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IMPACT OF NEW TECHNOLOGIES ON FINANCIAL  
INCLUSION

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## ABSTRACT

Advances in new technologies give millions of people who experience financial exclusion globally the opportunity to access and use financial services. This article describes the main benefits of financial innovation, particularly in emerging economies. It also identifies the main challenges associated with financial innovation, including the potential effects of digitalisation on financial exclusion, and possible ways to address these.

**Keywords:** digitalisation, mobile money, bigtech, big data, artificial intelligence, digital identification, financial education.

**JEL classification:** O17, O33.

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### Introduction

Recent estimates show that approximately 1.7 billion adults experience financial exclusion, as they do not have access to an account with basic functionalities.<sup>2</sup> Therefore, this prevents them from having access to financial services such as payments, credit or savings. The cost of this exclusion is not only social, but also economic, since high levels of financial accessibility generally entail greater wealth and economic growth (Myagmarsuren and Choong Lyol (2015)), reducing inequalities and poverty (World Bank (2007)).

Recent advances in new technologies provide an opportunity to foster the development of new services and distribution channels to help give access to the financially excluded and adapt to their specific needs. However, these new accessibility models and the participation of new actors pose challenges additional to those traditionally present in the financial sector.

This article starts by defining financial inclusion. It then goes on to describe the main benefits financial innovation is bringing, particularly in emerging economies, while identifying the main challenges associated with it and ways to address them.

### Definition and breadth

The term “financial inclusion” is broad and complex, and depends on the scope and geographical setting on the basis of which it is analysed. The World Bank defines it as having access to affordable and useful financial products and services delivered in a responsible and sustainable way.<sup>3</sup> The European Commission refers to both access to, and use of, financial services (European Commission (2008)). The economic literature usually distinguishes three aspects: access, availability and use (Sarma (2008)).

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1 The author thanks Juan Ayuso, Carlos Conesa, José Manuel Marqués, Ana Fernández and Sergio Gorjón for their comments.

2 Data relating to persons over 15 years old and to accounts at financial institutions or mobile money providers. (Demirgüç-Kunt et al. (2018)).

3 <https://www.worldbank.org/en/topic/financialinclusion/overview>.

Not having access to the formal financial system is generally involuntary and is driven by a lack of savings, service costs, distance or absence of documentation, among other factors (World Bank (2014)). However, there are also cultural and religious reasons, or other factors such as lack of trust in the financial system (Demirgüç-Kunt et al. (2018)). Some studies point to other factors, such as lack of products and services that add value for users (Bid et al. (2018)) and lack of financial education (Superintendencia Financiera de Colombia (2018)).<sup>4</sup>

## Technological innovation is driving financial inclusion

The application of new technologies is driving the launch of new or improved digital financial services and of distribution channels other than branch networks, agents and ATMs. This is contributing to overcoming some of the barriers identified in the previous section. Thus, the launch of digital financial services in more than 80 countries has enabled millions of the fully or partially excluded to move from cash-based transactions to the use of formal financial services (Lauer and Lyman (2015)).

Undoubtedly, this fresh supply of financial services is supported by the growing penetration of mobile phones and, in certain regions,<sup>5</sup> by the increasingly widespread use of smartphones. Indeed, approximately two thirds of unbanked adults have mobile phones and one fourth have access to internet (Demirgüç-Kunt et al. (2018)).

The World Bank itself recognises that the new generation of financial services accessible through mobile phones and the internet is contributing to progress in financial inclusion. (Demirgüç-Kunt et al. (2018)). In this connection, recognising the importance of this factor is so crucial that the G20 has specific high-level principles for digital financial inclusion, promoting the use of digital technologies whenever possible. (GPFI (2016)). Along the same lines, the Alliance for Financial Inclusion (AFI) reflected its commitment to establish a policy of financial inclusion through the use of innovative technology in the Maya Declaration (AFI (2011)).

Despite the foregoing, it should be noted that in order to fully benefit from technological development, there must be a minimum level of market and financial infrastructure development (Demirgüç-Kunt et al. (2018)). Likewise, a sound, technologically neutral and proportionate regulatory framework is necessary to allow the entry of new actors and ensure that there is a competitive playing field.

