



# Digital Public Infrastructure

## EVIDENCE COMPENDIUM

A window into the state of the evidence base on the economics of DPI implementations around the world.

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# The Economics of DPI

## FRAMING THE CONTEXT

Digital public infrastructure (DPI) has taken center stage in the global development discourse as a means to enabling a digital future that is inclusive, safe, and equitable. And with good reason. DPI can not only underpin smarter and cost-effective government services, but can enable the wider digital economy, promote innovation and competition, and serve as a tool for widespread trust and inclusion.

Just like public infrastructure, such as roads, electricity, and railways, has enabled economic growth, DPI, such as the internet and GPS, has transformed the lives of people and communities around the world. As economies increasingly rely on digital technology, some countries are building additional digital systems that function like new public infrastructure to enable greater inclusion and innovation.

However, much more needs to be done. Of the estimated \$800 billion governments will spend on IT in 2024, 88% of the spending

will happen in “mature economies.” This means that approximately 160 other countries have no financially feasible path to digital maturity led by the public sector – unless their approach changes from the traditional means of monolithic IT programs to something vastly more nimble and scalable. The choices countries make today will have a fundamental impact on the structure of tomorrow’s economic trajectory and distribution of welfare gains. Governments, multilateral institutions, bilateral aid agencies, and others who care about sustainable development must pay greater attention to how countries approach digitalization and the extent to which public benefit is front and center.

### Starting the conversation with evidence

Several early efforts have highlighted the economic considerations of the choices countries make when building technology. A team led by Co-Develop compiled evidence

from research on DPI published over the past few years. The following compendium is not comprehensive but intended to capture the current state of the evidence base.

In comparison to other approaches to digitalization, rigorous research on DPI is limited in part due to the opaque nature of financing, design, implementation, and other relevant decisions in the public sector. Nevertheless, the 29 research efforts summarized below represent some of the outstanding thinking that has been done to date to understand the economic implications of DPI.

### Need for further research

Several important questions need deeper investigation. We have detailed some of the key research questions:

- What are the individual- and market-level welfare effects of taking a DPI approach to digitalization, as compared to the traditional approaches characterizing most public sector IT investments? What are other public benefits and risks of a DPI approach?
- The nature of infrastructure, physical

or digital, is that layering public infrastructure can lead to enhanced economic activity. What evidence can we find on the impacts of adding several layers of digital capabilities on the economy?

- What are the short- and medium-term costs for governments when developing and leveraging reusable DPI and how do those costs compare to more traditional approaches?
- As a DPI approach is intended to accelerate digital economies and inclusion, which safeguards must also be accelerated to facilitate trust and adoption? What are the benefits and costs of these safeguards over time?
- Which models of governance over DPI maximize digital inclusion, innovation, competition, and trust? How can these be applied across countries with different institutional maturity and resourcing?

This is just the beginning. We need a more structured effort to both identify relevant questions and investigate them. We hope this is the start of such an effort.



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# Digital Public Infrastructure

## EVIDENCE COMPENDIUM

This compendium collates research on digital public infrastructure (DPI) and other digitization efforts over the past few years. It is not exhaustive, but the studies below demonstrate the potential impact of DPI. The team welcomes additional contributions to the evidence base provided below. Please contribute any missing research using [this link](#).

The document provides a quick scan of existing research that has been conducted on DPI. It is structured through a series of questions related to economic growth, women's empowerment, public administration capacity and effectiveness, and inclusion that might be relevant for senior policy makers, economists, and newcomers to these issues.

The research we have presented is a combination of Academic Evidence studies on DPI that has been deployed by countries and more operational data produced by governments and implementers rolling out DPI on the ground. The document focuses

on empirical research. It omits projections and other forward looking analysis on the theoretical or potential future impact of DPI.

