Cetina, 2020b). Similarly, the artificial intelligence algorithm of the Mexican audit office is capable of automatically detecting contracting irregularities at the sub-federal level by the country's 7,881 spending entities. In Chile, the audit agency's tech-based monitoring system tracks potential conflicts of interest analyzing government officials' asset declarations.

However, tech, per se, is not a substitute for clear legal frameworks and proactive independent auditors. It is important to underscore that while innovations in integrity analytics help auditors perform their responsibilities more efficiently, they do not replace the need for auditors to act on these insights and enforce accountability. Rather, it should be used to enhance the efficacy of laws and those who enforce them. To this end, in its 2019 Moscow Declaration the international organization of audit institutions committed to make better use of data analytics in audits and advance greater openness of data, source codes, and algorithms.

A challenge that government agencies are often confronted to is their limited capacities to absorb technological innovations. They have nevertheless found new allies in a new brand of start-ups seeking with a social vocation, the so-called civic-tech and govtech start-ups (Santiso and Ortiz, 2020; Cetina and Santiso, 2022). Increasingly, tech-based, data-powered start-ups are seeking to have positive social impact and generate public value by partnering with civil society in the fight against corruption. For example, the French start-up Linkurious and the Swedish start-up Neo-Technology helped the *International Consortium of Investigative Journalists* make sense of the trove of data leaked from the Panamanian law firm Mossack Fonseca, an effort that led to the Panama Papers' global scandal. More recently, govtech start-ups have begun to partner with government entities to devise innovative solutions for the public sector (Santiso and Ortiz, 2020).

These integrity-tech start-ups are increasingly supporting anti-money laundering solutions, due diligence and regulatory compliance efforts. In Mexico, for example, the national anticorruption commission set up an "anticorruption digital marketplace" with open-source integrity-tech solutions. To catalog the recent growth in these initiatives, in 2018, the World Economic Forum created a tech4integrity platform to serve as a global reference hub for integrity-tech innovations. The rise of integrity-tech start-ups is rapidly becoming one of the most dynamic and promising trends in the tech for integrity space. They also contribute to empower citizens in the oversight of government. They complement and built-up crowdsourcing solutions that have been deployed in many countries and cities around the world. In Spain, for example, Madrid created an interactive platform, *Decide Madrid*, to consult citizens who can, individually or collectively, raise concerns and make proposals to improve public services. In Australia, the South Australian regional government set up an open platform for participatory budgeting, *Fund my Community*, to identify and finance projects to improve the lives of disadvantaged, isolated, or vulnerable citizens. More recently, the city of Bogotá in Colombia created a single citizen window, *Bogotá Participa*, to consult citizens on municipal priorities and participatory budgeting.

5. Reducing Bribe Solicitation Risks

The surge of tech innovations and data analytics in the integrity space has captured the spotlight, with its hope and hype. Nevertheless, significant integrity benefits may come in a subtler form. These are often derived from the digitalization of public administrations that reduce opportunities for corruption upstream in the policy cycle and delivery chain. In emerging economies in particular, the expansion of government digital services and the digitalization of social transfers have had a significant impact on bureaucratic corruption.

In fact, government digitalization can prove to be a potent integrity strategy, mainly through the digitalization of government services and the automation of administrative procedures. Petty bribery in everyday government services and bureaucratic procedures has a direct impact on people's quality of life and trust in institutions (Roseth et al., 2018). For individuals and small business, the costs of bureaucratic red tape can be significant. According to Transparency International (2017), in 2017, one third of Latin Americans paid a bribe to access a public service they were entitled to. In Mexico, in 2019 and 2020, the costs of red tape and regulatory burden at the federal level represented 3.4% of GDP (Gonzalez Briseño and Espinosa-Wang, 2021).⁷

The digitalization of governments can have three integrity side effects. First, it reduces arbitrary interference by unscrupulous public officials who abuse their discretion by soliciting bribes to speed up administrative procedures and "grease the bureaucracy's wheel." The automation of internal bureaucratic processes cuts discretion in the machinery of government and the service delivery chain, while not increasing formal procedural controls and coercive measures. Research indeed suggests that

⁷ The federal statistics agency of Mexico, INEGI, estimates that petty bribery alone costs the economy US\$650 million or 0.4% of GDP in 2019, that is, an average of about US\$200 per victim (El Financiero, 2020).

rigid procedural rules might have counterproductive effects on corruption control, for example, in government procurement (Kwon, 2014). Digitalization allows for a more effective enforcement of existing rules. These efforts typically entail automating standard processes, increase access to information, and reduce reliance on paper-based processes (Santiso, 2019, 2021b). They include the streamlining of bureaucratic processes through administrative simplification and process re-engineering, often through ad-hoc de-bureaucratization initiatives and reforms in regulatory policy. The combination of digitalization and simplification of bureaucratic procedures tends to improve both their transparency and reliability. In recent years, many countries are also deploying digital payment solutions to pay for public service fees, which further reduce in-person interactions with civil servants and therefore bribery risks.

