Transforming Public Finance Through GovTech

Joint Vienna Institute Workshop
September 14, 2023

Prof. Dr. habil. Mariano Moszoro
Senior Economist
Fiscal Affairs Department

Connectivity

1880s

RAILROADS

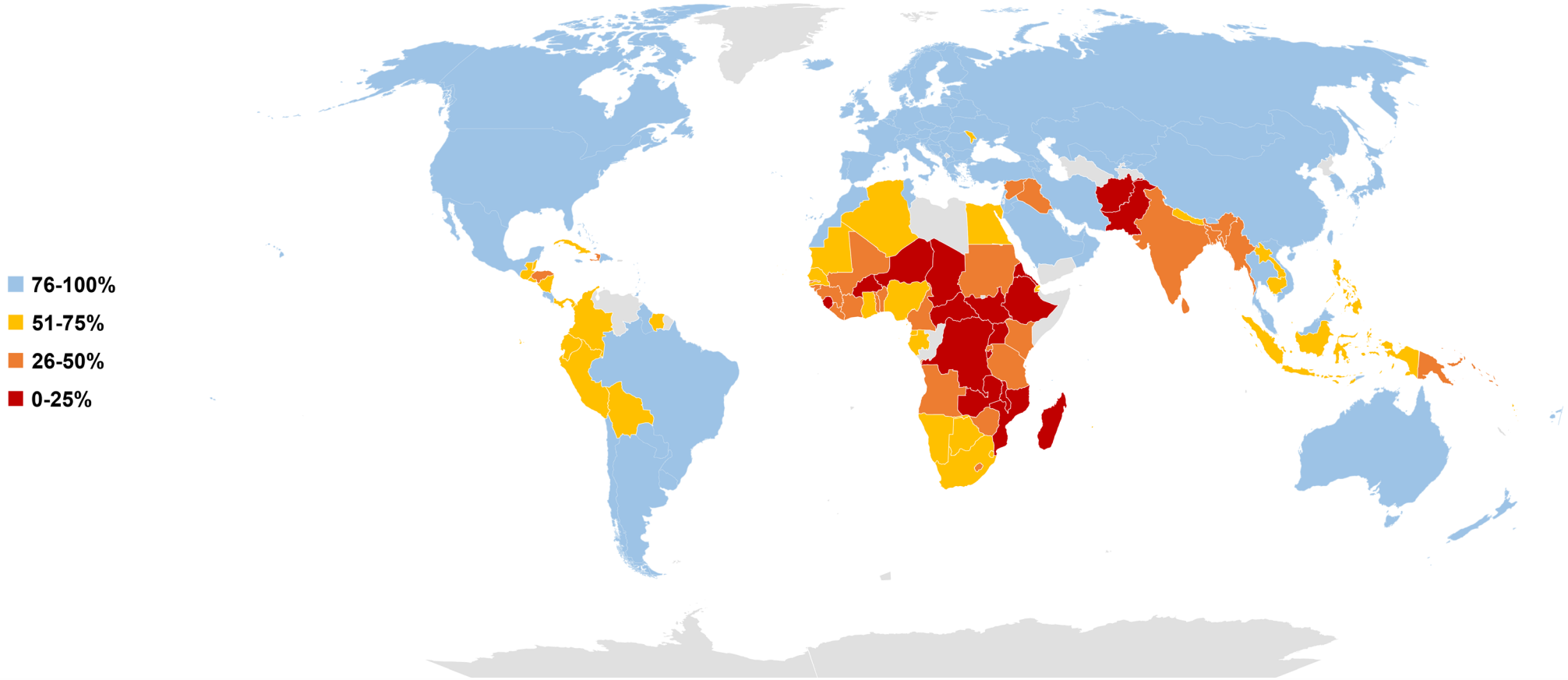
1950s

HIGHWAYS

2020s

DIGITAL

Internet Users

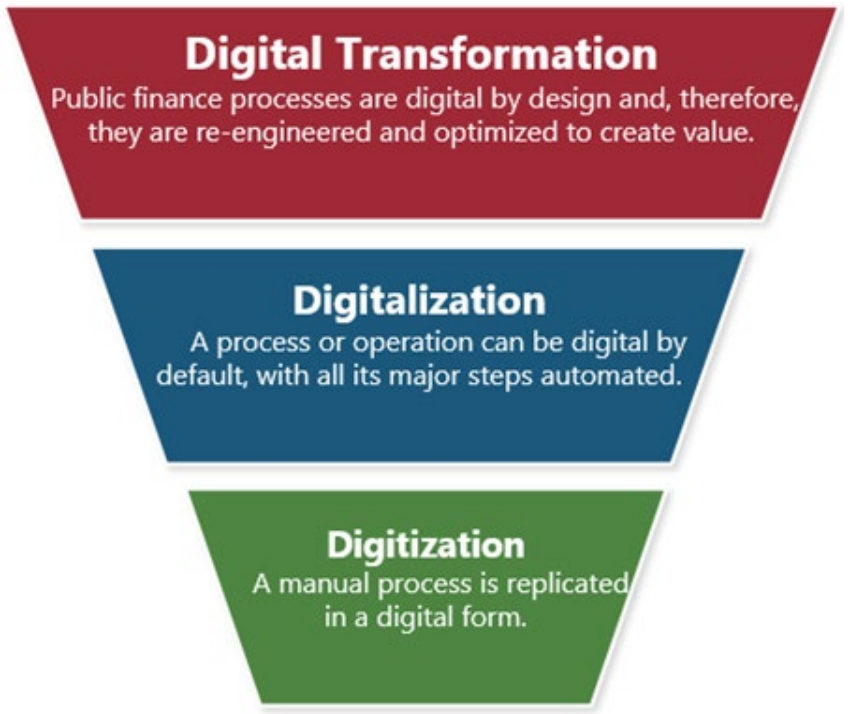


Source: IMF based on ITU.

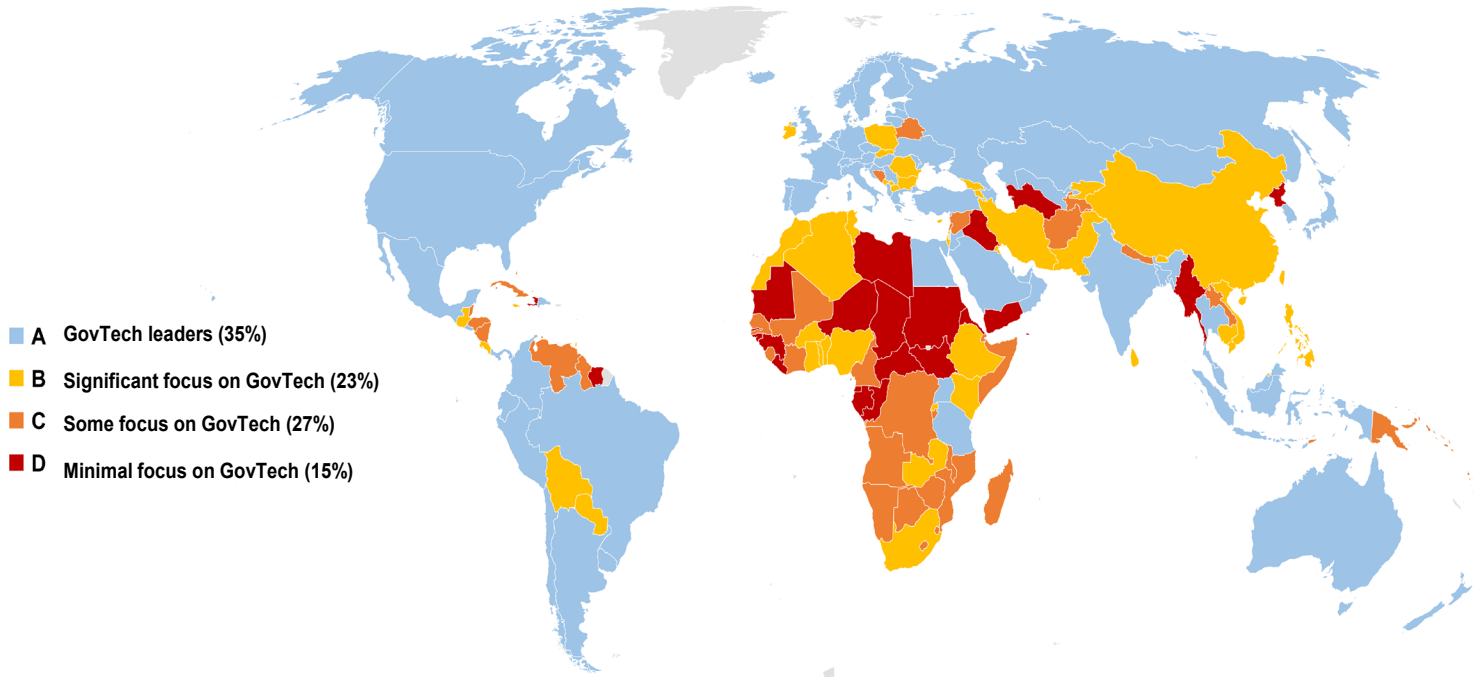
Digital Maturity

Government strategies should consider the stage of transformation of fiscal operations to achieved through digitalization.