In preparing this document, we received inputs and help from a number of partners who have thought deeply about investigating the evidence around DPI implementations. We are grateful to them for all the support on this initial effort to compile the evidence and make it more accessible for senior policy makers around the world. Co-Develop and DIAL would like to thank Navneet Kumar and Jordan Sandman for putting together the evidence base and the following organizations for contributing their time to review and contribute to the compendium: the Bill and Melinda Gates Foundation, Global Development Network, University College London, and the University of Oxford.

# Can DPI boost economic growth?

ACADEMIC EVIDENCE



**A 2024 study out of the University of Michigan finds that digital payments adoption in India boosted household incomes and small business activities.**

After the introduction of a nationwide Unified Payment Interface (UPI) in 2016, India has become one of the world's leading economies for cashless transactions. Researchers use varying intensity in the adoption of digital payments across districts to show that economic outcomes, as measured by household income and small business activities, increased significantly in districts with a higher intensity of cashless transactions. Researchers also found that self-employed households, especially marginal entrepreneurs such as hawkers and street vendors, benefited more from digital payments adoption.

*Source: Dubey, Tamanna Singh and Purnanandam, Amiyatosh, Can Cashless Payments Spur Economic Growth? (February 28, 2023). Available at SSRN: <https://ssrn.com/abstract=4373602> or <http://dx.doi.org/10.2139/ssrn.4373602>*

ACADEMIC EVIDENCE



**A 2012 study “Credit Market Consequences of Improved Personal Identification: Field Experimental Evidence from Malawi” reports improved loan repayment by over 40% and reduced fraud when administering loans with biometric ID.**

Researchers implemented a randomized study in Malawi examining borrower responses to being fingerprinted when applying for loans. This intervention improved lending institutions' ability to create incentives to repay loans by allowing them to identify past defaulters while rewarding good borrowers with better loan terms. Fingerprinting led to substantially higher repayment rates for borrowers with the highest default risk, but had no effect for the rest of the borrowers. The average share of the loan repaid by the due date increased from 66.7% in the control group to 92.2% among fingerprinted borrowers. The intervention led to less adverse selection and lower moral hazard.

*Source: Giné, Xavier, Jessica Goldberg, and Dean Yang. 2012. “Credit Market Consequences of Improved Personal Identification: Field Experimental Evidence from Malawi.” American Economic Review, 102 (6): 2923–54. Available at: <https://www.aeaweb.org/articles?id=10.1257/aer.102.6.2923>*



POLICY REPORT



**A 2023 Study finds that India’s Unified Payments Interface reduces the cost of domestic remittances for migrant workers from 5–10% to 1–2% of transaction value.**

Migrant workers in India have found new avenues of sending remittances through money transfer agents and UPI, as opposed to carrying cash themselves or sending it through fellow villagers. Several studies have shown that, until a few years ago, these domestic money transfers (DMT) used to cost anywhere between 5–10%, a tax on the poor workers sending money home. The cost of DMT has drastically come down in the last few years. It now costs 1–2% to remit and withdraw funds.

**Source:** Arunachalam, R S. (2023, December). *Inclusive Finance India Report 2023*. Access Publication. Page 20. Available at: <https://inclusivefinanceindia.org/wp-content/uploads/2023/12/IFI-Report-2023.pdf>

POLICY REPORT



**2023 IMF Report details how Brazil’s instant payments system, Pix, creates economic value by settling transactions immediately and reducing transaction fees.**

A Pix payment settles in 3 seconds on average versus 2 days for debit cards, and 28 days for credit cards. Rapid settlement allows businesses to manage cash flows, causing them to offer subsidies for use of Pix. In addition, the Central Bank has set a requirement on Pix to be free for individuals making peer to peer payments. The cost of a payment transaction for firms/merchants is only 0.33 percent of the transaction amount, versus 1.13 percent for debit cards and 2.34 percent for credit cards.

