Lehmann-Uschner, Katharina; Menkhoff, Lukas

Article

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AT A GLANCE

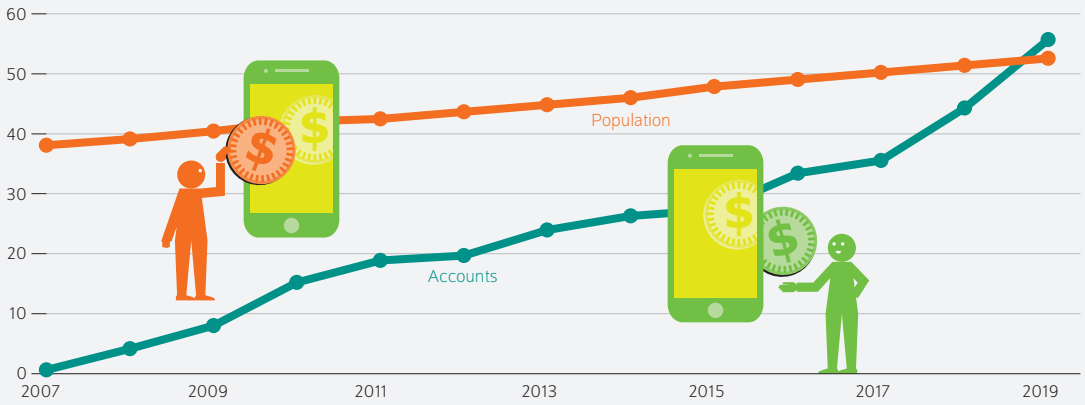
Mobile Money is Driving Financial Development in Africa

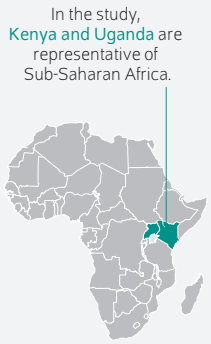
By Katharina Lehmann-Uschner and Lukas Menkhoff

- Mobile money has penetrated the market in rural Africa to a significant extent and financial inclusion is improving
- However, one fourth of the population has no access to formal financial services
- This seems to be less due to mobile money costs and more to a lack of accessibility and poor financial literacy
- Mobile money should be emphasized more in financial literacy training
- Mobile money usage figures have increased recently due to the coronavirus pandemic

The use of mobile money in Kenya has increased rapidly in recent years

Mobile money accounts compared to population size in Kenya (in millions)





Source: Authors' own calculations based on data from the Central Bank of Kenya and the World Bank.

FROM THE AUTHORS

"Financial innovations such as mobile money have the potential to turn the financial sector upside down. Our study, using Uganda as an example, shows which factors can also promote market penetration in other regions of the world."

— Katharina Lehmann-Uschner —

MEDIA

Audio Interview with K. Lehmann-Uschner (in German)
www.diw.de/mediathek

Mobile Money is Driving Financial Development in Africa

By Katharina Lehmann-Uschner and Lukas Menkhoff

ABSTRACT

Mobile money is an innovation that allows financial transactions to be performed via a cell phone. Even in poor regions of Africa, almost everyone has a cell phone; therefore, mobile money could both contribute to the continent's economic growth and ensure that no Africans are excluded from access to financial services. However, DIW Berlin data from Uganda show that mobile money is actually used less frequently than the number of mobile money accounts suggests. Nevertheless, demand for financial services has increased by 20 percentage points since the introduction of mobile money. At the same time, a fourth of the population—the poorest, in particular—remain financially excluded. In addition to high costs, this is mainly due to the insufficient availability of mobile money in rural areas and a lack of financial literacy. Consequently, to increase the use of mobile money and thus promote economic development in Africa, an appropriate competition policy, requirements for an enhanced network coverage, and financial literacy trainings are necessary.