Three Stages of Digitalization

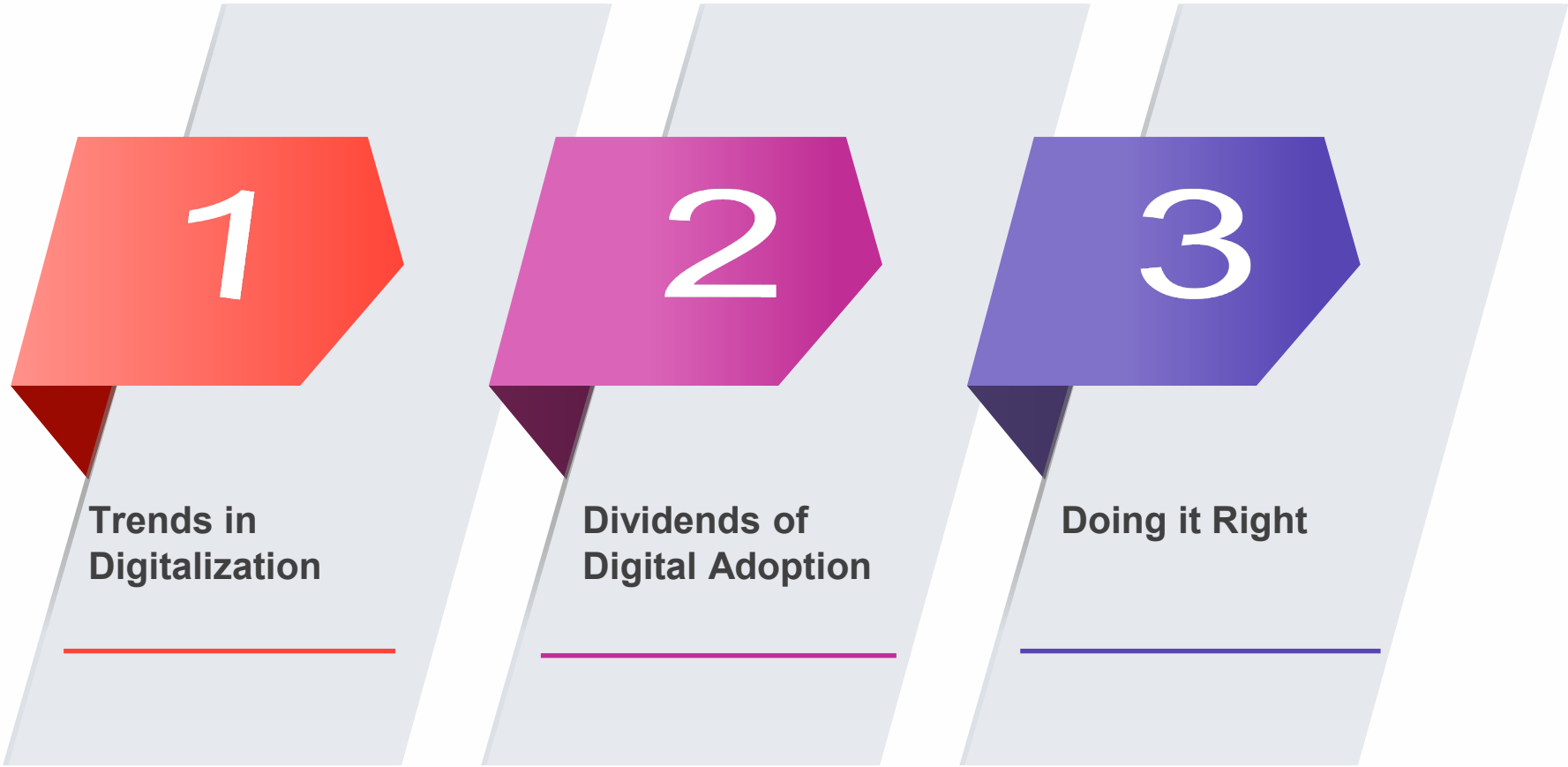


GovTech Maturity Index (GTMI)

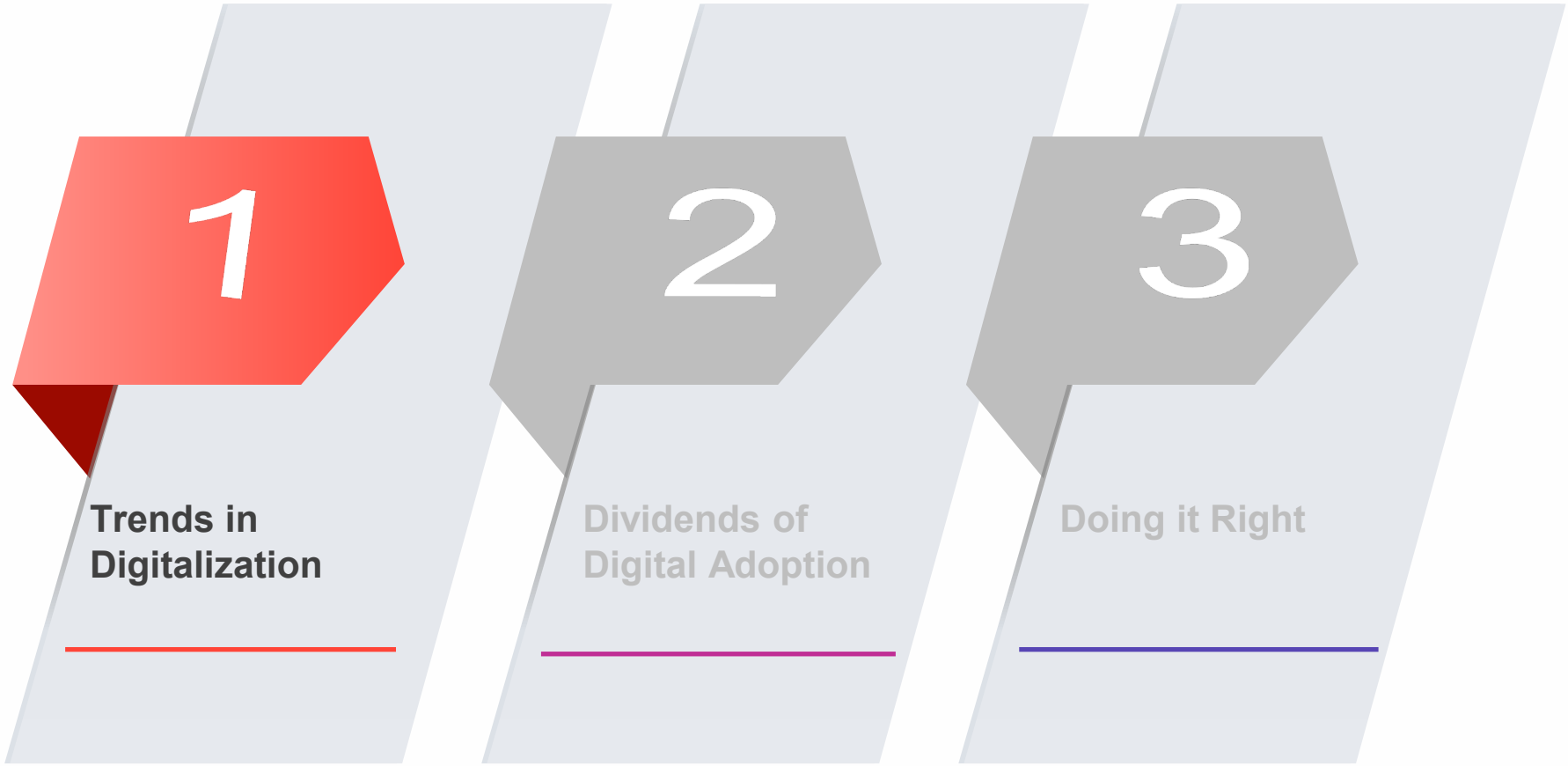


Sources: World Bank (2022) GTMI 2022 Update: Trends in Public Sector Digital Transformation and World Bank (2021) GovTech Maturity Index: The State of Public Sector Digital Transformation.

Outline


1
Trends in Digitalization
2
Dividends of Digital Adoption
3
Doing it Right

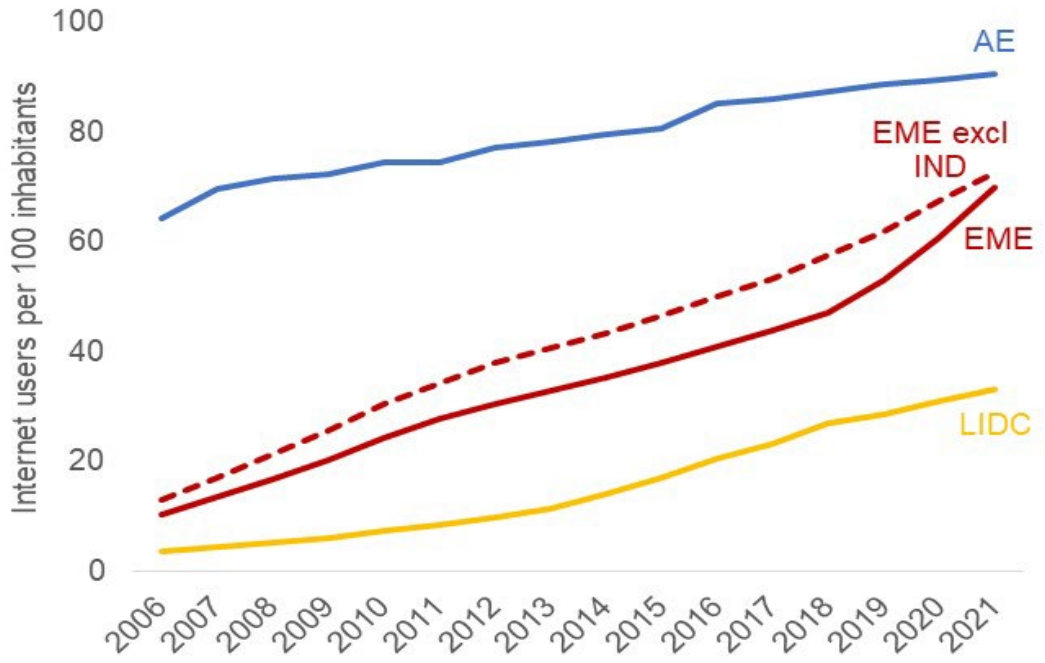
Outline


1
2
3
Trends in Digitalization
Dividends of Digital Adoption
Doing it Right

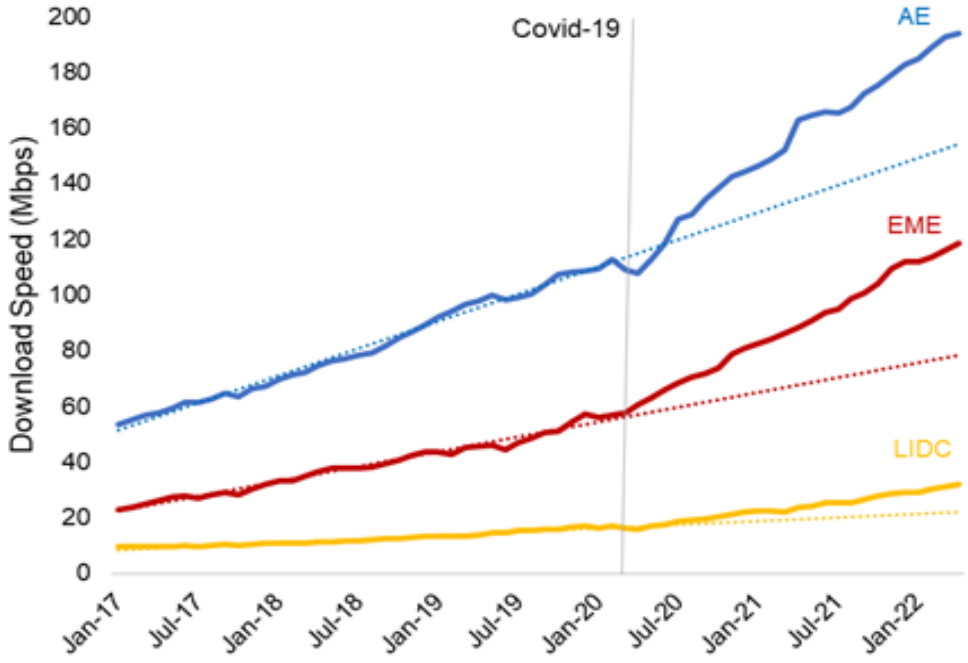
Developments in Internet Access

In most countries the trend growth in internet access continues to follow the historical path but the growth in internet speed (a proxy for the quality of internet access) accelerated after the COVID-19 across all income groups.

