

# The trillion-dollar prize: Plugging government revenue leaks with advanced analytics

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# The trillion-dollar prize: Plugging government revenue leaks with advanced analytics

Few fiscal opportunities are bigger than reducing revenue leakages from tax and payment abuse. Now, new sources of data and new analytics tools are giving governments the upper hand.

Rare is the government today whose fiscal challenges don't handcuff leaders seeking to provide for the future through investments in infrastructure, education, and healthcare. Often the difference between funded and deferred policy priorities comes down to the perennial and seemingly intractable challenge of revenue lost to tax noncompliance and improper government payments.

Our analysis suggests that close to 20 percent of government revenues worldwide, or about \$5 trillion, go missing each year, either in dollars owed but never paid or in outbound payments gone awry. In this era of growing demands for government services and pressing budget challenges worldwide, few fiscal opportunities loom larger than reducing these leakages (Exhibit 1).

The good news is that truly game-changing advances in big data and advanced analytics are providing governments with capabilities that would have been difficult to imagine even five years ago. While applying these new capabilities in revenue administration and payments is still a young science, some pioneers are already securing large gains. In one case, a ministry of finance set up a new unit to combine data sets from tax, customs, and business registrations, along with external data from the banking sector, to target fraud and noncompliance. The team quickly integrated new data and analytics to identify suspicious patterns of customs declarations and tax payments. Within a matter of weeks, the unit was testing interventions

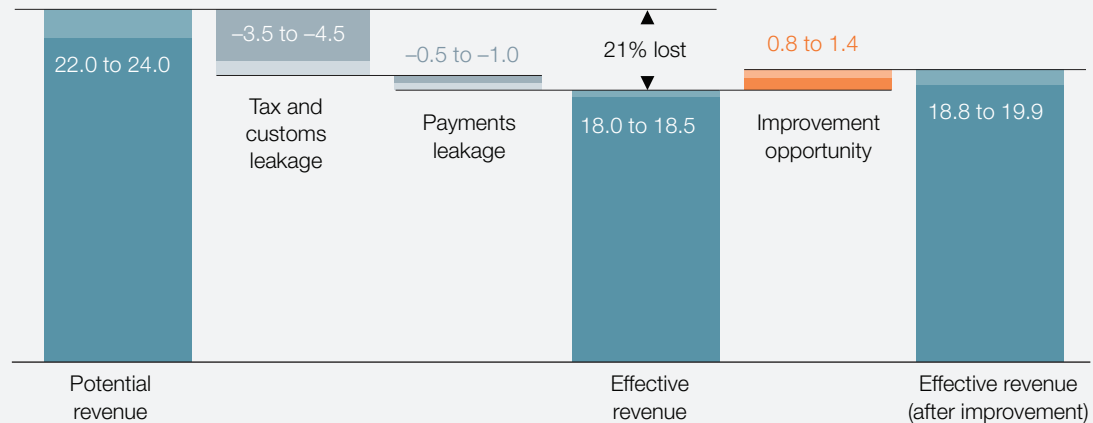
and plugging revenue gaps that previously would have taken years to uncover. In another example, a finance ministry and a tax authority collaborated on a completely new approach to compliance infused by analytics strategies and identified opportunities to increase total revenue collected by 5 percent over several years.

Overall, our research suggests that in larger, developed economies, these capabilities have the potential to increase total government revenues by 1 to 3 percent. In less-formal, developing economies, the opportunity is much larger, as much as 10 percent or more. To put this number in context, worldwide government deficits are expected to be 2.6 percent of estimated GDP in 2021.<sup>1</sup> Improving revenue collections just 1 percent of GDP would eliminate over one-third of the deficit, equipping leaders to make and implement better policy choices.

Unfortunately, a handful of common barriers stymie government efforts. First, we find that very few governments globally have taken the systematic approach necessary to deploy these new capabilities at scale. Second, agencies often lack exposure to and experience with the latest innovations. Third, well-meaning civil servants may resist analytics-driven approaches that may challenge long-held assumptions and practices. Finally, effective use of analytics requires mastery of rapid, small-scale tests that can push the boundaries of traditional organizational agility.

