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Cambridge  
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for Alternative  
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 UNIVERSITY OF  
CAMBRIDGE  
Judge Business School

# The 3<sup>rd</sup> Global Fintech Regulator Survey



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# The 3<sup>rd</sup> Global Fintech Regulator Survey



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## WORLD BANK GROUP

Innovation has transformed financial services, especially over the past decade. Much of this change has been driven by exponential growth of the global digital economy, which has enabled a dramatic expansion in access to financial services for poor people. Yet, increased access to digital financial services has also brought new risks—to financial stability and integrity and to consumers. Finding the right balance between supporting these changes so financial services can adequately meet the needs of the public, while also maintaining a stable, transparent and safe marketplace, has become a significant challenge for financial regulatory authorities.

The Global Fintech Regulator Survey provides authorities with an opportunity to take stock of the policy approaches and tools they and their peers use to effectively manage the developments of fintech. It provides a bird's eye view of how external shocks such as Covid-19 have influenced the trajectory of financial regulation and supervision of fintech institutions. By surveying jurisdictions from around the world, with varying income levels and differing policy objectives, the survey highlights global trends in priorities relating to fintech and perceptions of risk.

The first iteration of the survey (in 2019) provided insights into how regulators were initially responding to developments in equity-crowd funding, peer-to-peer lending and initial coin offerings. Results showed that alternative finance was largely unregulated at the time with bespoke regulation just slowly catching up to market developments. The second survey (one year later) was created and disseminated under the auspices of the global partnership for financial inclusion within the G20 framework. Findings showed that regulators responded to the challenges of Covid-19 and increasing digitalization of financial services by taking both sector-wide and fintech specific regulatory measures. Recent Findex results have also demonstrated how much of a difference digital financial services and fintech made to bolster financial inclusion.

This latest survey underscored the ongoing impact of the pandemic and how regulators are managing persistent and emerging consumer risks within fintech, how they aspire to use technology to better manage such risks and how balancing risks and opportunities effectively help achieve significant improvements in financial inclusion and access to finance. At the World Bank we see a growing demand from client countries for data driven assessment tools of risk in financial services. Recognising this, the survey has also explored how and where regulatory authorities are utilizing different types of digital infrastructures to enhance regulatory and supervisory functions for various fintech verticals.

The findings inform how the World Bank and other international organizations might offer support and technical assistance to our client countries. The World Bank is committed to supplying evidence-based knowledge products that can help the global regulatory community better reconcile the benefits, such as financial inclusion, and the risks of innovation and manage, when needed, the trade-offs between those. We aim to translate this understanding into policy dialogue and effective, well designed technical assistance programmes and operations for our client countries.

We thank our colleagues at the Cambridge Centre for Alternative Finance for their contributions to this important work and we are grateful to have collaborated with a leading institution working on fintech and related topics.

### **Jean Pesme**

Global Director, Finance – Finance, Competitiveness and Innovation Practice  
*The World Bank Group*

The continued growth of fintechs and increasing adoption of digital financial services regionally and globally in recent years, present opportunities as well as risks. Fintech industry verticals, such as digital payments, digital lending and capital raising, digital banking and savings, insurtech, as well as digital assets related activities, all saw accelerated development during the global pandemic. By providing new and innovative channels and instruments, fintechs can make financial services more accessible, convenient, and affordable for consumers and small and medium-sized enterprises. However, fintech business models and related activities can also introduce or exacerbate a range of risks, from consumer protection, market conduct and integrity, to financial stability. How financial authorities around the world are responding to both the opportunities and challenges brought by the rapid digitalization of financial services, therefore, is an important area of research.

Building on the foundation of two previous global regulatory studies, the World Bank and the Cambridge Centre for Alternative Finance (CCAF) at the University of Cambridge Judge Business School conducted *The 3rd Global Fintech Regulator Survey* to shed light on the evolving priorities and changing regulatory landscape regarding fintech and other forms of digital financial services. Between April and July 2022, the joint research team successfully surveyed 128 financial authorities from 106 jurisdictions, with 68% of responses coming from authorities in emerging markets and developing economies.

This comprehensive dataset offers a unique view into the world of fintech regulators, supervisors, and policymakers. The survey and resulting report focused on four thematic areas: the medium-term impact of Covid-19 on fintech-related regulation and policy, how regulators and supervisors perceive consumer risks associated with fintech activities, the evolving landscape and recent developments in building vital digital regulatory and supervisory infrastructures, and the current state of supervisory technology creation and adoption.

We hope that the data and insights generated from this global survey will inform the work and practice of fintech regulators, supervisors and policymakers, help them benchmark responses, frameworks and activities, and facilitate meaningful peer learning and knowledge exchange. We also hope that the learnings from this study will be of interest to and practically useful for other stakeholders in the burgeoning global fintech ecosystem, including fintech firms and industry associations, end-user groups, the investor community, financial incumbents, international standard-setting bodies, as well as development institutions and organizations. After all, it is in the interest of all these stakeholder groups that the development of the fintech industry becomes more sustainable, inclusive, and responsible.

At the CCAF, we are immensely grateful for the time and support of all responding financial authorities, and also for the opportunity to work with our World Bank colleagues on this global research. We also wish to express our gratitude to the UK Foreign, Commonwealth & Development Office, and The Bill & Melinda Gates Foundation for their support that made this study possible.

**Bryan Zhang**

Co-Founder and Executive Director  
Cambridge Centre for Alternative Finance



The UK welcomes the Cambridge Centre for Alternative Finance's (CCAF) latest expert assessment of FinTech regulation and supervision over the past year, researched in partnership with the World Bank. Following previous annual benchmarking reports, *The 3rd Global FinTech Regulator Survey*, written in partnership with the World Bank, shares unique insights across markets to inform future FinTech policy and regulation.

Over the past decade, the UK has been at the forefront of the global FinTech revolution where innovation has created jobs, improved access to financial services and strengthened competitiveness. Notably, the UK's FinTech industry showed tremendous resilience to the Covid-19 pandemic, with UK FinTechs attracting \$24.5 billion of investment in the first half of 2021, the highest volume of deals on record, ranking first in Europe and second to the US globally.

The global FinTech industry was not immune to the disruption caused by Covid-19, however, it adapted and played an important role in the pandemic response, attracting new customers, and supporting individuals and enterprises to access crucial financial services during a time of unprecedented economic uncertainty. Evidence set out in this report helps us better understand how FinTech responded to these challenging market dynamics, with enabling regulation and supervision that have proven integral to maintaining business continuity and financial stability.

The report's findings will be of great interest to financial services regulators and supervisors in Asian and African countries where FinTech plays an important role in deepening domestic capital markets and providing access to credit so that people and businesses can save, borrow, and invest. From 'innovation offices' to 'regulatory sandbox development', the UK works with regulators around the world to strengthen regulatory environments, to enable FinTech innovation and protection businesses and consumers.

This research series from CCAF and the World Bank provides an excellent evidence base for both FinTech innovators and the global regulatory community.

A handwritten signature in blue ink that reads 'Andrew Mitchell'.

**Andrew Mitchell MP**

Minister of State (Development and Africa)  
*Foreign, Commonwealth & Development Office (FCDO)*

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# Research team

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## Contributors and reviewers

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# Acronyms

AML – anti-money laundering

APAC – Asia Pacific

API – application programming interface

CBDC – central bank digital currency

CFT – combating the financing of terrorism

CGAP – consultative group to assist the poor

COVID-19 – Coronavirus disease 2019

DFS – digital financial services

DRSI – digital regulatory and supervisory infrastructure

EMDEs – emerging market and developing economies

e-KYC – electronic know your customer

FCP – financial consumer protection

MENA – Middle East and North Africa

OECD – Organization for economic cooperation and development

NFTs – non-fungible tokens

SSA – sub-Saharan Africa



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# Glossary

**application programming interface (API)** – allows software programs to interact by exchanging data, enabling certain actions such as making a transaction. This includes payment APIs, data APIs, ‘ecosystem expansion’ APIs, and ‘consent and identity’ APIs (World Bank, 2020b).

**central bank digital currency (CBDC)** – a digital form of central bank money that is different from balances in traditional reserve or settlement accounts. It is envisioned as a new form of central bank money, namely a central bank liability, denominated in an existing unit of account, which serves both as a medium of exchange and a store of value (BIS, 2018b).

**consumer protection** – the framework of laws, regulations, and institutional arrangements that safeguards consumers by ensuring they are treated fairly and responsibly in the financial marketplace (World Bank, 2022a).

**cybersecurity** – related to preserving confidentiality, integrity, and availability of information and/or information systems in the cyber medium. It can also include authenticity, accountability, non-repudiation, and reliability (FSB, 2018a).

**DFS consumer risk** – a condition or factor that exposes a consumer to potential or actual harm or loss (both financial and non-financial) while using DFS (CGAP, 2022).

**digital asset** – a digital instrument issued or represented using distributed ledger or similar technology. It does not include digital representation of fiat currencies, such as e-money (FSB, 2022a).

**digital financial services (DFS)** – services, such as payments, transfers, savings, credit, insurance, securities, financial planning, and account statements, that are delivered via digital/electronic technology (for example, money, payment cards, and a regular bank account) (World Bank, 2020b).

**digital infrastructure** – the digital technologies that provide the foundation for an organization’s information technology and operation (World Bank, 2019).

**digital sandbox** – provides access to features, such as synthetic data, an API marketplace, a digital testing environment, and a collaboration platform, to support innovation and address challenges in tech development and adoption (FCA, 2022a).

**fintech** – an acronym for ‘financial technology’. It refers to the advances in technology that have the potential to transform financial services, stimulating the development of new business models, applications, processes, and products (World Bank, 2020d).

**financial interconnectedness** - relates to financial distress at one institution that can materially increase the likelihood of distress at other institutions given the network of contractual obligations in which firms operate. For instance, a bank’s systemic impact is likely to be positively related to its interconnectedness vis-à-vis other financial institutions (BCBS 2021).

**innovation accelerator** – supports early-stage, growth-driven companies through education, mentorship, and financing. Startups enter accelerators for a fixed period and as part of a cohort of companies. The accelerator experience is a process of intense, rapid, and immersive education aimed at accelerating the lifecycle of young innovative companies, compressing years of learning through experience into just a few months (CCAF and World Bank, 2020).

**innovation office** – a dedicated function within a regulator that engages with and provides regulatory clarification to innovative financial services providers. These are also called innovation or fintech hubs (World Bank, 2020d).

**payment tokens/digital currency** – currency/payment tokens in their pure form fulfill the economic criteria of money, serving as a means of exchange, store of value, and unit of account (Zetzsche, Arner, and Buckley, 2020).

**regulatory innovation initiatives** – a broad set of activities carried out by regulators to innovate regulatory and supervisory functions, processes, organizations, and applications, which often, but do not necessarily, involve the use of technological solutions. These include an innovation office, a regulatory sandbox, and suptech solutions (CCAF and World Bank, 2020).

**regulatory sandbox** – formal regulatory programs that allow market participants to test new financial services or models with live customers, subject to certain safeguards and oversight (CCAF and World Bank, 2020).

**security tokens** – tokens with specific characteristics providing rights and obligations similar to specific investments, like a share or debt instrument (FCA, 2019).

**sentiment analysis** – a specific form of natural language processing that focuses on inferring the emotional content expressed in a collection of text or transcribed speech. Examples include social media data mining to understand public sentiment surrounding a given topic or entity, and analysis of customer service requests/complaints to inform escalation (BIS, 2018).

**stablecoins/tokens** – a category of cryptoassets that aims to maintain a stable value with reference to a specified asset, or basket of assets, and provide stability compared to the high volatility of unbacked cryptoassets. They are often pegged to a specific fiat currency (FSB, 2022a).

**suptech** – an acronym for ‘supervisory technology’. It is defined as the use of innovative technology by financial authorities to support their work (BIS, 2018).

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# Executive summary

The 2022 World Bank-CCAF Global Fintech Regulator Survey is the third global survey of regulatory and supervisory authorities to assess their responses to financial technology (fintech) activities and related regulatory innovation initiatives.

The outputs from this survey provide timely data and analysis to inform the work and practice of financial authorities around the world. A central objective of the study is to provide information that regulators can use to benchmark, evaluate, and prioritize their policy responses to fintech developments within their market.

Between April and July 2022, the joint CCAF and World Bank research team surveyed 128 financial authorities from 106 jurisdictions. Survey respondents came from authorities in East Asia Pacific (21), Europe and Central Asia (28), Latin America and the Caribbean (24), Middle East and North Africa (14), North America (3), South Asia (6), and sub-Saharan Africa (32).

For this iteration of the survey,<sup>1</sup> the research aim was to understand the extent to which policymakers continue to be impacted by the Covid-19 pandemic as we move away from the crisis. The survey provides insights into the types of consumer risks that have emerged because of the pandemic and the impact of such risks on policy objectives. The survey also explores the important role of information technology systems and infrastructures in supporting oversight and supervision across fintech verticals.

As with previous reports, the empirical data from this survey enables the development community to better prioritize and tailor their support to regulatory and supervisory agencies, particularly in emerging market and developing economies (EMDEs). This support could include

the development of effective capacity-building initiatives and targeted, well-researched knowledge products.

This survey is one of the largest empirical studies to date on the regulation and supervision of fintech aimed at financial authorities. Importantly, almost 70% of respondents oversee fintech developments in EMDEs.

## Survey structure and main findings

The survey asked a range of questions covering four key themes:

- 1 The medium-term impact of Covid-19 on policy responses to fintech
- 2 Perceptions of continuing and emerging consumer risks within fintech and their implications for consumer protection
- 3 The landscape of different types of digital regulatory and supervisory infrastructures (DRSI)<sup>2</sup> used to enable effective regulation and oversight of fintech markets
- 4 A mapping of supotech activities

A link to the survey questions can be found in this footnote.<sup>3</sup>

Covid-19 continues to catalyze financial authorities in EMDEs to prioritize fintech-related work to deepen financial inclusion. Fifty-six percent of respondents in EMDEs have increased the priority of fintech compared to 35% of respondents in advanced economies. This is particularly the case in sub-Saharan Africa (SSA) where 75% of respondents report an increase in fintech prioritization. Regulatory innovation initiatives, such as innovation offices and regulatory sandboxes, are specific areas of growth in EMDEs.

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1 The *first iteration of the survey*, which took place in 2019, was to understand regulatory responses to equity crowdfunding, peer-to-peer lending, and initial coin offering. *The second survey* focused on the pandemic's immediate impact, and regulatory and supervisory authorities' policy responses to address challenges (and in some instances opportunities) arising from the pandemic.

2 In the context of this report, digital regulatory and supervisory infrastructure (DRSI) refers to systems that electronically collect, process, and transmit information to facilitate effective regulation and supervision of digital financial services. DRSI provides financial authorities with the necessary data and tools to enable them to carry out their functions. For example, DRSI can include foundational data-gathering applications needed for supotech initiatives development, or infrastructure deployed by a financial authority to enable digital regulatory reporting.

3 The survey instrument can be viewed using this link: [https://cambridge.eu.qualtrics.com/jfe/form/SV\\_OxNmcp1sb8XdIPA](https://cambridge.eu.qualtrics.com/jfe/form/SV_OxNmcp1sb8XdIPA)

Generally, respondents perceive that fintech aligns with their overarching policy objectives. However, a significant proportion cite concerns about effectively mitigating existing and emerging consumer risks. Respondents report capacity and resource constraints as the main challenge in addressing consumer risks. Overall, authorities are most worried about their internal capacity to effectively mitigate consumer risks related to digital assets and cryptoassets.

The top three risks that have increased for survey respondents due to Covid-19 relate to cybersecurity, fraud and scams, and other consumer protection issues. Seventy-eight percent of respondents considers threats to cybersecurity as the top risk in fintech. Fraud and scams are the second most common risk, reported by 67% of respondents, up from 18% in the 2020 survey. General consumer protection risks are of greater concern for financial authorities in EMDEs (56%) compared to those in advanced economies (43%).

Using suptech applications to effectively respond to consumer risks is an important objective for a large proportion of respondents. However, consumer education and literacy initiatives are the most common ways financial authorities currently respond to risks to consumers.

Far more respondents in advanced economies use DRSI than those in EMDEs, and the most common applications are for consumer protection and ongoing supervision.

Regulators would like to use DRSI for monitoring competition practices, policymaking, and international regulatory coordination. The most desired area for DRSI application is monitoring competition practices, cited by 50% of respondents. However, it is also the regulatory function with the lowest currently active/operational DRSI, reported by just 6% of respondents.

Forty one percent of respondents indicated a desire to apply DRSI to open banking. Other digital initiatives that regulators and supervisors are interested in are digital ID/e-KYC, CBDCs, and digital asset supervision. Limited knowledge and/or expertise is a fundamental challenge to developing effective DRSI for more financial authorities in EMDEs.

Forty per cent of all respondents have one or more operational suptech applications. Out of 60% of financial authorities who responded negatively half have begun their journey and are either currently developing a suptech application, or have created their strategy in how to move forward with operationalising suptech applications.

Financial authorities are also implementing suptech tools to enhance consumer protection. While only 18% of all respondents indicated they already have suptech applications for consumer protection, 31% indicated that they plan to introduce one in the future.

Respondents reported several benefits of suptech adoption. Improved risk-based supervision, as well as improved scope, accuracy, consistency, and timeliness of collected information, and more efficient use of resources are the biggest positive impacts of suptech adoption. Other benefits cited include greater internal supervisor coordination and more efficient information flows.

### **Policy implications and potential areas for further work**

The survey data presented in this study enables discussions on policy implications for both financial authorities and the wider development community. These areas are interrelated and mutually reinforcing.

There are opportunities to strengthen and enhance fintech-related consumer protection measures. The creation of new business models that may sit outside the regulatory perimeter of many jurisdictions, limits authorities' ability to establish supervisory approaches that help mitigate consumer risks arising from these new business models. Authorities may need technical and capacity-building support in applying approaches, such as 'test and learn' or sandboxes, to help facilitate oversight of these business models and keep consumers protected, ahead of establishing or extending the regulatory framework perimeter to include such activities.

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A considered and coordinated policy response is also important to address the concerns and uncertainty relating to consumer risk in the digital assets sector. This might include evaluating the potential risks and harm that may arise in the sector and providing better data and technology to support financial authorities. However, capacity building is also needed so that regulators can better understand the digital assets space and thus respond to the challenges it might create.

Supporting enhanced cybersecurity frameworks is becoming ever more important in the face of rapid digital transformation.<sup>4</sup> This is particularly the case in EMDEs, where financial and regulatory infrastructure may be less resilient to emerging challenges compared to that in advanced economies.

Strategically strengthening digital and regulatory supervisory infrastructure capabilities would support several positive outcomes, for both financial authorities and supervised firms, while mitigating some of the challenges they experience.

An area of particular interest is the application of supotech tools. Resource and capacity constraints are limiting many financial authorities' ability to effectively deploy and/or scale supotech activities. Fundamental to this challenge is access to necessary data. To realize the potential of supotech in overseeing financial markets, authorities will also require support in developing effective data science techniques.

Finally, tying a number of these themes together, financial authorities need research, capacity building, and technical support to balance the benefits and risks of the increased digitalization of financial services. This is particularly the case for respondents in EMDEs, who perceive that both the potential benefits and risks of this digitalization are higher compared to their counterparts in advanced economies.

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<sup>4</sup> To support efforts to enhance cybersecurity, the World Bank has announced a new global fund: <https://www.worldbank.org/en/news/press-release/2021/08/16/world-bank-and-partners-announce-new-global-fund-for-cybersecurity>

# 1. Introduction and research motivation



# 1. Introduction and research motivation

The global Covid-19 pandemic has brought to the fore the potential benefits and challenges of digital finance. Digital financial services (DFS) have been seen as an integral part of the response to the pandemic, enabling business continuity and financial stability (Arner, D. et al., 2022b). There have been cases where DFS, including many forms of fintech activities, have supported recovery efforts, facilitating payments, savings, and credit, while supporting the long-term goals of developing digital economies and e-government, and supporting aims such as financial inclusion (World Bank, 2020b; Sahay, et al., 2020).

This third global survey of regulatory and supervisory authorities assesses their response to fintech and related regulatory and supervisory innovation initiatives. It follows the two previous studies:

- 1 *Regulating Alternative Finance: Results from a Global Regulator Survey* (CCAF and World Bank, 2019)
- 2 *The Global-CCAF Covid-19 Fintech Regulatory Rapid Assessment Study* (CCAF and World Bank, 2020), henceforth referred to as *The Rapid Assessment Study*

This joint survey is part of a broader collaboration between the CCAF and the World Bank, which includes surveys of the fintech market. The collaboration also led to *The Global COVID-19 Fintech Market Impact and Industry Resilience Study* (CCAF, WEF, and World Bank, 2022) and *The Global Covid-19 FinTech Market Rapid Assessment Study* (CCAF, WEF, and World Bank, 2020).

The findings from this survey aim to assist policymakers, regulators, market participants, and the development community understand the global regulatory community's perceptions of key topics relating to fintech. The continuing impact of the Covid-19 pandemic has rapidly transformed global financial markets, and regulators and supervisors must respond to the transformation. The increase

in the use of digital financial products and services has also highlighted a growing concern regarding the impact of fintech on consumers (World Bank, 2022a). In addition, the ability of financial authorities to respond to these changes often relies on whether the appropriate digital infrastructure is in place and the availability of the skills required to use emerging regulatory and supervisory technology.

This report provides data and analysis to help financial authorities benchmark, evaluate, and prioritize their responses to fintech developments. It describes the different experiences of EMDE participants, giving the development community insight into how to prioritize and tailor their support to regulators as they confront challenges in dealing with the continued disruption of the Covid-19 pandemic.

The survey focuses on four key themes:

- 1 An assessment of the medium-term impact of Covid-19 (**Chapter 3**)
- 2 Consumer risks concerning fintech activities (**Chapter 4**)
- 3 The landscape of digital regulatory and supervisory infrastructure (**Chapter 5**)
- 4 Global supotech mapping (**Chapter 6**)

## **An assessment of the medium-term impact of Covid-19 (Chapter 3)**

Regulators and supervisors around the world have had to respond to the accelerated adoption of fintech and DFS due to the pandemic. This has created challenges, such as ensuring regulatory and supervisory operations continue and accelerating the need to establish regulatory innovation initiatives.

Together with the results from *The Rapid Assessment Study*, this chapter evaluates the impact of the pandemic on financial sector authorities' views and innovation initiatives related to fintech.

## Consumer risks concerning fintech activities (Chapter 4)

More financial authorities are becoming aware of the risks that the increased use of fintech poses to consumers. Some of these risks are new, while others are existing risks that the pandemic has intensified (World Bank, 2022b). This chapter evaluates regulators and supervisors' perceptions of fintech-related consumer risks and how they identify, assess, prioritize, and address these risks.

## The landscape of digital regulatory and supervisory infrastructure (Chapter 5)

Digital infrastructure is a necessary base that the digital economy needs to transform the global economy (World Bank, 2019). The Covid-19 pandemic has highlighted the importance of such digital infrastructure, especially in financial markets, as it can provide societal resilience and business continuity (IFS, 2020). In addition, the rapid digitalization of financial products and services, and the complex ecosystems of financial markets, have required financial authorities to adapt their approaches to regulation and supervision. Financial authorities need to ensure that technology, people, processes, systems, and digital tools are strategically deployed to effectively oversee these new markets and achieve their regulatory mandates and social priorities, such as ensuring adequate consumer protection, promoting financial inclusion, and ensuring financial system stability. Such infrastructure is costly to develop and maintain, and thus the lack of digital regulatory and supervisory infrastructure can act as a barrier to digital transformation (di Castri, Grasser, and Kulenkampff, 2020).