Financial innovations have the potential to fundamentally change the financial sector. Worldwide, these FinTechs are likely to increasingly compete with established financial institutions, as they are cheaper, more convenient, and can be used more quickly. Such an innovation already exists in Africa, where mobile money (financial services offered via cell phones) has been successfully penetrating the market.[1] Within ten years, mobile money has achieved great market significance in many countries. For example, over 50 percent of households in Uganda and Kenya use mobile money (51 and 73 percent, respectively).[2] These numbers keep increasing: Over the past year, 50 million new mobile money accounts were created in Sub-Saharan Africa, resulting in a total of almost 470 million accounts.[3] Mobile money was given an unexpected boost by the 2020 coronavirus pandemic; mobile money account growth rates are estimated to be in the double digits in 2020.[4]

What is the economic impact of mobile money and what aspects can be further improved?

The market success of mobile money

Mobile money is an innovation that was introduced in Kenya in 2007 by a subsidiary of the Vodafone Group in cooperation with the leading local telephone provider Safari Telecom under the name M-PESA.[5] Essentially, it uses the SMS function of regular cell phones to authorize financial services. Initially, mobile money was used to process payments from one account to another before expanding to include savings and loans.

1 Cf. Tavneet Suri, William Jack, and Thomas M. Stocker, "Documenting the Birth of a Financial Economy," *Proceedings of the National Academy of Science* 109, no. 26 (2012): 10257–10262 (available online).

2 Cf. Asli Demirgüç-Kunt, Leora Klapper, Dorothe Singer, Saniya Ansar, and Jake Hess, *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution* (Washington, DC: World Bank, 2018) (available online).

3 According to data from the GSM Association (available online).

4 Cf. Nellie Peyton, *Coronavirus seen as trigger for mobile money growth in West Africa* (2020) (available online).

5 Cf. for an overview Tavneet Suri, "Mobile Money," *Annual Review of Economics* 9 (2017): 497–520 (available online).

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Box

How do users and non-users of mobile money differ?

This report analyzes to what extent innovative financial services improve financial inclusion and thus can contribute to changing the financial sector. However, it is important to understand which groups of people use such new financial products in the first place. The following probit regression is used to calculate the strength of the correlation between the probability of actively using mobile money and various socio-economic characteristics, personality traits, business characteristics, and supply-side factors.

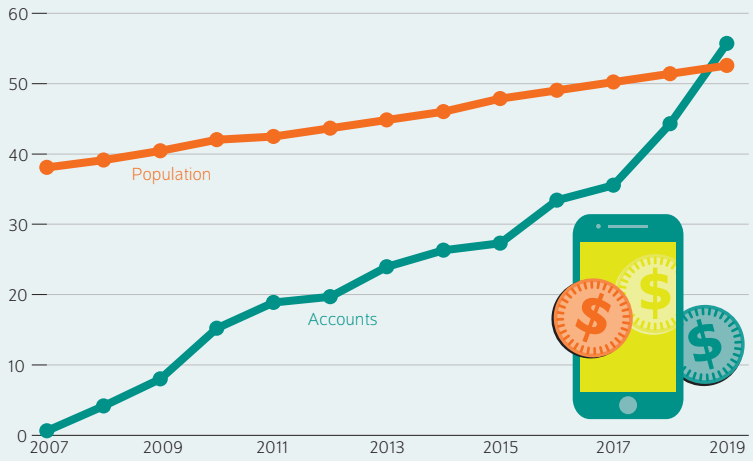
$$\Pr(\textit{Mobile Money Use}=1) = f(\textit{age, gender, education, financial literacy, wealth, risk preferences, experience, business size and formalization, network coverage, access to mobile money agents})$$

To be able to assess the extent to which mobile money can improve financial inclusion, it is of particular interest which factors favor or hinder the use of mobile money among the previously unbanked individuals. Therefore, in this regression, individuals who already have access to other formal financial services are not considered.

Since there could be more unobservable factors that influence both the use of mobile money and socio-economic characteristics, such as education and wealth, the coefficients calculated in this regression should only be interpreted as correlations and not causality.

Figure 1

Mobile money accounts compared to the population size of Kenya
In millions



Note: Some people have accounts with multiple mobile money providers. Therefore, the overall number of accounts is larger than the overall population.

Source: Central Bank of Kenya (available online) and the World Bank; number of accounts surveyed in September of every year.

The use of mobile money has increased rapidly over the past few years.