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4 More than the lack of financial capacity, the main barrier noted by fintech startups in countries such as Colombia is the lack of financial education.

5 Such as Latin America. By contrast, East Africa and South Asia have the lowest levels of smartphone use, with the cost of the devices being one of the main barriers. For example, in the case of India, it is estimated that 134 million people cannot afford to purchase the cheapest terminal available (GSMA (2017)).

Additionally, the higher level of accessibility to financial services brought about by new technologies should be accompanied by sufficient levels of trust in the financial system. To this end, it is essential to strengthen consumer protection safeguards, particularly those relating to privacy and security.<sup>6</sup> There are also other important elements regarding action by the authorities, such as digitalisation of the public sector (GPMI (2016)), application of financial education policies (Gopalan and Kikuchi (2016)) and other types of measures designed to remedy social discrimination, such as the inclusion of gender-based approaches in the financial inclusion strategies.<sup>7</sup> In addition to improving the granular collection of data relating to access to, and use of, financial services, the latter requires adopting specific measures, such as facilitating the opening of accounts or access to certain services, including microcredit.<sup>8</sup>

## Actors

Both traditional and new actors in the financial services market are implementing financial innovation developments based on the use of digital technologies.

Financial institutions have an increasing number of new business proposals for the unbanked. Examples include mobile platforms enabling payments to be made to people who do not have a bank account. These services are often provided in cooperation with new market agents, which permits targeting new segments and increasing customisation (Banco Santander (2017)). Likewise, mobile phone operators, who are highly active in providing mobile money services,<sup>9</sup> are investing in gathering and analysing data with the aim of providing an experience that is better tailored to customers' needs. (GSMA (2018)).

In addition, the number of new specialised service providers<sup>10</sup> has increased notably in the past decade. Most of these firms offer specific solutions tailored to the needs of neglected groups, fostering accessibility, user experience and affordability (Murthy et al. (2019)). For instance, in South America and the Caribbean 46% of fintech startups target unbanked consumers and SMEs.<sup>11</sup> This figure rises to 75% in the Dominican Republic (IDB et al. (2018)).

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6 In 2018 and 2019, Vietnam, Uganda, Uruguay and Ruanda passed new privacy and cyber-security laws (The Economist Intelligence Unit (2019)).

7 The gender gap in access to financial accounts in the 55 countries researched in the Global Microscope 2019 is 9% on average (The Economist Intelligence Unit (2019)).

8 Madagascar, Mozambique and South Africa have launched specific gender-based actions (The Economist Intelligence Unit (2019)).

9 These are payment services predominantly offered by mobile phone operators which permit transactions to be made using basic mobile devices. Thus, a virtual (non-bank) account is generated that is linked to a phone number and is accessible via a SIM card. Regulatory treatment varies depending on each jurisdiction, and the payments are normally considered to be electronic money or a type of electronic deposit (AFI (2014)).

10 Usually small firms concentrated in market niches.

11 Or partially banked (e.g. without access to credit).

Promoting financial inclusion is sometimes, as stated by bigtech firms, one of the reasons motivating them to enter the financial services market, as can be seen in the case of Libra.<sup>12</sup> In fact, this initiative is presented as a way of “inviting everyone to participate in the global economy, with access to the same financial services”. Thus, reducing information and transaction costs associated with bigtech activity can boost financial inclusion (BIS (2019)). These firms usually start by offering payment services as an ancillary item of their main businesses, subsequently expanding to other financial services, such as granting consumer loans and credit, among others. In the case of certain Chinese tech giants,<sup>13</sup> the supply of services is broader, sometimes even including deposit-taking through the creation of their own deposit-taking institutions.

### Innovation in products and financial services

Generally speaking, the aforementioned actors are concentrating their innovative activity in payment, credit and other ancillary services.

In the field of payment services, improvements are being made in the provision of traditional mobile money services (see Box 1), through the use of data gathering and processing tools, such as big data and artificial intelligence<sup>14</sup> (GSMA (2018)).