To achieve this, there is a need for DRSI to be in place. DRSI refers to digital technologies that collect, process, and transmit information to facilitate effective regulation and supervision of financial services. It provides financial authorities with the data and tools they need to carry out their functions. DRSI can include foundational data gathering applications needed for developing supotech initiatives, or infrastructure to enable digital identity initiatives such as common platforms for multiple ID use cases as well as data storage facilities.

This infrastructure is needed to realize the full potential of digital financial services, but it can also be instrumental in enabling the effective oversight of financial markets. DRSI can also be deployed to develop and implement new technologies that require reliable and secure foundational building blocks. This chapter maps the global landscape of such infrastructure, as well as financial authorities' approaches and priorities in developing it.

## Global supotech mapping (Chapter 6)

Supotech refers to the application of technology and data analysis solutions to enhance a financial authority's financial market oversight capabilities (BIS, 2019). It allows financial authorities to access more granular, diverse, timely, and trustworthy data to better inform their decisions and improve operational efficiencies. The technology aims to help supervisory agencies digitize (in the main) reporting and regulatory processes, enabling them to monitor the risk and compliance of financial institutions more efficiently and proactively. The survey provides an overview of the supotech tools that are developed by financial authorities, as well as the benefits financial authorities receive from their use, and the challenges they face as they deploy these tools.

## Policy implications and areas for further research (Chapter 7)

This study provides timely data and analysis aimed at enabling financial authorities globally to benchmark, evaluate, and prioritize their responses to fintech developments. This also provides an opportunity to discuss policy implications for both financial authorities and the wider development community. This chapter sets out several interrelated policy implications and areas for future research based on the empirical evidence gathered from this study. These are centered on enhancing consumer protection measures, developing policy approaches to digital assets, supporting enhanced cybersecurity frameworks, strategically strengthening DRSI and supotech capabilities and supporting capacity building and technical assistance in key areas identified by the respondents.



## 2. Survey methodology and sample



## 2. Survey methodology and sample

### 2.1 Survey administration and fieldwork

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The online survey was designed by the CCAF and World Bank research team and centered around important themes in fintech regulation and supervision. Before being distributed, the survey was tested on a small number of regulators and supervisors to determine the most pertinent set of questions, and the appropriate phrasing and terminology, and to ensure the answers could be captured in an effective and timely manner. In response to the feedback from the pilot, an extensive glossary was created and embedded within the survey to help participants with their responses.

*The 2022 Global Fintech Regulator Survey* (the survey for this report) was designed between January and March 2022 and distributed online to financial authorities from April to July 2022. The individuals who were asked to complete the survey were those familiar with their institution's regulatory approach, framework(s), and practices to regulate and/or supervise fintech activities, entities, and related DFS.<sup>5</sup>

This report presents the empirical data collected from 128 authorities in 106 jurisdictions. The target audience was regulatory and supervisory authorities with remit over some or all the fintech verticals in their jurisdiction. This includes financial conduct authorities, central banks, securities and capital market authorities, and insurance regulators.

Of the 128 responses, 77 were from central banks, representing 60% of the total responses, with the remainder mainly comprising securities/capital markets authorities and other financial authorities. In the analysis that follows, the group 'other financial regulators' incorporates all non-central bank respondents. Given the focus on EMDEs, these jurisdictions were targeted more specifically. As a result, 87 responses were received from EMDEs, which represents 68% of the total.

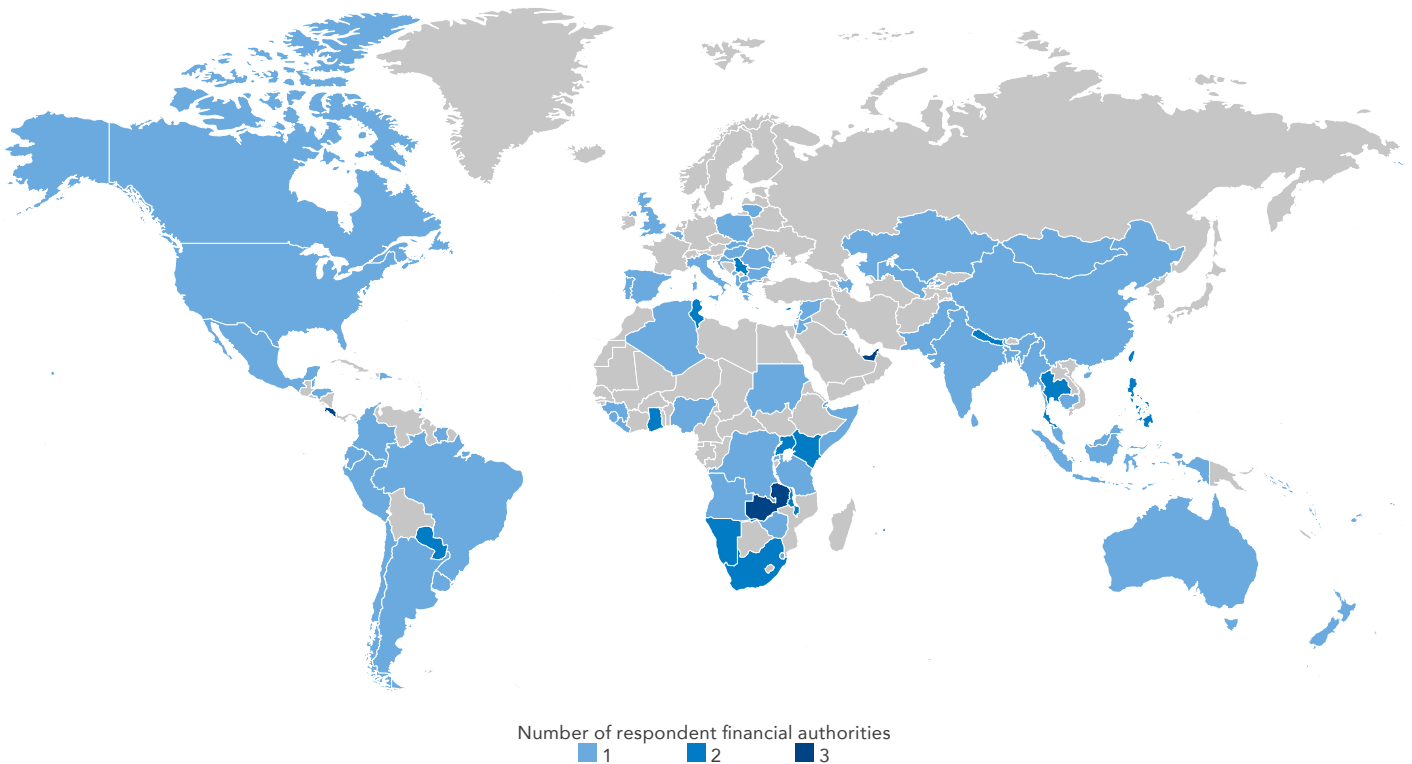
Several channels were used to identify suitable participants and determine whether they would be willing to take part in the study. These channels included approaching previous participants in *The Rapid Assessment Study* (CCAF and World Bank, 2020), the 2019 *Regulating Alternative Finance: Results from a Global Regulatory Survey* (CCAF and World Bank, 2019), and the CCAF's online fintech executive education program (Cambridge Fintech and Regulatory Innovation Program). Contacts within the CCAF and the World Bank's global networks were also approached.

A survey of experts within financial authorities can provide data on global perceptions of current issues that affect digital financial services, allowing a global benchmarking of regulatory and supervisory views on topics of interest. However, it is acknowledged that this captures the opinions of only a part of the broader digital financial ecosystem.

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5 The survey instrument can be viewed using this link: [https://cambridge.eu.qualtrics.com/jfe/form/SV\\_0xNmcp1sb8XdIPA](https://cambridge.eu.qualtrics.com/jfe/form/SV_0xNmcp1sb8XdIPA)

Figure 2.1: Geographical distribution of respondents



## 2.2 Sample by geography and income classification

Figure 2.1 maps the 128 financial authorities from 106 jurisdictions that participated in this study. The full list of financial authorities is given in Appendix 1. This study is based on a geographically diverse

sample that is also representative of the World Bank’s country income levels.<sup>6</sup> Table 2.1 breaks down participating respondents by the World Bank’s regional classification.

Table 2.1: Geographical distribution of respondents by region

Region	Number of respondents	Percentage of jurisdictions per region in the sample (%)	Percentage of region covered (%)
East Asia and the Pacific	21	16	46
Europe and Central Asia	28	22	42
Latin America and the Caribbean	24	19	44
Middle East and North Africa	14	11	46
North America	3	2	100
South Asia	6	5	63
Sub-Saharan Africa	32	25	44
Total	128	100	

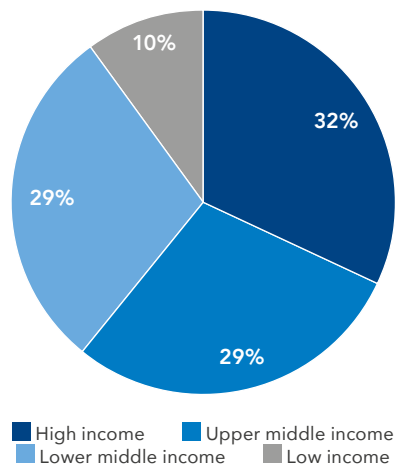
The regional distribution of this study is similar to that in *The Rapid Assessment Study*. The largest number of respondents was from SSA, representing 32% of the sample, with Europe and Central Asia representing 28% of the responses. While North

America and South Asia had the smallest number of respondents, 100% of jurisdictions in North America are represented in the study and 63% of jurisdictions in South Asia.

<sup>6</sup> The total number of jurisdictions includes all countries in the World Bank’s list and territories in the survey. Anguilla, Jersey Channel Islands, and Palestine are counted as unique jurisdictions. ‘Percentage of jurisdictions per region in the sample’ is the number of respondents in the region divided by the total number of respondents in the survey. ‘Percentage of region covered’ is the distinct number of jurisdictions represented in the region divided by the total number of jurisdictions in that region.

Figure 2.2 illustrates the distribution of responses according to the four income groups classified by the World Bank. The sample contains responses from jurisdictions across all four income classifications, with 39% of the sample from either low- or lower-middle-income jurisdictions.<sup>7</sup> ‘Advanced economies’ are defined as jurisdictions from the high-income group, while ‘emerging market and developing economies’ includes upper-middle-income, lower-middle-income, and low-income economies.

**Figure 2.2: Breakdown of respondents by World Bank income groups (N=128)**



<sup>7</sup> The classification of World Bank regions and income groups is from the World Bank (World Bank, 2022e).

# 3. Medium-term impact of Covid-19



## 3. Medium-term impact of Covid-19

The Covid-19 pandemic has accelerated the adoption of fintech and DFS, as evidenced by increased client acquisition and turnover volume across most fintech verticals (CCAF, WEF, and World Bank, 2020; CCAF, 2021b). The growth in transaction value of retail-facing fintech platforms increased by 47% between 2019 (USD357 billion) and 2020 (USD526 billion) (CCAF, WEF, and World Bank, 2022), especially in digital payments and digital lending. In developing economies (excluding China) 20% of adults made a digital merchant payment in 2021 and for 8% of those, it was the first time they had done so (World Bank, 2022b). This growth in DFS use is corroborated by *The Rapid Assessment Study*, where regulators also identified a global increase in fintech/DFS use (CCAF and World Bank, 2020).

Financial regulators and supervisors have a pivotal role to play in alleviating market uncertainty and risk, minimizing consumer distress, and supporting financial intermediation. Risks, both existing and emerging, must be understood, monitored, and managed. These risks include maintaining the stability of the financial system (FSB, 2022b; IMF, 2022), increased data protection and cybersecurity challenges (CCAF, WEF, and World Bank, 2020; FATF, 2020), as well as a wide range of consumer risks, such as fraud (World Bank, 2021a, 2022b).

Covid-19 caused financial authorities, especially those in EMDEs, to re-evaluate their prioritization of fintech (CCAF and World Bank, 2020). New risks that emerged during this period made regulating and supervising fintech/DFS more complex. The extraordinary growth of decentralized finance (DeFi) presented market, liquidity, and cybersecurity risks against a backdrop of legal uncertainties (IMF, 2022). The interlinkages between DeFi and the traditional financial market also elevated financial stability risks, including contagion risks (ESMA, 2022).

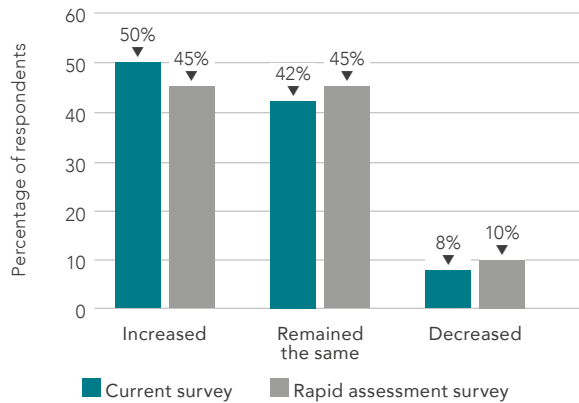
The pandemic also impacted the capacity, activities, and operations of regulators and supervisors around the world, forcing them to find digital ways of responding to these impacts (CCAF and World Bank, 2020). To this end, some financial authorities accelerated changes to their supervisory practices, passing new regulations and directives (either temporary or permanent). For example, many regulators and supervisors launched consumer protection initiatives. Regulatory innovation initiatives were also affected, as resources were readjusted or reallocated or, occasionally, plans drafted before the pandemic were fast-tracked to completion.

Building on the knowledge gained from *The Rapid Assessment Study*, this chapter focuses on the medium-term impact of Covid-19 on financial regulators and supervisors globally, after their initial responses at the beginning of the pandemic. It evaluates changes in the prioritization of fintech and identifies challenges in regulating and supervising fintech activities. The chapter also assesses the pandemic's effect on planning, launching, and running regulatory innovation initiatives, such as regulatory sandboxes and innovation offices. The chapter also includes thematic case studies on financial inclusion and cybersecurity.

### 3.1 The prioritization of fintech due to Covid-19

Figure 3.1 shows an increase in the percentage of respondents who consider that the priority of fintech has risen due to Covid-19. It has increased from 45% in *The Rapid Assessment Study* in 2020, to 50% in 2022. The proportion of respondents who consider that the priority of fintech has decreased due to the pandemic has fallen to 8%, down from 10% of respondents in 2020.

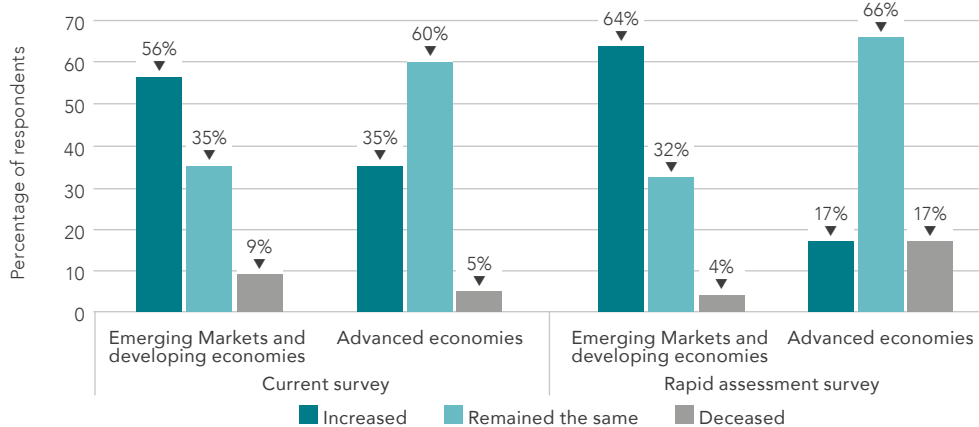
**Figure 3.1: Prioritization of fintech due to Covid-19 (N=127)**



Note: The 'remained the same' category for *The Rapid Assessment Survey* is a combination of the answers 'remained high' and 'remained low'. The N number in *The Rapid Assessment Survey* was 72.

There are considerable differences in the prioritization of fintech between income levels, as illustrated in Figure 3.2. Fifty-six percent of EMDE respondents stated its priority has increased, compared to 35% of respondents in advanced economies. This greater prioritization of fintech in EMDEs is particularly evident in SSA, where 75% of respondents cited an increase in fintech prioritization due to the pandemic.

**Figure 3.2: Prioritization of fintech due to Covid-19 – emerging market and developing economies vs advanced economies (N=127)**



Note: The 'remained the same' category for *The Rapid Assessment Survey* is a combination of the answers 'remained high' and 'remained low'. The N number in *The Rapid Assessment Survey* was 72.

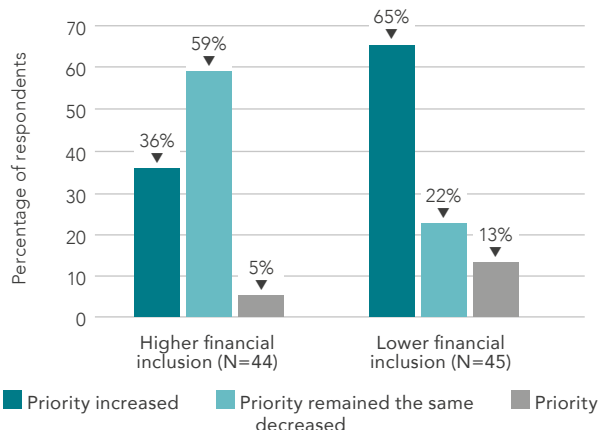
### Fintech and financial inclusion

Financial inclusion is a key process in fulfilling the UN's Sustainable Development Goals (UNCDF, 2022; Khera, 2021). Consequently, international organizations have sought to encourage financial inclusion. For instance, the IMF and World Bank's 'Bali Fintech Agenda' seeks to ensure that new technologies enhance financial service provision to achieve greater financial inclusion (IMF and World Bank, 2018). The OECD and G20 have also highlighted the role of meaningful financial inclusion in the context of the pandemic, stressing the part that digitalization plays in opening new digital products and access channels to consumers as well as in increasing societal resilience (OECD and G20, 2021).

The World Bank Findex database on *Financial Inclusion, Digital Payments and Resilience* (World Bank, 2022d) provides global data on financial inclusion around the world, which enables cross-referencing with this study.<sup>8</sup> In jurisdictions with lower levels of financial inclusion than the median, the prioritization of fintech due to Covid-19 is higher than those where the levels of financial inclusion are high.

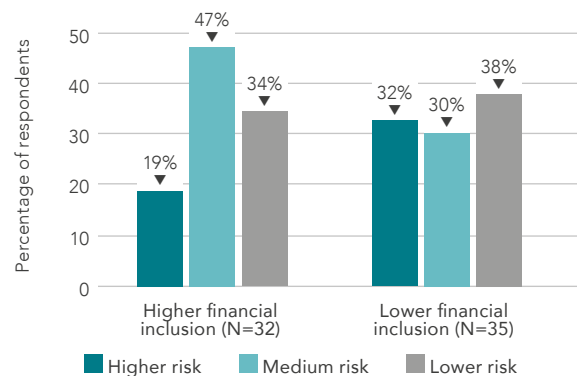
There is a notable association between the prioritization of fintech by financial authorities and the level of financial inclusion in their respective markets. Figure 3.3 indicates that 65% of respondents in lower-level female financial inclusion jurisdictions consider that the priority of fintech has increased during the Covid-19 pandemic, compared to 36% of respondents from higher-level female financial inclusion jurisdictions.<sup>9</sup> Similar results are evidenced using other measures of financial inclusion, such as aggregate financial inclusion (both men and women). The finding of increased prioritization of fintech in lower financial inclusion jurisdictions also holds when using an alternative measure of financial inclusion, such as the percentage of persons over the age of 15 who made or received a digital payment.

**Figure 3.3: Prioritization of fintech due to Covid-19 – higher vs lower financial inclusion (account, female, age 15+) (N=89)**



Digital payments have accelerated financial inclusion, although, it is notable that the use of digital payments is perceived to be riskier in lower-level financial inclusion jurisdictions than in higher-level financial inclusion jurisdictions. Figure 3.4 illustrates that a greater proportion of respondents in lower-level financial inclusion jurisdictions (32%) perceive consumer risks in digital payments to be 'high', compared to respondents in higher-level financial inclusion jurisdictions (19%). In Figure 3.4, the measure of financial inclusion chosen is percentage of persons over the age of 15 who made or received a digital payment, but similar results are evidenced using other measures of financial inclusion.

**Figure 3.4: Comparison of digital payments use ('made or received a digital payment', age 15+) and the sector's perceived consumer risk (N=69)**



Note: 'High risk' includes the responses 'very high risk' and 'high risk'. 'Low risk' includes the responses 'very low risk' and 'low risk'. Respondents who answered 'unsure', or who answered that consumer protection is not in their remit, were excluded.

8 We matched 90 responses of financial authorities in this survey with their jurisdictions in the 2021 data on financial inclusion 'Findex' database (World Bank, 2022d).

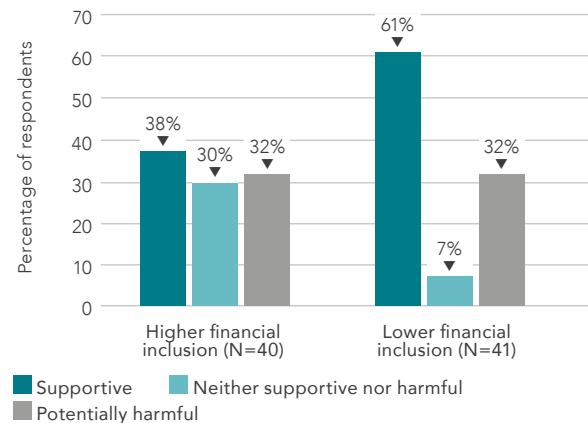
9 Respondents were grouped into either 'higher' or 'lower' financial inclusion groups, depending on whether they fell above or below the median level of financial inclusion for the sample of respondents where Findex data and respondent survey data were available.



The perception of consumer risk in the digital payments sector is not just associated with the level of financial inclusion in payments, but it is also associated with the level of DSRI in a jurisdiction. The higher the percentage of existing infrastructure in payments, the lower the perceived risk to consumers from the payment sector. Seventy-four percent of respondents who consider the consumer risk in the digital payments sector to be low have active DRSI in payments.

In general, authorities in lower-level financial inclusion jurisdictions are positive about the impact of fintech on consumer protection. As shown in Figure 3.5, more respondents in jurisdictions with lower levels of financial inclusion (61%) consider that fintech supports consumer protection, compared to those in jurisdictions with higher levels of financial inclusion (38%). The results are similar when using measures of female financial inclusion or other measures of financial inclusion.