Cash deposits and withdrawals occur via a dense network of mobile money agents, usually owners of small stores who also offer mobile money services. An identification document and a PIN are required to authorize transactions. In some areas, the ATMs of participating banks can also be used for cash withdrawals. Moreover, it is increasingly possible to pay taxes and bills, such as school fees or electricity and water bills, directly via mobile money. Some employees even receive their wages directly deposited into their mobile money accounts instead of in cash.

Market penetration in Kenya, measured by the share of the population who have access to mobile money, has grown rapidly over the past years (Figure 1). As a result, the share of individuals who lack access to formal financial services ("unbanked" individuals), including mobile money, decreased rapidly from almost 60 percent in 2011 to 18 percent in 2017.[6]

To describe and analyze this development more precisely, this report uses data from rural Uganda collected among small business owners with a special focus on mobile money.

Uganda was one of the first countries to follow its neighbor Kenya in introducing mobile money. In a rural sample of small business owners, 86 percent of the respondents have access to mobile money, a figure above the country-wide average.[7] However, only 48 percent of respondents—still a large majority of the 86 percent— have actually used mobile money in the past three months. In contrast, the other 38 percent were inactive.[8]

Although mobile money is used by the majority of those who already have access to formal financial services (52 percent of respondents), 42 percent of the unbanked individuals (48 percent of the entire sample) use mobile money.[9] In this respect, the share of banked individuals increased by 20 percentage points due to mobile money (from 52 to 72 percent), which in itself represents a major development.

6 Cf. Demirgüç-Kunt et al., *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution.*

7 Measured as the share of respondents who indicated they have a mobile money account.

8 To exclusively cover financial services, as this paper is looking at financial inclusion, respondents who only use mobile money to top up phone credit are labeled as inactive.

9 "Banked" refers to all individuals who, according to the World Bank's definition (cf. Demirgüç-Kunt et al., *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*), have access to formal (state-regulated) financial services. "Regulated" in this sense in Uganda refers to banks, mobile money providers, and cooperative banking institutions (see Financial Sector Deepening Uganda, *FinScope Uganda—Topline Findings Report* (Kampala, Uganda: 2018) (available online)).

However, this innovation has not yet reached the very destitute, as the correlation of mobile money use with socio-economic characteristics shows (Table 1). In almost every respect, mobile money users are better off. For example, mobile money users have a larger asset base and are more likely to own a cell phone.[10] In addition, their businesses are usually larger (measured by the number of employees) and more organized. They are more likely to have a license for their business and to keep records of their income and expenditure. Moreover, individuals who have actively used mobile financial services within the past three months are less risk averse and younger than individuals who have no access to formal financial services through mobile money. However, supply-side factors also play a role in the spread of mobile money. For example, the use of mobile financial services is higher among otherwise unbanked individuals with better quality mobile phone network coverage and better access to mobile money agents.[11]

Reasons for market success

The rapid spread of mobile money was possible due to both supply and demand-side factors.[12] On the supply side, the infrastructure was present in the form of a wide availability of cell phones and the necessary stores selling mobile phones and credit. On the demand side, there were very few credit institutions, often expensive, with only a minority of the population as customers. As a result, most of the population rely on alternatives when it comes to savings and credit, such as informal local financial institutions. For transfers, it was common to personally deliver the money—or to give the money to a bus driver for a fee, who would then hand it over to the recipient.

As a result, the use of mobile money differs considerably between individual financial services. For example, informal financial institutions were primarily used for savings and loans. Only nine percent of the sample (12 percent of the 76 percent of all respondents who currently have savings) save via mobile money. Fewer than one percent of the 34 percent of all respondents who have an outstanding loan use mobile money loans. However, almost 30 percent of the sample has used mobile money to transfer money. This is equivalent to 70 percent of the 41 percent of all respondents who transferred money within the past three months.

Table 1

Which socio-economic characteristics make an individual more likely to be an active mobile money user?