Internet Users, Percent of Population



Internet Download Speed, Mbps

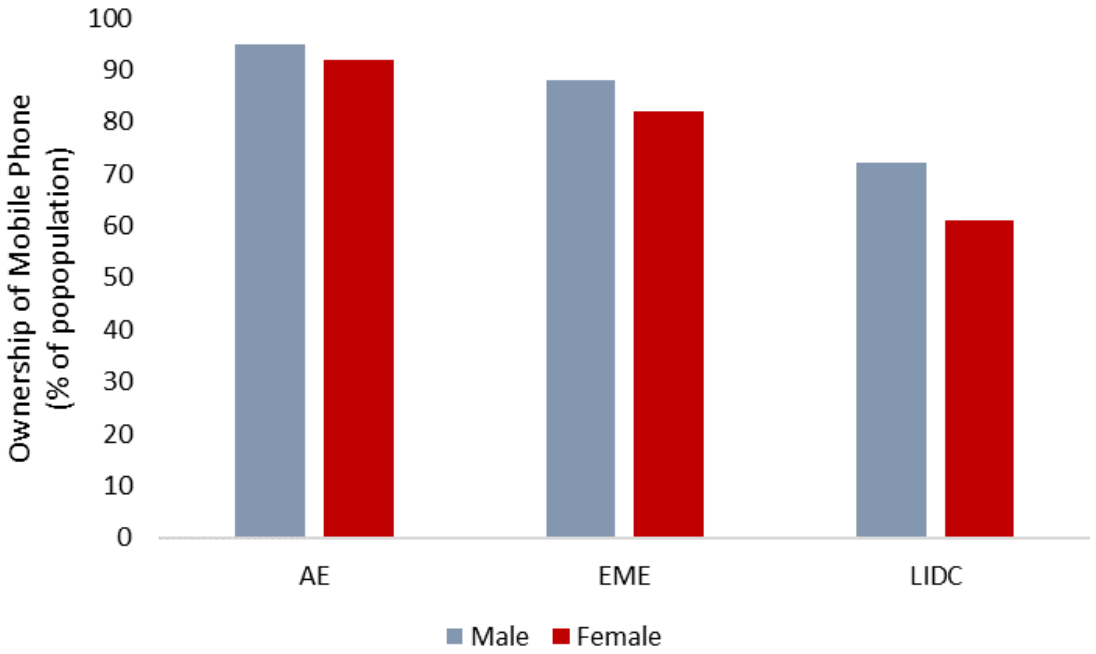


Sources: ITU, GSMA Intelligence, Ericsson, Statista, ITU, Ookla, and IMF Staff calculations.
Note: Population-weighted average is used. Download speed is the fixed band average download speed. The grey line in Figure 1.4 refers to March 2020 when the World Health Organization declared COVID-19 as a global pandemic. The dashed line in Figure 1.4 is the fitted trendline without structural break.

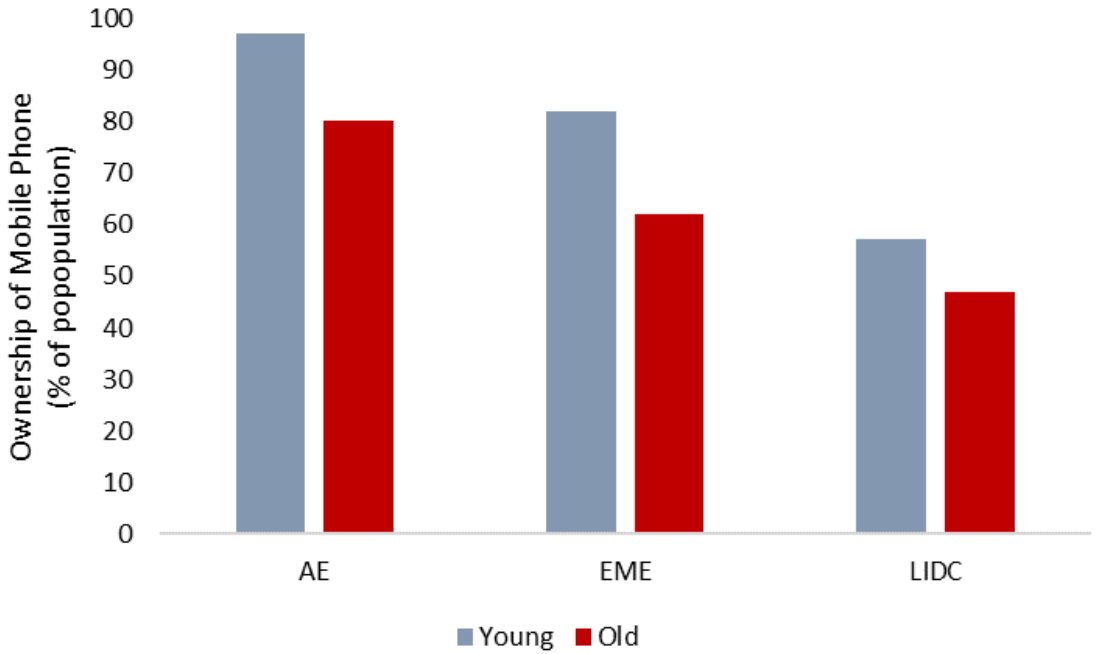
Digital Divide by Gender and Age

Digital divide exists not only across countries but also within countries with women and the elderly less likely to own a mobile phone than men and the young, respectively.

Male versus Female



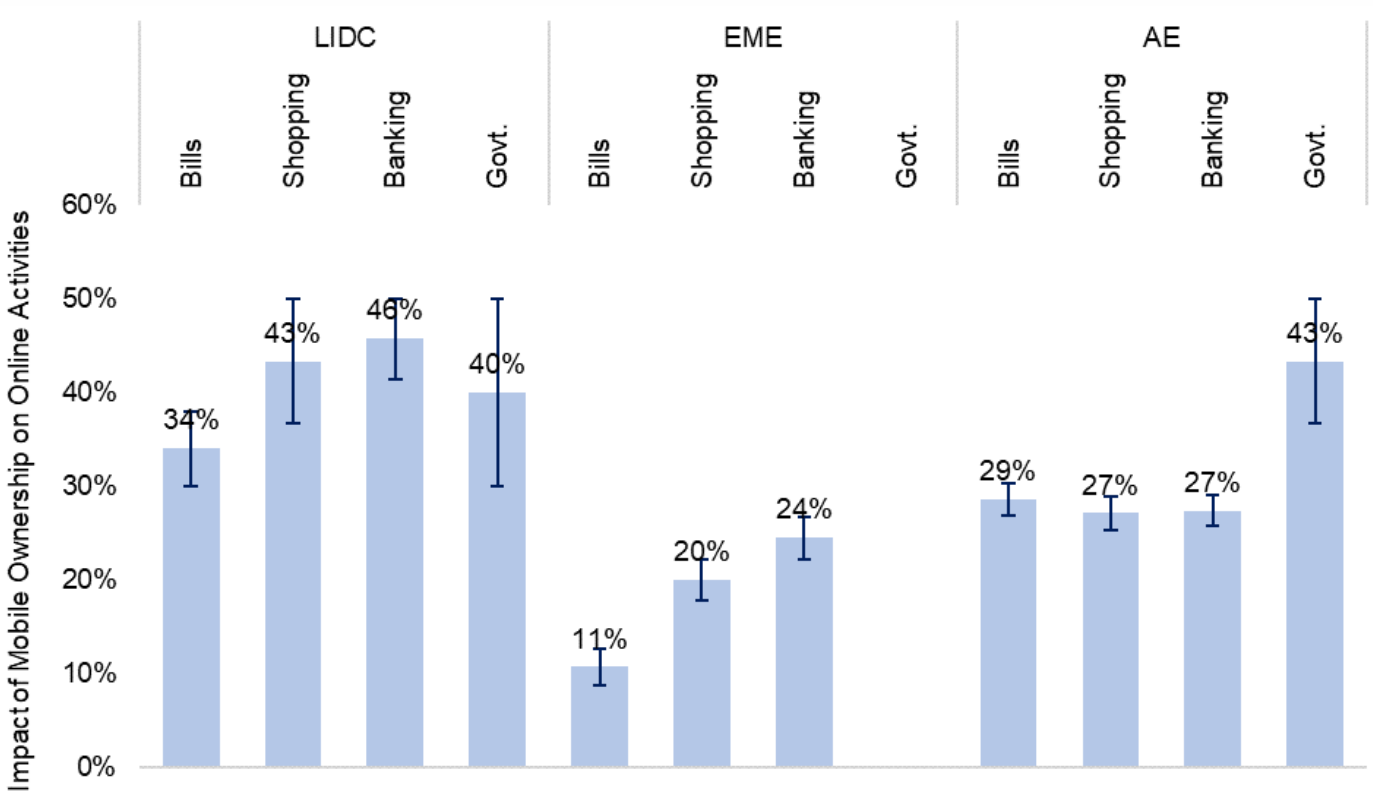
Young versus Old



Sources: Kumar, Amaglobeli, and Moszoro (2023) based on World Bank's FINDEX survey of over 150 countries in 2017.
Note: The charts plot simple averages of percent of the population owning a mobile phone by country income groups.