**Figure 3.5: Comparison of financial inclusion (account, age 15+) and perceived impact of fintech on consumer protection (N=81)**



### 3.2 Fintech, perceived risks, and regulatory objectives in light of Covid-19

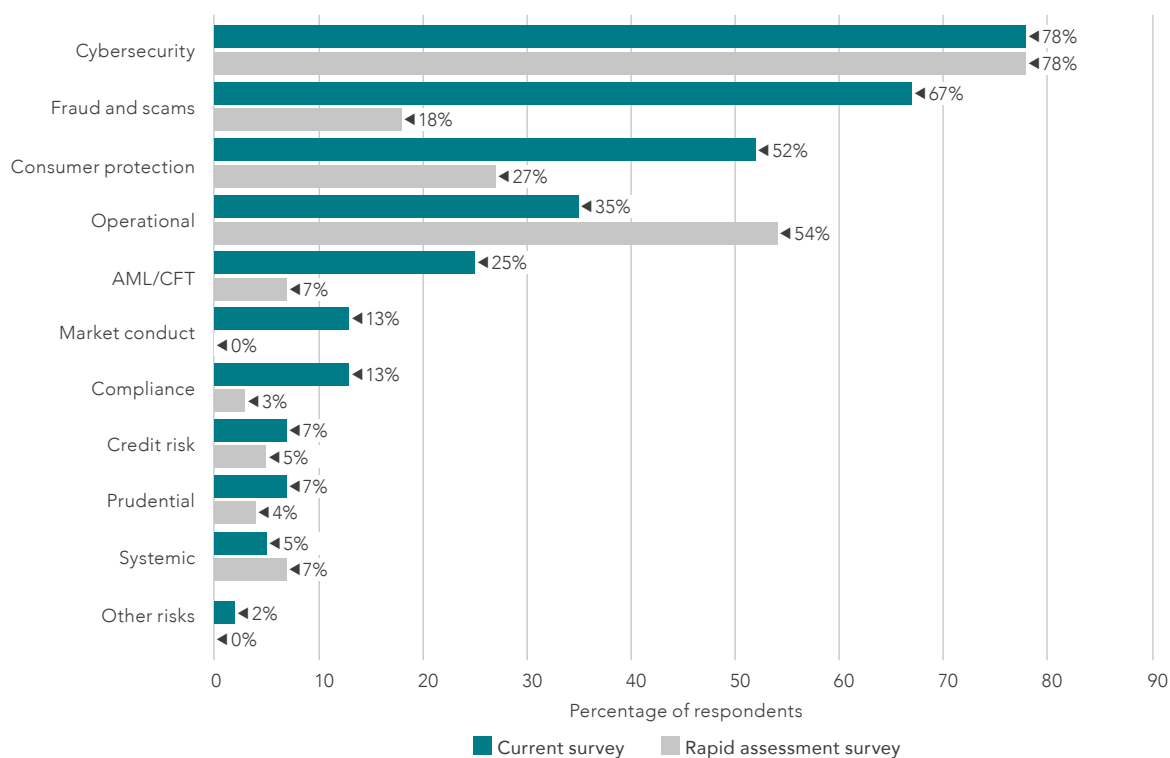
To determine whether risk perceptions had changed since *The Rapid Assessment Study*, respondents were asked to prioritize risks that had increased and/or emerged. They were asked to identify, if any, the top three risks they perceive as increasing due to the Covid-19 pandemic.

As Figure 3.6 indicates, increased cybersecurity risks are the most reported concern. Seventy-eight percent of respondents perceive that these risks have increased due to Covid-19, which tallies with the 78% of respondents that reported cybersecurity as one of their top three risks in 2020. There are notable regional variations, with

89% of respondents in Europe and Central Asia citing cybersecurity as one of their top three risks, followed by Latin America and the Caribbean (LAC) at 88%, with the lowest in South Asia at 50%.

Fraud and scams have increased considerably as a perceived key risk, with 67% of respondents identifying it as such in 2022, compared with 18% in 2020. This increased concern aligns with research suggesting that fintech/DFS consumers were targeted during the pandemic, increasing fraud and scams and the misdirection or exploitation of government funds and/or international assistance (FATF, 2020).

**Figure 3.6: Perceived risks in the fintech market due to Covid-19 (N=126)**



Note: Respondents could select up to three risks. The N number in *The Rapid Assessment Survey* was 92.

Other consumer protection issues are regarded as a key risk by 52% of respondents, a substantial increase from the 27% who identified it as such in the 2020 survey. The increased use of DFS and fintech have exacerbated challenges in consumer protection. This growing concern regarding consumer risks is a defining theme of Chapter 4 and aligns with other research (World Bank, 2022c).

Conversely, while operational risks are still a concern, the proportion of authorities that cited it as one of their top three risks decreased, falling

from 54% in 2020 to 35% in 2022. A medium-term impact of the pandemic is that while operational risks remain a key concern, the share of respondents in 2022 that consider it one of their top three risks has decreased.

Cybersecurity, fraud and scams, and consumer protection are the top three risks reported by financial authorities in both EMDEs and advanced economies. Consumer protection concerns were cited by more respondents in EMDEs (56%) compared to those in advanced economics (43%).

### Covid-19 and perceptions of cybersecurity risks

Most financial authorities still perceive cybersecurity threats as one of the key risks that were elevated due to the Covid-19 pandemic, as Figure 3.6 illustrates. At the start of the pandemic, many financial authorities first responded by making market participants aware of the increased risk as incidences of cyber-attacks rose (Deloitte, 2021). For example, Uganda’s National Information Technology Authority issued information to raise awareness, while similar measures were implemented in Kenya and Nigeria (CCAF, 2021a). As the pandemic progressed, regulators and supervisors moved beyond creating awareness to introducing measures to ensure market resilience against cybersecurity attacks (Deloitte, 2021). Examples of such efforts include the cybersecurity fortification initiative 2.0 by the Hong Kong Monetary Authority and the update of technology risk management and business continuity guidelines by the Monetary Authority of Singapore (Deloitte, 2021).

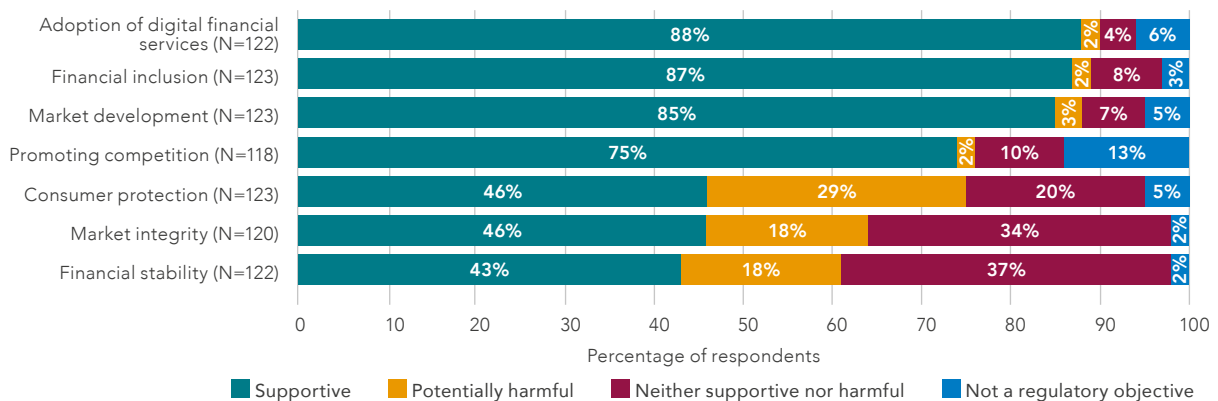
The increase in financial authorities’ concern over cybersecurity threats is also mirrored by market

participants. *The Global COVID-19 Fintech Market Impact and Industry Resilience Study* surveyed fintech firms and reported an increase in cybersecurity attacks, especially in retail-facing activities, which saw a year-on-year increase of 7% in 2020 (CCAF, WEF, and World Bank, 2022). To combat the increase in threats, 33% of market participants surveyed made changes to their services to enhance their cybersecurity features (CCAF, WEF, and World Bank, 2022).

Enhancing cybersecurity features increased the cost of cybersecurity for firms in EMDEs by 17% and by 16% in advanced economies (CCAF, WEF, and World Bank, 2022). It is noteworthy that 11% of market participants reported using regulatory support initiatives provided by regulators that related to cybersecurity and fraud prevention. Of those, 39% consider that the regulatory support initiatives were sufficient, while 26% stated they need more support from regulators to standardize cybersecurity and fraud prevention (CCAF, WEF, and World Bank, 2022).

Respondents were asked whether fintech was supportive or harmful in their efforts to achieve their policy objectives during the pandemic. Figure 3.7 summarizes these findings. The top three objectives where respondents consider that fintech has a positive impact are DFS adoption (reported by 88% of respondents), financial inclusion (87%), and market development (85%). Far fewer respondents consider that fintech has negatively affected their ability to achieve their objectives, but it is notable that 29% of respondents reported possible negative impacts in consumer protection, followed by financial stability (18%), and market integrity (18%).

**Figure 3.7: Perceived impact of fintech on regulatory objectives due to Covid-19**



Compared to the findings of the 2020 survey, more financial authorities believe that fintech supports their objective of consumer protection (46% in 2022 versus 38% in 2020). However, the number of financial authorities that are concerned that fintech could hinder their consumer protection efforts also increased (29% in 2022 versus 13% in 2020).

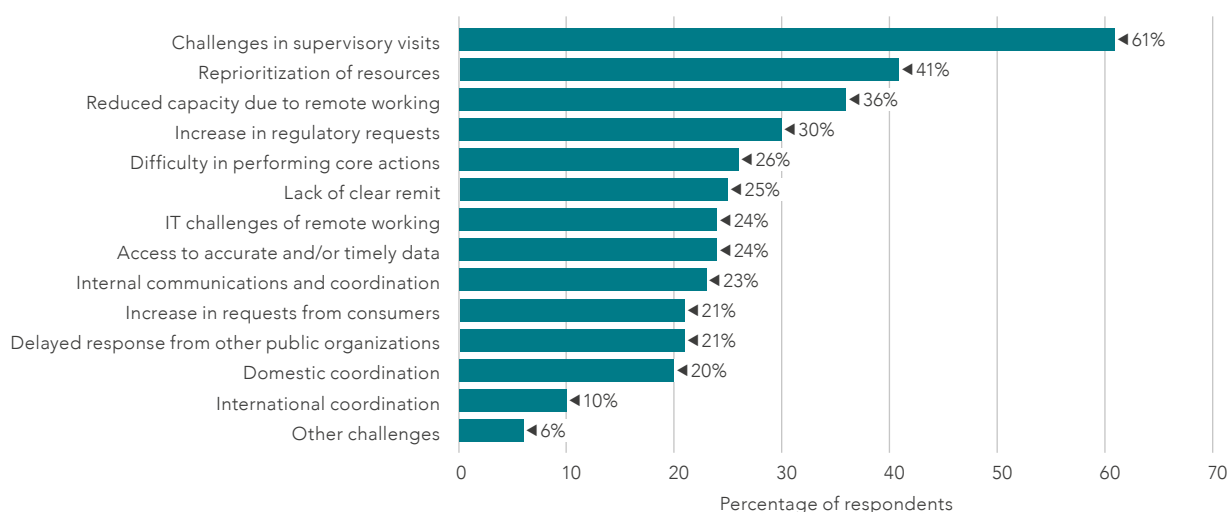
In looking at the medium-term impact of the pandemic on regulatory objectives, the number of respondents who have a positive view of fintech's role in consumer protection, DFS adoption, financial inclusion, and market development has increased. There is, however, a rise in the minority who consider that fintech may potentially harm efforts to protect consumers. Consumer protection is discussed in detail in Chapter 4.

### 3.3 Challenges due to the impact of Covid-19

The *Rapid Assessment Study* in 2020 provided an overview of the challenges regulators and supervisors faced as a consequence of Covid-19. Two years after the World Health Organization declared it a pandemic, it was pertinent to determine whether these challenges had changed in the medium term.

Figure 3.8 illustrates that 61% of respondents experience challenges in conducting supervisory visits because of Covid-19, up from 49% in 2020. It is still the top challenge in 2022, as it was in 2020. Forty-one percent of respondents consider reprioritization of resources a challenge, up from 25% in 2020.

**Figure 3.8: Internal challenges to developing regulatory responses to fintech (N=125)**



Note: Respondents could choose multiple responses.

Broadly, authorities across the regions ranked the risks similarly. More respondents in South Asia reported conducting supervisory visits (83%) as a challenge compared to those in other regions.

### 3.4 The impact of Covid-19 on regulatory innovation initiatives

Financial authorities have been responding to the opportunities and challenges of technology-enabled financial innovation by developing regulatory innovation initiatives. These include innovation offices, regulatory sandboxes, innovation accelerators, and suptech applications.

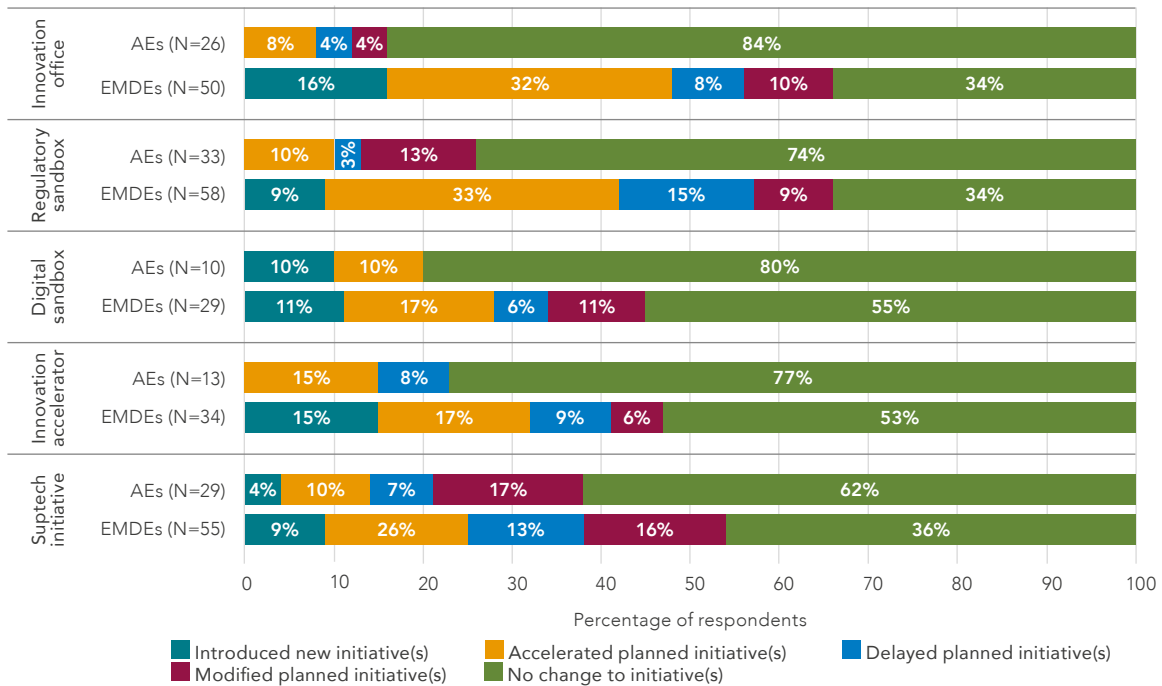
In recent regional reports on SSA, MENA, and APAC, the number of jurisdictions with at least one innovation office increased from 15 in 2019 to 37 in 2021 (CCAF, 2021a, 2022a, 2022b). Similarly, the number of jurisdictions with at least one regulatory sandbox increased from 21 in 2019 to 46 in 2021. The development of other regulatory innovation initiatives, such as digital sandboxes and innovation accelerators, also increased.

Covid-19 led to some respondents changing their approach in relation to their regulatory innovation initiatives. In terms of innovation offices and regulatory sandboxes, 35% and 31% of respondents, respectively, introduced a new

initiative or accelerated an existing one during the pandemic. It is also notable that for 55% of respondents, the pandemic impacted their suptech initiatives, with 17% modifying their planned initiative to integrate the lessons they had learned since the start of the crisis.

A far greater proportion of respondents in EMDEs changed their approach to their regulatory innovation initiatives due to Covid-19, compared to those in advanced economies. As illustrated in Figure 3.9, just 16% of respondents in advanced economies with an innovation office considers that Covid-19 impacts its operation, compared to 66% in EMDEs. This difference is also observed for regulatory sandboxes (26% in advanced economies versus 66% in EMDEs) and suptech initiatives (38% in advanced economies versus 64% in EMDEs). So, while the rapid increase in regulatory innovation initiatives might broadly be welcomed, EMDE respondents experience greater challenges in developing such initiatives.

**Figure 3.9: Impact of Covid-19 on regulatory innovation initiatives – emerging market and developing economies vs advanced economies**



Note: Respondents that answered they did not have the initiative in their jurisdiction are not included

Figure 3.9 also illustrates that, in response to the rapid digitalization of financial services caused by the pandemic, financial authorities in EMDEs have mainly introduced new or accelerated planned initiatives. For example, while 15% of EMDE respondents delayed planned regulatory sandbox initiatives due to Covid-19, 33% accelerated their plans.

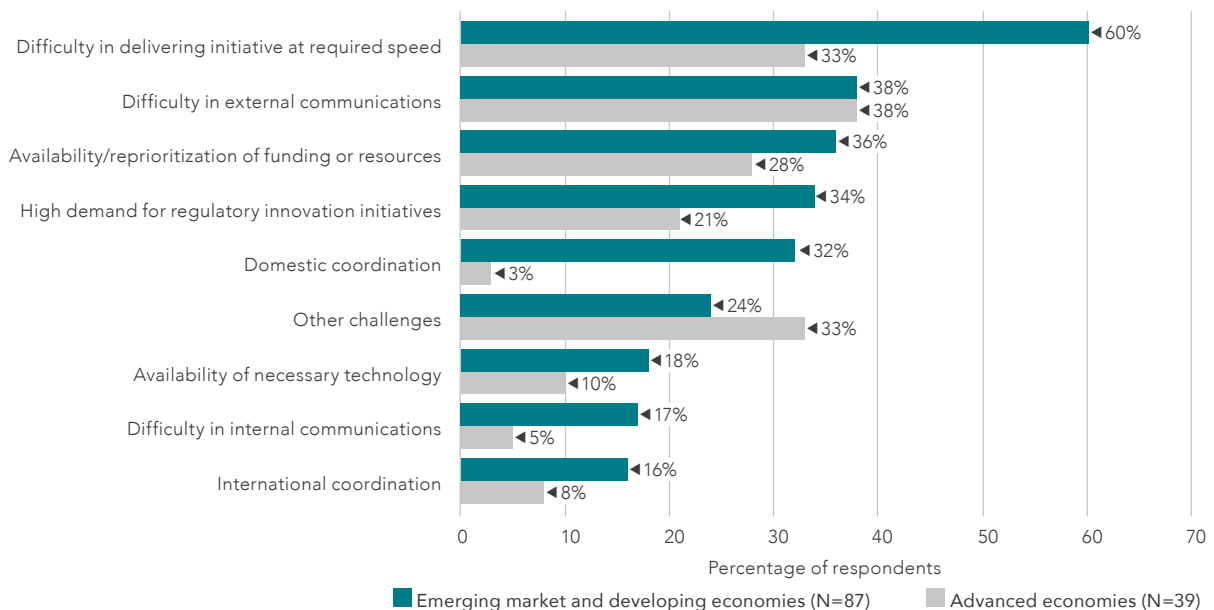
In this regard, one respondent commented:

*“Covid-19 indeed catalyzed digitalization in our jurisdiction. It is a positive development but one that has placed a lot of pressure on regulators not only in the financial sector. The urgency for supotech cannot be overemphasized. Partners such as CCAF have benefited our financial authority in terms of capacity building, resource reserve and thought leadership. We hope for more initiatives that will help bridge the gap from a regulatory infrastructure standpoint.”*

The challenges due to Covid-19 that jurisdictions with regulatory innovation initiatives are facing in the medium term have evolved from the immediate challenges reported in *The Rapid Assessment Study*. Over half (52%) of the respondents stated that delivering an initiative at speed is a major challenge. External communications, which was the main issue in 2020 (reported by 43% of respondents), is still an important challenge in 2022 for 38% of respondents. Perhaps due to the lessons learned during the first two years of the pandemic, the challenge of domestic coordination (reported by 43% of respondents in 2020) decreased to 23% in 2022.

Generally, financial authorities in EMDEs faced more challenges in developing regulatory innovation initiatives during the pandemic than those in advanced economies. Figure 3.10 illustrates that 60% of EMDE respondents cited difficulty in delivering an initiative at speed, compared to 33% in advanced economies. Another notable difference is that almost one in three (32%) respondents in EMDEs experience challenges in coordinating with domestic authorities, compared to just 3% in advanced economies. Conversely, respondents in both advanced economies and EMDEs reported difficulties in external communications, at 38%.

**Figure 3.10: Challenges in developing regulatory innovation initiatives – emerging market and developing economies vs advanced economies**



Note: Respondents could choose multiple challenges.

# 4. Consumer risk and protection



## 4. Consumer risk and protection

The previous chapter set out the medium-term impact of Covid-19 on financial regulators and supervisors globally. It outlined how financial authorities' prioritization and perceived benefits of fintech/DFS have changed since 2020, and the challenges they experienced in regulating and supervising fintech activities.

This chapter discusses challenges associated with financial authorities' perceptions of, and responses to, emerging and exacerbated consumer risks related to the increasing adoption of fintech/DFS within and across jurisdictions, as well as those related to the pandemic. This builds on the findings of *The Rapid Assessment Study*, which reported growing concerns among financial authorities regarding DFS-related consumer risks, particularly due to the pandemic.

Financial consumer protection (FCP) encompasses the laws, regulations, and institutions that ensure consumers' safety when using financial services and products. An effective FCP regime ensures that users of financial products and services, both potential and current, can make well-informed decisions. It also supports financial authorities' wider aims of increasing financial stability, financial integrity, and financial inclusion (World Bank, 2012).

DFS consumer risk is defined as a condition or factor that exposes a consumer to potential or actual harm or loss (both financial and non-financial) while using DFS (CGAP, 2022). A recent study by CGAP identified sixty-six types of consumer risks and grouped them into four broad risk types: fraud, data misuse, lack of transparency, and inadequate redress mechanisms. It also identified two cross-cutting risk types related to agent issues and network downtime (CGAP, 2022).

DFS and fintech adoption has grown during Covid-19, and while this has had some positive impacts (CCAF and World Bank, 2020; Fu and Mishra, 2020; OECD and G20, 2021), certain existing consumer risks have been exacerbated and new ones introduced. The pandemic has also heightened existing and introduced new consumer risks, including cybersecurity, data privacy, fraud

and scams, business failure, algorithmic bias, predatory lending practices, and other market conduct risks. The increase in size and relevance of the digital assets and cryptocurrencies markets in some jurisdictions has also led to a greater focus on consumer risk and protection regarding digital assets. Regulators, supervisors, and other institutions in the global regulatory arena have been building on previous assessments of fintech-related issues, presented below, and highlighting in these assessments that the accelerated adoption of DFS is set to continue (OECD and G20, 2021).

Widespread concerns about factors that may contribute to heightened fintech-related consumer risks are still being reported. At a high level, there are concerns regarding data gaps in several fintech verticals, as it is perceived these will prevent the necessary assessment of risks to financial consumers and financial stability more generally (CGAP, 2022; FSB, 2022b). Concerns about new and obscure fintech business models, and consumers' inexperience and limited understanding of new offerings have also been raised (World Bank, 2021a). Likewise, regulators and international bodies are still concerned about unclear regulatory perimeters and remits, which might increase fraud and generate issues related to product unsuitability, especially for new products and services (OECD and G20, 2021; World Bank, 2021a, 2022b). Fintech firms present a distinct challenge for financial authorities in their efforts to identify, measure, prioritize, and address fintech-related consumer risks, as their activities typically fall outside existing regulatory and supervisory frameworks, both for consumer protection and prudential supervision, which may result in insufficient regulation and supervision (World Bank, 2020c).

As well as these high-level concerns, there is also a greater focus on specific issues. For example, digital assets and cryptocurrencies have come under closer scrutiny both from micro-prudential and macro-prudential perspectives (FSB, 2019, 2022a; ECB, 2022; IMF, 2022). Also under the spotlight are risks related to digital infrastructure, which often are not directly within the remit of financial authorities and will require greater coordination



among different government agencies (FSB, 2017a, 2017b, 2018b; IOSCO, 2017, 2021; BCBS, 2018; World Bank, 2022b).