**Exhibit 1** **Leading practices enabled by data, analytics, and more-proactive approaches to revenue collection could save \$1 trillion worldwide.**

**Government revenue leakage in 2015, \$ trillion**



Source: GOV.UK; Internal Revenue Service; Organisation for Economic Co-operation and Development; US Office of Management and Budget; World Bank; McKinsey analysis

Still, leading governments have realized that the value at stake greatly outweighs these challenges, and there are emerging practices that can be deployed to surmount them. Citizens, increasingly accustomed to businesses’ sophisticated use of data and analytics, will create urgency and expectations of innovation within governments. The increasing pace of innovation will make the gap between followers and innovators more difficult to surmount.

This article explores why governments now have unparalleled opportunities for improving their outcomes in revenue administration and payments, how big the opportunity could be, and what it takes to effectively seize it.

**A rapidly changing game**

The substantial leakage of government revenues and improper payments is a persistent challenge

for governments. However, three trends create a unique and immediate opportunity for governments to mobilize for greater success—the availability of data, the plummeting costs of data and analytics tools and storage, and new techniques for translating analysis into action.

**The explosion in available data**

The rapid digitization of consumer and business life is transforming the way that companies and governments conduct their business. Digitization creates a massive trail of data that can support more-effective revenue and payment programs. There is an emerging consensus globally that governments can and should use this data to reduce revenue leakage, subject to strong privacy constraints prescribed by policy makers. (See sidebar “Addressing privacy head-on.”)

Consider the following examples:

- As *e-commerce* swells and cash becomes less prevalent, tax authorities can unearth businesses that have been “off the radar.” In developed countries, the share of cash transactions by value has tumbled by half in the past decade. Across Sweden, Norway, and Denmark, the share is less than 1 percent (Exhibit 2). More than half of Sweden’s 1,600 bank branches no longer keep cash on hand or take cash deposits.
- The volume and quality of satellite and other *digital imagery* brings new opportunities to use geospatial data to address fraud and leakage, such as by identifying suspicious payment addresses and detecting undervalued properties for tax purposes.
- Governments themselves have increasingly *digitized operations*, making previously offline or limited digital data sets much richer and timelier. Examples include data on business ownership, professional licenses, travel records, and police and court records.
- *Private companies* also have significant amounts of data that can inform government administration. For example, power-consumption patterns may indicate a likely presence of a business operation in a home or a larger commercial enterprise than reported.
- *Cooperation and data sharing* among global tax authorities is accelerating, with standardized reporting by and about multinational enterprises and on individual holdings. Examples include the Organisation

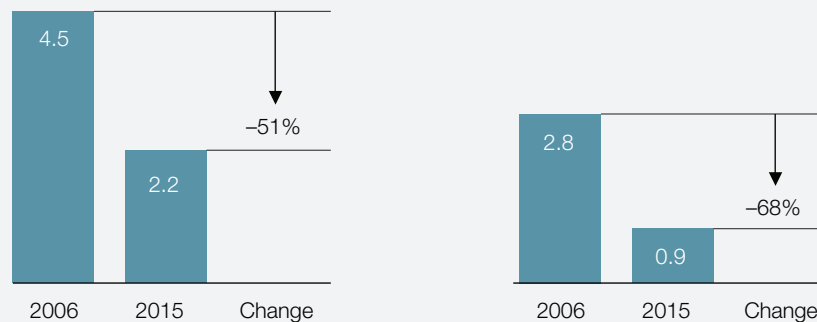
## Addressing privacy head-on

Data-driven transformations require governments to become much more adept in accessing and analyzing large amounts of data. Successful programs tackle data-privacy concerns (which vary by jurisdiction) through a handful of common best practices, including:

- maintaining strict protocols to ensure that data analysis is performed using masked data wherever possible and only those with a need to know can see personally identifying information
- creating transparency around how data will be used (for example, by limiting which agencies can use the data for which purposes)
- developing streamlined channels for citizens to respond when data that agencies rely on are inaccurate or out-of-date
- providing clear public communications on the outcomes achieved through usage of big data so that the public understands that better analysis means improved outcomes with less irritation for those playing by the rules

**Exhibit 2 The share of cash payments by value has fallen sharply, in some regions to below 1 percent.**

Share of cash payments in developed countries, %



Source: McKinsey analysis

for Economic Co-operation and Development's (OECD) Common Reporting Standard (CRS) and the US Foreign Account Tax Compliance Act (FATCA).