Impact of Mobile Ownership on Online Activities

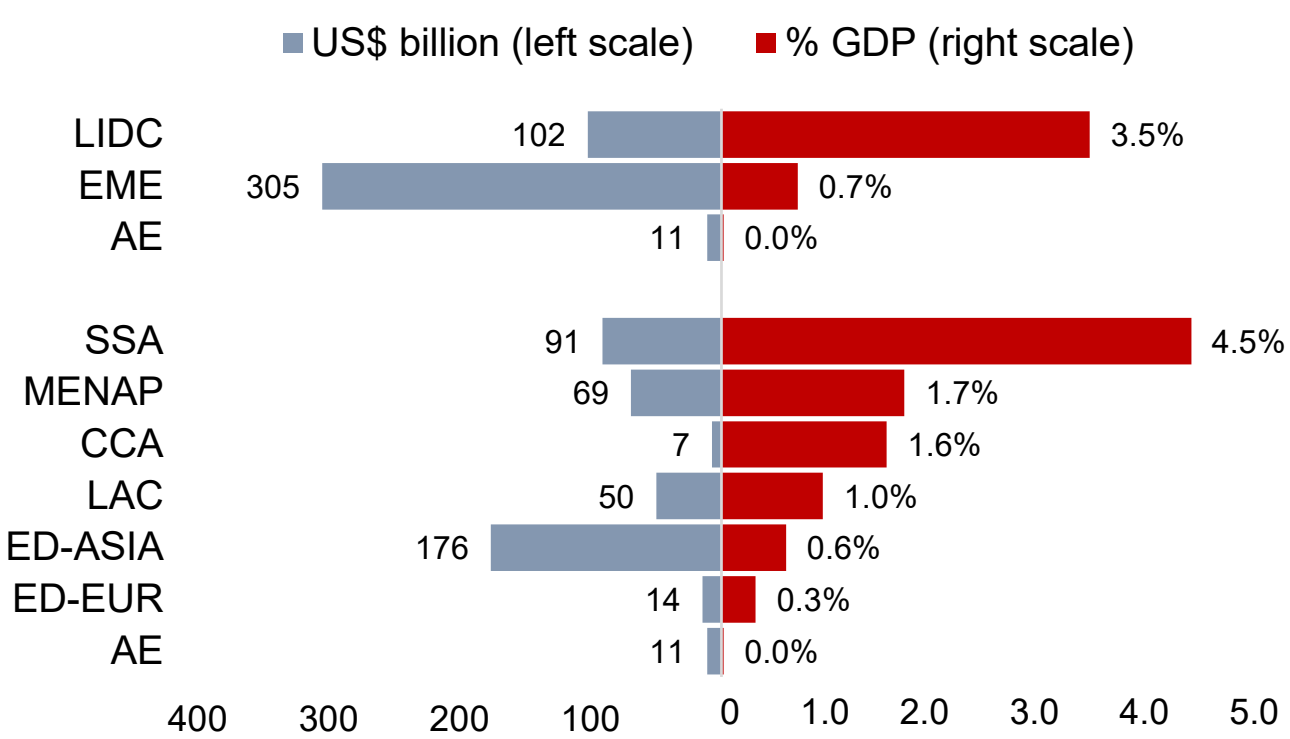
Estimated Impact of Mobile Ownership on Online Activities



Mobile ownership is strongly associated with online activities: bill payments, shopping, banking, and government transfers across country income groups.

Source: Authors' calculations based on Kumar, Amaglobeli, and Moszoro (2023).
Note: The figure plots estimates and standard deviations of the probability of using online activities conditional on mobile ownership.

Digital Infrastructure Investments Needs



Global investment needs to provide universal broadband connectivity (SDG 9.c) equal $418 billion.

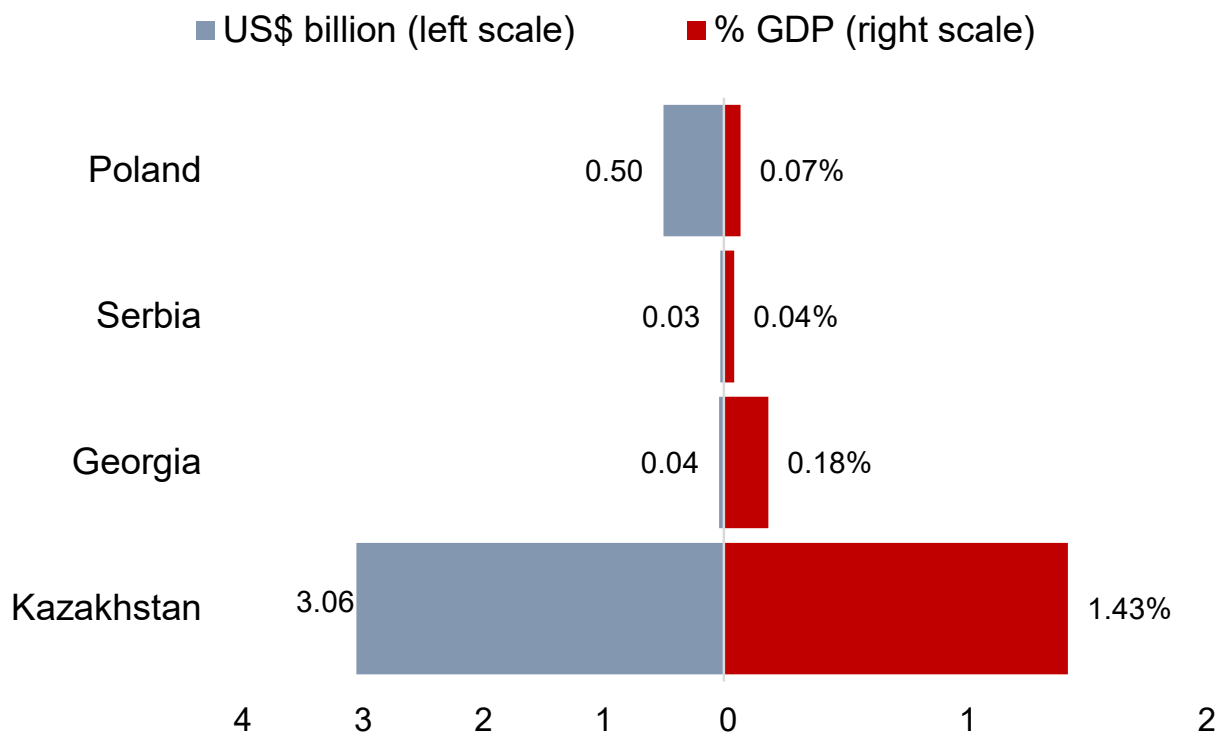
The total investment needs mainly include digital infrastructure capital expenditure, metro and backbone fiber, and infrastructure operational expenditure.

This estimate assumes providing universal 4G cellular broadband to users with approximately 40-50 GB of monthly data.

Source: Kumar, Amaglobeli, and Moszoro (2023).

Notes: These estimates assume providing universal 4G cellular broadband to users with approximately 40-50 GB of monthly data. The Digital Infrastructure Costing Estimator (DICE) project was partially financed by the European Union under the EU-IMF Public Financial Management Partnership Program (PFM-PP).

Digital Infrastructure Investments Needs

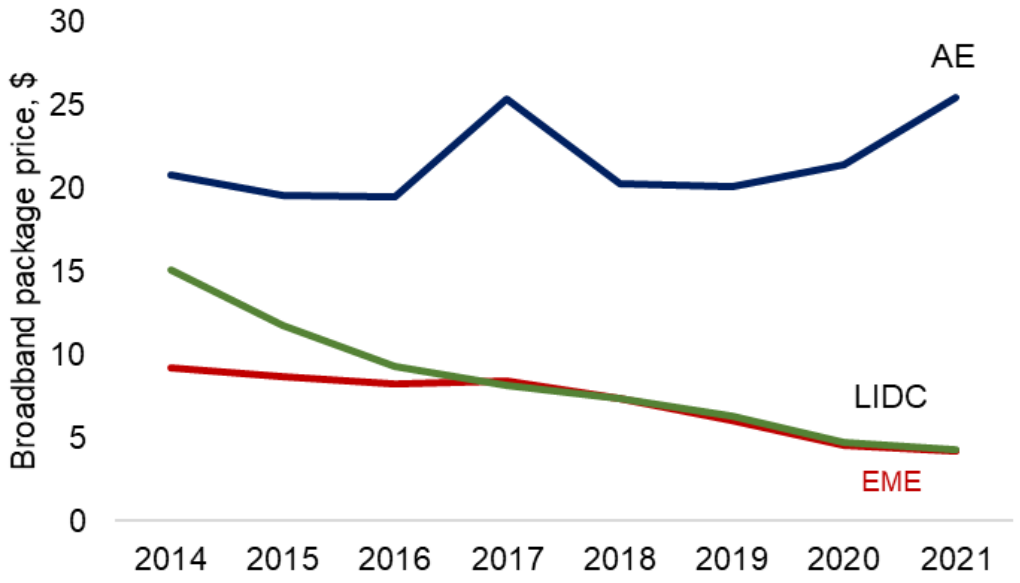


Source: Kumar, Amaglobeli, and Moszoro (2023).
Notes: These estimates assume providing universal 4G cellular broadband to users with approximately 40-50 GB of monthly data.

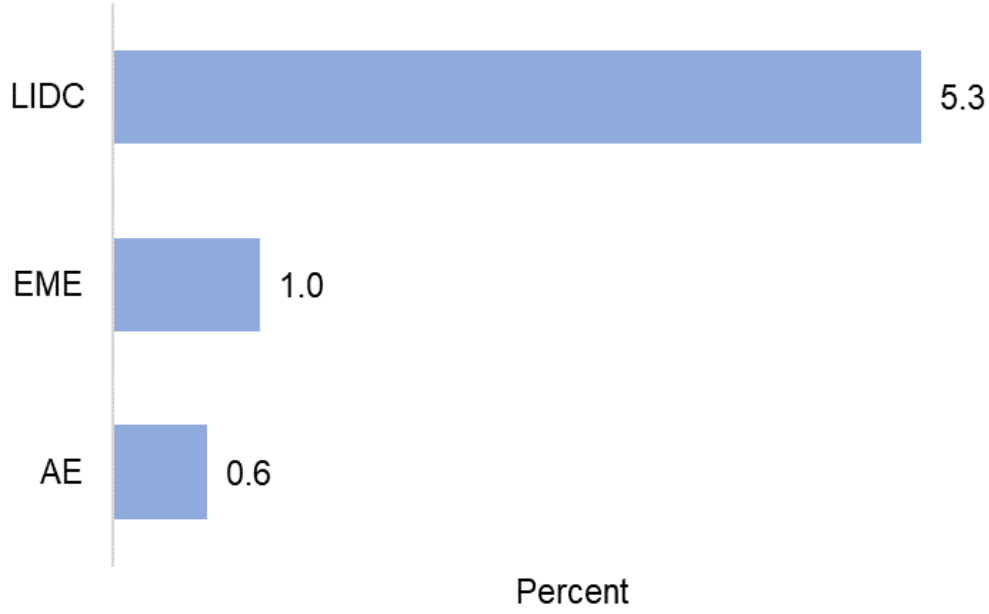
Affordability of Internet

Despite a continued decline in internet prices—a key factor for digital adoption—affordability remains a major concern, particularly low-income developing countries.