In 2015, Argentina decided to go paperless, with the digitalization of administrative procedures, the introduction of digital authentication, and the expansion of digital services (Alfie, 2018). The goal was to make administrative procedures more efficient and less prone to tampering. The government embraced a dual strategy: on the one hand, it ended paper-based processes and implemented digital services and, on the other hand, it simplified administrative requirements to the greatest extent possible without having to alter underlying regulations. The simplification program targeted the productive sector to cut red tape faced by the private sector, which resulted in the streamlining 480 procedures and the elimination of 600 unnecessary and easily manipulatable norms. It generated savings to the productive sector estimated at US\$2.1 billion (Ghersinich Eckers, 2020). Similarly, the social security agency ANSES deployed an artificial intelligence system, *Laura*, to improve both the agency's internal operating efficiency and its services to pensioners.

A second integrity side effect of government digitalization is the expansion of digital public services that are directly accessible on-line and end-to-end. These efforts originally entailed making available online information on the process, requirements, and paperwork required to complete an administrative procedure. They now also entail putting the entire process online, from end to end, allowing citizens to complete and monitor it remotely. By digitalizing public services, governments aim first to improve the effectiveness and efficiency of service delivery, but by limiting arbitrary discretion, these reforms also reduce red tape and thus petty corruption (Basel, 2017). This is especially important for widely used critical services around people's life events in particular. For example, Mexico digitalized its birth certificates and Argentina its drivers' licenses—two high-impact public services that are particularly vulnerable to bribe solicitation when people seek to expedite the process for obtaining either document.

A third integrity side effect of digitalization relates to the reduction in information asymmetries between government, businesses, and citizens, so there is greater transparency on the status of administrative procedures (Charoensukmongkol and Moqbel, 2014; Adam and Fazekas, 2018). The digitalization of public services automatically also generates better insights on bottlenecks and vulnerabilities in the service delivery chain. It allows to track administrative procedures throughout its various stages and the myriad of public entities involved. This is particularly important for services critical to economic activity, such as business licenses, construction permits, and property registration.

A policy area that is particularly prone to corruption and for which the automation of administrative procedures is especially effective at curbing discretion is customs administration. Following the example of tax authorities, custom agencies are gradually going digital, automating key procedures, and data management systems to facilitate transborder trade. Procedural red tape and the significant discretion wielded by customs officials make customs a major source of corruption risk. Singapore, Rwanda, and Georgia have undertaken important digitally driven customs reforms. In the early 2000s, Colombia undertook important digital reforms of its customs agency with the explicit aim to reduce corruption. Laajaj et al. (2018) also show that the digitalization of customs procedures and import transactions has improved importers' productivity, reduced the time to clear customs, increased predictability, and promoted judicial recourse.

The private sector is particularly concerned with bribery risks when interacting with government entities and has developed guidelines to better address those risks. Global business increasingly appreciates the value of digital government to mitigate corruption risks in sensitive processes such as licensing

and registration, regulatory compliance, tax payments and custom duties, and government procurement. It has become an active advocate for better digital government services. As part of their compliance policies, companies are starting to mandate their managers to use of digital channels. For example, the Anti-Bribery and Corruption Policy of GSK, a multinational pharmaceutical company, encourages its managers to use digital channels in their interactions or transactions with governments.⁸ Similarly, Unilever's anti-bribery code of business practice, the world's largest consumer goods company, encourages its managers to use e-government solutions for licensing, procurement, and taxes. Some companies, such as Trace International, have started to include measures of digital governance maturity in their assessment of country risk.

Digitalization has also made important strides against corruption in social policies and antipoverty programs notably through the digitalization of social transfers. Available evidence suggests that digitalization helps antipoverty programs in various ways: it facilitates the biometric identification of beneficiaries (Gelb and Diofasi, 2018), increases the ease of government payments (Radcliff, 2016, 2017), and improves the tracking of transfers to beneficiaries (Banerjee et al., 2016). The introduction of digital registers, digital identity, and digital transfers has improved the precision of public benefits programs and reduced the diversion of public funds (World Bank, 2021a,b). These three digital innovations have been particularly effective in improving social spending.