**Source:** IMF Staff Country Reports 2023, 28. Available at: <https://www.elibrary.imf.org/view/journals/002/2023/289/article-A004-en.xml?ArticleTabs=fulltext>

POLICY REPORT



**A 2022 report by ACI Global found that Brazil’s Pix generated cost savings of \$US5.7 billion for businesses and consumers in 2021, which helped unlock \$US5.5 billion of additional economic output (0.34% of the country’s GDP).**

**Source:** ACI Global, 2022 <https://investor.aciworldwide.com/news-releases/news-release-details/latin-american-economies-poised-reap-economic-benefits-real-time>



# Can DPI improve women's empowerment?

ACADEMIC EVIDENCE



**A 2021 report that tracked digital Government to People (G2P) payments sent directly to women's accounts in India found that digital transfers increase income predictability and offer women greater control over the use of such funds.**

Researchers from Harvard Kennedy School conducted a randomized controlled trial with the MGNREGS workfare program. The study showed that depositing G2P social assistance into women's own accounts (instead of the default of the head of household which is her husband's) led to 90% account ownership, compared to 43% for those who did not receive payments into their own accounts.

*Source: Field, Erica, Rohini Pande, Natalia Rigol, Simone Schaner, and Charity Troyer Moore. 2021. "On Her Own Account: How Strengthening Women's Financial Control Impacts Labor Supply and Gender Norms." American Economic Review, 111 (7): 2342–75. Available at: <https://www.aeaweb.org/articles?id=10.1257/aer.20200705>*

POLICY REPORT



**A 2022 World Bank study finds that linking digital ID to cash transfers in Pakistan tripled women's ability to collect their own social assistance and increased their decision making over the funds by 9 percentage points.**

The introduction of a biometric verification system to administer a cash transfer program increased women's financial inclusion and control. The system did not reduce access to social assistance. However, it did dramatically increase women's involvement in collecting their own social assistance payments as well as increase their control over where those funds went. Among women who were not present for cash withdrawal at baseline, BVS increased control of cash from 65 to 74 percent, a 14 percent (9 percentage point) increase that is statistically significant at the 99 percent level.

*Source: Clark, et al (2022). Using Biometrics to Deliver Cash Payments to Women: Early Results From an Impact Evaluation in Pakistan. Available at: <https://documents1.worldbank.org/curated/en/099155004142238180/pdf/P1763410d1e1af00108e170e5754d04fed9.pdf>*

POLICY REPORT



**The 2019 Global Findex found that among adults in developing economies who received government transfers digitally, 36% opened their first account specifically for that purpose. The effect was significantly higher for women.**

According to the Global Findex, digital government cash transfers provide a reason for women and other marginalized groups to adopt digital payments. Country examples in Brazil, Mexico, South Africa, Mongolia, and Iran demonstrate moving routine cash transactions into digital accounts can boost rates of female account ownership significantly and rapidly.

*Source: Digitize, Direct, Design (D3): Can These Three Principles Help Close the Gender Gap? FinDev Gateway. 2019. <https://www.findevgateway.org/paper/2018/04/global-findex-database-2017-measuring-financial-inclusion-and-fintech-revolution> + <https://www.findevgateway.org/blog/2019/06/digitize-direct-design-d3-can-these-three-principles-help-close-gender-gap>*





# Can DPI reduce leakage and enhance government savings by facilitating direct transfers?

ACADEMIC EVIDENCE



**Forthcoming 2024 American Economic Review Paper finds the direct digital transfer of cooking fuel subsidies to bank accounts in India led to a reduction in leakage from the program.**

Directly transferring cooking fuel subsidies to beneficiaries' bank accounts led to significant changes in the domestic fuel sector. Specifically, direct subsidy transfers reduced domestic fuel purchases by 11% to 14%, indicating a decrease in subsidy diversion (corruption). After the policy ended, fuel purchases returned to levels similar to those before the policy was implemented. Additionally, the positive supply shock following the policy's termination resulted in a reduction in black market prices by 13% to 19%. These findings suggest that addressing perverse incentives in welfare programs can improve efficiency by curbing leakages and reducing black market activity.