US dollars Per Month

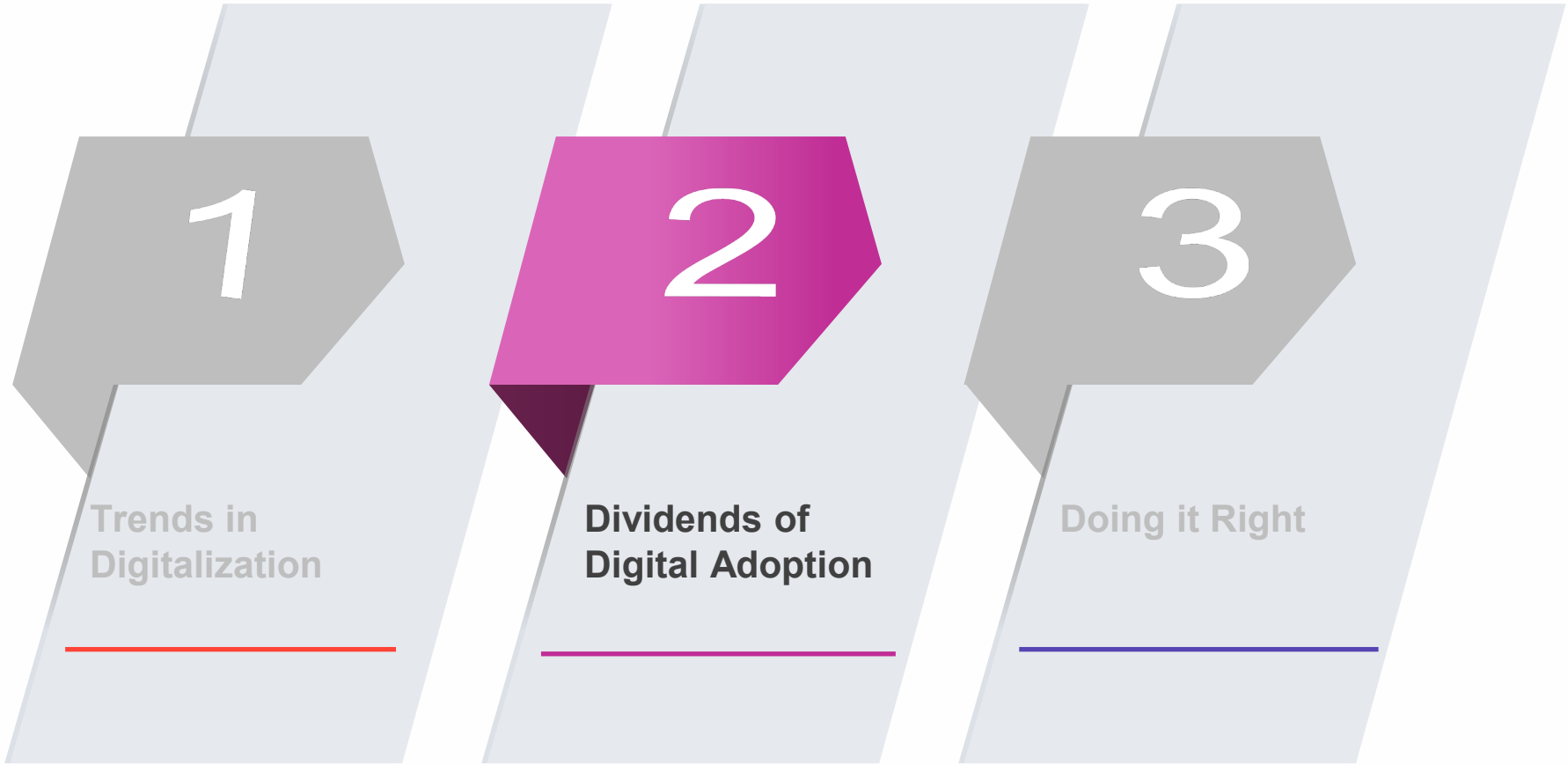


Percent of Monthly GNI per Capita (2020)



Sources: ITU, Cable.co.uk (https://www.cable.co.uk/broadband/pricing/worldwide-comparison/), and IMF staff calculations.
Notes: AE is Advanced Economies, EME is Emerging Market Economies, LIDC is Low-Income and Developing Countries. ICT prices based on current and historical basket definitions in USD PPP 2020 and as a percent of monthly Gross National Income (GNI) per capita. Population-weighted average is used.

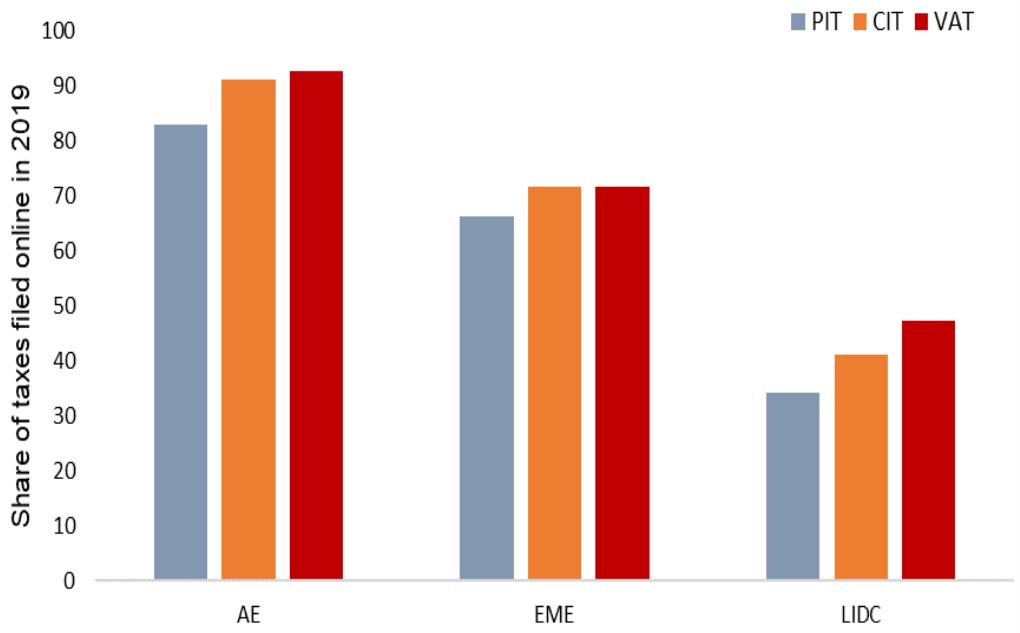
Outline


1
Trends in Digitalization
2
Dividends of Digital Adoption
3
Doing it Right

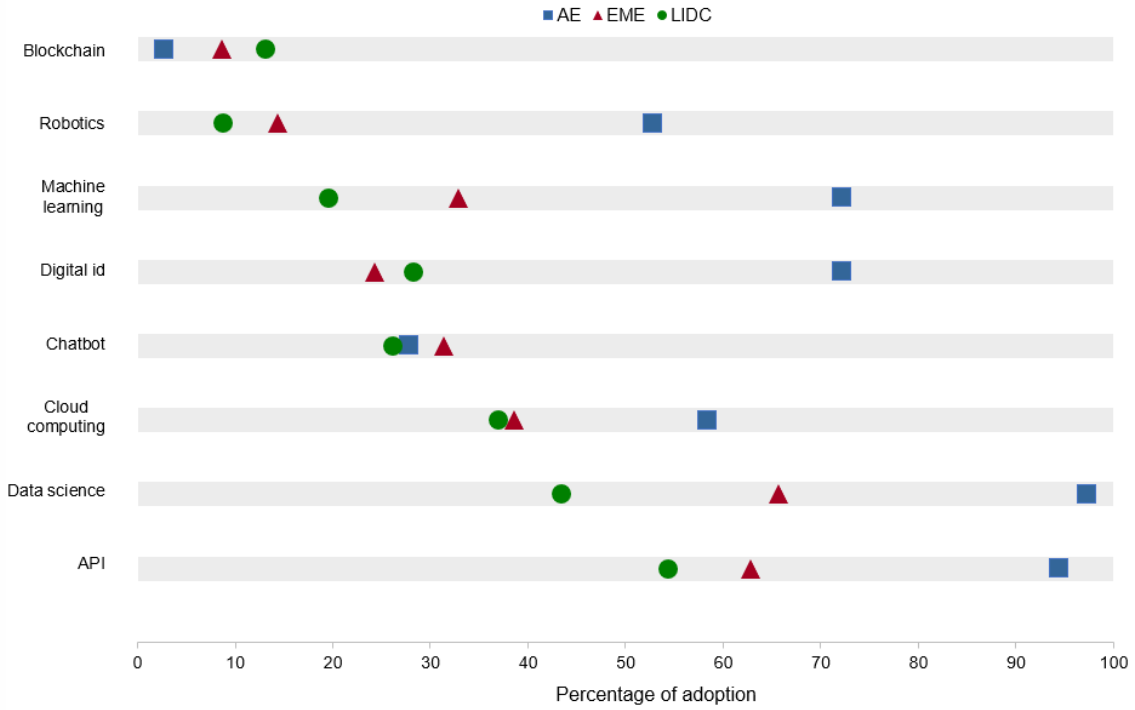
GovTech Solutions for Revenue Administration

Low-income developing countries have considerable space to improve in terms of online registration and e-filing, and in adopting analytical tools.

Share of Taxes e-Filed by Tax type



Adoption of Analytical Tools in Revenue Administration Across Countries (percent), in 2019

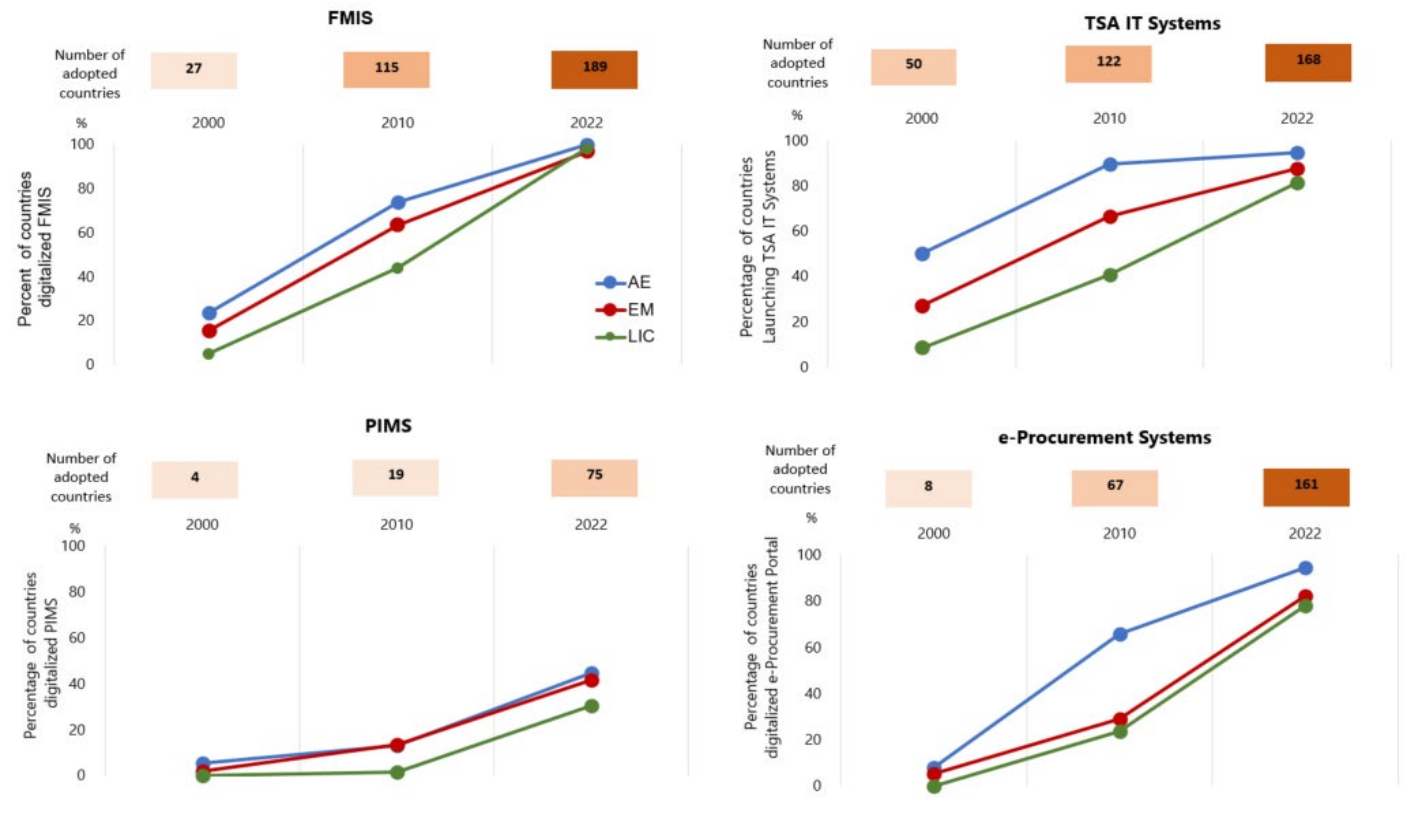


Sources: ISORA survey and IMF staff estimates.