Similarly, antitrust-related concerns, especially regarding the increasing presence of bigtech in fintech, have also become part of the focus (Arner et al., 2022a; Bains, Sugimoto, and Wilson, 2022; FSB, 2022b). Finally, there are still concerns regarding more mature verticals, such as platform finance, where these platforms have expanded to become more relevant from a prudential perspective. For instance, consumers who borrow through this channel may be at risk from imprudent lending (World Bank, 2021a).

#### 4.1 Regulatory mandate for financial consumer protection

The G20 high-level principles on financial consumer protection recommend that jurisdictions establish oversight bodies (dedicated or not) with an explicit mandate for financial consumer protection (OECD, 2011).

The findings, illustrated in Figure 4.1, summarize the approaches relating to consumer protection mandates adopted by the financial authorities surveyed. The findings show that, typically, multiple agencies have mandates/authority for financial consumer protection. Sixty-two percent of respondents indicated that multiple agencies in their jurisdiction have overlapping mandates/

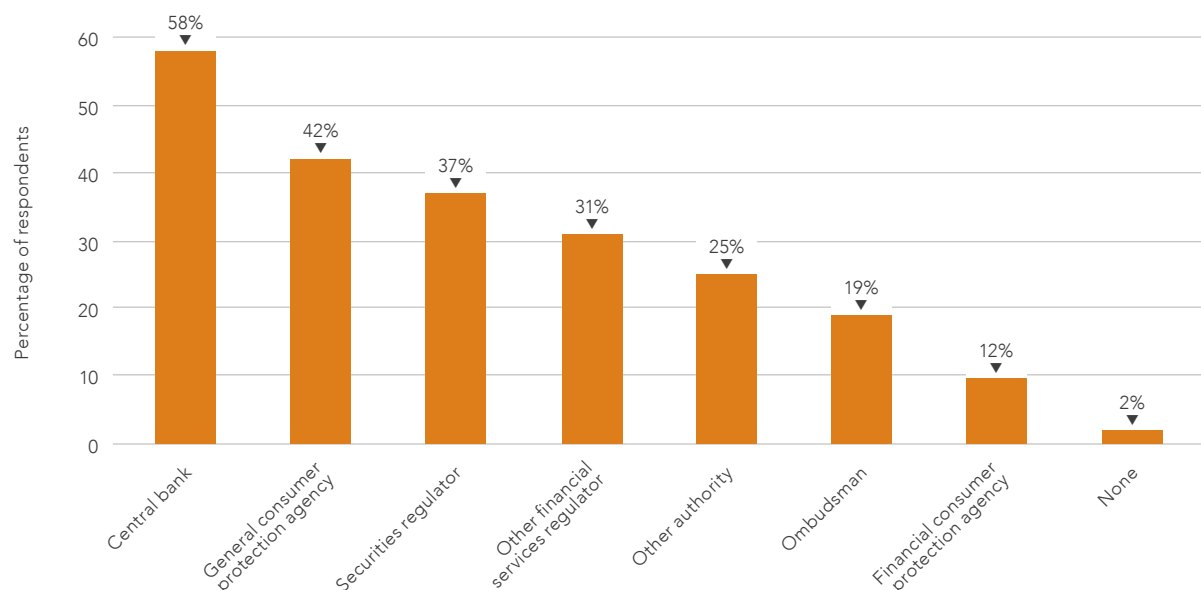
authority for consumer protection, with a minority (38%) reporting only one regulator with this mandate. Fifty-eight percent reported that central banks have a mandate/authority for consumer protection. Other regulators and supervisors with a consumer protection mandate are securities regulators (reported by 37%) or other financial authorities (31%). Additionally, 54% of respondents indicated that consumer protection agencies also have mandates, either as a general consumer protection agency (reported by 42%) or a specific financial consumer protection agency (12%). Only 19% have an ombudsman with remit over financial consumer protection.

This fragmentation over consumer protection requires coordination both to minimize duplication of efforts and ensure that consumer risks are being adequately addressed by the relevant agency (World Bank, 2012).

In this regard, one respondent had this recommendation:

*“For effective regulation of fintech, it is highly advisable to adopt joint regulation since the players fall under multiple financial sector regulatory authorities.”*

**Figure 4.1: Authorities with a mandate for financial consumer protection (N=127)**



Note: Respondents could select multiple responses.

## 4.2 Covid-19 and consumer risks

Consumer protection is one of the top three risks that respondents consider has increased during Covid-19, cited by 52%, as Figure 3.6 illustrates.

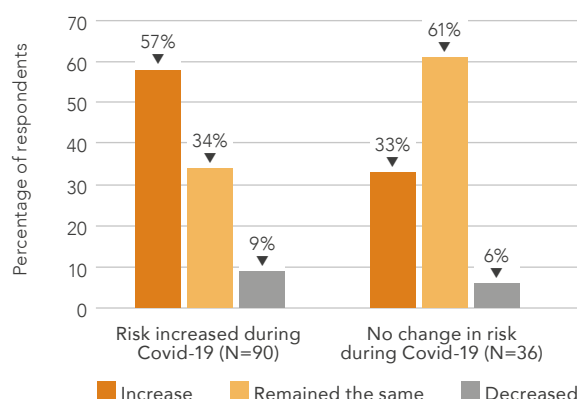
Seventy-one percent of financial authorities indicated that Covid-19 has increased existing fintech-related consumer risks, with more EMDE respondents reporting this increase (75%) compared to those in advanced economies (64%). The finding is consistent across central banks and other financial authorities.

In terms of cross-regional findings, over 50% of respondents across all regions consider that Covid-19 has increased fintech-related consumer risks. The top three regions are LAC (reported by 83% of respondents), SSA (81%), and Europe and Central Asia (59%).

Figure 4.2 illustrates the relationship between respondents' perception of fintech-related risks and their prioritization of fintech/DFS during the pandemic. Fifty-seven percent of those who had noted an increase in the importance of fintech/DFS during the pandemic also noted an increase in consumer risk in the same period. This proportion is

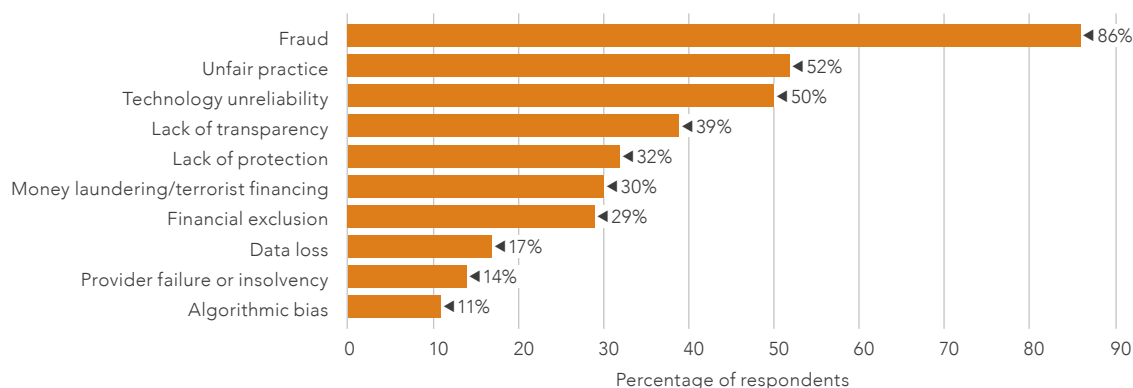
significantly higher compared to those who had not cited an increase in the importance of fintech/DFS (33%).

**Figure 4.2: Comparison of the perceived importance of fintech prioritization and perception of increased consumer risk during Covid-19**



Respondents who had noted an increase in consumer risks relating to fintech/DFS during Covid-19 were then asked to select specific risks they considered had increased. Figure 4.3 illustrates that most respondents (86%) cited the risk of fraud and related misconduct.

**Figure 4.3: Perceived increase of consumer risks related to fintech/DFS during Covid-19 (N=90)**



Note: Respondents were only prompted to answer this question if they indicated that risks had increased in a previous question. Respondents could select multiple responses.

This finding reflects comparable results in other recent studies that emphasize the increase and significance of fraud in fintech/DFS. Fraud and scams are reported to have risen in line with the growth in digital transactions (OECD, 2022). Additionally, data from Outseer's quarterly fraud reports indicates that between 2016 and 2020, fraudulent transactions via mobile apps increased by 104% even though the total number of transactions had only increased by 34% (CGAP, 2022). A marked rise in fraudulent app-based digital microcredit lenders during the Covid-19 lockdowns has also been reported (World Bank, 2022b). Fraud risks, specifically those related to financial scams and frauds, were the second most important concern for respondents in a 2020 survey of member jurisdictions of the global partnership on financial inclusion. Respondents were asked to rank various risks arising due to Covid-19 and rate their significance (OECD and G20, 2021). The main areas of concern were phishing and fake schemes to

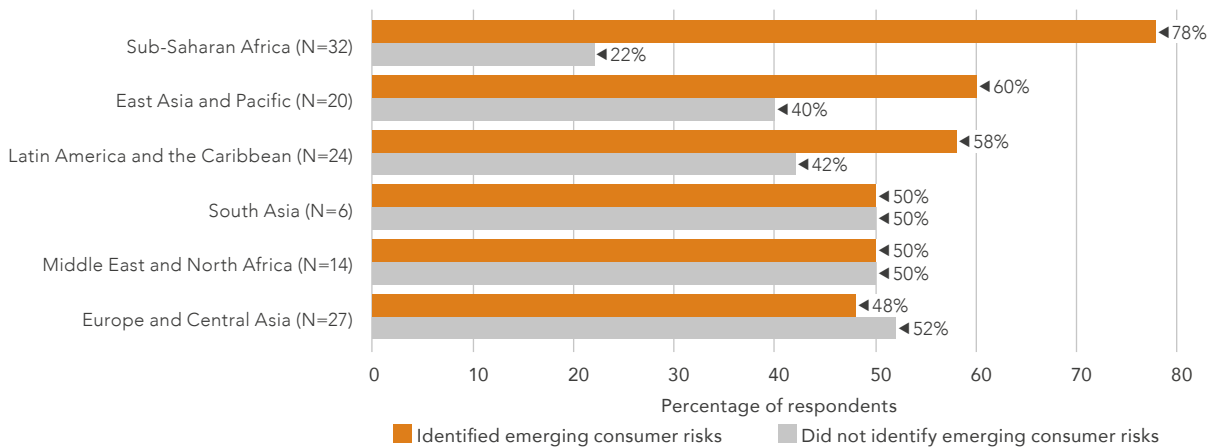
persuade consumers to transfer, pay or invest money, scams linked to social media or investment platforms, and fraud targeting recipients of emergency government benefits (OECD and G20, 2021).

Notably, the risk of increased financial exclusion during Covid-19 was reported by 29% of respondents. This is significant, as fintech is frequently identified (in this and previous World Bank-CCAF studies) as enabling the policy objective of financial inclusion. The finding is illustrated in Figure 3.7, which shows that 87% of respondents reported that fintech supports financial inclusion. However, it also suggests that a minority believes it could lead to financial exclusion. Financial exclusion could arise due to factors such as lack of digital access to financial products and services caused by connectivity issues, lack of digital literacy/capability, especially among certain groups (for example, low-income households and senior citizens), or excessive data profiling leading to financial exclusion (OECD and G20, 2021).

### 4.3 Emerging consumer risks related to fintech/DFS

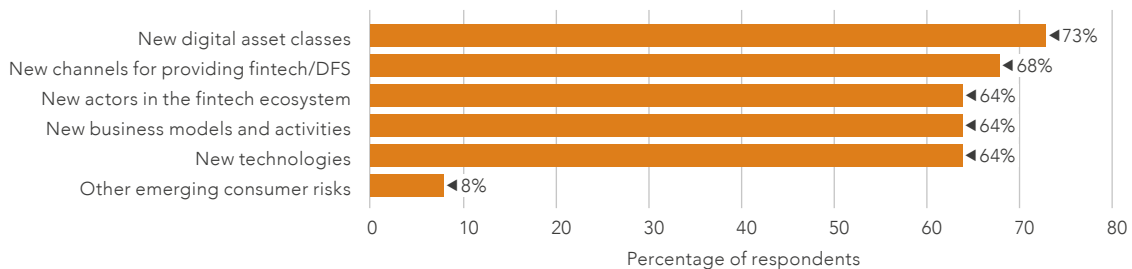
As well as identifying exacerbated *existing* risks, it is necessary to evaluate whether the growth in fintech and DFS adoption introduced *emerging* consumer risks, irrespective of the pandemic. Sixty percent of all respondents stated this was the case, with similar proportions being reported by those in EMDEs (61%) and advanced economies (56%). Figure 4.4 shows that financial authorities in all regions identified emerging consumer risks related to fintech/DFS, particularly those in SSA (78%).

Figure 4.4: Identified emerging consumer risks related to fintech/DFS – regional breakdown (N=123)



Respondents who identified emerging consumer risks were asked what they attributed these new risks to, and what has intensified them. Figure 4.5 illustrates that the category where most new risks were identified (by 73% of respondents) is new digital asset classes (for example, cryptoassets, stablecoins, and non-fungible tokens (- NFTs)). This area of concern is explored in more detail in Section 4.4, which sets out the perception of the severity of risks in this vertical. Over 60% of respondents identified new consumer risks in other categories, such as new channels (68%), new actors (64%), new business models and activities (64%), and new technologies (64%).

Figure 4.5: Categories in which new consumer risks relating to fintech/DFS were identified (N=75)



Note: Respondents were only prompted to answer this question if they indicated that risks had increased in a previous question. Respondents could select multiple responses.

As well as identifying the *source* of emerging consumer risks, respondents were also asked to identify factors that had *intensified* these risks. The leading factors, identified by 77% of respondents, are regulatory or supervisory challenges due to new technologies and business models, and financial authorities' low capacity/understanding of consumer risks, as illustrated in Figure 4.6.

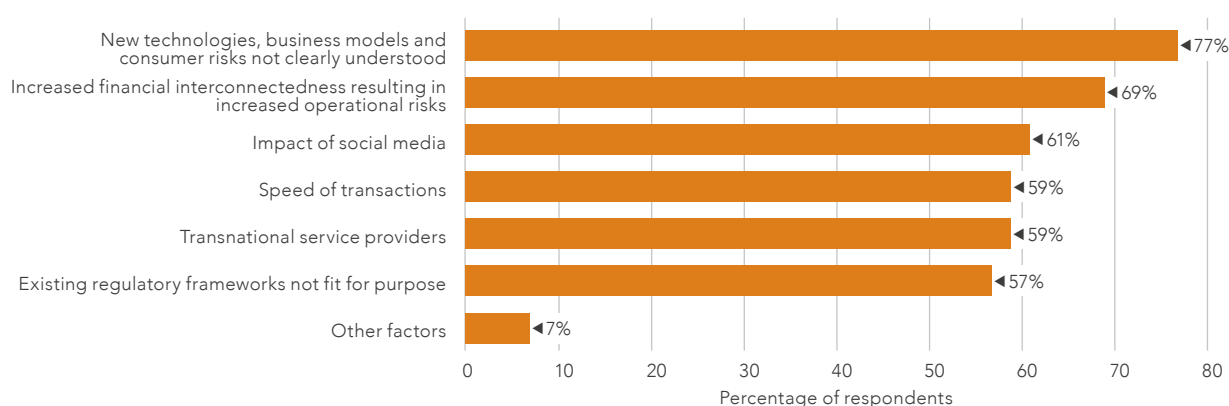
This is followed (at 69%) by increased financial interconnectedness resulting in increased operational risks, such as cyber risks and financial stability risks. In third place is the impact of social

media, for example, promotions by celebrities, influencers, and other forms of digital consumer engagement, reported by 61% of respondents.

The role of new actors in intensifying consumer risk is highlighted by one respondent's comment:

*“The increased use of third-party service providers may exacerbate operational/cyber risks.”*

**Figure 4.6: Perceived factors intensifying consumer risks related to fintech/DFS (N=75)**



Note: Respondents were only prompted to answer this question if they indicated that risks had increased in a previous question. Respondents could select multiple responses.

#### 4.4 General level of consumer risks across fintech verticals

Respondents were asked about their perception of the general level of consumer risks that various fintech verticals pose in their jurisdiction. Respondents were not required to rank the fintech verticals in terms of risk, but their responses indicate their opinions regarding the areas of greatest concern regarding fintech-related consumer risks.<sup>10</sup>

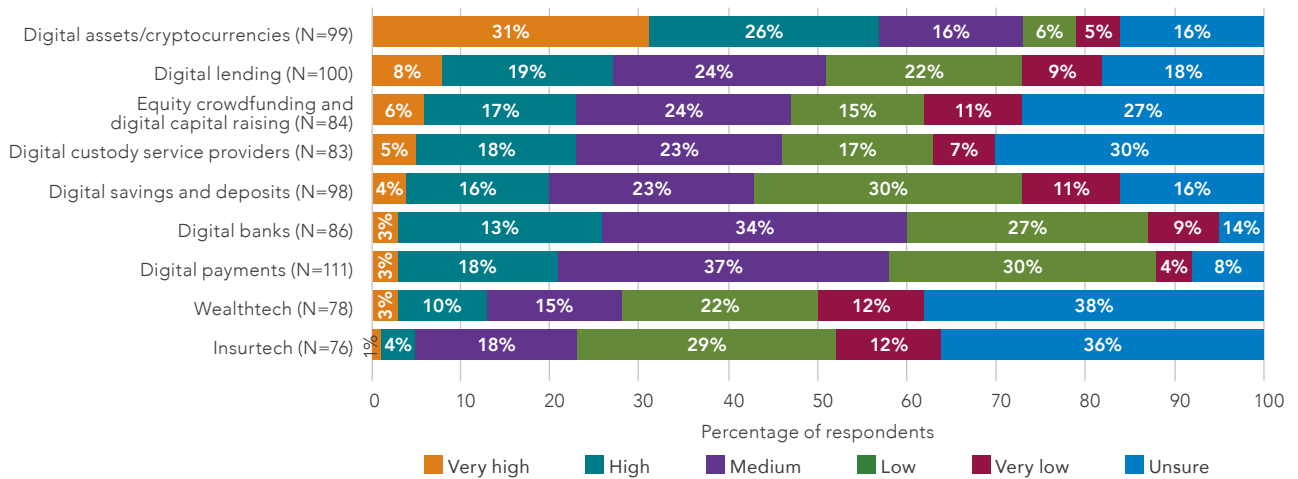
In line with the results outlined in the previous section, Figure 4.7 confirms that the main area of focus for financial authorities regarding consumer risk is digital assets and cryptocurrencies. Four times as many respondents classified risks associated with digital assets and cryptocurrencies as 'very high' (31%) compared to other risk types.

This is followed by the digital lending and equity crowdfunding/digital capital raising verticals at 8% and 6%, respectively.

While perceptions of consumer risks are generally similar across advanced economies and EMDEs, financial authorities in advanced economies seem less concerned about risks from segments such as digital savings and deposits (61% in advanced economies classified it as 'very low' or 'low' compared to 32% in EMDEs), digital banks (52% in advanced economies classified it as 'very low' or 'low' compared to 29% in EMDEs), and equity crowdfunding/digital capital raising (40% in advanced economies classified it as 'very low' or 'low' compared to 20% in EMDEs).

<sup>10</sup> Refer to question B4 in the questionnaire. The survey instrument can be viewed using this link: [https://cambridge.eu.qualtrics.com/jfe/form/SV\\_0xNmcp1sb8XdIPA](https://cambridge.eu.qualtrics.com/jfe/form/SV_0xNmcp1sb8XdIPA)

Figure 4.7: Perceptions of consumer risk level by fintech vertical



As a follow-up to the question on the general risk level, respondents were asked about their perceptions regarding the severity of various categories of consumer risks within specific verticals, as discussed in the sections below.<sup>11</sup>

#### 4.4.1 Severity of consumer risks in digital assets/cryptocurrencies

Digital assets refer to digital instruments or digital representations of value, which are often represented using distributed ledger technology. Examples include security tokens, utility tokens, payment tokens, stablecoins, and NFTs.

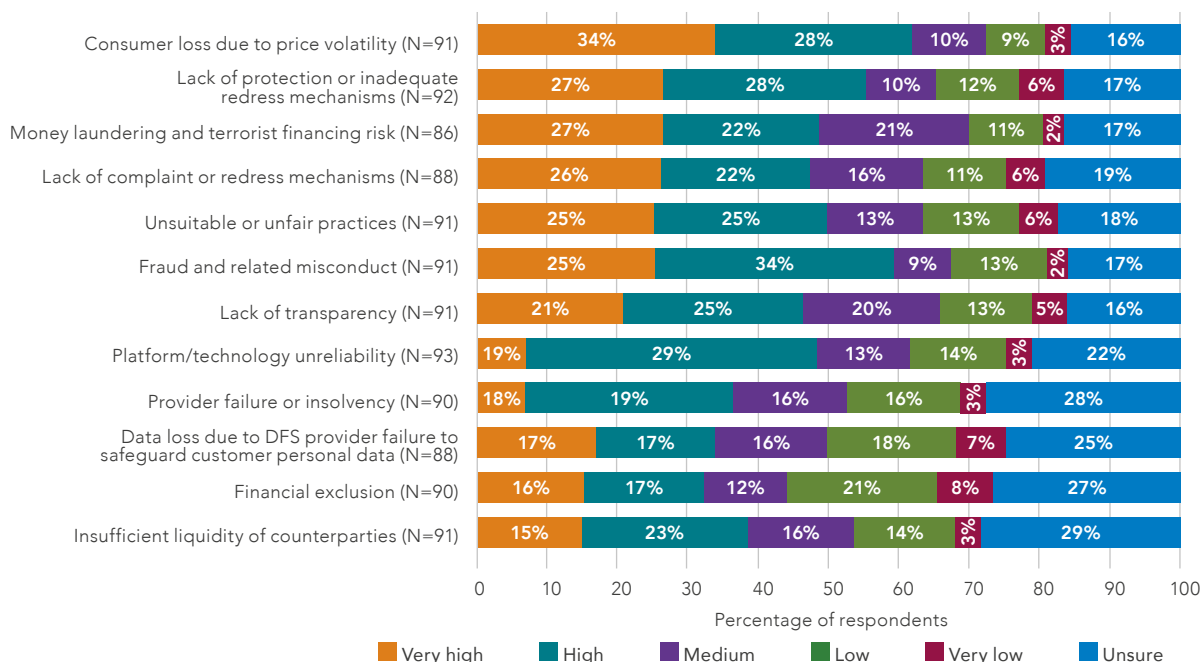
The digital assets market has grown rapidly in recent years, with the overall market capitalization of cryptocurrencies peaking at more than USD3 trillion in November 2021 (Statista, 2022). One of the primary use cases for digital assets is as a means of payment, where distributed ledger technology

enables faster, cheaper, and more efficient payments (BIS, 2018a).

Figure 4.8 indicates the perceived severity of consumer risks with respect to digital assets and cryptocurrencies. The key risk (with 34% of respondents classifying it as 'very high') relates to consumer loss due to price volatility, which is documented in digital asset markets across different jurisdictions. This is followed by concerns regarding lack of protection or inadequate redress mechanisms, and AML/CFT, with 27% of respondents classifying both these risk types as 'very high'. This aligns with studies on the increase in digital assets-based crimes that followed the rise in digital assets use more generally (Chainalysis, 2022). Other issues, such as fraud, unfair practices, and lack of complaint or redress mechanisms, are also classified as either 'very high' or 'high' by most respondents. The risks related to financial exclusion are perceived as being somewhat lower.