**Source:** Available at: <https://www.aeaweb.org/articles?id=10.1257/aer.20161864> and <https://thedocs.worldbank.org/en/doc/826341466181741330-0050022016/original/BarnwalDBTIndia.pdf>

ACADEMIC EVIDENCE



**A 2018 study in India found that tying workfare programs to digital identity reduced payment lags in the program and increased demand for the program during times of economic distress, improving the effectiveness of the program.**

Workfare programs are intended to be countercyclical, providing an income floor for economically distressed individuals who cannot find employment. Significant payment lags for economically distressed workers could reduce demand for workfare programs if workers do not expect the programs to pay them in enough time to meet their needs. A study found that digital identity improved the time to payment delivery for a popular workfare program in India, and in doing so increased demand for the program among potential beneficiaries.

**Source:** Agarwal, Sumit and Prasad, Shradhey Parijat and Sharma, Nishka and Tantri, Prasanna L., *A Friend Indeed: Does the Use of Biometric Digital Identity Make Welfare Programs Counter Cyclical?* (June 24, 2018). Available at SSRN: <https://ssrn.com/abstract=3201746> or <http://dx.doi.org/10.2139/ssrn.3201746>

ACADEMIC EVIDENCE



**A 2019 study in India documents that biometric authentication failed as much as 33% of attempts, but that “transaction failures do not deter the users from using the biometric platform.”**

Researchers examined the impact of transaction failures on the working of a biometric enabled payment system introduced in India to facilitate banking by the poor. On average, nearly one third of transactions fail. However, the proportion of failures declines steeply with user experience. Usage of the system increases significantly with experience. Overall, transaction failures do not deter the users from using the biometric platform. Further tests reveal that convenience offered by technology seems to score over other conventional banking channels, despite high failure rate.

**Source:** Balasubramanian, Padmanabhan and Chandra, S V Ravi and Murlidharan, Aditya and Tantri, Prasanna L., *Fintech For The Poor: Do Technological Failures Deter Financial Inclusion ?* (May 5, 2021). Available at SSRN: <https://ssrn.com/abstract=3840021> or <http://dx.doi.org/10.2139/ssrn.3840021>

ACADEMIC EVIDENCE



**A 2019 study in India finds that biometric tracking helps with reducing health worker absenteeism and concludes that digital identity is “an effective and sustainable way to improve the state’s capacity to deliver healthcare in challenging areas.”**

Patients enrolled at biometric-equipped centers are 25 percent less likely to interrupt medical treatment—an improvement driven by increased attendance and efforts by health workers and greater treatment adherence by patients. Second, biometric tracking decreases data forgery: it reduces overreporting of patient numbers in both NGO data and government registers and underreporting of treatment interruptions. Third, the impact of biometric tracking is sustained over time and it decreases neither health worker satisfaction nor patient satisfaction.

**Source:** *Biometric Tracking, Healthcare Provision, and Data Quality. Experimental Evidence from Tuberculosis Control.* Thomas Bossuroy, Clara Delavallade, and Vincent Pons. NBER Working Paper No. 26388. October 2019 <https://www.nber.org/papers/w26388>

ACADEMIC EVIDENCE



### A 2022 Study on Using Digital ID enabled Biometric Authentication for Distributing Social Assistance in Andhra Pradesh, India Finds Digital Transformation Reduces Leakage and Passes More Social Benefits to Target Recipients.