Note: The share of taxes filed online is calculated by dividing the number of taxes filed online by the total number of taxes filed annually. The share of countries using analytical tools represents the proportion of countries that had implemented these tools in their revenue administration as of 2019.

GovTech in Public Expenditure

While some level of digitalization of core PFM functions has been achieved in most countries, there is significant variation in the extent of coverage and the use of functionality.

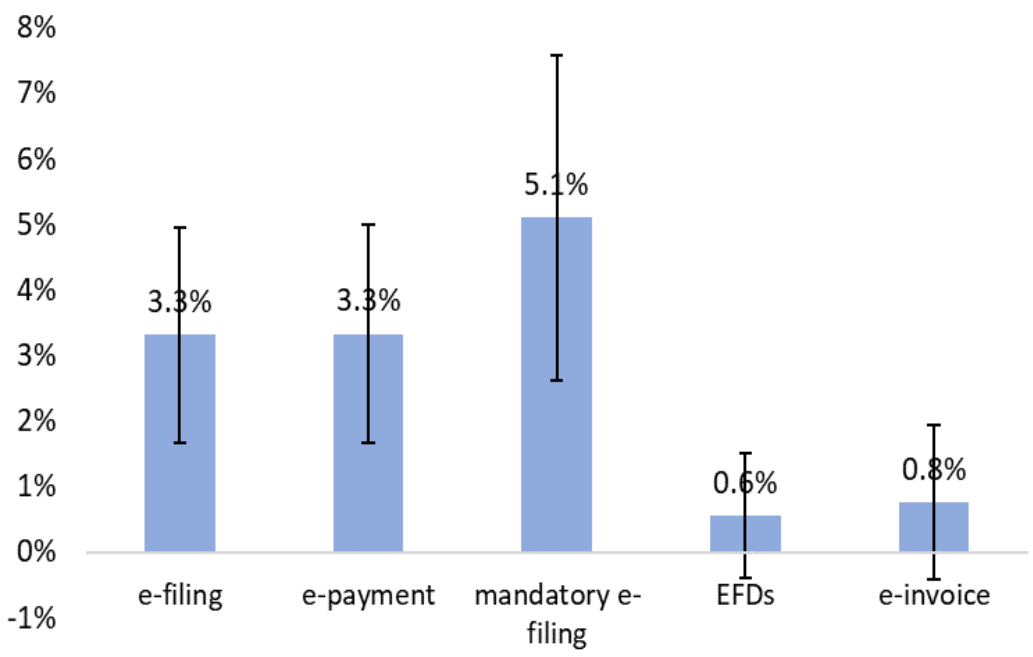


Sources: World Bank GovTech Maturity Index and IMF staff estimates.
Note: FMIS: Financial Management Information System; TSA: Treasury Single Account Information Systems; PIMS: Public Investment Management System.

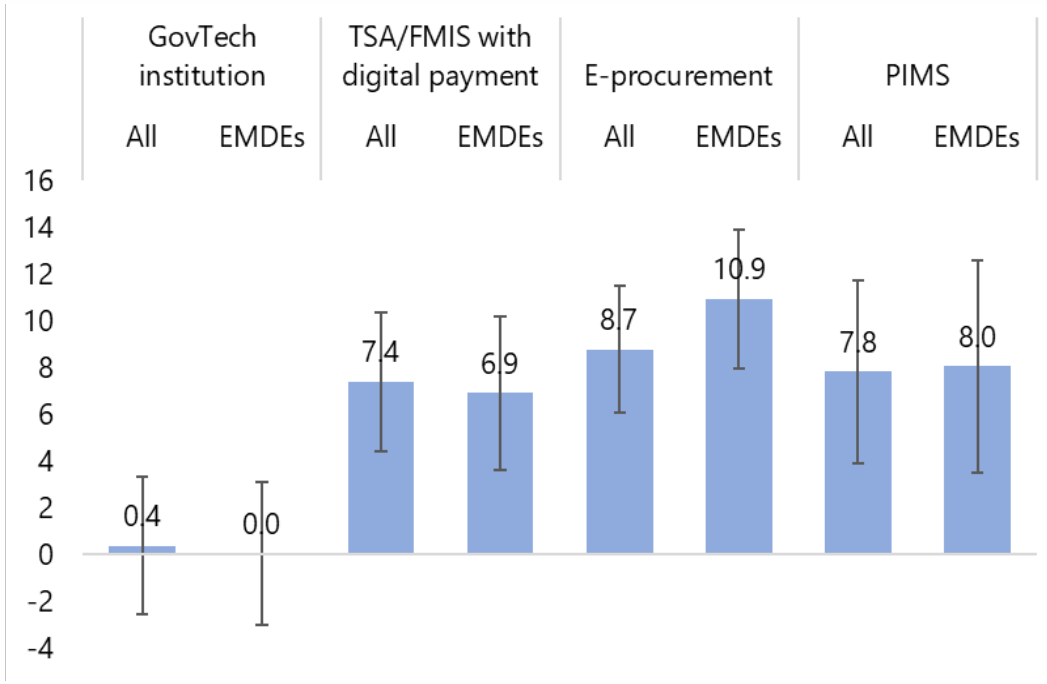
Impact of Digitalization on Public Finance

When properly implemented, the adoption of GovTech solutions has the potential to significantly increase revenue collection and enhance fiscal transparency and spending efficiency.

Impact on Tax Revenue (percent of GDP)



Impact on Open Budget Index



Sources: Nose (2023) using IMF, World Bank GovTech Maturity Index, ISORA, TADAT, and Open Budget Survey.
Note: Bars show point estimates of each GovTech variable from fixed effect regressions, controlling for macroeconomic, structural, and institutional determinants of each outcome. Error bars present 95 percent confidence intervals. Digital payment is defined as electronic government transfers with internet or mobile phone.

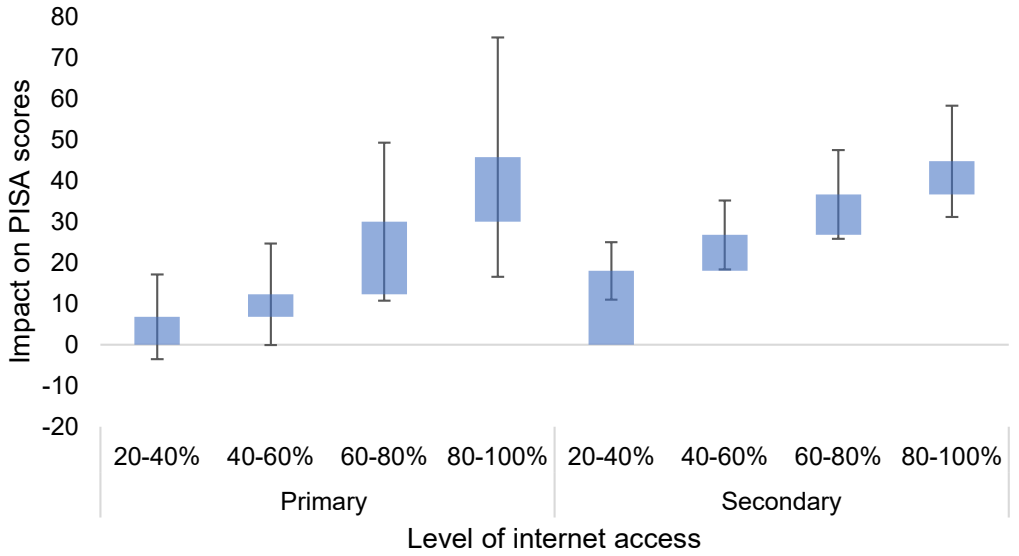
Impact of Digitalization on Education

Internet adoption could yield significant learning dividends. For example, an increase in internet use from 10 to 90 percent increases average primary and secondary education test scores by up to 25 percent.

Mapping Digital Interventions to Education Outcomes

User	Access to […] at home		Access to […] at school	
	Equipment & software	Internet	Equipment & software	Internet
Students	Educational software installed on home computers can increase learning [*One Laptop Per Child* China]	Distance learning [China; *Telesecundarias* Mexico] Can increase access to information for university or career options [Uruguay]	Education software can reduce the learning gap [*Mindspark* India]	Beneficial as study tool if restricted [Malawi] Effects may appear only in the long run [Peru]
	Computers increase digital skills, but can decrease test scores [Romania; North Carolina, USA; *One Laptop Per Child* Peru]	Beneficial for homework if under parental control [Chile]		
Parents		Monitor grades and attendance [USA]		
Teachers			Planning of classes [Kenya]	Detrimental as substitute to teachers [India; Pakistan; USA]
			Videos to complement teaching increase students' learning [Pakistan]	Training teachers is key for positive effects of internet access on students' learning [Ecuador]
Principals			Management software and best practices	Communication with parents

Effects of Internet Use on Education Quality



Source: Michaud-Leclerc and Moszoro (2023) and Kumar, Amaglobeli, and Moszoro (2023).
Note: With the average test score in the sample of 478 and the minimum of 300, the 45-point increase yields a 25 percent increase in test scores over the effective baseline average of 178 points.

Impact of Digitalization on Health

GovTech improves quality of healthcare, coverage of underserved populations, and resource utilization through electronic health records, telemedicine, digital platforms, and monitoring.