<sup>11</sup> Refer to questions B5–B8 in the questionnaire. The survey instrument can be viewed using this link: [https://cambridge.eu.qualtrics.com/jfe/form/SV\\_0xNmcp1sb8XdIPA](https://cambridge.eu.qualtrics.com/jfe/form/SV_0xNmcp1sb8XdIPA)

**Figure 4.8 Perceived severity of consumer risks in digital assets/cryptocurrencies**



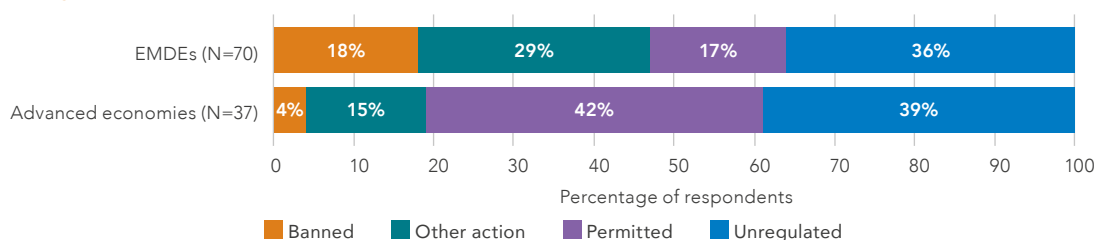
Note: Respondents who answered that this is not in their remit are excluded.

These findings reflect the recent focus of financial authorities and standard-setting bodies. Previous assessments regarding digital assets and cryptocurrencies have largely been exploratory and aimed at understanding the different emerging classes of assets, consumer profiles and exposures, interconnection with traditional finance, and the potential risks to financial stability (FSB, 2017a, 2017b, 2018b; BIS, 2018a). Significant data gaps and the difficulties posed by the rapidly evolving sector have also been underlined (BIS, 2021a; FSB,

2022a; WEF and Wharton Blockchain and Digital Asset Project, 2022).

Given the severity with which financial authorities regard consumer risks in digital assets and cryptocurrencies, a brief analysis of the typical regulatory approaches to digital assets is warranted. Figure 4.9 illustrates whether digital assets are permitted, unregulated, banned, or subject to other actions in EMDEs and advanced economies.

**Figure 4.9: The regulatory approach to digital assets – emerging market and developing economies vs advanced economies**



Jurisdictions in advanced economies are much more likely to permit digital assets (reported by 42% of respondents) compared to those in EMDEs (17%). Furthermore, just 4% of respondents in advanced economies have banned digital assets compared to a significantly higher proportion of respondents in EMDE jurisdictions, at 18%.

Several factors may be driving these different approaches. Firstly, digital assets are considered riskier by respondents in EMDEs compared to those in advanced economies. However, this difference does not appear to be significant, with 59% of respondents in EMDEs indicating digital asset consumer risks as ‘very high’ or ‘high’ compared to 51% of respondents in advanced economies.

A second factor may be resource and capacity constraints. Financial authorities in advanced economies are likely to have more resources and greater technical capacity than those in EMDEs to develop regulatory frameworks for digital assets. Therefore, with fewer resources and a higher perception of the risks, financial authorities in EMDEs are more likely to ban digital assets.

### Digital assets regulation – the approach of the Philippines Securities and Exchange Commission

The digital assets sector has grown rapidly in recent years, resulting in increased attention from financial authorities on the implications for consumer protection, as discussed in Section 4.4.1. However, the regulation of digital assets may be complicated by the lack of a universally accepted taxonomy and an unclear regulatory perimeter which, together with the decentralized nature of digital assets, has led to a variety of regulatory responses globally.

For example, some financial authorities have developed tailored regulatory frameworks for digital assets, while others classify them under existing securities laws. With the permission of the Securities and Exchange Commission (SEC) Philippines, their specific approach to regulating digital assets is outlined below as an example.

The SEC Philippines currently permits security tokens under a pre-existing framework. In its response to this survey, the SEC Philippines indicated that it considers unsuitable or unfair practices, fraud and related misconduct, and loss due to price volatility as the largest risks posed to consumers by digital assets/cryptocurrencies. It is therefore currently developing a regulatory

framework with three key objectives for digital assets which are deemed as securities.

#### 1 Protecting investors

The framework is intended to establish legal and regulatory certainty, particularly for investors. It will provide minimum standards for compliance and mandate that only duly licensed or authorized persons can provide investment services to the public as well as ensure that only registered securities can be offered.

#### 2 Ensuring that markets are fair, efficient, and transparent

The framework seeks to facilitate a transparent approach. Digital asset exchanges will be accountable for the products they offer investors and must also submit relevant information to the SEC for assessment.

#### 3 Reducing systemic risk

Assessing and identifying systemic risks in digital assets and service providers will enable the regulator to more effectively manage risks by determining the necessary capital requirements and implementing other prudential requirements.

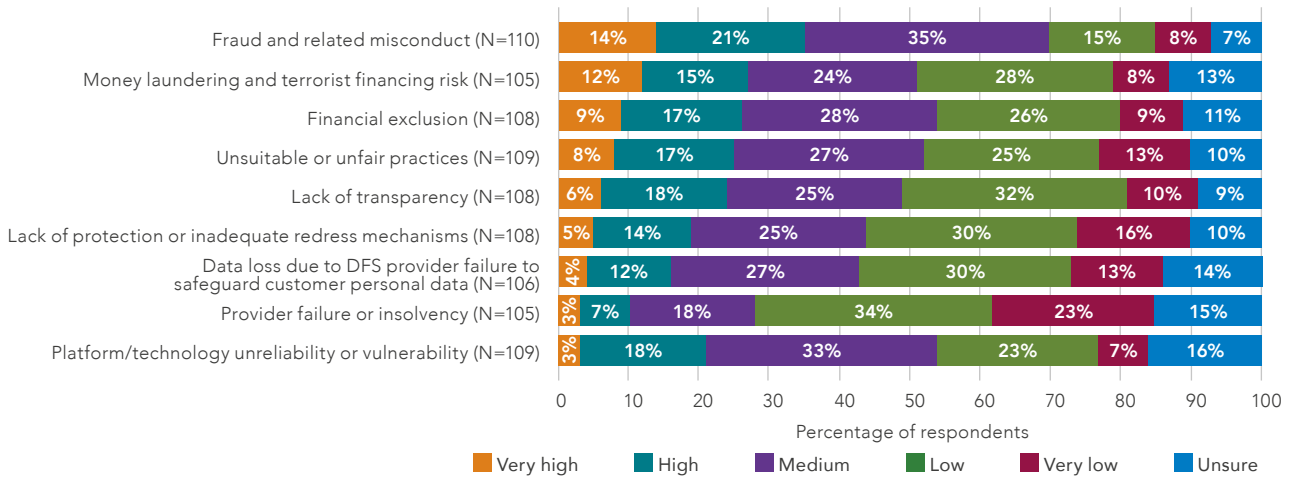
#### 4.4.2 Severity of consumer risks in digital payments and international remittances

In the digital payments and international remittances sector, the risks most often perceived as ‘very high’ are fraud and related misconduct (14%), closely followed by another risk of concern to regulators, that of AML/CFT (12%)<sup>12</sup> and financial exclusion (9%), as illustrated in Figure 4.10. Interestingly, respondents also indicated consumer protection risks concerning lack of protection or adequate redress mechanisms, lack of transparency, and provider failure or insolvency as ‘very low’ or ‘low’.

It is worth highlighting that there is growing literature concerning risks from fintech/DFS providers operating across different jurisdictions. One example is the early insolvency cases regarding digital assets and cryptocurrencies intermediaries due to the uncertainty surrounding consumers’ potential claims over assets (World Bank, 2021a, 2022b; Clifford Chance, 2022). But as these insolvency proceedings have so far been concentrated in a handful of jurisdictions, it is possible that most regulators and supervisors have yet to be impacted by them and other threats that have not yet spread.

<sup>12</sup> AML/CFT may not be considered a consumer risk but was included for comparison in this chapter as it is recognized as a key regulatory concern based on findings from past reports.

Figure 4.10: Perceived severity of consumer risks in digital payments and international remittances

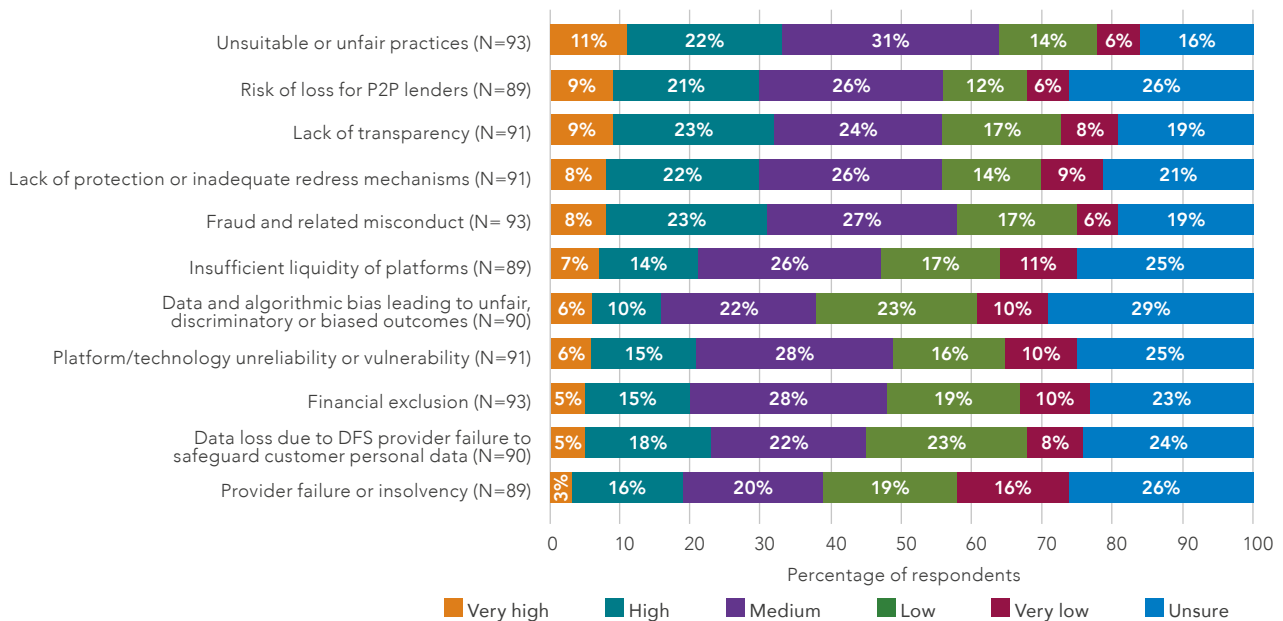


Note: Respondents who answered that this is not in their remit are excluded.

### 4.4.3 Severity of consumer risks in digital lending

The perceived severity of risks is more evenly distributed in the digital lending sector. Figure 4.11 suggests that the only outlier is provider failure or insolvency, where the risks are perceived as ‘very low’ by 16% of respondents and ‘low’ by 19%. Interestingly, the percentage of respondents who are unsure about the severity of risks in digital lending is higher than in the other verticals (except equity crowdfunding and digital capital raising). This suggests there may be data gaps or other challenges that need to be addressed to support financial authorities in their efforts to appropriately identify, prioritize, and mitigate risks in this vertical.

Figure 4.11: Perceived severity of consumer risks in digital lending



Note: Respondents who answered that this is not in their remit are excluded.

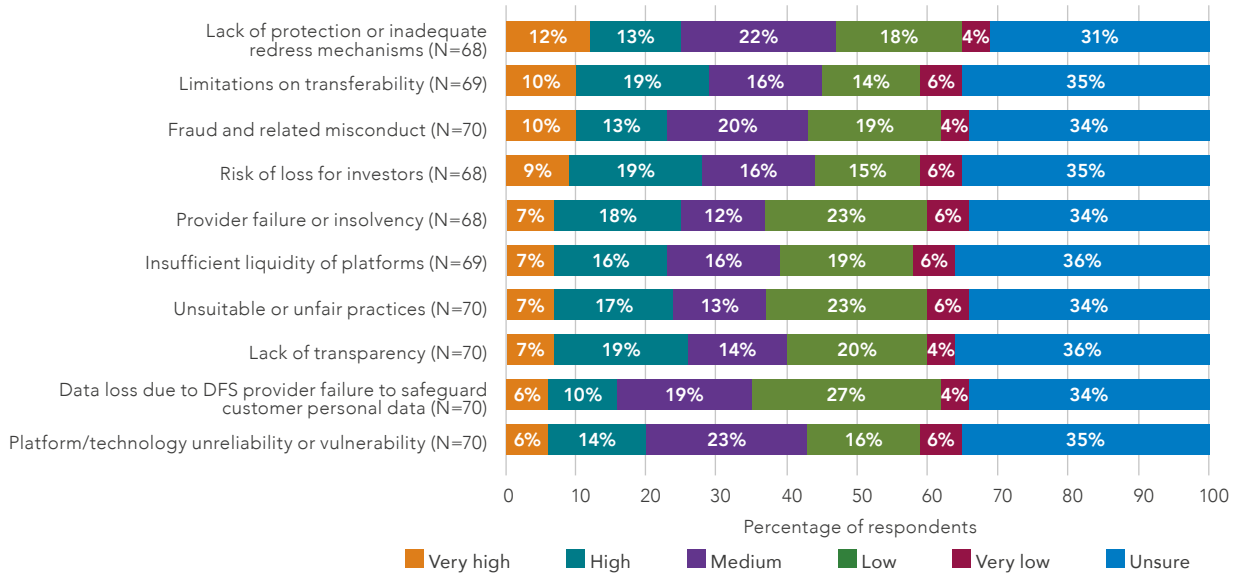


#### 4.4.4 Severity of consumer risks in equity crowdfunding and digital capital raising

The severity of the risks reported for equity crowdfunding and digital capital raising, as illustrated in Figure 4.12, resemble those for digital lending. A high percentage of respondents are unsure about the severity of the risks, with similar proportions being reported across the risk types.

As highlighted in the discussion on digital lending, this uncertainty may suggest data gaps or other challenges that need to be addressed to support financial authorities in identifying, prioritizing, and mitigating risks in this vertical. It is also worth noting that respondents consider the risk of data loss due to providers failing to safeguard consumer data as ‘very low’ (4%) or ‘low’ (27%).

Figure 4.12: Perceived severity of consumer risks in equity crowdfunding and digital capital raising

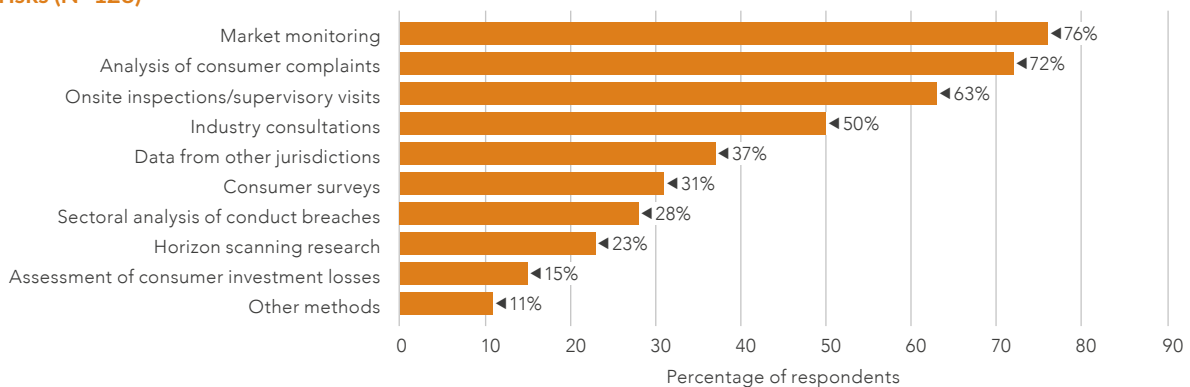


Note: Respondents who answered that this is not in their remit are excluded.

#### 4.5 Identifying, measuring, and prioritizing fintech-related consumer risks

Respondents are using different analytical methods to identify, measure, and prioritize fintech-related consumer risks, as illustrated in Figure 4.13. The most frequently cited are market monitoring (reported by 76% of respondents),<sup>13</sup> analyzing consumer complaints (72%), and onsite inspections/supervisory visits (63%).

Figure 4.13: Analytical methods used by regulators to identify, measure, and prioritize fintech-related consumer risks (N=123)



Note: Respondents could select multiple responses.

13 This involves monitoring developments or activities in the fintech market more generally.

Guidance from international bodies was also useful in assessing consumer risks, as illustrated by a respondent from LAC:

*“The IMF/World Bank Bali Fintech Agenda has helped us assess emerging consumer risks and balance them against the potential benefits, including when it comes to collaboration among regulators domestically and internationally.”*

#### **4.6 Challenges in identifying, measuring, and prioritizing consumer risks**

Respondents reported various challenges in identifying, measuring, and prioritizing fintech-related consumer risks. Each of the top five reported challenges was selected by more than half the respondents. Poor quality data and/or insufficient data are identified by 68% of respondents. This complements the findings related to capacity building needs, indicated in Figure 7.1, which highlights that some of the areas where technical support is most needed relate to data processing and analytics, and data collection.

Challenges related to data gaps may be partly due to instances where a jurisdiction’s existing regulatory reporting requirements do not extend to some fintechs or their activities. Data gaps could prevent regulators from accurately assessing the financial risks posed by such fintechs, making it more difficult for them to decide whether to extend the regulatory perimeter to include fintech activities (FSB, 2022a). Unclear regulatory remit and lack of clarity on the responsibilities of each

regulator and supervisor in jurisdictions where multiple authorities are involved can exacerbate this.

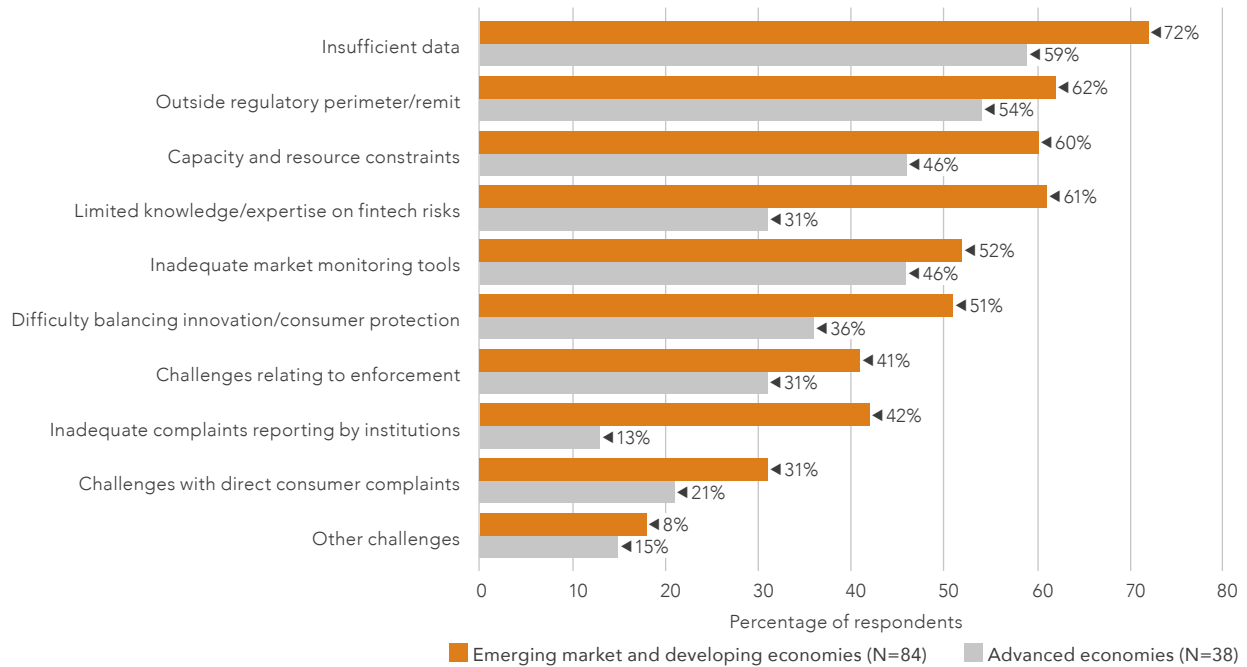
Other key challenges identified by financial authorities include fintech-related consumer risks being outside their regulatory perimeter/remit (60%), capacity and resource constraints (56%), limited knowledge/expertise on fintech-related risks (52%), and a lack of or inadequate market monitoring tools (50%).

Significantly, all challenges are cited more frequently by financial authorities in EMDEs jurisdictions, as shown in Figure 4.14. The largest reported differences between the two economies are limited knowledge/expertise about fintech-related risks (61% in EMDEs versus 31% in advanced economies), inadequate reporting from supervised institutions regarding consumer complaints (42% in EMDEs versus 13% in advanced economies), and capacity and resource constraints (60% in EMDEs versus 46% in advanced economies).

A respondent from SSA described their approach to dealing with the uncertainty arising from activities outside their regulatory perimeter or remit:

*“We have adopted temporary measures where necessary to license those providers that require licenses to operate and opted to engage with those that are not clearly captured under any legal regime, as well as adopting administrative measures for oversight where there is a vacuum while learning from others.”*

**Figure 4.14: Challenges in identifying, measuring, and prioritizing consumer risks – emerging market and developing economies vs advanced economies**



Note: Respondents could select multiple responses.

## 4.7 Challenges in addressing fintech-related consumer risks

Respondents reported various challenges in addressing fintech-related consumer risks. The top challenge, cited by 60% of respondents, relates to capacity and resource constraints. Significantly, as well as being the top challenge in addressing fintech-related risks, it is also one of the top challenges in identifying, measuring, and prioritizing consumer risks. Challenges in regulatory frameworks, specifically those relating to consumer protection and other frameworks, are equally noteworthy, suggesting existing data gaps and the need for greater regulatory action. In this regard, the findings highlight two connected challenges among the top five: regulatory frameworks that are absent or not fit for purpose (reported by 53% of respondents) and gaps in financial consumer protection regulatory frameworks (50%). Concerning the latter, weak consumer protection standards within each regulatory or supervisory authority may intensify consumer risks (World

Bank, 2020d).

Figure 4.15 compares the challenges financial authorities in EMDEs and advanced economies face in addressing fintech-related consumer risks. All challenges (except in the category 'other') are more frequently cited by those in EMDE jurisdictions. The most cited challenges relate to capacity and resource constraints (67% in EMDEs versus 44% in advanced economies) and limited knowledge/expertise on fintech-related risks (58% in EMDEs versus 28% in advanced economies).

Capacity and resource constraints are more often cited by respondents in East Asia and Pacific (74%), SSA (68%), and LAC (63%). The challenge of gaps in financial consumer protection regulatory frameworks is also noteworthy and is an issue for a greater proportion of respondents in SSA (58%), MENA (57%), and LAC (54%).