**Newly accessible and affordable tools**

Not only are more data available, but it is now significantly faster and cheaper to extract, process, store, and analyze them. This makes it possible to rapidly transform data into insights and to put both data and insights directly in the hands of decision makers.

Legacy processes for ingesting and storing data are being completely transformed by the following:

- rapid advances in *data assembly and storage* capabilities (for example, through cloud technologies, unstructured data lakes, and data warehouses)

- an expanding set of *tools to manage and manipulate unstructured data* such as free text images, sounds, and video
- quickly evolving *algorithms that can automatically detect patterns* across vast sums of complex data (for example, to detect unusual concentrations of payments going to a specific geography, or to uncover hidden links with known fraudsters)
- *advances in visualization tools* that allow analysts to convert algorithms to insights leaders can understand (for example, to explore relationships in the data to better understand why algorithms flagged specific transactions)

Now consider how governments are putting these new tools and data to work to identify large and untapped revenue pools. First, advanced models

can predict compliance risks that are overlooked by human judgment. For instance, governments are predicting the likelihood of insolvency and unpaid tax debt based on subtle changes in financial statements or payment behaviors such as timing and method of payment.

Second, governments can create an outside-in estimate of business revenues and tax liability, which can then be compared to self-reported values, for example, by using data on electronic payments and then estimating how much cash the business should be reporting. An example is using statistical techniques to predict net income based on business type, specific geography, and benchmarks on input costs.

Finally, agencies can detect linkages between seemingly disconnected entities in ways that can reveal fraud. For example, network analysis can detect organized fraud hubs improperly claiming government benefits or identify healthcare claims submitted by providers colluding to commit insurance-reimbursement fraud.

#### [Innovative ways to operationalize analytics insights](#)

It's no secret that government agencies and employees tend to be risk-averse, in ways that can stifle innovation. As a result, most agencies make changes in big steps: they deliberate, agree on direction, and immediately roll out the change to all citizens, sometimes after a short operational pilot. With new analytics tools and skills, agencies can control risk and drive rapid improvements by shifting from this "big bang" approach to innovation to a more controlled, iterative "test-and-learn" approach. (See sidebar "Mastering the art of test and learn.")

For example, one tax authority tackled tax evasion in the small- and medium-size-enterprise sector through a robust test-and-learn program. A vast number of businesses underreporting income were identified through analytics, first by combining

data sets across time and agencies and then iterating advanced predictive models to estimate the likely revenues of each business. The agency carefully tested a range of new treatments, both "hard" enforcement actions and "soft" reminders and educational communications, to determine the return on investment of each treatment for each business. The testing included outreach to taxpayers and their advisers and varied the channels used (mail, phone calls, and mobile messages) as well as the messaging and the actions initiated. For example, authorities sent some businesses a request for self-correction, others a request for limited additional information, and some a notice of audit conducted by mail or in person.

Combining advanced analytics with carefully designed randomized control tests can help governments make the most of insights from new data and analytics, while minimizing resource demands and reducing risks. In addition to immediate revenue improvements, this rapid, successful innovation can fuel a hunger for analytics-driven initiatives across the organization. As a result, we see government teams moving away from their previous mind-set of no action holding the lowest risk to safely designing and testing innovative solutions.

#### [A trillion-dollar opportunity for governments](#)

These trends—in data, processing, analytics, and agile operations—have converged to open new pathways to recapture revenue leakages. While specifics will vary by geography, our research reveals substantial revenue opportunity available to governments worldwide.

Government revenue leakages come in many forms. Revenue lost from direct tax leakages alone—the "tax gap"—stubbornly hovers around 5 to 15 percent of tax revenue for developed nations and can be over 60 percent in emerging economies. This represents underreporting and underpayment by individuals and businesses in the formal economy

# Mastering the art of test and learn

The best data-driven organizations run frequent small tests of different potential changes. For instance, Internet marketing tests run hundreds of randomized, controlled A/B trials, showing one of two versions of a message to viewers and comparing the resulting consumer behavior to select the best option.