The digitalization of beneficiary registries has helped improved the targeting of social transfers and the removal of ineligible beneficiaries. In South Africa, provincial governments have used fingerprint-based biometric smart cards to deliver pension benefits and social grants. By 2013, 20 million social grant recipients had been registered by the South African social security agency. Gelb and Diofasi (2018) found that digitalization detected 650,000 ineligible recipients, saving the government over US\$65 million annually. The digitalization of civil servants' registers has also reduced fraud in payroll outlays in the public sector.

The introduction of universal digital identity has further improved the targeting of social transfers. India is probably the world's greatest experiment on digital identity. Launched in 2009, its "Aadhaar" digital identity program now reaches all of India's 1.15 billion residents through unique biometric identifiers that allow to automatically determine who is eligible to which social program (Roy and Rai, 2017). There is evidence that biometric identification has reduced corruption in employment and pension programs (Muralidharan et al., 2016), as well as in fuel subsidy programs (Barnwall, 2018). Using a randomized control trial, Muralidharan et al. (2016) found that Andhra Pradesh's government reduced the leakage rate of its *National Rural Employment Guarantee Scheme* from 30.7 to 18.5% on average by digitalizing it. Banerjee et al. (2016) show that digital government reduced fiscal leakages in India's workfare program, although it did not necessarily improve program outcomes.

Digital identification is also instrumental in curbing corruption in other government transfers, such as public salaries and emergency aid. Nigeria, for instance, eliminated over 43,000 ghost workers from the public payroll following an audit using biometric identification in 2011, which saved the government US \$60 million (Gelb and Diofasi, 2018). In Ghana, the digitalization of civil service databases and salary payments has helped eliminate "ghost workers" and reduced the public-sector wage bill (Cangiano et al., 2017). Biometric information has also reduced leakage in emergency aid. For example, AID:Tech, a govtech start-up, helped deliver emergency aid to Syrian refugees in Lebanon in 2016. Its blockchain-based decentralized digital identity and interoperable protocol enabled digital assets to be delivered in a transparent and reliable manner.

The introduction of digital payments is providing a further driver of integrity in social transfers, as corruption often runs on cash. The best-known demonetization initiative of recent years is probably that of India (Roy and Rai, 2017). In November 2016, the Indian government decided to withdraw large-denomination bank notes—about 87% of currency in circulation. India's finance minister explained that the government was motivated by a desire to reduce tax evasion and expand the tax base, stating that "the predominance of cash in the economy makes it possible for the people to evade taxes" (Roy and Rai, 2017, p. 266).

⁸ These may include e-invoicing; e-filing of taxes, contributions, licensing; e-procurement, e-tendering, e-sourcing.

The move from cash to digital transfers is not a minor issue for development countries. In the social realm, cash transfers are the most widely used social assistance intervention and many governments have introduced new initiatives specifically in response to COVID-19 (Davidovic et al., 2020). A decade ago, Brazil improved the delivery and targeting of its public benefits by switching to digital payments after consolidating four existing cash-transfer programs into one, *Bolsa Familia*, in 2003. It also reduced the administrative costs of serving *Bolsa Familia*'s 12.4 million eligible households, which have since then declined by more than three-fourths, down to 2.6% from a previous high of 14.7% of the total benefits delivered (Pickens et al., 2009).⁹

During the pandemic, governments accelerated the shift from cash to digital social transfers—in particular pension benefits—to mitigate the risk of contagion and, at the same time, reduce fraud.¹⁰ Prior investments in the digitalization of beneficiary registers and payment methods have played a critical role in scaling-up emergency transfers during the pandemic (Gelb and Mukherjee, 2020). Colombia, for example, was able to leverage various databases to better identify the beneficiaries of its COVID-19-related emergency transfers, *Ingreso Solidario*, through the use of a preexisting integrated system for potential beneficiaries of Colombia's social programs, SISBEN.

Lund et al. (2017) find that digitizing government payments in developing countries could save about 1% of GDP annually, equivalent to US\$220–\$320 billion per year. These savings stem from reduced leakage in government benefits and tax payments, reduced fraud and tax evasion, and increased cost savings from digitizing payment processes. Nevertheless, progress is slow and uneven, even in more advanced economies. In the United States, for example, the federal government completely phased out paper checks for recipients of social security in 2013.