**Figure 4.15: Challenges in addressing fintech-related consumer risks – emerging market and developing economies vs advanced economies**



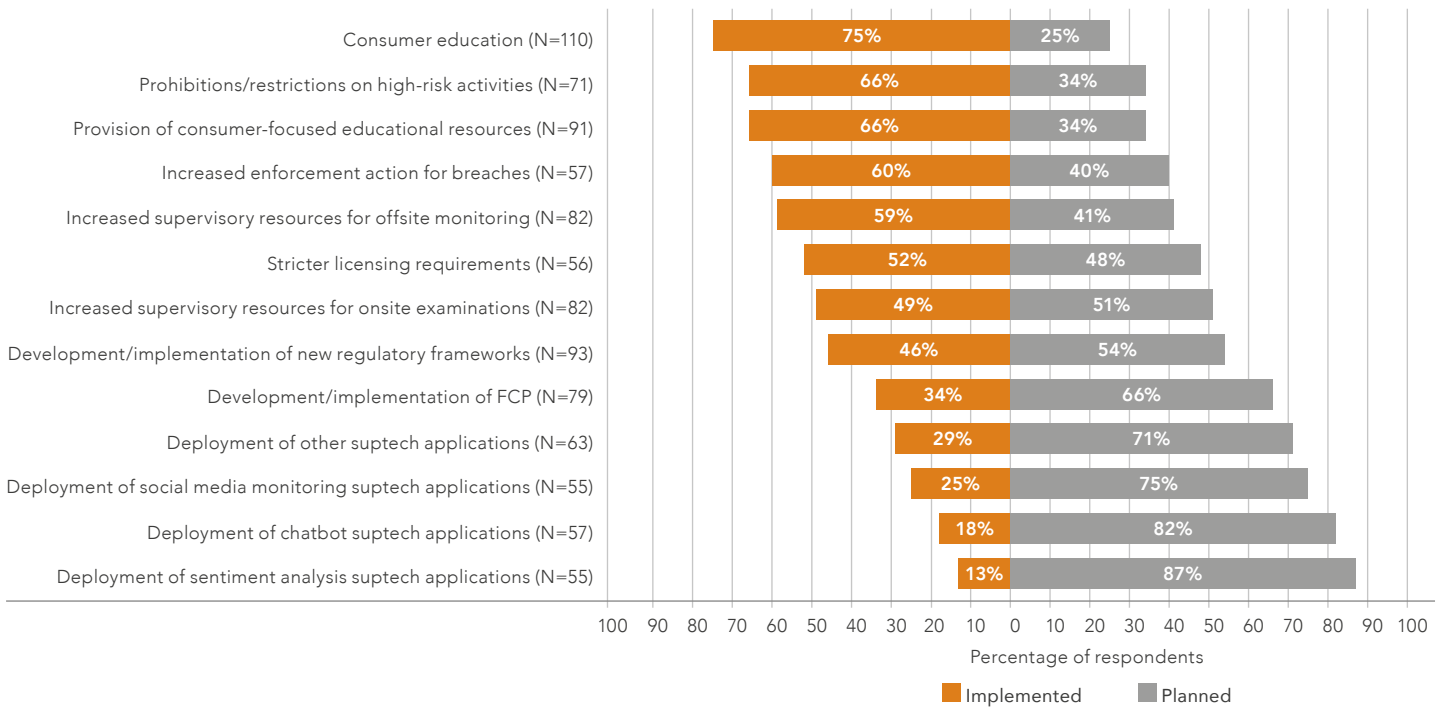
Note: Respondents could select multiple responses.

## 4.8 Responses to fintech-related consumer risks

Figure 4.16 shows the range of actions that financial authorities have implemented or are planning to implement in response to fintech-related consumer risks. The findings suggest that the most popular actions relate to consumer education and literacy. Seventy-five percent of respondents employ consumer education campaigns/risk warnings and, relatedly, 66% provide consumer-focused educational resources (financial literacy programs). Other measures in the top five relate to introducing prohibitions/restrictions on high-risk activities (reported by 66% of respondents), increasing enforcement action for breaches (60%), and increasing supervisory resources for offsite monitoring (59%).

Figure 4.16 also shows the planned measures to combat fintech-related consumer risks. These findings are consistent with evidence presented in Chapter 6. The top four planned activities relate to leveraging supotech applications: sentiment analysis (reported by 87% of respondents), chatbots (82%), social media monitoring (75%), and other supotech applications (71%). Developing and implementing new financial consumer protection regulatory frameworks is the fifth most selected measure (66%).

**Figure 4.16: Actions undertaken by financial authorities in response to fintech-related consumer risks**



Note: Only respondents who reported planned or implemented actions are included.

# 5. The landscape of digital regulatory and supervisory infrastructure



## 5. The landscape of digital regulatory and supervisory infrastructure

The previous chapters outlined how the rapid transformation toward the digitalization of financial products and services, and the complex ecosystems of fintech and DFS markets require financial authorities to adapt their approaches to regulation and supervision.

The effective regulation, supervision, and oversight of financial markets require digital infrastructure that provides regulators and supervisors with the data and tools they need to carry out their functions. Organizations, including the World Bank, have identified that the full potential of digital development cannot be realized without a range of digital infrastructure, including digital financial services and digital identification (World Bank, 2019). Digital infrastructure is defined as the digital technologies that provide the foundation for an organization's information technology and operation (World Bank, 2019).

In this context, digital regulatory and supervisory infrastructure (DRSI) refers to systems that electronically collect, process, and transmit information to help financial authorities effectively regulate and supervise the financial sector including, but not limited to digital financial services. DRSI provides financial authorities with data and tools to enable them to carry out their functions. For example, DRSI can include foundational data-gathering applications needed for the development of supotech initiatives, or infrastructure deployed by a financial authority to enable digital regulatory reporting. DRSI can also include the analysis of data to inform regulatory and supervisory actions.

There is a relationship between supotech and DRSI. Supotech is the use of innovative technology by supervisory agencies to support supervision (BIS, 2018), while DRSI can be seen as both a prerequisite for developing supotech initiatives and also as comprising initiatives that can be considered supotech. However, DRSI is broader than supotech and includes other infrastructure used by regulators.

This chapter evaluates the different layers of DRSI that interact to produce technological solutions and applications linked to regulatory and supervisory activity. These regulatory and supervisory applications often require a strong digital infrastructure to ensure the application's effectiveness (MAS, 2021). Consequently, at least in terms of data transformation, a data divide is forming between fintech/DFS market participants who can process and leverage data effectively and the regulators and supervisors who cannot (di Castri, Grasser, and Kulenkampff, 2020).

DRSI can help develop and implement new technologies that require a foundation of reliable and secure digital frameworks. For example, establishing new portable systems of digital identity initiatives requires that financial authorities and governments work with financial stakeholders to create DRSI, such as common platforms for multiple ID use cases, secure and reliable data storage facilities, and open-source technologies. Current literature on aspects of digital infrastructure emphasizes the applications that DRSI can enable, such as customer due diligence or e-KYC, or certain verticals such as payments (IMF, 2019). However, the cost of the infrastructure and the capacity to develop and maintain it can deter their creation (di Castri, Grasser, and Kulenkampff, 2020).

Similarly, open banking initiatives require, at a minimum, a standard for data-sharing protocols, and this requires all the involved public and private stakeholders, including regulators and supervisors, to have an effective digital infrastructure (Ziegler, 2021).

The chapter summarizes, in a layered approach, empirical data on the planned and established regulatory and supervisory activities concerning DRSI. This will help compare and benchmark approaches, as well as identify opportunities and anticipate challenges. It will also help the development community support financial regulators and supervisors in this domain, particularly those in EMDEs.

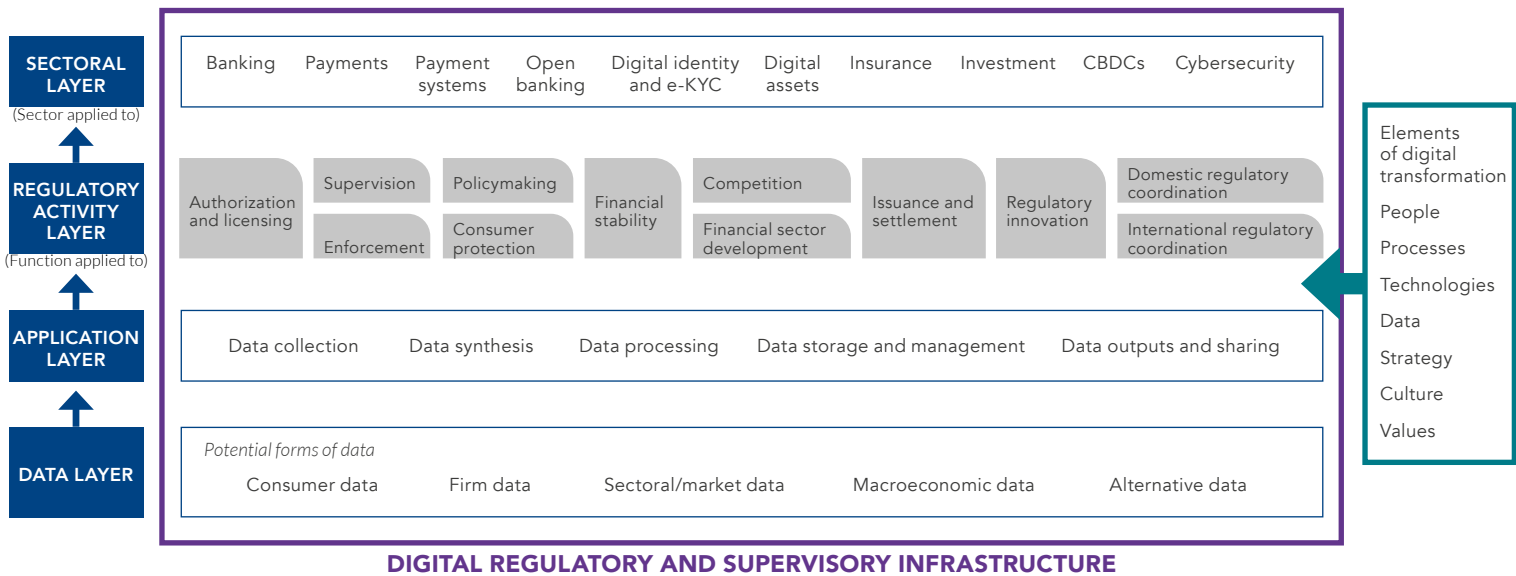
## 5.1 Proposed conceptual framework of digital regulatory and supervisory infrastructure

A conceptual framework, based on layers, illustrates and helps map DRSI. Figure 5.1 demonstrates this conceptual DRSI framework and comprises four key layers:

- 1 The foundational *data layer* describes the types of data that regulators and supervisors can access and use to support decision-making and DRSI initiatives. The data can be, for example, data from firms, macroeconomic data, or sectoral/market data. This data forms key building blocks enabling further DRSI applications and processes.
- 2 The *application layer* relates to the different approaches to data collection and management that an analyst can apply to the data in the
- 3 The *regulatory and supervisory activity layer* comprises the different functions and activities that the gathered and analyzed data can be applied to, for example, authorization and licensing, stress testing, or risk-based supervision.
- 4 The *sectoral layer* concerns how the regulatory and supervisory activities are applied to the different sectors that a regulator typically oversees, for example, banking and payments. However, it can also contain processes a regulator or supervisor may be interested in, such as e-KYC and cybersecurity.

**Figure 5.1: Digital regulatory and supervisory infrastructure, a conceptual framework**

Digital regulatory and supervisory infrastructure components

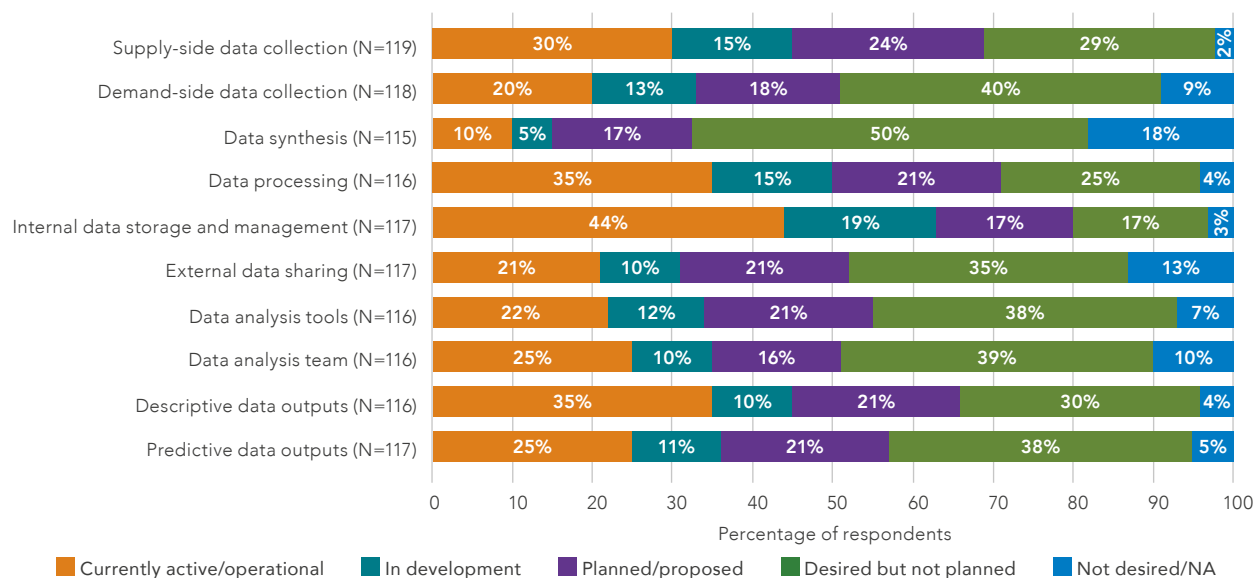




## 5.2 The data and application layers of DRSI

Figure 5.2 shows the core data components that respondents consider important in developing DRSI. Broadly, all ten components are considered important as, on average, only 8% of the respondents reported not needing any of these components. Despite this, only an average of 27% reported having one that was currently operational.

Figure 5.2: Core data components of financial authorities



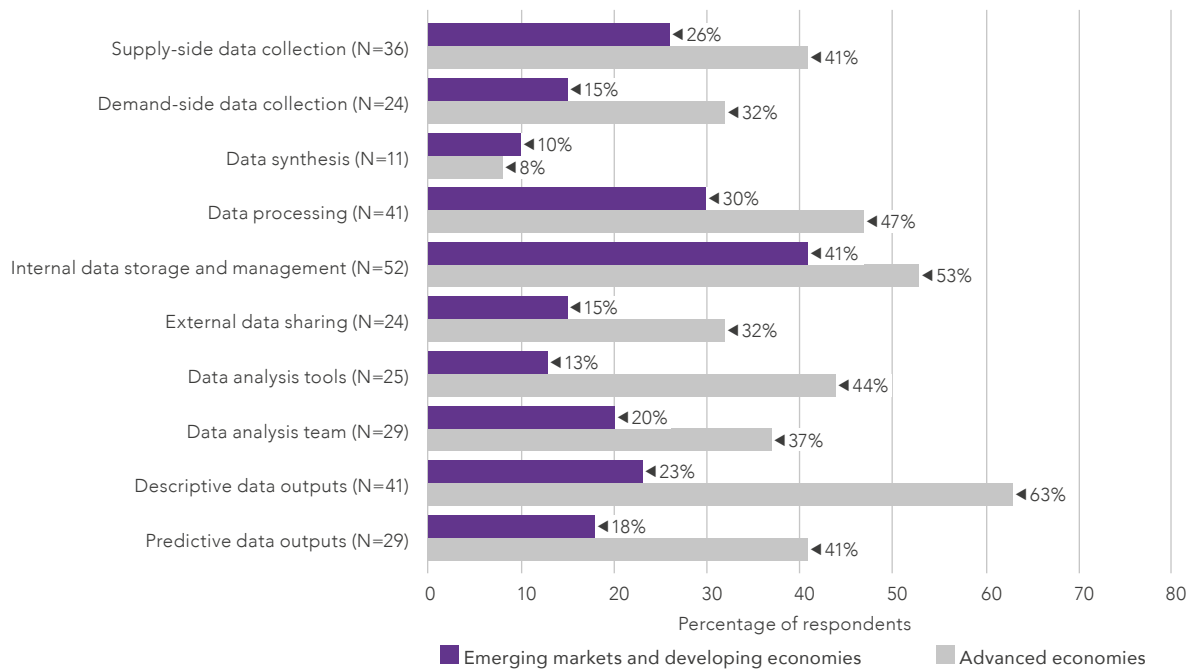
The most common core DRSI components that respondents have already deployed or are currently developing are storage related, with 44% having internal data storage and management DRSI in place, followed by descriptive data outputs at 35%, and data processing infrastructure at 35%. A quarter of respondents deployed data analysis teams and 22% data analysis tools. Respondents may see these types of DRSI components as key to becoming more digitally enabled and data-led financial authorities.

A significant number of respondents also want to apply DRSI to other applications but do not currently have plans to implement them. For

example, 50% cited data synthesis applications and 38% a specific data analysis team. This could indicate resource or technological constraints.

More respondents in advanced economies have currently active/operational DRSI applications to enhance regulatory and supervisory capabilities in every category compared to those in EMDEs, as indicated in Figure 5.3. The responses reveal large differences between advanced economies and EMDEs, particularly in data analysis tools (44% in advanced economies versus 13% in EMDEs) and descriptive data outputs (63% in advanced economies versus 23% in EMDEs).

**Figure 5.3: Core data components of financial authorities (active/operational) – emerging market and developing economies vs advanced economies**



A greater proportion of financial authorities in EMDEs reported they are planning to develop core data components, such as descriptive data outputs, data analysis tools, and predictive data outputs compared to those in advanced economies. If these proposed projects are implemented, the gap between EMDEs and advanced economies regarding data DRSI components would narrow.

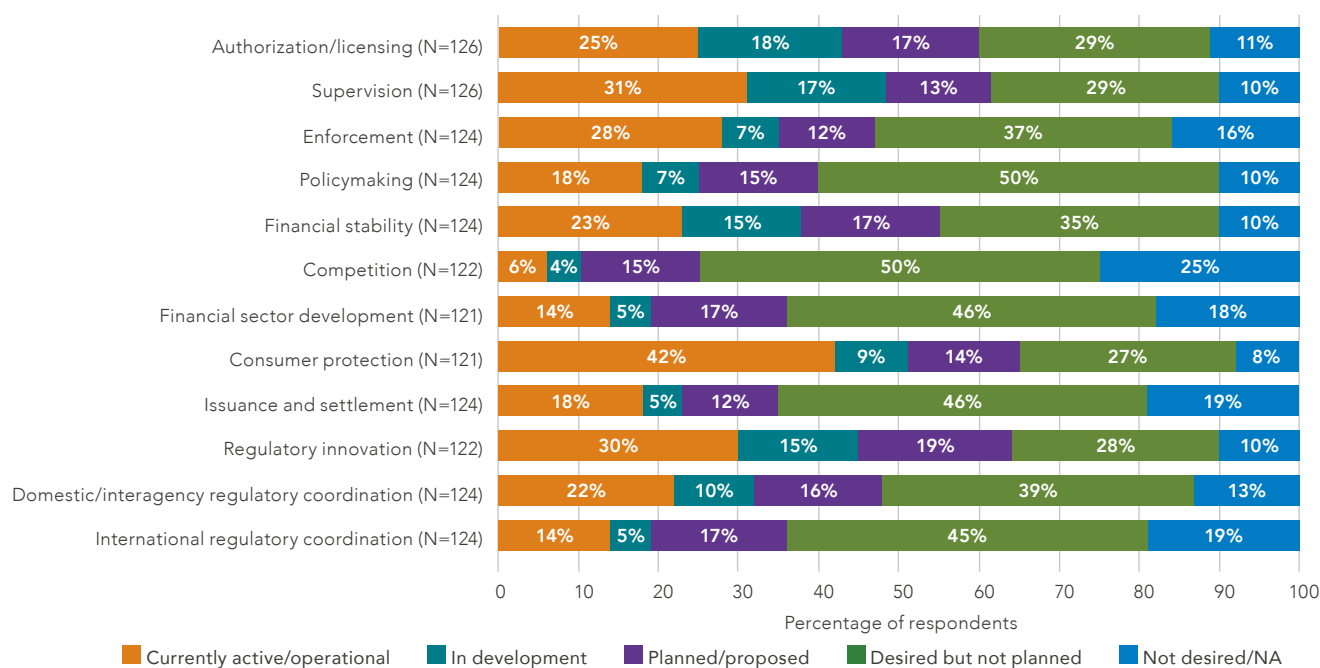
In this regard, one respondent commented:

*“We are far behind in IT sophistication for regulatory and supervisory purposes. We are initiating slowly to develop and enhance IT sophistication for operational and regulatory purposes. Hence, we have very little to share.”*

### 5.3 The regulatory and supervisory activity layer of DRSI

In the regulatory and supervisory activity layer, the core DRSI components of the application layer are used for different policy, regulatory, and supervisory functions. Figure 5.4 illustrates the functions, and their status, to which respondents typically apply these components.

**Figure 5.4: Status of DRSI applications within financial authorities**



The top two functions for which respondents have currently operational DRSI are consumer protection and supervision, at 42% and 31%, respectively. It is perhaps unsurprising that these are the top two functions, given the perceived new challenges and exacerbated existing challenges in supervising financial markets, and measuring and prioritizing consumer risks.

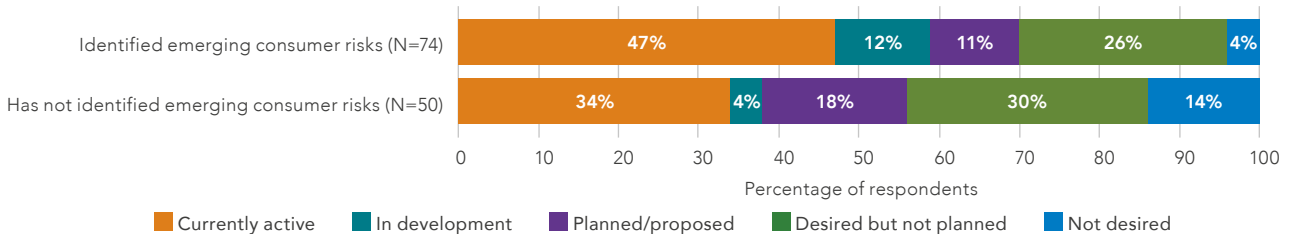
Further analysis was conducted to establish whether there was any connection between respondents who had identified fintech/DFS consumer risks and those with operational or active DRSI. Of the 60% of respondents who had identified these risks in Chapter 4, 67% indicated they have operational or active DRSI related to consumer protection, which is also the highest reported use of DRSI, as shown in Figure 5.4. This suggests that DRSI related to consumer protection is one way that financial authorities are using to tackle the perceived increase in consumer risks associated with fintech/DFS.

Figure 5.4 also indicates that many respondents want to apply DRSI to their regulatory functions but do not yet have plans to do so. Respondents reported that they require DRSI applications for competition, policymaking, financial sector development, and issuance and settlement. However, while the competition function is one of the most desired, accounting for 50% of responses, it is also the regulatory function with the lowest currently active/operational DRSI, at just 6%. This could be due to a lack of expertise, funding, or resources, which are the most common challenges stated by respondents in developing DRSI (see Figure 5.8).

In terms of currently operational DRSI, respondents in advanced economies reported higher levels of DRSI applications in every regulatory function compared to those in EMDEs. There is also a link between respondents who had identified emerging consumer risks and the status of their DRSI initiatives for specific regulatory and supervisory functions. For example, as shown in Figure 5.5, those who had identified emerging consumer risks are more likely to have currently active/operational DRSI initiatives

for consumer protection compared to those who had not identified these risks (47% versus 34%). Furthermore, respondents who had identified emerging consumer risks are also more likely to have DRSI initiatives related to consumer protection in development (reported by 12%) compared to those who had not (4%).