Digitizing a social welfare payments program (NREGS) and authenticating recipients using biometric smart cards in Andhra Pradesh, India, drove improvements in how the program was administered. Digitization ensured that distributed funds reached their intended beneficiaries. The study found that digitization led to a:

- 24% increase in NREGS earnings per household (~\$0.60 per HH)
- 35% reduction in leakage (11 percentage points – from 31% to 20%) totalling \$38.5M – equal to 9 times the cost to government of implementing the new payment scheme
- 22 minute reduction in time spent collecting their payments (20%)

**Source:** *Identity Verification Standards in Welfare Programs: Experimental Evidence from India* Karthik Muralidharan, Paul Niehaus, and Sandip Sukhtankar NBER Working Paper No. 26744 February 2020, Revised September 2021

Available at: [https://www.nber.org/system/files/working\\_papers/w26744/w26744.pdf](https://www.nber.org/system/files/working_papers/w26744/w26744.pdf)

ACADEMIC EVIDENCE



### A 2022 Study on Using Digital ID enabled Biometric Authentication for Distributing Social Assistance in Jharkhand, India Finds Digital Transformation Reduces Leakage But Causes Some Households to Lose Benefits Access.

An analogous study to the Andhra Pradesh study tracked the digitization of NREGS in Jharkhand. Unlike in Andhra Pradesh, where the total cost of NREGS remained constant, in Jharkhand, the cost of administering NREGS decreased. However, digitization did prevent some households from accessing benefits. Both programs (Andhra Pradesh and Jharkhand) reduced leakage. However, in the case of the NREGS and pensions in Andhra Pradesh, the benefits of reduced leakage were passed on to the beneficiaries in terms of more money received (displaced from corrupt intermediaries). In contrast, in Jharkhand, the reduced leakage led to reduced disbursements from the government but did not improve the beneficiary experience in any way (and worsened it in some ways). A key difference of the programs was their core motivation: Jharkhand's implementation was geared toward reducing leakage, while Andhra's was aimed at improving beneficiary experience.

**Source:** *Identity Verification Standards in Welfare Programs: Experimental Evidence from India* Karthik Muralidharan, Paul Niehaus, and Sandip Sukhtankar NBER Working Paper No. 26744 February 2020, Revised September 2021

Available at: [https://www.nber.org/system/files/working\\_papers/w26744/w26744.pdf](https://www.nber.org/system/files/working_papers/w26744/w26744.pdf)

POLICY REPORT



**A 2018 report claims that Nigeria’s e-ID system for its civil servants saved the government US\$1.12 billion from 2007 to 2014.**

Nigeria, which implemented an eID system called the Integrated Payroll and Personnel Information System (IPPIIS) for its civil servants. Beginning with a pilot in 2007, the IPPIIS biometrically enrolled employees in a limited number of federal agencies. Through registration and deduplication, this process uncovered approximately 60,000 fictitious employees (some 20 percent of these agencies’ payrolls), reportedly saving the government US\$1.12 billion dollars over the 2007–2014 period.

**Source:** Gelb, Alan, and Ana Diofasi Metz. 2018. *Identification Revolution: Can Digital ID Be Harnessed for Development?* Washington, DC: Center for Global Development. Available at: <https://documents1.worldbank.org/curated/en/745871522848339938/Public-Sector-Savings-and-Revenue-from-Identification-Systems-Opportunities-and-Constraints.pdf>

POLICY REPORT



**A 2018 World Bank study found that running duplicative, sectoral identification systems amounts to \$4.3 billion in Nigeria.**

A World Bank assessment in Nigeria estimated that the fiscal burden of maintaining the country’s various overlapping foundational and functional identification systems amounts to US\$4.3 billion, including the US\$1.2 billion spent between 2011 and 2015 and the US\$3.1 billion needed to continue these programs over the medium term.

**Source:** *Public Sector Savings and Revenue from Identification Systems: Opportunities and Constraints.* World Bank, 2018. Available at: <https://documents1.worldbank.org/curated/en/745871522848339938/Public-Sector-Savings-and-Revenue-from-Identification-Systems-Opportunities-and-Constraints.pdf>



POLICY REPORT



**In 2017, Ghana’s e-Zwich authentication and payments system claimed to have allowed it to save \$35M per year by eliminating 35,000 fictitious employees.**

Ghana reduced payroll fraud using the unique identifier in its e-Zwich payment system. Among other applications, the e-Zwich system—which relies on fingerprints for enrollment and authentication—was used to verify the identities of public sector employees when receiving wage payments. The government reports that this process allowed them to eliminate some 35,000 fictitious employees from the initial agency payroll of 75,000, leading to a savings of US\$35 million per year.