This agile, test-and-learn approach differs from a traditional “pilot then roll out” approach in the following ways:

- **Test results drive the rollout.** Test results determine whether to proceed at all, with which approach, and for which population. The testing drives the rollout plan, rather than the other way around, as done in traditional pilots.
- **Technical skill sets power the process.** Analytics experts define the decisions being evaluated, design statistically valid samples

and control groups, and capture and evaluate test data.

- **The approach is much more flexible.** Testing multiple treatment options may involve varied call scripts and different versions of notices and website journeys—all while tracking the citizens’ responses separately.
- **Failures are small and opportunities for learning great.** An evidenced-based test-and-learn program dramatically reduces the cost and risk of failure, improves overall return on investment, and builds rapid buy-in.
- **Successes scale quickly.** Once interventions have been tested on a small scale, the winning approaches can be rapidly and confidently scaled up, while lackluster approaches can be either abandoned or significantly retooled.

as well as activities in the informal sector that are not visible to tax and customs authorities. It also includes honest mistakes from citizens who are busy trying to provide for their families, run small businesses, and are confused or out-of-date with frequently changing tax policies or requirements.

In addition, improper payments due to fraud, waste, and abuse cost at least 5 percent of total payments. Improper payments can range from the relatively innocuous, such as an individual claiming a tax deduction for ineligible expenses, to the egregious,

such as large-scale fraudulent benefit claims. In the United States, the Government Accountability Office estimates that in 2016 the government lost \$144 billion, or 4.6 percent of all government payments, to improper payments, with some multibillion-dollar programs reporting over 20 percent in leakage.<sup>2</sup>

Beyond the estimated \$5 trillion of direct costs of revenue leakages worldwide, the indirect costs of this lost government revenue are also large—a significant debt-servicing burden, uncertain and

reduced social benefits, lack of investment in infrastructure for the future, inequity, and, in some cases, social and political unrest.

How much revenue can governments recapture with data and analytics? Taking full advantage of the advanced-analytics revolution to reduce revenue leakage is still in its early days, with many countries yet to formally establish programs. Only a handful have a track record of more than five years. Still, our experience in both the private and public sectors suggests that governments can capture about 20 percent of the leakage over several years of concentrated effort. Worldwide, that represents a trillion-dollar opportunity.

The private sector has a longer track record in deploying well-planned analytics transformations including these latest advances. For instance, in the insurance industry, machine-learning algorithms have improved fraud detection in insurance claims, in some cases by as much as 50 percent. In retail, analytics-driven demand forecasting is expected to reduce forecasting errors by 30 to 50 percent, making overall inventory reductions of 20 to 50 percent feasible. In equipment-intensive industries, the explosion of data and associated analytics has enabled entirely new capabilities of predicting when parts will fail, allowing for substantial reductions in downtime for repair.

In addition to helping with fiscal challenges, these advances have the potential to improve citizens' confidence in government, contribute to greater fairness in the system, and advance government sustainability.

### **Capturing the analytics opportunity**

We believe that the tools and approaches discussed here are broadly accessible. The technology behind the data-and-analytics revolution is sufficiently mature, and successful private- and public-sector use cases abound. The investment in IT, data, and

analytics infrastructure is modest compared to the potential revenue gains. Of course, transforming agencies to take full advantage of data and analytics requires a comprehensive strategy and dedicated leadership. But while a full-scale transformation takes time, governments can get started quickly and begin capturing revenue gains immediately.

In our experience, we have found seven practical steps that help governments establish a successful analytics program and begin to tap these gains. These steps can help governments achieve rapid momentum and progress, while putting in place measures to prevent typical setbacks and failures. These steps include the following:

- *Enlist a small team of experts with real-world, relevant expertise to launch the effort.* Even large organizations can start with a modest entrepreneurial effort led by individuals with real-world experience applying analytics techniques and a clear understanding of what the end state looks like. Agencies may attract private-sector leaders, often from the financial-services sector or the digital/high-tech community, with an interest in public service. A team of two or three practitioners, supplemented with specialized external expertise as needed, can create substantial momentum, even in organizations with many thousands of employees. One large developed-economy tax authority recruited senior leaders with experience in advanced analytics in credit-card marketing and risk analysis to lead its new analytics and innovation unit.
- *Pair analytics experts with rising operational leaders, charging both with two-way learning, rapid results, and shared success.* Small, cross-functional groups can quickly learn from each other and unlock massive creativity in problem solving. Consider pairing an up-and-comer in the tax authority's audit function



with a seasoned analytics leader, or link an operational leader in an unemployment-benefits agency with a data scientist. Such pairings drive a virtuous cycle of demand, as individuals inside operating units get hooked on new analytics techniques and share their experience with others. At the same time, analytics experts focus more clearly on improving operational results.