Also notable is how solutions such as digital wallets<sup>15</sup> for smartphone users have taken-off. They have progressed so fast that in certain countries, such as China, these kinds of mobile phone-based services are replacing the use of cash. In the specific case of China, the volume of mobile payment transactions doubled from 2015 to 2018, to reach nearly €36 billion (Klein (2019)).<sup>16</sup>

Technological innovation is also being applied in the international remittance field, a highly significant activity in many emerging economies, where it can account for up to 35% of GDP.<sup>17</sup> In addition to the possibility of making remittances via smartphones, some solutions, such as those developed in the Philippines or India, use distributed ledger technology to process transactions.<sup>18</sup> In comparison with traditional alternatives, these proposals based on distributed ledger technology may provide

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12 The global payment method proposed by Facebook.

13 For further information on the main bigtechs in China, see Gorjón (2018).

14 A set of theories and algorithms which enable computers to perform tasks normally requiring the capabilities of human intelligence and which occasionally improve such capabilities (Fernández (2019)).

15 A service that is accessible via a device with an internet connection, such as a computer or a mobile phone, to access, manage and use certain applications, and payment, identification and other services (EPC (2017)).

16 The Alipay and WeChat Pay mobile platforms account for more than 92% of these payments (Klein (2019)).

17 See Plaza et al. (2019).

18 A distributed ledger is a database of which there are multiple identical copies distributed among several participants and which is updated in a synchronised manner by consensus among the parties (Romero Ugarte (2018)).

advantages such as improved efficiency (e.g. reducing payment processing time), automation of actions and enhanced transparency. They may also lower costs, particularly in low-value payments.

New credit service developments include, notably, electronic crowdfunding platforms. These facilitate electronic contact between persons offering financing – for a financial return – and those seeking financing, such as microfirms and households. In particular, “digital savings groups” are small self-sufficient savings communities whose members contribute money to a common fund, which is used to make – generally short-term – loans within the group (Murthy *et al.* (2019)).

Meanwhile, the application of artificial intelligence to credit scoring affords access to individuals and small firms with no credit history or lacking the traditionally required collateral. Analyses for this purpose consider non-financial variables, such as mobile phone use or social network behaviour (online reputation). In more specific cases, such as that of lending to small agricultural producers, satellite data<sup>19</sup> may be used for credit scoring, which also reduces operating and logistical costs (Partnership for Finance in a Digital Africa (2018)).

There are studies showing that these new techniques can, in certain cases, outperform traditional ratings and predict possible losses more accurately, although admittedly this evidence is not widespread and has not been verified over a full economic cycle (Frost *et al.* (2019)).

### Advances in digital identification

Personal identification is an indispensable prerequisite for accessing financial services. Nonetheless, the latest World Bank survey shows that, in low income economies, 26% of adults without an account at a financial institution lack the documentation needed to open one (Demirgüç-Kunt *et al.* (2018)). In recent years, the development of new technologies has led to advances in digital identification services.

Specifically, the use of big data can reduce customer identification (and KYC compliance) costs, and also enable public domain data to be used to confirm an individual’s identity (Gardeva (2012)). This is particularly useful if the individual does not have a national identification document.

Also, the use of biometrics can simplify documentation requirements and facilitate identity management (see Box 2). Notable advantages are its greater exactitude in comparison with recognition based on physical documentation, ease of storage and

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19 These capture data such as exact location and size of the plot and may identify annual climate patterns.

management (no need to memorise passwords) and greater security against robbery and identity theft.

## The main challenges associated with financial innovations

As referred to in this article, there is clear evidence of the potential for new technologies to boost financial inclusion. However, the authorities face various challenges; for example, those relating to the existence of an institutional framework conducive to new technological developments.

The IMF and the World Bank, aware of the challenge involved in striking a balance between financial stability, financial inclusion and Fintech, include 12 policy elements in the “Bali Fintech Agenda” for consideration by policymakers (IMF (2018)).

Notable challenges mentioned are the need to modernise financial infrastructure,<sup>20</sup> reinforce competition, adapt regulatory and supervisory frameworks, incorporate digital financial education strategies,<sup>21</sup> intensify anti-money laundering and terrorist financing surveillance, and promote international cooperation. There are also other considerations relating to data protection, arising from the storage and intensive use of data, and consumer protection, with a view to avoiding fraud, unfair pricing and over-indebtedness (the Economist Intelligence Unit (2019)).