**Source:** Ghana Interbank Payment and Settlement Systems Limited (GhIPSS) 2017. Available at: <https://www.ghipss.net/index.php/media/press-releases/12-blog/investment/27-e-zwich-helps-flush-out-35-000-ghost-names-from-payroll-saves-gov-t-gh-146m>

POLICY REPORT



**A 2018 World Bank report found that Argentina’s DPI-related projects generated an estimated savings of US\$303 million by deduplicating beneficiaries.**

Integration between tax databases and other registers in Argentina via a unique ID improved tax audits. Connecting the ID to identify inclusion errors across pensions and social programs, the program saved approximately US\$143 million between 1999 and 2007. In 2013, for example, the government estimated that the system saved over US\$160M by removing deceased individuals from social benefits registries that year. This yields a combined savings in G2P programs of some US\$303 million, which is roughly eight times the US\$38 million project cost.

**Source:** Public Sector Savings and Revenue from Identification Systems: Opportunities and Constraints. World Bank, 2018. Available at: <https://documents1.worldbank.org/curated/en/745871522848339938/Public-Sector-Savings-and-Revenue-from-Identification-Systems-Opportunities-and-Constraints.pdf>





POLICY REPORT



**In 2024, the UK Government's Notify messaging service claimed that it saves taxpayers an average of £35m a year by reducing the need for chasing information and making time consuming calls to call centers.**

*Source:* Gov.UK. 2024 Available at: <https://www.gov.uk/government/news/governments-streamlined-messaging-service-to-save-taxpayer-175m>

*Image credit:* GOV.UK Notify Team, "GOV.UK Notify", Flickr. Licensed under CC BY 2.0.



POLICY REPORT



**In 2024, the Government of India claimed that the elimination of fraud and duplicate entries in public benefits rolls has saved India 3.4 trillion rupees (approximately US\$41 billion).**

*Source:* Government of India, Direct Benefit Transfer. 2024. Available at: <https://dbtbharat.gov.in/static-page-content/spagecont?id=18>

# Can DPI reduce time spent in and traveling to government offices?

ACADEMIC EVIDENCE



**A 2010 report in Niger found that sending social assistance via mobile money saved recipients more than 4 hours in travel and waiting time versus receiving payment in cash.**

Using data from a randomized experiment of a mobile money cash transfer program in Niger, researchers found evidence that household diet diversity was 9%–16% higher among households who received mobile transfers, and children ate an additional one-third of a meal per day. These results can be partially attributed to time savings associated with mobile transfers, as program recipients spent less time traveling to and waiting for their transfer. They are also associated with shifts in intrahousehold bargaining power for women.

**Source:** Aker, Jenny C., and Isaac M. Mbiti. 2010. "Mobile Phones and Economic Development in Africa." *Journal of Economic Perspectives* 24, no. 3:207–32. Available at: <https://www.journals.uchicago.edu/doi/full/10.1086/687578>

POLICY REPORT



**A 2022 study from Bangladesh demonstrated how digital transformation resulted in savings of time, cost, and government visits among Bangladeshis.**

A study found that digital transformation centers offer more than 300 public and private services, including banking and e-commerce services. They have saved an average of 17,450.2 working hours and significant travel costs for citizens. The centers have resulted in a satisfaction rate of 76.6 percent, a significant increase from the 50% reported in 2018 (Rashid & Shafie, 2018).