Electronic health records

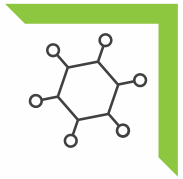
- Informed diagnostics, diseases and health monitoring, and evidence for policy decisions
- Estonia: ~15% prescriptions changed when warnings of interacting drugs

Telemedicine

- China: 315 million users and 530+ million virtual consultations, assisted by AI
- Malawi: drones for blood transportation

Digital platforms for patent licensing and drug procurement

- Transparent drug patent database (MedsPaL) and sharing licenses; easier drug procurement across and within countries
- Pooled procurement reduces prices and delays, but longer procurement planning



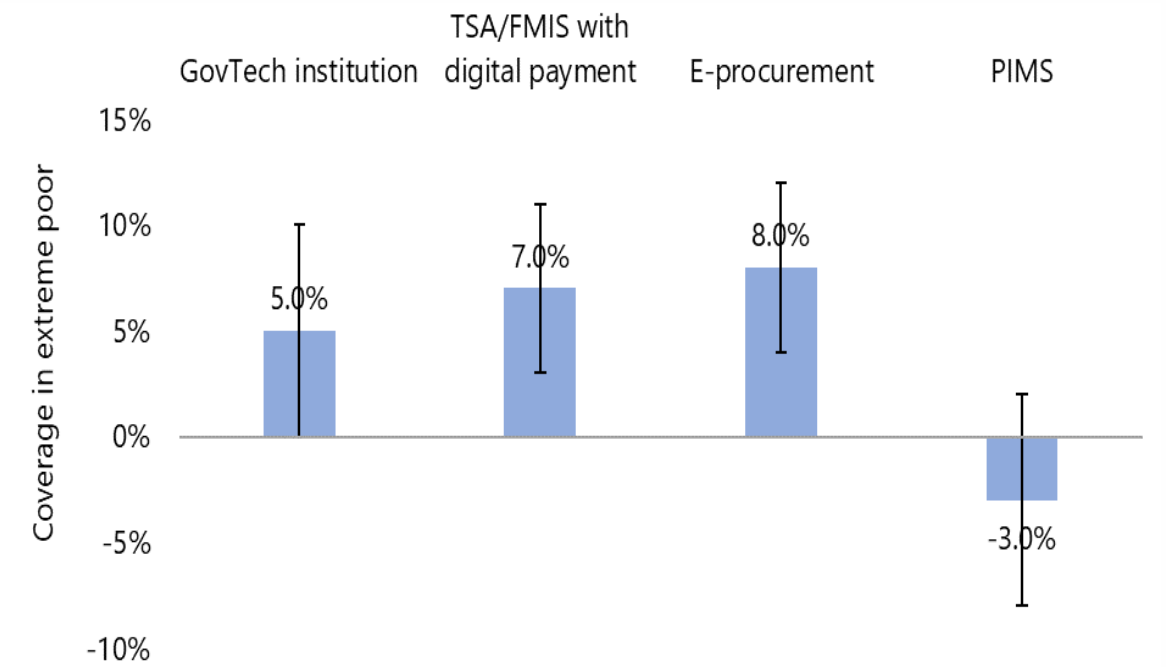
Monitoring of infectious diseases

- Identify outbreaks and track the spread of diseases
- Faster response times and better-targeted interventions

Digitalization and Social Safety Nets

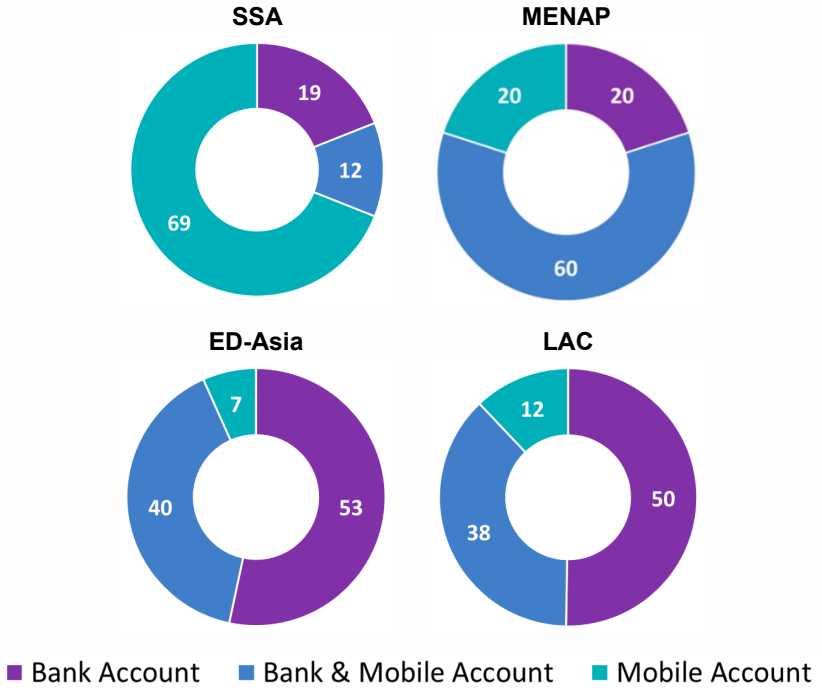
Digitalization strengthens social safety nets (SSNs) through better identification, eligibility verification, and payment mechanisms. Many governments relied on digital tools to quickly scale up social assistance during COVID-19.

Impact of Digitalization on SSN Coverage



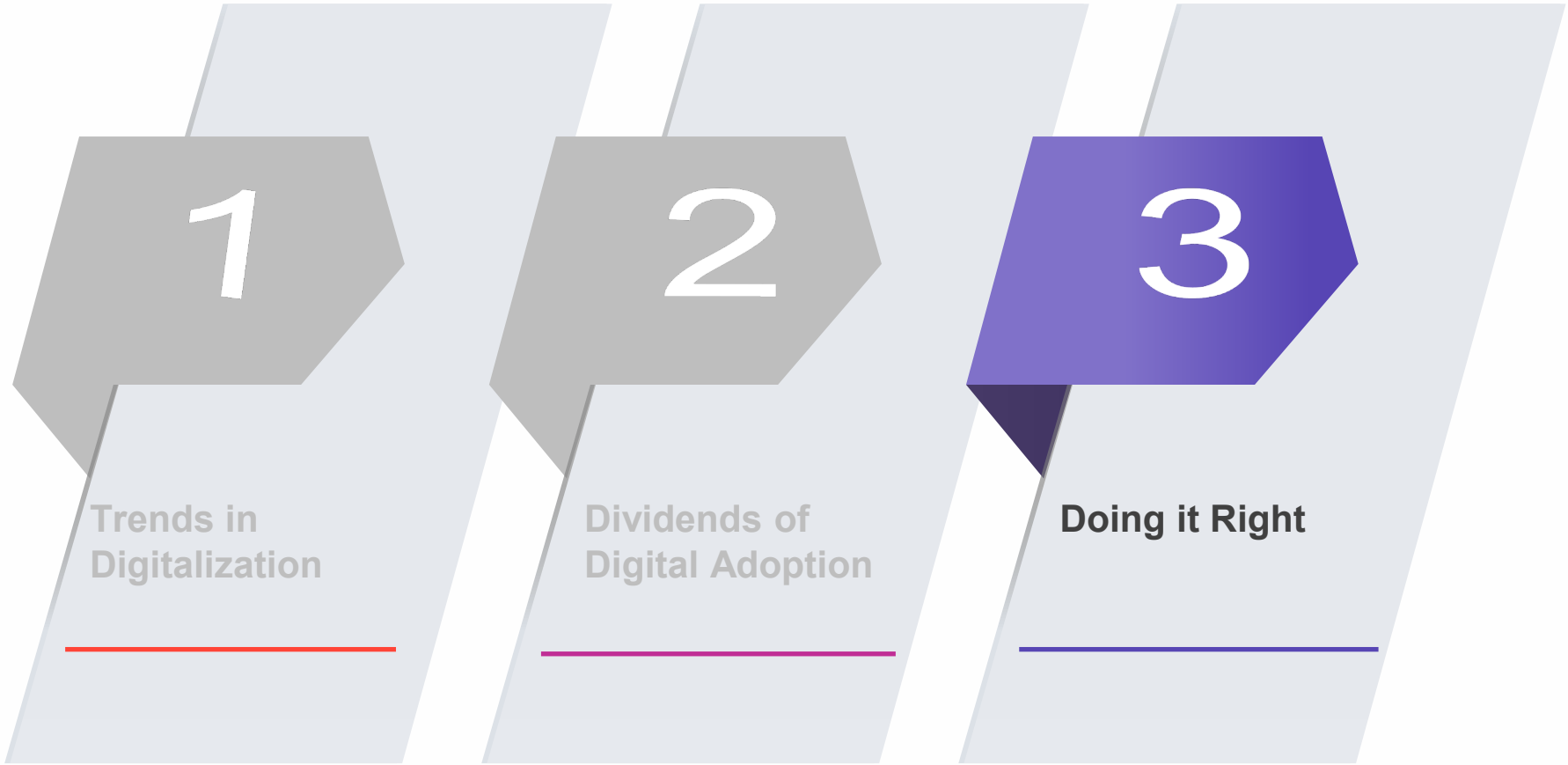
Source: Nose (2023).

SSNs Delivery Mechanisms during COVID-19,
Percentage of Countries by Region



Source: Bird and Hanedar (2023).

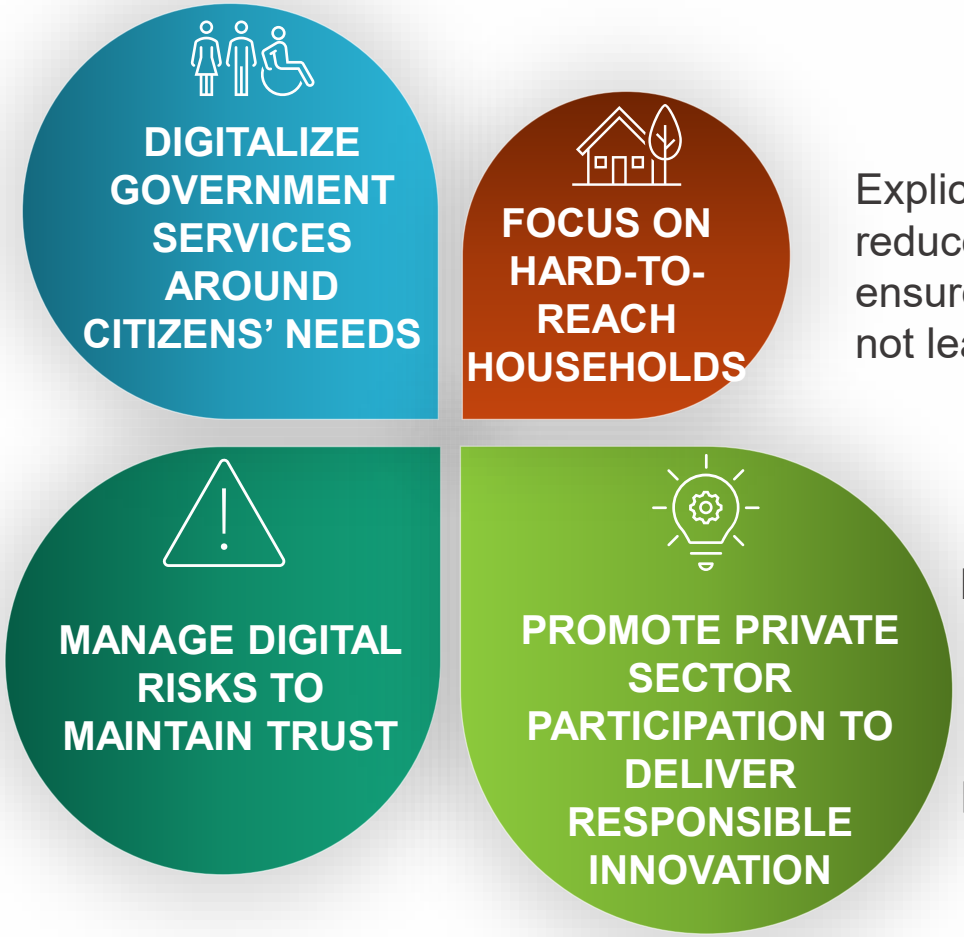
Outline


1
Trends in Digitalization
2
Dividends of Digital Adoption
3
Doing it Right

National Digital Strategy

Four Elements of an Effective NDS

Consider life events; focus on usability



Explicitly consider the need to reduce the digital divide to ensure that policy initiatives do not leave anyone behind