The big challenge for regulators and supervisors is, therefore, to avoid the materialisation of risks and, specifically, to ensure that progress in financial inclusion does not involve any deterioration in consumer protection or financial stability (Hernández de Cos (2019)). Also, financial service projects that are potentially global in scope, offered by major actors (such as the Libra project led by Facebook), may generate additional concerns. Such projects are usually justified by arguments linked to financial inclusion in particular geographical areas, but their widespread development may raise issues of market power or monopolistic practices in other areas, in which the level of banking penetration is high.

## Could digitalisation cause financial exclusion?

In view of the inclusive potential of new technologies in the financial sector, it is worth asking whether their inappropriate use, or their lack of universality, may have the opposite effect to that desired and lead to the financial exclusion of certain individuals or groups.

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20 In particular, improving their resilience to new operational risks (especially cybernetic ones).

21 In this respect, the financial protection of digital consumers and financial education help to ensure that challenges such as over-indebtedness and abusive loans do not undermine the gains in terms of financial inclusion. The case of the digital loan market in Kenya is an example that illustrates this need (The Economist Intelligence Unit (2019)).

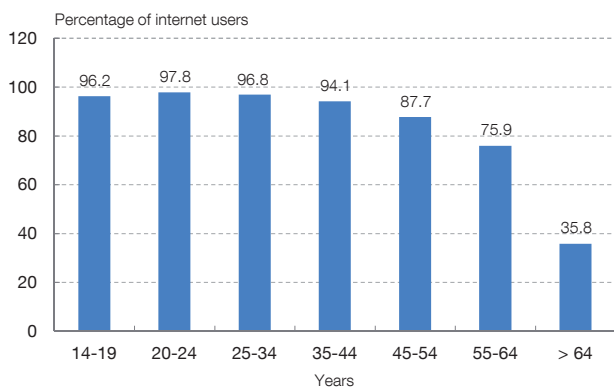


Chart 1

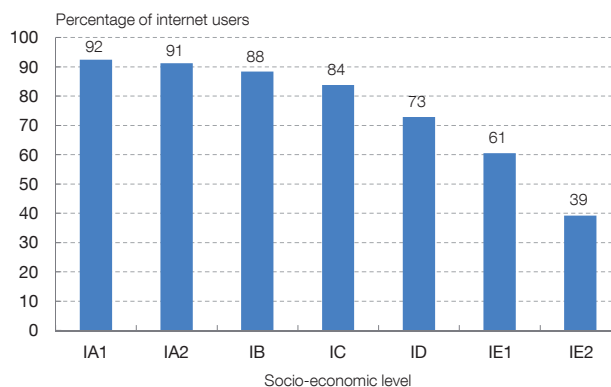
**DEMOGRAPHIC AND SOCIO-ECONOMIC DISTRIBUTION OF INTERNET USE IN SPAIN**

In Spain, the percentage of internet users is high between the ages of 14 and 54, and declines significantly beyond the age of 64. There are also differences in socio-economic terms: the lower the level of income, the lower the internet use.

1 INTERNET USE IN SPAIN IN 2018, BY AGE GROUP



2 INTERNET USERS IN SPAIN IN 2018, BY SOCIO-ECONOMIC LEVEL (a)



SOURCE: Statista.

a IA1 = highest socio-economic level; IE2 = lowest socio-economic level.

For example, in the case of artificial intelligence applied to credit scoring, inappropriate use of algorithms may introduce unintentional bias and block certain users' access to credit. In general, the origin of this bias may be in the quality and diversity of the data used in the model, or else in the way in which the algorithm is designed and functions (Fernández (2019)). In order to avoid this risk, lenders should incorporate tools that allow them to understand the concepts learned by the algorithm and how these influence the decisions and results achieved (Petrasic *et al.* (2017)).

Given the potential socio-economic and ethical implications of the accumulation of ever more data and the use of increasingly complex algorithms, the European authorities are currently debating numerous issues relating to the possibility that the use of new technologies may lead to discrimination and exclusion (EBA *et al.* (2018)).