**Source:** *Fostering Transformation Through Digital Centre*. UNDP. 2022. Available at: [https://www.undp.org/sites/g/files/zskgke326/files/2023-11/micro\\_report\\_1.3\\_-\\_copy.pdf](https://www.undp.org/sites/g/files/zskgke326/files/2023-11/micro_report_1.3_-_copy.pdf)

POLICY REPORT



## A 2023 World Bank report on Philippines' Digital ID integration projected that the new digital system could cut business permit processing between 30–81%.

The World Bank's Time and Motion Study provides an in-depth analysis of time and cost savings when transitioning from traditional paper-based methods to digital alternatives. According to the study, integrating the PhilSys ID system across various services could dramatically streamline processes. For instance, the time required to obtain a new business permit could be reduced by 80%, while opening a bank account could become 62% faster. These findings underscore the potential for enhanced efficiency, improved data accuracy, and a better user experience across financial services, local government, and social protection systems.

**Source:** ID4D Annual Report, 2023. Available at: <https://documents1.worldbank.org/curated/en/099647503042425828/pdf/IDU1a9d1a6be130dc148e6193181cf9d26959fb9.pdf>

POLICY REPORT



## A 2024 IMF article claims digital public infrastructure streamlines and improves tax collection processes to increase public revenues in India by 50 GDP basis points.

Since the introduction of the Goods and Services Tax (GST) in 2018, revenue collection has grown by 50 GDP basis points, significantly exceeding projections under the previous tax regime. The time required to process electronic returns and refunds for taxpayers has also decreased dramatically, from over 80 days to less than 20 days in 2023–24. Additionally, the tax base has broadened, with a notable and sustained increase in non-corporate taxpayers, including small businesses and individuals.

**Source:** *Creating Value For Taxpayers*. Kamya Chandra, Tanushka Vaid, Pramod Varma. 2024. Available at: <https://www.imf.org/en/Publications/fandd/issues/2024/09/Creating-Value-for-Taxpayers-Chandra-Vaid-Varma>

# How does DPI create inclusion or exclusion?

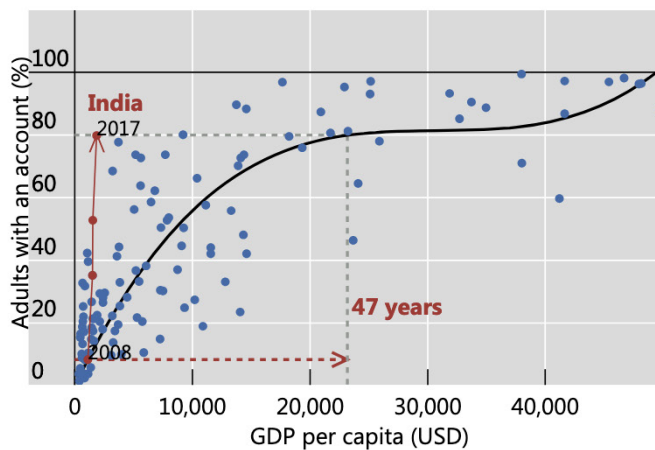
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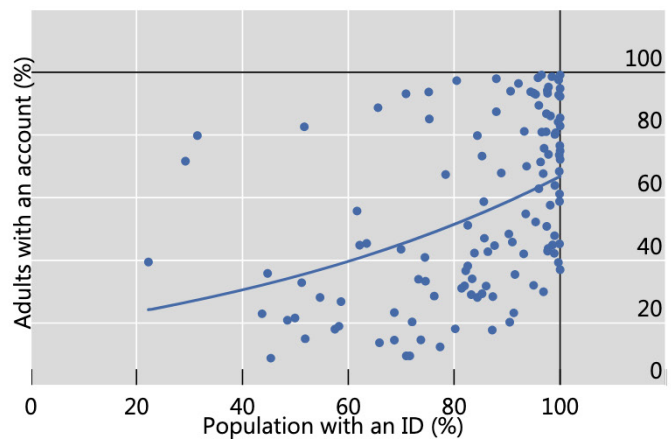
A 2019 Bank of International Settlements report found that India's Aadhaar ID enabled an increase in bank accounts in nine years that would have taken 47 years along a typical development trajectory.