Mitigate cyber threats and risks related to digital fraud, outages, data privacy, data loss, AI, ethics

Responsible innovation: practice of developing, regulating and adopting new digital technologies that considers privacy concerns, social, ethical, and environmental impacts

Digital Solutions for Public Finance Initiatives

Pillars of GovTech for Public Finance

Functional

1. Data capture
2. Data Processing and control
3. Data Storage
4. Data Architecture and Interoperability
5. Information for Decision Making
6. Information Transparency

IT Architectural

1. Adaptive
2. Anticipatory
3. Pragmatic
4. Secure
5. User-Centered
6. Open Architecture

Governance and Management

1. Legal and Regulatory Framework
2. Institutional arrangements
3. Project Management
4. Data Governance
5. Data Protection
6. Digital risks management

IMF Support to Countries on GovTech

Conclusions

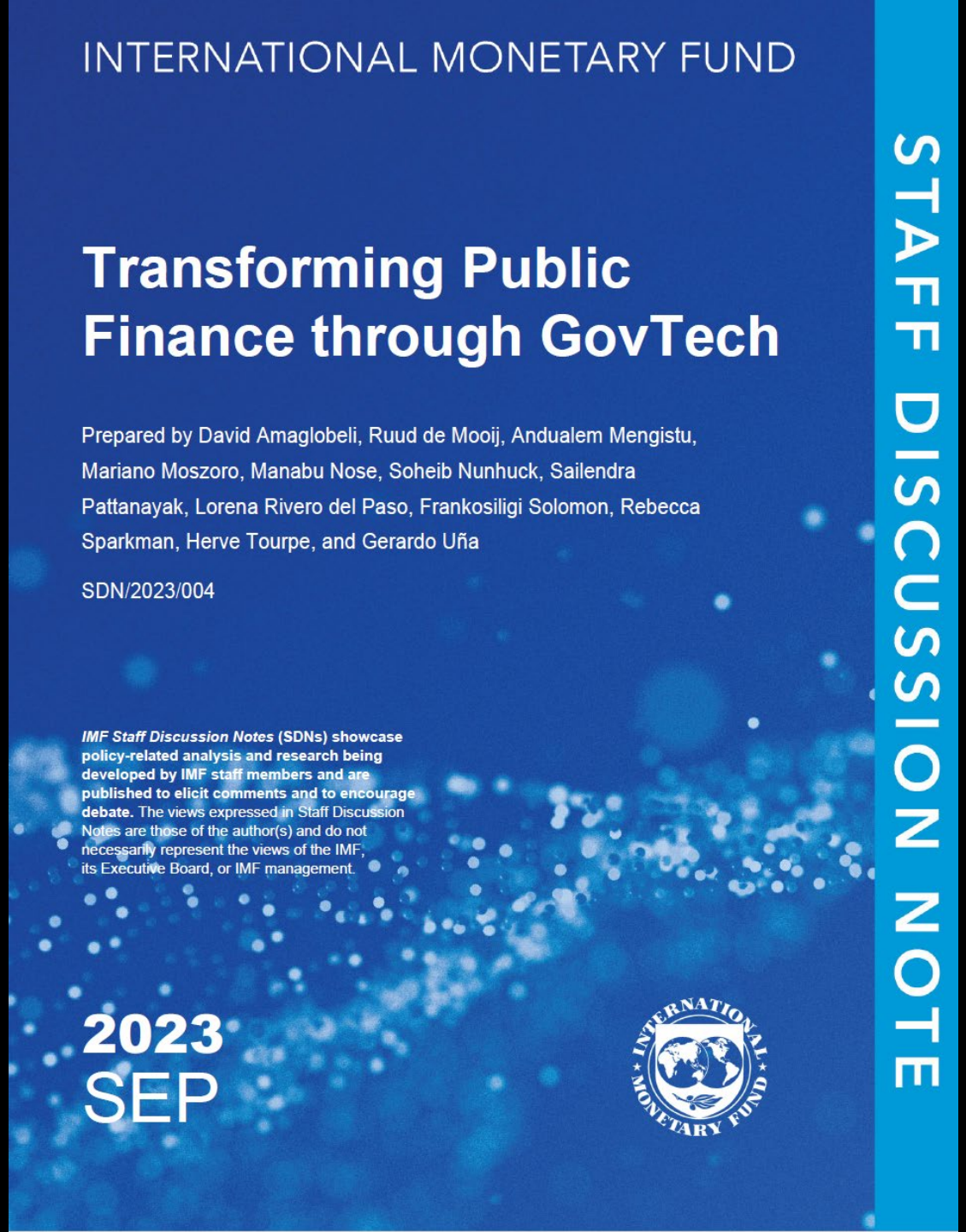
By facilitating digital adoption and implementing GovTech governments can:

- Improve education, health, and social outcomes
- Increase revenue collection and enhance transparency and efficiency of public spending

Maximizing benefits from digitalization requires:

- A comprehensive digitalization strategy that provides vision, roadmap, and resources
- Attendant implementation of reforms to strengthen governance institutions and update legislative and regulatory frameworks
- Management of risks associated (e.g., cyber security and data privacy)

IMF will continue supporting governments in implementing GovTech solutions through its capacity development activities

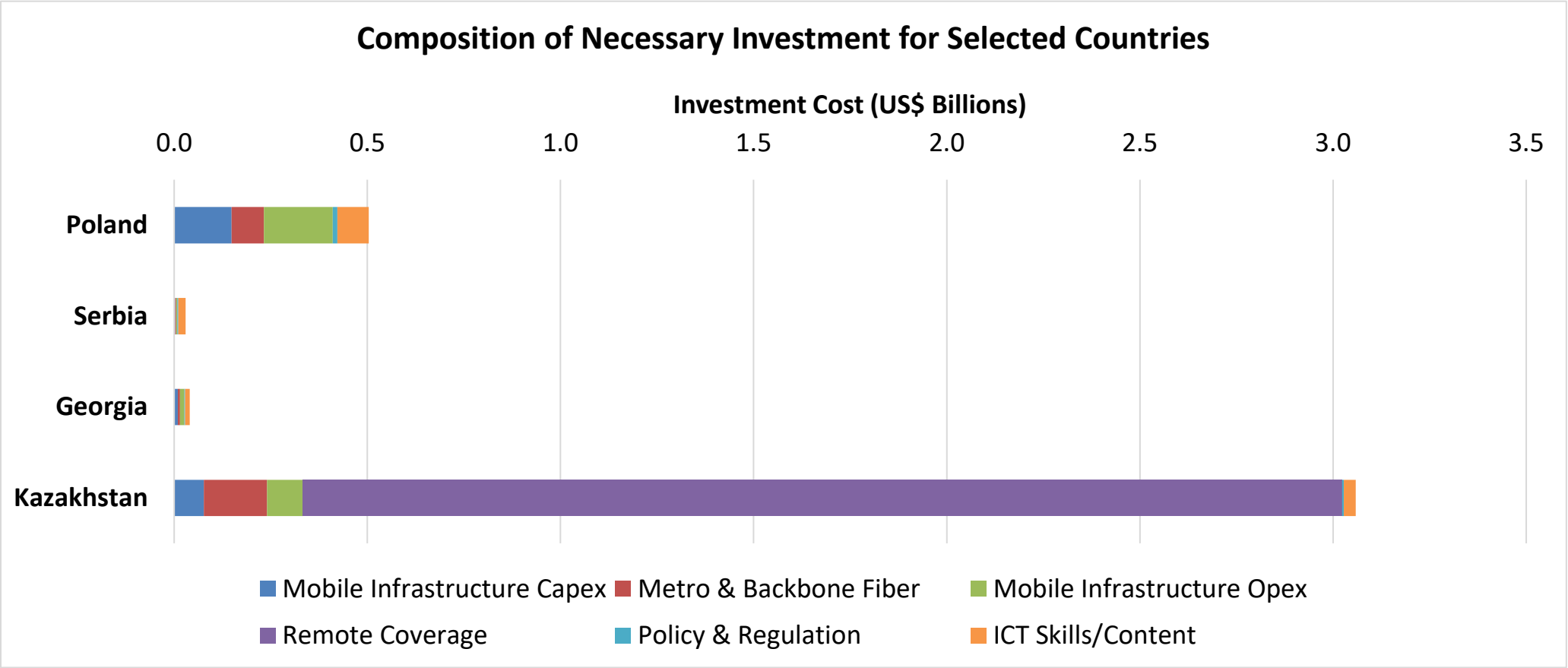

INTERNATIONAL MONETARY FUND
Transforming Public Finance through GovTech
Prepared by David Amaglobeli, Ruud de Mooij, Andualem Mengistu, Mariano Moszoro, Manabu Nose, Soheib Nunhuck, Sailendra Pattanayak, Lorena Rivero del Paso, Frankosiligi Solomon, Rebecca Sparkman, Herve Tourpe, and Gerardo Uña
SDN/2023/004
IMF Staff Discussion Notes (SDNs) showcase policy-related analysis and research being developed by IMF staff members and are published to elicit comments and to encourage debate. The views expressed in Staff Discussion Notes are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.
2023
SEP
STAFF DISCUSSION NOTE

Transforming Public Finance Through GovTech

Joint Vienna Institute Workshop
September 14, 2023

Prof. Dr. habil. Mariano Moszoro
Senior Economist
Fiscal Affairs Department

Digital Infrastructure Investments Needs



Source: Kumar, Amaglobeli, and Moszoro (2023).
Notes: These estimates assume providing universal 4G cellular broadband to users with approximately 40-50 GB of monthly data.