**Figure 5.5: Status of DRSI initiatives related to consumer protection within financial authorities and identification of consumer risk during Covid-19**

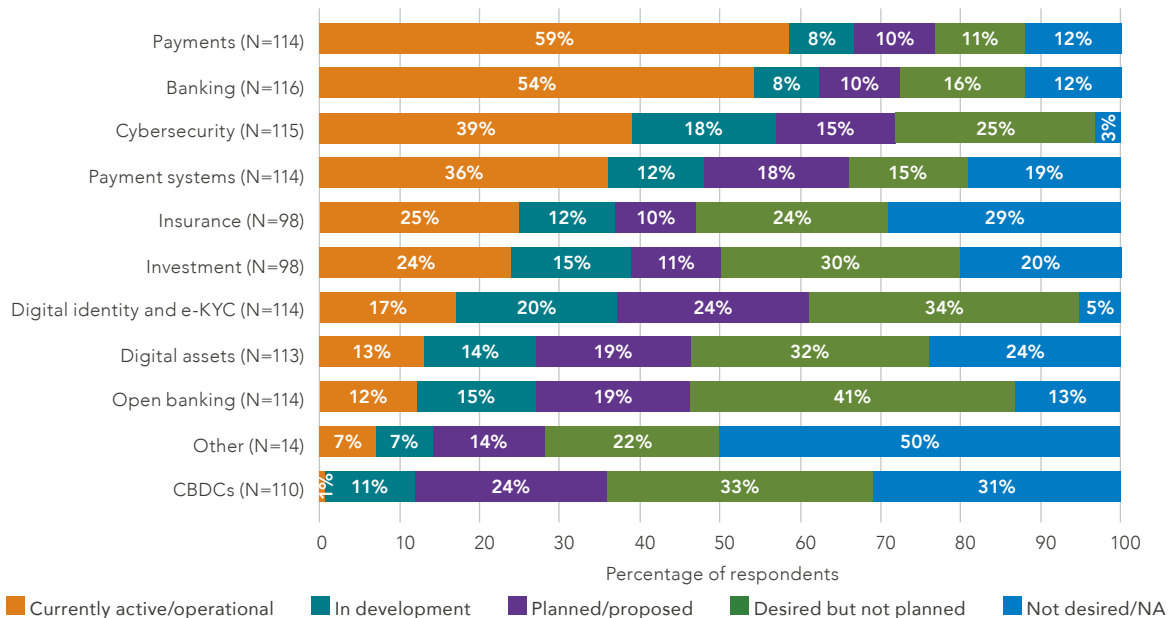


There is a similar association in supervision-related DRSI initiatives: 36% of respondents who had identified emerging consumer risks have currently active supervision-related DRSI compared to 22% who had not identified such risks. This indicates that DRSI may help financial authorities identify emerging consumer risks.

### 5.4 The sectoral layer of DRSI

The sectoral layer refers to the financial services sectors to which the activity layer of DRSI is employed. Financial authorities’ responses are captured in Figure 5.6.

**Figure 5.6: Status of DRSI within financial authorities per vertical or function**



The two most common sectors where DRSI has been developed are payments (reported by 59% of respondents) and banking (54%). This is partly due to the rapid growth and digitalization of retail banking and payments services, as well as the impact of Covid-19. Cybersecurity (cited by 39% of respondents) and payment systems (36%) also

feature prominently, reflecting consumer risks and market integrity concerns after various high-profile cases of cybersecurity failures and data breaches.

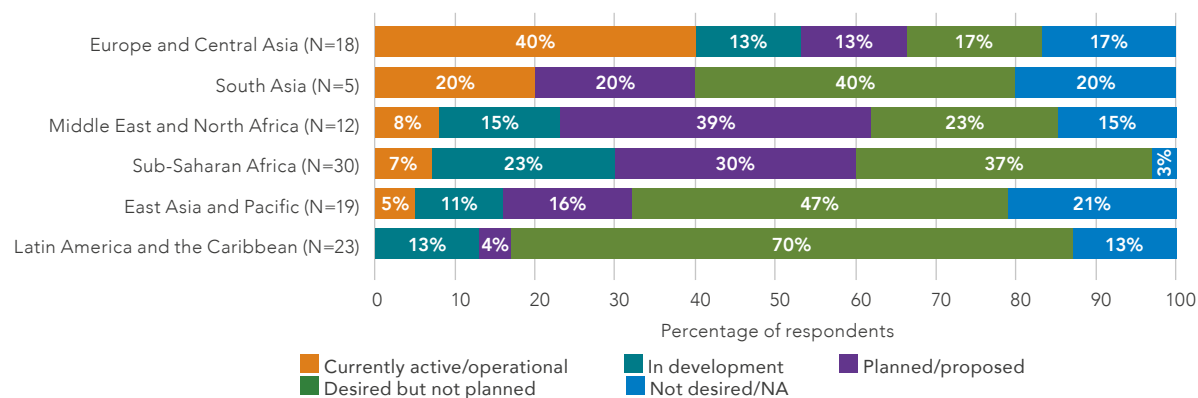
Many regulators and supervisors also desire DRSI applications in open banking (reported by 41%), digital ID/e-KYC (34%), CBDCs (33%), and digital

assets (32%). This may be due to the rapid growth in open banking and digital ID/e-KYC in DFS, the limited understanding of the implications of CBDCs, and the increased perception of new consumer risks regarding digital assets.

The applications of DRSI vary significantly across regions. More respondents in South Asia, Europe/Central Asia, and SSA have more currently active DRSI in banking, payments, and cybersecurity compared to those in other regions, with 80% of respondents in South Asia, and 72% of respondents in Europe/Central Asia, reporting currently active DRSI initiatives in banking.

Regarding open banking, the responses indicate that many financial authorities see potential in applying DRSI to this sector. This is illustrated in Figure 5.7, where 70% of respondents in LAC reported a desire for DRSI applications in this area, although they have not yet planned these initiatives. This is followed by East Asia and Pacific (reported by 47% of respondents) and South Asia (40%). Almost twice as many respondents in Europe and Central Asia (40%) have currently active open banking DRSI compared to those in South Asia (20%) and MENA (8%).

**Figure 5.7: Status of DRSI within financial authorities – open banking**



## India Stack – a DRSI case study

India Stack is a group of technologies represented by three digital infrastructure systems (also called rails): identity, digital payments infrastructure, and a data-management and sharing system (Carrière-Swallow, Haksar, and Patnam, 2021).

The three digital infrastructure systems

### Identity

The identity rail comprises a unique biometric identification system called Aadhaar that employs a random 12-digit number. Introduced in 2010, it was designed to authenticate individuals' identities. Additional capabilities were later introduced, including e-KYC (verification), eSign (digital signature), and DigiLocker (an online cloud-based document repository) (D'Silva et al., 2019; Government of India, 2021). Non-banking financial institutions, including fintechs with an Aadhaar e-KYC authentication license, can use the Aadhaar number system to confirm a customer's identity (FIGI, 2021). Aadhaar allows public access to government digital services, such as social payments (Government of India, 2021).

### Digital payments infrastructure

The payment rail comprises a unified payment interface (UPI) which was built by the National Payments Corporation of India (NPCI). It is a single interoperable interface to bank accounts that grants everyone mobile access to the payment system. It enables instantaneous and seamless financial service transactions in fiat money and settling within the banking system (D'Silva et al., 2019).

### Data-management and sharing system

To facilitate financial data sharing, in 2016 the Reserve Bank of India established a legal framework for a class of regulated data fiduciary entities called account aggregators that facilitate data-sharing among regulated financial institutions. As well as facilitating transactions, the data-sharing rail also ensures data privacy and security, and requires customer knowledge and consent to share data (D'Silva et al., 2019).

## India Stack conceptual DRSI framework

In this section, India Stack's infrastructure systems are described using the conceptual framework illustrated in Figure 5.1.

### Data layer

The India Stack allows regulators and supervisors to access certain data sources. For instance, in the identity rail, they can access customer-level data through Aadhaar which uses infrastructure components, including e-KYC, eSign, and DigiLocker capabilities previously mentioned. In the payments rail, they can access financial transaction data through the UPI.

### Application layer (or data infrastructure layer)

The India Stack uses a variety of data management, processes, and sharing methods to facilitate its three rails of identity, payments, and data sharing (the activity layer, described below). This provides a data infrastructure layer upon which regulatory and supervisory applications can be created.

### Regulatory and supervisory activity layer

The analyzed data can be applied to various regulatory and supervisory functions and activities. For example, data gathered through Aadhaar-based KYC procedures (the identity rail) provides more robust data for AML/CFT checks. The data can also be used to facilitate supervisory activities related to issuance and settlement via the UPI payments rail. Additionally, the India Stack enables consumer protection through the data privacy features built into the data-sharing rails.

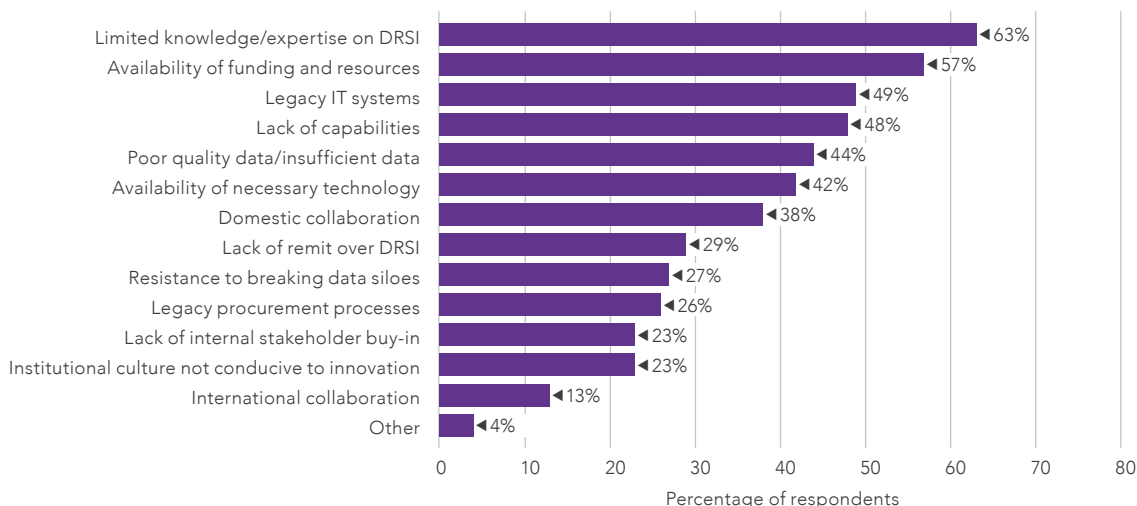
### Sectoral layer

The India Stack rails can be applied to various sectors in the conceptual framework (Figure 5.1), including banking, payment systems, open banking, insurance, investment, digital identity, and e-KYC.

## 5.5 Challenges in developing DRSI

Figure 5.8 illustrates the considerable challenges financial authorities face in developing DRSI in their jurisdictions. The top two challenges are limited knowledge/expertise (cited by 63% of respondents) and funding/resource constraints (57%). Legacy IT systems (reported by 49%), a lack of capabilities (48%), poor quality or insufficient data (44%), and the availability of technology (42%) are also common challenges.

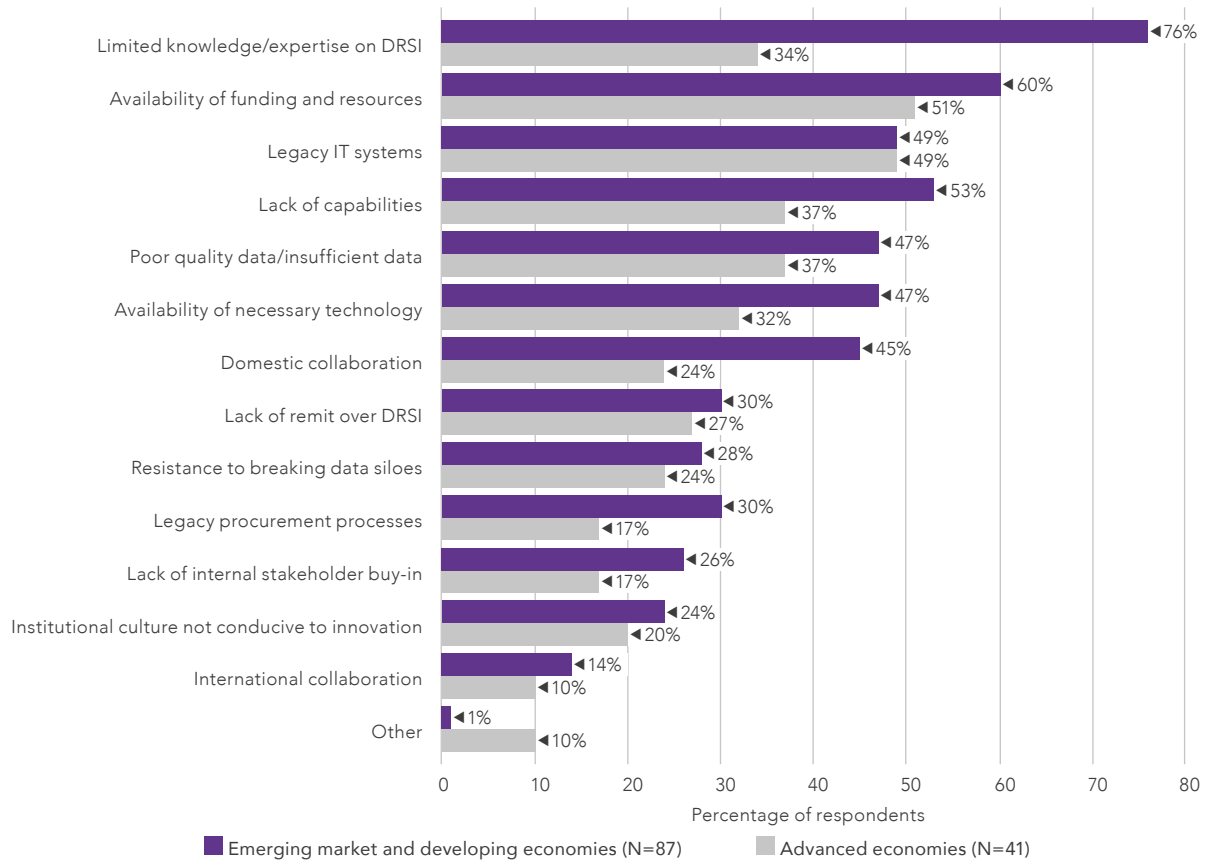
**Figure 5.8: Challenges in developing DRSI (N=128)**



Note: Respondents could select multiple responses.

More respondents in EMDEs experience challenges in developing DRSI than those in advanced economies in almost every category, as illustrated in Figure 5.9. This is particularly true for limited knowledge/expertise (76% in EMDEs versus 34% in advanced economies), lack of capabilities (53% in EMDEs versus 37% in advanced economies), availability of technology (47% in EMDEs versus 32% in advanced economies), and poor quality or insufficient data (47% in EMDEs versus 37% in advanced economies). The common hurdles in tackling these challenges are the need for resources and cost considerations.

Figure 5.9: Challenges in developing DRSI – emerging market and developing economies vs advanced economies





# 6. Supervisory technology mapping



## 6. Supervisory technology mapping

Before Covid-19, factors such as changing business models, emerging risks, and the availability of emerging technologies played a significant role in the digital transformation of financial supervisory authorities. These push factors were then accelerated by the pandemic, as outlined in the previous chapters, prompting financial service providers to adopt digital applications. It also limited supervisors' ability to conduct onsite inspections (CCAF and World Bank, 2020; World Bank, 2020a), necessitating a shift toward offsite supervision and authorities' increased use of digital platforms, such as cloud computing, to facilitate document and data sharing with supervised entities (BIS, 2021b).

This digitalization of financial sector supervision and the consequent increase in data availability enabled supervisors to expand supervised entities' risk profiles and enhance their existing tools or deploy new suptech applications (BIS, 2018, 2020; World Bank, 2021b).

Suptech refers to the application of technology and data analysis solutions to complement and enhance a financial authority's supervisory capabilities. It allows financial authorities to access more granular, diverse, timely, and trustworthy data to better inform their decisions and improve operational efficiency.

However, this shift to data-driven supervision is not without challenges. Supervisors have encountered several operational hurdles, such as the availability and quality of data, gaps in DRSI, and limited data analytics skills and expertise (di Castri, S. and Kulenkampff, A., 2018; FSB, 2020b; BIS, 2021b). The challenges supervisors face in developing suptech initiatives were also highlighted in *The Rapid Assessment Study* (CCAF and World Bank, 2020).

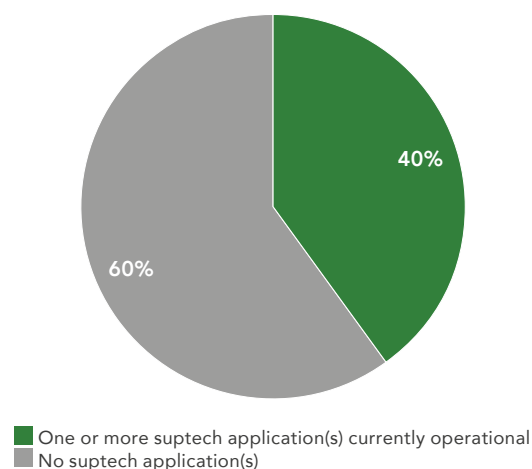
This chapter broadly maps the suptech approaches and tools being developed globally, as well as the benefits and challenges that regulators and supervisors face as they deploy these tools. This builds on the previous chapter on DRSI. Further analysis of the state of suptech is presented in the 2022 State of SupTech Report (Cambridge SupTech Lab, 2022) by the Cambridge SupTech Lab. The State of SupTech Report presents insights

on the current state of the digital transformation of financial supervision based on a survey of 147 supervisory agencies globally. This ground-breaking analysis of primary empirical data leverages the BIS' Four Generations model of suptech implementation (BIS, 2019) to present a global snapshot across several facets of suptech including: underpinning digital infrastructure and technologies, supported supervisory use cases, approaches employed for suptech development and implementation, and challenges and risks. By also surfacing key insights from the nascent but rapidly growing industry of suptech vendors, the report advances the understanding of the suptech depicting a 360-degree view of the marketplace and its foundational elements.

### 6.1 Mapping suptech initiatives

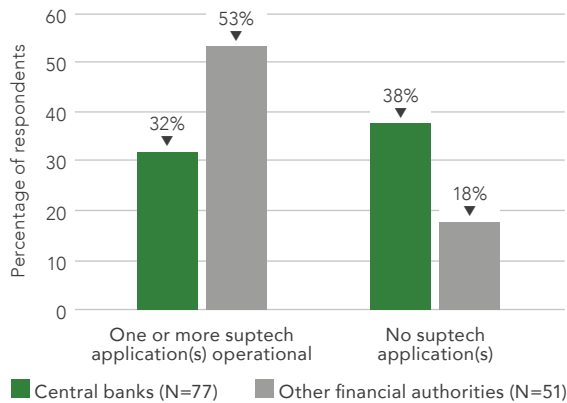
As Figure 6.1 shows, 40% of respondents have one or more operational suptech applications with 60% of respondents stating that they do not have an application operational. Out of the 60% that do not have an application operational, there are 21 financial authorities which are in the process of developing at least one application and a further 16 that created a suptech strategy and/or roadmap, indicating a commitment to suptech adoption.

**Figure 6.1: Status of suptech initiatives within financial authorities (N=126)**



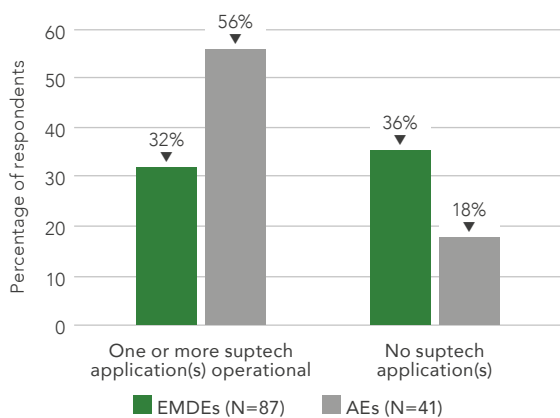
Notably, fewer respondents in central banks have an active suptech initiative (32%) compared to those in other financial authorities (53%), as illustrated in Figure 6.2.

**Figure 6.2: Status of suptech initiatives within financial authorities – central banks vs other financial authorities**



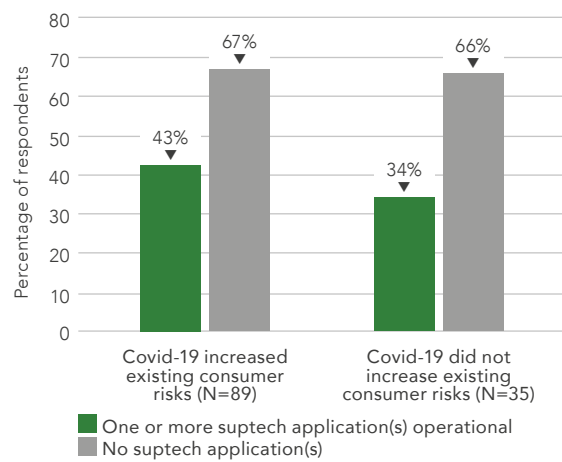
The number of suptech initiatives across income groups also differs, with more institutions in advanced economies (56%) having one or more operational suptech initiatives compared to those in EMDEs (32%), as indicated in Figure 6.3.

**Figure 6.3: Status of suptech initiatives within financial authorities – emerging market and developing economies vs advanced economies**



Respondents who had identified an increase in consumer risks due to the pandemic are more likely to have operational suptech applications. As shown in Figure 6.4, 43% of those who had reported increased risks have an operational suptech application(s) to 34% of those who did not have an operational suptech application(s). This could be due to two reasons: either financial authorities who saw an increase in consumer risk developed suptech applications or those financial authorities who have suptech applications are more keenly aware of the risks increasing during the pandemic.

**Figure 6.4: Comparison of perceived consumer risks during Covid-19 and status of suptech initiatives**



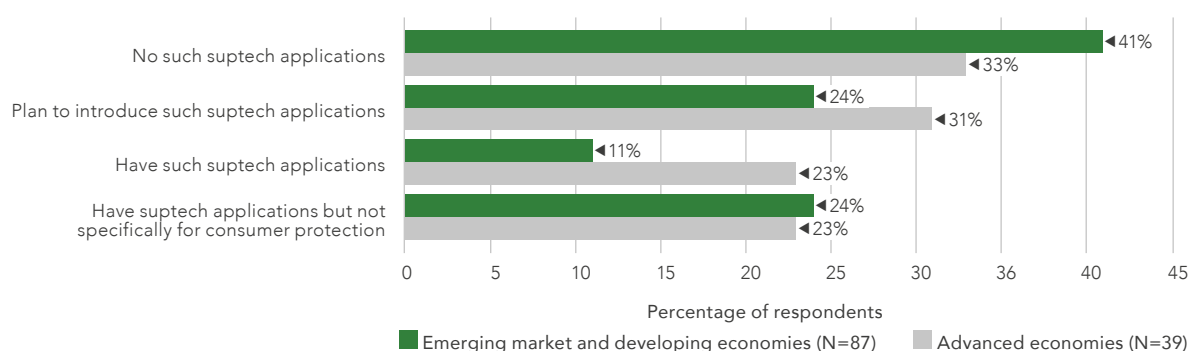
There are varied thematic uses of suptech applications with the majority focusing on market conduct, prudential supervision, licensing, capital markets securities and investment instruments supervision and AML/CFT. Overall, the respondents gave indication that suptech initiatives for financial inclusion, cryptocurrencies, insurance, and climate/ESG are only beginning to be developed. The 2022 State of SupTech Report (Cambridge SupTech Lab, 2022) expands on the thematic uses of suptech applications. The snapshot following indicates financial authorities plan to implement suptech tools to enhance consumer protection.

### Use of suptech tools for consumer protection

In terms of consumer risks in fintech/DFS, respondents were asked whether they have implemented or are planning to implement suptech tools to enhance consumer protection. Only 18% indicated they have suptech applications for consumer protection, but 31% indicated that they plan to introduce one in the future.

In terms of income groups, as illustrated in Figure 6.5, 23% of respondents in advanced economies have suptech applications for consumer protection compared to only 11% in EMDEs. Similarly, the lack of such suptech applications was more pronounced in EMDEs (cited by 41% of respondents) compared to advanced economies (33%). Similar proportions of respondents in advanced economies (31%) and EMDEs (24%) plan to introduce suptech applications.