## Leapfrogging traditional development processes

Positive relation between GDP per capita and adults with a bank account<sup>1</sup> in 2011



Positive relation between having a bank account<sup>1</sup> and having an ID in 2017<sup>2</sup>



<sup>1</sup>Bank account held by people aged 15 and older. Data on adults with an account in 2008 were not available, therefore the graph assumes India to be on the fitted line. GDP per capita restricted to \$50,000 to remove outliers and expressed in 2011 USD values. <sup>2</sup>Due to data constraints, data in the right-hand panel are displayed for 2017 instead of 2011.

**Source:** A Demirgüç-Kunt, L Klapper, D Singer, S Ansar and J Hess, "The Global Findex Database 2017: measuring financial inclusion and the fintech revolution", World Bank Group, 2018; IMF, World Economic Outlook, October 2019; World Bank Group, Global Findex Database; World Bank Group, Identification For Development (ID4D) Global Dataset.

**Source:** The design of digital financial infrastructure: lessons from India. Bank of International Settlements. BIS Papers. No 106. 2019. Available at: <https://www.bis.org/publ/bppdf/bispap106.htm>

POLICY REPORT



**A 2021 World Bank Report found that Rwanda’s Electronic Population Register created a new unique digital identification number that is associated with an increase in identity coverage to 98% of residents.**

The World Bank report found the digital system helped Rwanda expand access. The system allows the government to target emergency payments, postnatal care, and child growth visits to families who need it most.

*Source:* “World Bank. 2021. *People’s Perspectives on ID and Civil Registration in Rwanda*. World Bank, Washington, DC. Available at: <http://hdl.handle.net/10986/35121>

POLICY REPORT



**A 2021 report found that a “national security approach” to mandatory digitization of ID for access to social assistance and health services exacerbated existing exclusion of women and the elderly in Uganda.**

Qualitative research on rapid mandatory requirements found that the deployment of a digital ID in Uganda did not take an inclusive approach. Mandatory requirements led to exclusion of women and elderly from health services and elderly social assistance. Exclusion issues largely stemmed from inability to register for the ID due to limited access to foundational documents such as birth certificates. The 2014 Census suggested that fewer than 28% of the adult population currently possess a birth certificate.

*Source:* *Chased Away and Left To Die: How a National Security Approach to Uganda’s National Digital ID Has Led to Wholesale Exclusion of Women and Older Persons*. NYU CHRGJ, ISER Uganda, *Unwanted Witness*. 2021. Available at: [https://drive.google.com/file/d/1EOgwFPMK\\_8TY\\_qUhWAASMk\\_b4f3HgRM3/view](https://drive.google.com/file/d/1EOgwFPMK_8TY_qUhWAASMk_b4f3HgRM3/view)





POLICY REPORT



**A 2019 report on the State of Aadhaar found that 2.5% of respondents reported exclusion from social assistance related to Aadhaar in 2019. Today, that number is around 1%.**

The State of Aadhaar Report was an effort to assess the inclusivity of Aadhaar in various regions across India. The 2019 report claimed that a small percentage of users had challenges related to accessing services due to policy or technology barriers when using Aadhaar. A greater number of the respondents reported other barriers such as digital illiteracy or lack of connectivity as reasons preventing access to services.

**Source:** State of Aadhaar Report. 2019. Available at: <https://policyinsights.in/state-of-aadhaar/>

POLICY REPORT



**As of December 2022, Brazil's Pix brought 71.5 million individuals into the digital economy.**

Pix supported financial inclusion by facilitating digital transactions among Brazilians who had not previously made any electronic transfers. 71.5 million individuals used Pix to make their first digital transaction.

**Source:** Banco Central do Brasil. Pix Statistics. Available at: <https://www.bcb.gov.br/en/financialstability/pixstatistics>



# Digital transformation *moves at the speed of trust.*

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