Moreover, if traditional channels are discontinued, the growing supply of digital financial services may lead to problems using financial products for certain groups that are already banked, but outside the digital environment or lacking digital skills, such as elderly people and those with low incomes or some type of incapacity. It may also make access to cash difficult for a segment of the population that uses cash as its main or only means of payment.<sup>22</sup>

To give an example, in Spain around 36% of the over 65s are internet users, compared with a level of practically 100% for younger groups (see Chart 1.1). In terms of income

<sup>22</sup> In the case of Spain it is estimated that the proportion of the total population without a nearby cash-access point was approximately 1.96% in 2016 (Jiménez Gonzalo and Tejero Sala (2018)).

level, the difference in internet penetration between groups with low income levels and those with the highest levels may be as much as 53 percentage points (see Chart 1.2).

At international level, the G20 has highlighted the statistical importance of the financial inclusion of elderly people and the challenges involved.<sup>23</sup> Its recommendations include the use of inclusive technologies, consideration of the specific needs of vulnerable groups and support for digital financial education, including the secure use of these services. In addition, it is important that mobile phone and digital proposals should not be exclusive and remain part of a broader, multi-channel offering (House of Lords (2017)).

## Final remarks

The application of new technologies to financial services is driving the development of new services, the improvement of existing ones and the creation of additional distribution channels, mainly based on the use of smartphones. Overall, these innovations, offered by actors traditionally present in the market and by new ones, are helping to eliminate the barriers to access and use faced by financially more vulnerable groups.

That said, the use of new technologies and the emergence of new actors in the provision of financial services pose a number of challenges to the authorities. Their response should be to strike a balance between innovation, consumer protection and financial stability. The broad range of challenges for the authorities includes the need to adapt regulatory and supervisory frameworks.

In particular, the authorities must ensure that new developments do not introduce new access barriers for groups outside or less familiar with the digital environment, or lead to undesired discrimination or exclusion. Thus, universal access to digital media and infrastructures, a guaranteed supply of multi-channel financial services, active support for digital financial education and promotion of the appropriate use of technological tools are essential.

18.2.2020.

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23 The document “G20 Fukuoka Policy Priorities on Aging and Financial Inclusion” contains eight priorities in this respect.

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**CHANGES IN MOBILE MONEY SERVICES**

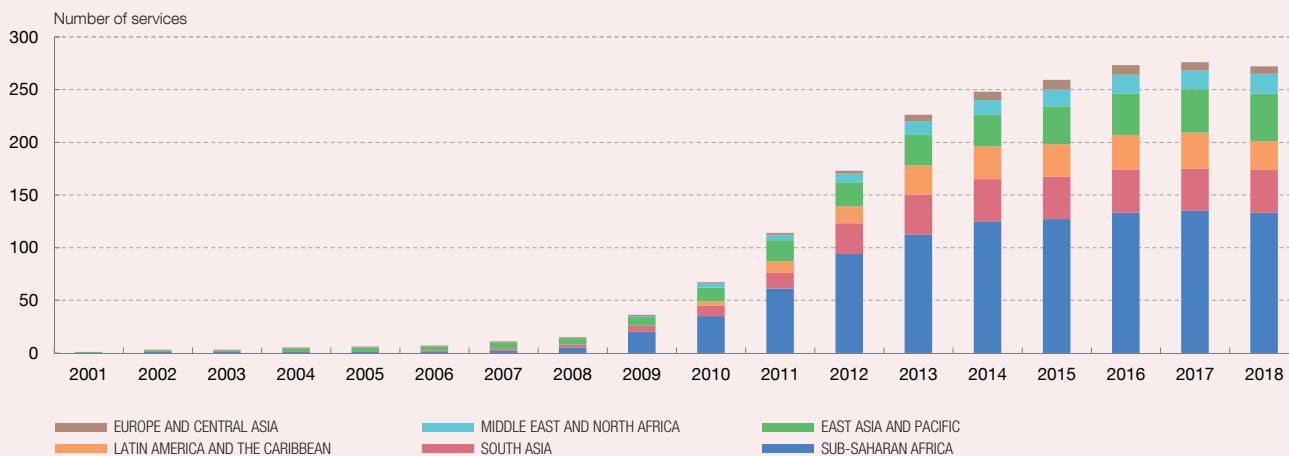
In most emerging economies the first steps in supplying digital financial services were taken in 2001, with the launch of mobile money schemes. They emerged as an alternative to opening accounts at financial institutions, allowing people to make cash deposits and withdrawals, and purchases at establishments and to receive other basic services through the use of mobile text messaging.