**Figure 6.5: Status of suptech applications for consumer protection within financial authorities – emerging market and developing economies vs advanced economies**

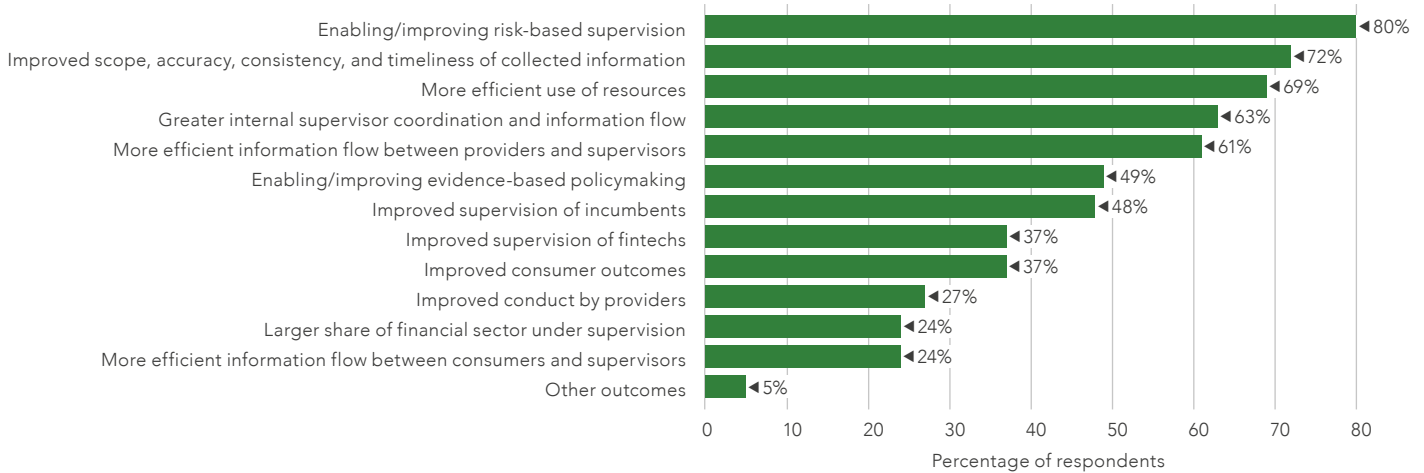


## 6.2 Outcomes supported by suptech initiatives

The survey responses show that financial authorities leverage suptech initiatives to support a range of outcomes. As illustrated in Figure 6.7<sup>14</sup>, the most common outcome is improved risk-based supervision (reported by 80% of respondents), followed by improved scope, accuracy, consistency, and timeliness of collected information (72%), and efficient use of resources (69%).

These results suggest that financial authorities are leveraging suptech tools to improve risk-based supervision to prioritize risks within their key focus areas, such as prudential supervision and market conduct. Further, there may be an increase in integrations of suptech initiatives because they provide access to more granular and timely data, enabling financial authorities to improve their decision-making processes with increased operational efficiency and sharper outcomes.

<sup>14</sup> This report presents a preliminary suptech mapping of the outcomes, with emphasis on the internal outcomes that are relevant to financial authorities. The 2022 State of SupTech Report (Cambridge SupTech Lab, 2022) expands on these, both by presenting expanded responses and introducing external outcomes that are sought by regulators and supervisors.

**Figure 6.6: Outcomes supported by suptech initiatives (N=83)**

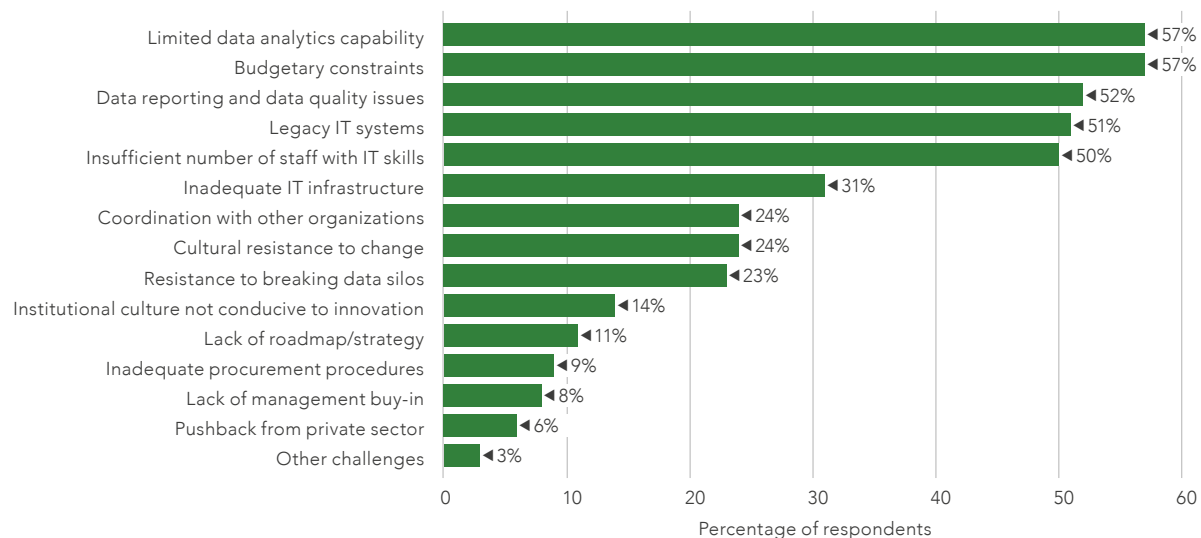
Note: Only those who answered that they had operational suptech applications, or were developing such applications, or had an strategy/roadmap, were included.

Other outcomes cited by respondents are greater internal coordination (63%) and more efficient information flow between providers and financial authorities (61%). These outcomes are particularly important in supporting cross-organizational and cross-jurisdictional monitoring of fintech activities, especially within cross-border fintech partnerships.

### 6.3 Challenges in developing suptech initiatives

While the number of financial authorities adopting suptech initiatives has increased, they still face challenges in implementing them. As Figure 6.8<sup>15</sup> illustrates, limited data analytics capability is a common challenge, reported by 57% of respondents. This aligns with previous research which finds that limited data science skills affect how widely financial authorities can deploy suptech initiatives (BIS, 2021b) as well as emphasizing the necessity of the core data components of the DRSI application layer, as discussed in Chapter 5. The finding also aligns with the results outlined in Figure 7.1, where 80% of respondents in EMDEs and 59% in advanced economies reported needing technical support for data processing and analytics. Other challenges identified are budgetary constraints (by 57% of respondents), data reporting and data quality issues (52%), issues relating to legacy IT systems (51%), and an insufficient number of staff with IT skills (50%).

15 This report presents a preliminary suptech mapping of the challenges, with emphasis on the internal challenges faced by financial authorities. The 2022 State of SupTech Report (Cambridge SupTech Lab, 2022,) expands on these, both by presenting expanded responses and introducing external challenges that regulators and supervisors are facing.

**Figure 6.7: Challenges in developing supotech initiatives (N=88)**

Note: Only those who answered that they had operational supotech applications, or were developing such applications, or had an strategy/roadmap, were included.

Financial authorities across EMDEs and advanced economies face similar challenges in developing supotech applications. Equivalent proportions cited challenges in limited data analytics capabilities, data quality and reporting issues, legacy IT systems, and insufficient numbers of staff with IT skills. Notably, a higher percentage of agencies in advanced economies (65%) reported budgetary constraint challenges compared to those in EMDEs (53%).

# 7. Policy implications and areas for future research



## 7. Policy implications and areas for future research

This study provides timely data and analysis aimed at enabling financial authorities globally to benchmark, evaluate, and prioritize their responses to fintech developments. It also provides the opportunity to discuss policy implications for both financial authorities and the wider development community. This chapter outlines several policy implications and areas for future research based on the empirical evidence gathered from this study. It also provides supportive research for further reference and application. These areas are interrelated and mutually reinforcing, as underlined throughout.

### **Enhance consumer protection measures**

The study findings demonstrate that financial authorities generally view the increased digitalization of financial services, accelerated by the pandemic, as a positive development. However, respondents also recognize the increase of existing and emerging consumer risks associated with this digitalization and the challenges in identifying these risks.

The study identifies opportunities to strengthen and enhance fintech-related consumer protection measures together with practical steps to support this. For example, clarification of the regulatory perimeter, remit, and responsibility regarding consumer protection in fintech verticals appears to be a pressing need. Unclear regulatory perimeters/remits concerning fintech activities are regularly cited by respondents as a challenge in identifying, measuring, and prioritizing consumer risks. Similarly, the World Bank (2022c) further confirms that ‘consumers of fintech products may risk receiving less protection than consumers of traditional financial products due to gaps in the coverage of their country’s existing FCP regulation’ (World Bank, 2022c).

Many of the measures introduced during the pandemic focused on supporting the immediate needs of consumers and providers by providing appropriate regulatory action. As we move away from a pandemic crisis response, regulators and supervisors can now have the opportunity to take a more nuanced look at developing sustainable long-term measures to strengthen consumer protection, without over-burdening the sector. The World Bank sets out several emerging regulatory approaches and implementation considerations to support this process (World Bank, 2022c).

Consumer protection could also be strengthened by enhancing the uptake and use of DSRI and suptech initiatives, particularly given that poor quality and/or insufficient data is the most frequently cited challenge in identifying, measuring, and prioritizing consumer risks.

### **Develop a policy approach to digital assets**

Given the relatively nascent nature of the digital assets sector, it is unsurprising that many financial authorities have yet to develop a regulatory and supervisory framework for overseeing the sector’s activities. It is clear from the study results that financial authorities across the board perceive that consumer risks within the digital assets sector are growing. There is also uncertainty regarding the extent of the risk and the potential implications for various policy objectives.

The perception that digital assets are risky, combined with the lack of clarity surrounding the associated threats, highlights that authorities need to better understand the market dynamics and business models that operate within the various digital asset subsectors. This will enable them to assess underlying risks more effectively (to consumers and in other areas of importance). Important steps in improving the understanding of how the sector operates and the risks that arise from this include obtaining better quality data and applying technology solutions, such as enhanced DRSI (for example, for suptech tools and techniques).



At an international level, much work is being done to establish a legal and regulatory framework for overseeing activities within the digital assets sector. The IMF (Bains, Arif, Fabiana, and Nobuyasa, 2022), World Bank (2022), and others continue to share approaches for regulating aspects of the digital asset sector. This includes developing common taxonomies, providing access to reliable and consistent data, setting a risk-based approach, and establishing a level playing field.

### **Support enhanced cybersecurity frameworks**

In *The Rapid Assessment Study*, 29% of respondents undertook measures to improve cybersecurity due to Covid-19. Specific measures included enhancing requirements or controls, strengthening cybersecurity oversight and supervision, recommending cybersecurity protocols, and encouraging providers to conduct cybersecurity risk assessments.

This study shows that financial authorities still consider cyber-related risks as an important challenge in responding to the rapid uptake of fintech and DFS. This is particularly the case in EMDEs, where financial and regulatory infrastructure may be less resilient to attacks than in advanced economies. The continued regulatory and supervisory focus on potential cybersecurity threats is mirrored by market participants (CCAF, WEF, and World Bank, 2022).

As digital transformation becomes increasingly essential to the financial sector, cybersecurity frameworks and solutions must keep up. Several financial-sector-specific reference tools are available to support financial authorities in developing appropriate cybersecurity frameworks. These include the G7 Fundamental Elements of Cybersecurity for the Financial Sector (G7 Cyber Expert Group, 2016), and the World Bank cybersecurity regulatory digest (World Bank, 2022f).

### **Strategically strengthen DRSI capabilities**

The pandemic forced many financial authorities to reconsider the foundational building blocks of their digital infrastructure. New initiatives were

created and accelerated, often with great haste, and typically encouraged or supported by wider government authorities. These actions increased the understanding that DRSI initiatives can be transformational for regulators and supervisors.

Developing and applying suptech tools within financial authorities would enable access to more granular, diverse, timely, and trustworthy data that can improve operational efficiency and generate new insights, thus improving decision-making. However, this study illustrates that the potential for suptech to radically transform and improve financial supervision has yet to be realized.

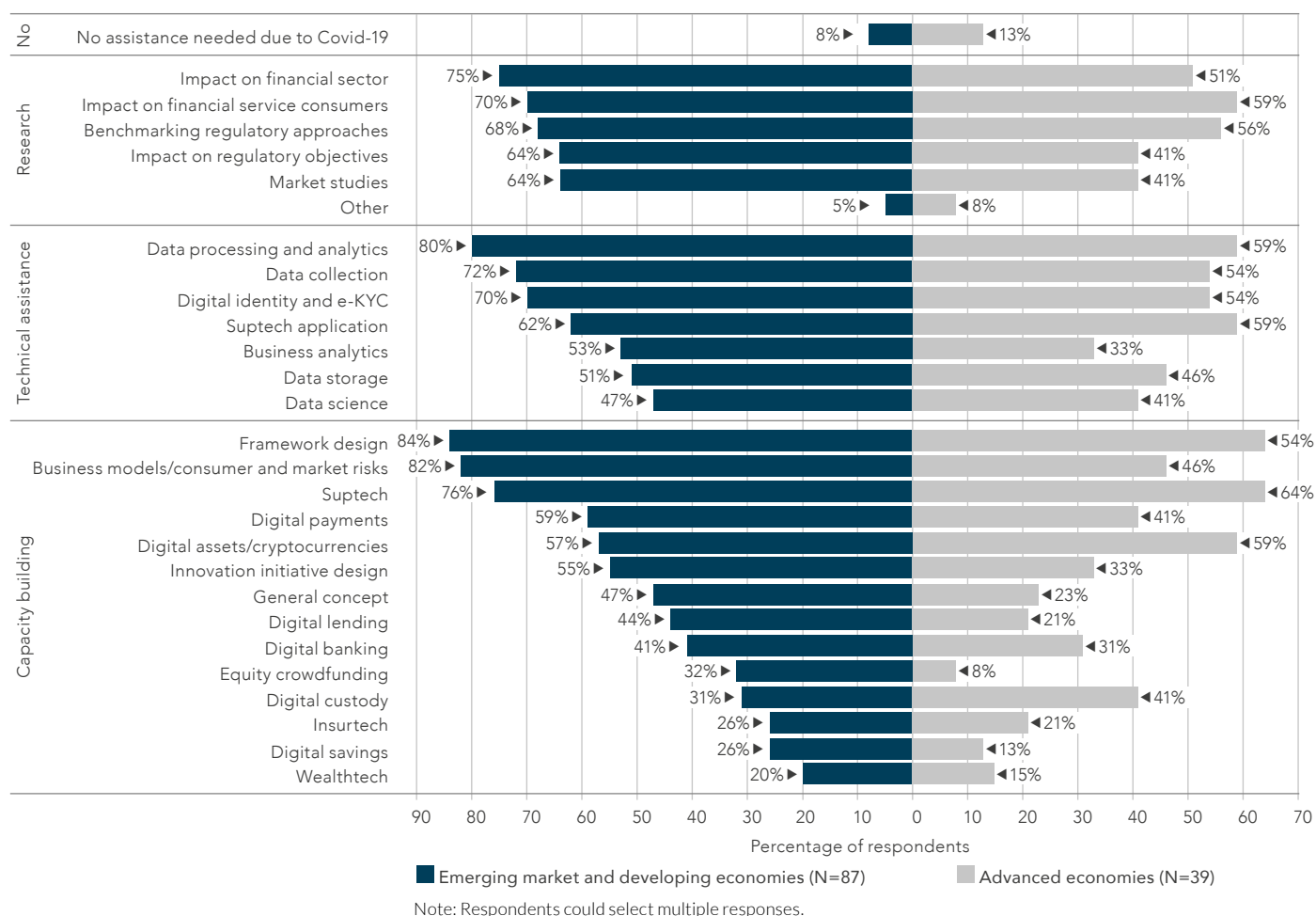
Conducting onsite supervisory visits and insufficient data are two of the biggest challenges financial authorities face in overseeing fintech markets. Here, DRSI, and suptech applications have a key role to play in alleviating such challenges. However, it is important to note that this transformation must consider that budget constraints are one of the biggest hurdles to further developing or scaling suptech initiatives.

Strengthening DRSI capabilities in financial authorities supports several positive outcomes for both financial authorities and supervised firms through improved data collection, monitoring, reporting, and risk management. However, strengthening DRSI capabilities requires greater capacity building and technical assistance. Financial authorities need assistance to enhance their data collection, storage, processing, and analytics capabilities, as well as to develop suptech applications.

### **Support capacity building and technical assistance in key areas**

As highlighted throughout this study, there is still a high demand from financial authorities for research, capacity building, and technical assistance to balance the benefits and risks of the increased digitalization of financial services. This is particularly the case for respondents in EMDEs. Figure 7.1 provides an overview of the specific areas where support is needed.

**Figure 7.1: Assistance required by financial authorities – emerging market and developing economies vs advanced economies**



The two research areas where EMDE respondents most need support are in evaluating fintech’s impact on their financial sector (reported by 75%) and its impact on financial consumers (70%). A smaller, but significant, proportion of respondents from advanced economies also need research support in these two areas, at 51% and 59%, respectively.

The top three areas where technical assistance is required are data processing (reported by 80% of respondents in EMDEs versus 59% in advanced economies), data collection (72% in EMDEs versus 54% in advanced economies), and digital identity and e-KYC (70% in EMDEs versus 54% in advanced economies).

Regulatory framework design training is wanted by 84% of respondents in EMDEs and by more than half (54%) in advanced economies. Seventy-six percent of EMDE respondents and 64% of respondents in advanced economies require support in suptech capacity building and training. Eighty-two percent of respondents in EMDEs and 46% in advanced economies need support in understanding fintech business models, and consumer and market risks.

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# Appendix 1: List of survey respondents by jurisdiction

Jurisdiction	Name of financial authority
Albania	Albanian Financial Supervisory Authority
Algeria	Bank of Algeria
Angola	Banco Nacional de Angola
Anguilla	Anguilla Financial Services Commission
Argentina	Central Bank of the Argentine Republic
Australia	ASIC – Australian Securities and Investments Commission
Azerbaijan	Central Bank of the Republic of Azerbaijan
Bangladesh	Bangladesh Bank
Barbados	Central Bank of Barbados
Belgium	National Bank of Belgium
Belize	Central Bank of Belize
Bermuda	Bermuda Monetary Authority
Brazil	Central Bank of Brazil
British Virgin Islands	BVI Financial Services Commission
Bulgaria	Bulgarian National Bank
Cambodia	National Bank of Cambodia
Canada	British Columbia Securities Commission
Cayman Islands	Cayman Islands Monetary Authority
Chile	Central Bank of Chile
China	People's Bank of China
Colombia	Financial Superintendency of Colombia
Costa Rica	Superintendencia General de Entidades Financieras Costa Rica
Costa Rica	Sugese (insurance supervisor of Costa Rica)
Costa Rica	Superintendencia General de Valores (SUGEVAL)
Croatia	Croatian National Bank
Cyprus	Cyprus Securities and Exchange Commission
Cyprus	Central Bank of Cyprus
Democratic Republic of Congo	Central Bank of Congo
Djibouti	Central Bank of Djibouti
Dominican Republic	Central Bank of the Dominican Republic
Ecuador	Central Bank of Ecuador
Eswatini	Central Bank of Eswatini
Fiji	Reserve Bank of Fiji
Ghana	National Pensions Regulatory Authority
Ghana	National Insurance Commission
Gibraltar	Gibraltar Financial Services Commission
Greece	Bank of Greece
Guinea	Central Bank of the Republic of Guinea
Honduras	Comision Nacional de Bancos y Seguros
Hungary	Central Bank of Hungary
India	Securities and Exchange Board of India
Indonesia	Otoritas Jasa Keuangan
Israel	Israel Securities Authority
Italy	Bank of Italy
Jersey	Jersey Financial Services Commission
Jordan	Central Bank of Jordan
Kazakhstan	Astana Financial Services Authority
Kenya	Capital Markets Authority of Kenya
Kenya	Central Bank of Kenya

Jurisdiction	Name of financial authority
Kuwait	The Central Bank of Kuwait
Lebanon	Banque du Liban
Liberia	Central Bank of Liberia
Liechtenstein	Financial Market Authority Liechtenstein
Lithuania	Bank of Lithuania
Macao, China	The Monetary Authority of Macao
Malawi	Reserve Bank of Malawi
Malawi	Malawi Communication Regulatory Authority
Malaysia	Securities Commission Malaysia
Malta	Malta Financial Services Authority
Marshall Islands	Office of the Banking Commission
Mauritius	Bank of Mauritius
Mauritius	Financial Services Commission
Mexico	National Banking and Securities Commission
Moldova	National Bank of Moldova
Mongolia	Bank of Mongolia
Montenegro	Central Bank of Montenegro
Myanmar	Securities and Exchange Commission
Namibia	Bank of Namibia
Namibia	The Namibia Financial Institutions Supervisory Authority
Nepal	Nepal Rastra Bank
Nepal	Securities Board of Nepal (SEBON)
New Zealand	Reserve Bank of New Zealand
Nigeria	Securities and Exchange Commission
North Macedonia	National Bank of the Republic of North Macedonia
Pakistan	State Bank of Pakistan
Palestine	Palestine capital market authority
Paraguay	Comision Nacional del Valores
Paraguay	Central Bank of Paraguay. Superintendence of Banks
Peru	Superintendencia de Banca, Seguros y AFP del Perú
Philippines	Securities and Exchange Commission
Philippines	Bangko Sentral ng Pilipinas
Poland	Narodowy Bank Polski
Portugal	Portuguese Securities Market Commission (CMVM)
Romania	National Bank of Romania
Rwanda	National Bank of Rwanda
Samoa	Central Bank of Samoa
San Marino	Central Bank of the Republic of San Marino
São Tome e Principe	Banco Central de São Tome e Principe
Serbia	National Bank of Serbia
Serbia	Securities Commission
Seychelles	Central Bank of Seychelles
Sierra Leone	Bank of Sierra Leone
Slovakia	National Bank of Slovakia
Solomon Islands	Central Bank of Solomon Islands
Somalia	Central Bank of Somalia
South Africa	The Financial Sector Conduct Authority
South Africa	South African Reserve Bank
Spain	Banco de España
Sri Lanka	Insurance Regulatory Commission of Sri Lanka
Sudan	Central Bank of Sudan
Suriname	Centrale Bank van Suriname
Syria	Central Bank of Syria
Taiwan, China	Central Bank
Taiwan, China	Financial Supervisory Commission

Jurisdiction	Name of financial authority
Tanzania	Bank of Tanzania
Thailand	The Office of Insurance Commission
Thailand	Bank of Thailand
The Bahamas	Central Bank of The Bahamas
The Gambia	Central Bank of The Gambia
Timor Leste	Banco Central de Timor Leste
Trinidad and Tobago	Central Bank of Trinidad and Tobago
Trinidad and Tobago	Trinidad and Tobago Securities and Exchange Commission
Tunisia	Conseil du Marche Financier
Tunisia	Central Bank of Tunisia
Uganda	National Information Technology Authority Uganda (NITA-U)
Uganda	Bank of Uganda
United Arab Emirates	Abu Dhabi Global Market
United Arab Emirates	Dubai Financial Services Authority (DFSA)
United Arab Emirates	Central Bank of The United Arab Emirates
United Kingdom	Financial Conduct Authority
Uruguay	Central Bank of Uruguay
USA	Consumer Financial Protection Bureau
Uzbekistan	Central Bank of Uzbekistan
Vanuatu	Reserve Bank of Vanuatu
Zambia	Securities and Exchange Commission
Zambia	Competition and Consumer Protection Commission
Zambia	Bank of Zambia
Zimbabwe	Securities and Exchange Commission of Zimbabwe

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