6. Mind the Gaps

Beyond the use of digital innovation and data intelligence to combat corruption, this article has shown that the digitalization of government has more subtle, yet broader anticorruption impact. This is especially the case in high-risk policy areas related to the management of public finances. However, to fully exploit the integrity benefits of digital transformation, there needs to be greater synergy between digital government reforms and anticorruption strategies.

Overall, a recent report by the Development Bank of Latin America (Cetina and Santiso, 2022) finds that government digitalization has five main integrity benefits: (a) it allows for greater access to information and open government data, and thus increases actionable transparency; (b) it reduces discretion and limits in-person interactions in government transactions and services by unscrupulous public officials, limiting opportunities for rent-seeking and bribe solicitation; (c) it also reduces transaction costs for service users, which increases voluntarily compliance by citizens and companies; (d) it expands competition in government contracting, which drives down costs and reduces collusion; and (e) it increases trust in institutions and governments' capacity to deliver, by facilitating access to public services and making them more efficient, simpler, and reliable.

Four policy insights and conclusions can be drawn from this analysis of the digital transformation of anticorruption policies and practices. First, government digitalization policies can be an effective anticorruption strategy, precisely because they are identified or called as such. The integrity benefits of digital transformation can be significant, often with lasting structural impact. They are also difficult to undo as the digital revolution grows in ubiquity. These positive externalities of digital reforms contribute not only to the deter rent seeking behavior but also to anchor integrity in government operations, altering incentives and changing mindsets. In emerging economies, the anticorruption intent of digitalization is often implicit

⁹ The digitalization of salary payments in the public sector also has important integrity benefits. In 2009, when the government of Afghanistan started to transfer their pay to its police officers by mobile phone rather than in cash, police officers started to receive their full pay for the first time (Lund et al., 2017)—unlike in the past, nothing was skimmed off by intermediaries.

¹⁰ Governments' shift to digital transfers mirrors the expansion of digital payments in the economy. The pandemic has accelerated the use of digital payments and the development of Fintech solutions, including digital wallets and QR-codes on mobile phones.

and indirect, because the political costs of digital reforms tend to be lower than those incurred by anticorruption strategies. Moreover, and although less visible and harder to measure, the anticorruption externalities of digitalization make it a better investment than the punitive approaches of criminal investigation and prosecution.

Second, it is important to stress that digitalization alone does not automatically translate into positive anticorruption outcomes. Its impact hinges on those digital and analytical tools being effectively used by integrity actors to enforce accountability, which, in turn, requires an enabling regulatory and institutional environment. Furthermore, these digital tools need to be adapted to the local context and the broader political economy in which they operate and require tackling corruption's political roots (World Bank, 2016, 2020b; Kaiser, 2020). Institutional incentives, state capacities, and strong leadership are key. Hence, to make digitalization work as an anticorruption device, it is equally important to reform analog institutions.

Third, the impact of digitalization on public integrity is contingent on policy choices by policymakers and politicians. Policy content does matter. Digitalization can make transparency more agile and enforce transparency, but the amount of transparency is actually a policy decision. In other words, the integrity dividends of digitalization are contingent to the extent to which public policies are increasing governments' transparency obligations, in both the digital and analog worlds. Moreover, the decision to apply digitalization in different policy spaces is also a political decision. One thing is to further government digital services, which tend to be low-value, high-volume corruption opportunities; another matter is to pursue digital reforms in high-value policy arenas, such as government procurement, wage bill management, and customs operations.

Fourth, digitalization also creates new corruption risks that need to be mitigated. The sharp rise in government spending on technology as part of the response to and recovery from the pandemic and the increasing complexity of digital solutions create their own set of vulnerabilities. Often, government tech procurement is complex and exposed to implementation failures, cost overruns, and vendor capture.¹¹ Such risks are often the result of the excessive outsourcing of tech expertise in the development of digital government projects. The financial management of government tech is an area which requires greater attention. Furthermore, digitalization creates new digital forms of corruption, as corrupt networks are, too, leveraging tech innovations (Camilo and Santiso, 2022). The more governments go digital, the more they expose themselves to cybercrime, ransomware attacks, and new corruption risks associated with the manipulation of digital records and the misuse of digital identity. Governments are thus realizing that to effectively invest in and deploy govtech solutions, they need to scale up their in-house digital expertise. The new corruption risks generated by digitalization are indeed an area requiring further research.

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¹¹ In 2013, the United States experienced a massive failure in its healthcare.gov platform, designed to implement the Affordable Care Act and to enroll citizens in health insurance. The website crashed upon take-off. The system, initially budgeted for US\$93.7 million, ended up costing US\$1.7 billion.

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