Mobile money services have become widespread across the main regions of the world, especially in Sub-Saharan Africa and in South Asia (see Chart 1), owing to their simplicity and to the development of an agent network

including retailers and convenience stores (Roa et al. (2017)).

There are 272 mobile money services, 866 million mobile money accounts and 6.6 million agents registered worldwide (GSMA (2018)). Cash-in and cash-out transactions make up the majority of mobile money movements, so the use of cash continues to be high. However, as agreements entered into between mobile phone operators and firms are increasing, digital transactions are gaining weight and it will be possible for new functionalities, such as credit and insurance, to be progressively provided through this channel (GSMA (2018)).

Chart 1  
CHANGES IN THE NUMBER OF MOBILE MONEY SERVICES



SOURCE: GSMA.

**BIOMETRIC IDENTIFICATION IN INDIA: A SUCCESS STORY**

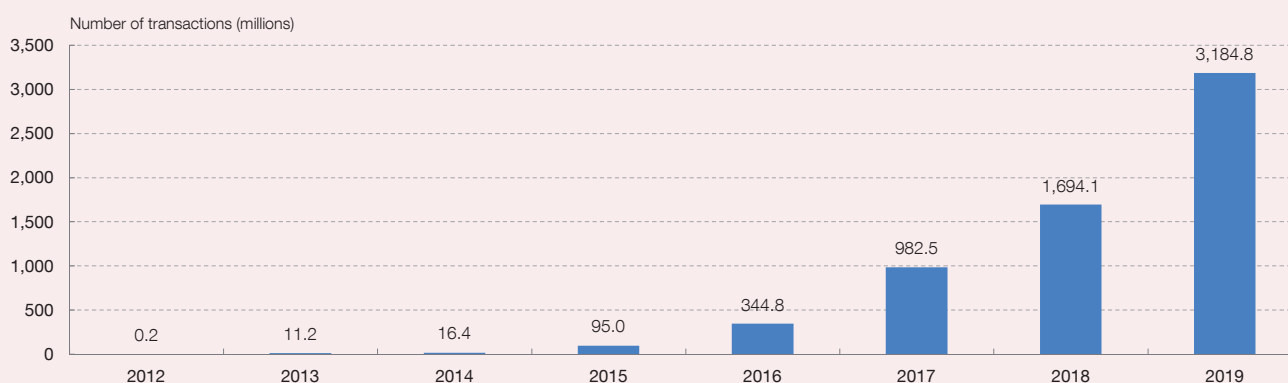
India is one of the countries that has made the greatest progress in relation to financial inclusion in recent years. The percentage of adults with bank accounts<sup>1</sup> rose from 53% in 2014 to 80% in 2017 (Demirgüç-Kunt et al. (2018)).

This success has been largely the result of a series of actions taken by the Indian government. The comprehensive financial inclusion plan, Jan Dhan Yojana, launched in 2014 and designed to ensure minimum financial services for the whole population, has been driven by the national Aadhaar biometric identification system, which has facilitated identity verification for the purposes of financial products and electronic transactions (see Chart 1).

This identification system, set up in 2009, consists of a personal identification number linked to a minimum set of demographic and biometric data (fingerprints, iris images and facial photographs), issued by the Indian state to all persons resident in that country. Despite certain implementation problems, this system is proving to be an important way of improving how tasks are performed, such as efficient and transparent allocation of social benefits to the population.<sup>2</sup>

The potential of this system is being exploited thanks to the construction of an ecosystem of application programming interfaces (APIs) called “IndiaStack”, which enable governments, businesses and other actors to offer their services remotely and more rapidly.

Chart 1  
ONLINE FINANCIAL TRANSACTIONS PERFORMED USING AADHAAR AUTHENTICATION (AePS)



**SOURCE:** National Payments Corporation of India.

**NOTE:** The data cover various transaction categories (cash withdrawals and deposits, simplified account balance and statement consultations, transfers and "best finger detection").

1 Accounts with financial institutions or mobile money providers.

2 Further information on certain obstacles can be found at: <https://www.bloomberquint.com/technology/has-aadhaar-worked-for-rural-india#gs.rPRPD6dq>.