- *Design a portfolio of analytics initiatives that ranks challenges and opportunities for delivering impact.* The most successful teams boldly tackle a few truly advanced approaches to solve very large problems and a few smaller, quick wins that serve as confidence builders for the organization. Organizations that fail to design a diverse portfolio end up overweighting highly speculative initiatives that can stall, or they select a large number of smaller initiatives that are difficult to distinguish from “business as usual.”
- *Commit senior leaders to fully support and provide resources for the analytics transformation, celebrating successes and quickly learning from failures.* Recognize that those in a government agency’s rank and file are likely to perceive that they are taking risks by working differently. Leaders should actively engage in the effort from the beginning—for example, hosting kickoff events, personally reaching out to team members to celebrate landmarks and successes, and broadly recognizing team learning. These visible support gestures are critical to building and maintaining enthusiasm. Collaboration between the public and private sectors can also accelerate learning and success.
- *Deploy agile processes, a nimble technology team, and analytics “sandboxes” to accelerate progress.* Launching analytics-driven transformations need not involve large-scale

IT programs. A small, nimble technology team can ensure a secure yet flexible environment to enable analytics innovation. With a “sandbox” environment that encourages experimentation, innovation can proceed without creating demands on the systems and platform that run critical day-to-day operations. Often this can greatly accelerate and simplify future IT requirements, saving considerable time and money.

- *Execute iteratively, moving quickly to improve based on initial findings.* Most agencies equate speed with risk. Combining analytics with test-and-learn techniques can eliminate this trade-off, but organizations need a push to operate differently. Governance mechanisms designed for large, multiyear implementation should be tailored for the smaller, faster test-and-learn approach. While the first iterations of this new operating paradigm benefit from substantial senior-leadership time to move analytics-driven innovation forward at pace, subsequent cycles are much more self-sufficient.
- *Measure and report on progress regularly.* It is critically important to pay attention to how the benefits of analytics initiatives are measured and communicated. Progress in detecting fraud and reducing errors can easily be swamped by day-to-day operations and expectations. Having an established baseline for comparing results and clearly communicating progress are important in building support for long-term change and a continuous-improvement program.

Finally, in embarking on such a journey, government leaders may face many naysayers. Critics will cite a variety of hurdles—fear of a big, ongoing IT transformation; “organ rejection” of new approaches by the existing culture; data-privacy concerns; fear of overburdening constituents; and the scarcity of data-science

talent. These are legitimate concerns, requiring engaged leadership and regular communication to overcome. In our experience, a modular approach that orients the organization to learn by doing and to take on risks in manageable increments holds the key for success.

For example, one government was eager to use analytics to improve tax compliance but feared the effort might derail the complex technology modernization program already in progress. However, leaders realized that by using secure analytics “sandboxes” and small-scale tests, they could start their analytics program in parallel and accelerate the improvements they sought, while generating buy-in to the new IT system. The result was an on-time IT modernization, with faster adoption and rapid compliance results.



For governments everywhere, the ability to fund policy priorities in an environment of fiscal constraint is only becoming more critical. Fortunately, advances in data analytics offer a rare opportunity for tax and benefit agencies to tap large effective revenue pools that for a long time have been out of reach. For those willing to take the leap, the benefits of improved government finances and citizen service delivery can be dramatic. ■

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<sup>1</sup> World Economic Outlook Database, International Monetary Fund, [imf.org](http://imf.org).

<sup>2</sup> “GAO-16-357R US government’s 2015 and 2014 consolidated financial statements,” Government Accountability Office, February 25, 2016, [gao.gov](http://gao.gov).

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