	Active mobile money use
Socio-economic characteristics	
Female	−0.05
	(0.033)
Age	−0.00***
	(0.002)
Highest level of education completed	0.01
	(0.004)
Wealth (standardized number of assets)	0.04*
	(0.022)
Owns a cell phone	0.27***
	(0.048)
Financial literacy and risk preferences	
Financial literacy (standardized)	−0.00
	(0.020)
Willingness to take risks (standardized)	0.07***
	(0.013)
Business characteristics	
Experience (years as small business owner)	0.00
	(0.002)
Number of employees	0.05**
	(0.024)
Bookkeeping	0.21***
	(0.027)
Small business owner has a license	0.07*
	(0.040)
Mobile money supply factors	
Density of mobile money sale outlets	0.01**
	(0.004)
Cell phone network coverage quality	0.01*
	(0.007)
N	1 077
Pseudo R^2	0.131

Notes: The sample consists of 2,231 small business owners from rural western Uganda. For the regression, the sample was limited here to "unbanked" individuals and to those who use mobile financial services exclusively. Robust standard errors in brackets. Standard errors clustered at the trading center level. Significance levels: *** p<0.01; ** p<0.05; * p<0.1.

Source: Authors' own calculations.

Mobile money has obvious advantages in payment transactions over large distances when one cannot use a bank account. First of all, it is safe, which is why sometimes it is even used over short distances, such as in particularly crime-ridden areas. Additionally, the costs are manageable, as buying a bus ticket or paying a bus driver is not cheaper. For example, the small business owners surveyed here report transaction costs averaging 4.2 percent for mobile money transactions. In contrast, the transaction costs for personally bringing cash or sending cash via a bus driver can be anywhere from six to 13 percent.

The advantages of mobile money are reflected in its usage, as the present analysis shows. Mobile money dominates other channels for transfers and its relevance increases with the

10 A smartphone is not necessary to use mobile financial services; a simple cell phone is enough. In the sample analyzed here, 92 percent of the small business owners surveyed had a cell phone. In practice, simply having a SIM card is often sufficient for using mobile money services.

11 Overall, however, the network of such mobile money agents is very dense. With a total population equivalent to half the German population and an area the size of two-thirds of Germany, there are 200,000 mobile money sale outlets in Uganda.

12 Cf. Suri, "Mobile Money."

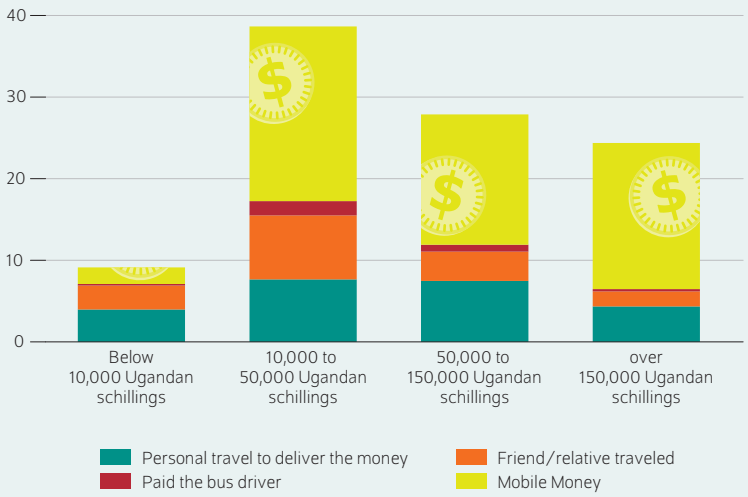
amount of money being transferred (Figure 2). For the largest transfer amounts of more than 150,000 Ugandan shillings, which corresponds to half the average monthly income for a household,[13] 73 percent of all transfers are made via mobile money. The shares are, again, slightly higher for individuals with higher levels of financial literacy.[14]

Despite this clear preference for mobile money when transferring money, its market potential has not yet been fully exploited. When asked how much they would pay for a mobile money transaction, an average of over 50 percent of small business owners say they want to process transactions at the fees actually charged by mobile money providers. For higher transaction amounts, it is more than 70 percent of all respondents.

The fees for mobile financial services follow a step function. In percentage terms, fees decrease the higher the transaction amount, whereas micro-transfers in the single-digit euro range are relatively expensive.[15] Significant here is the difference in the willingness to pay depending on how the fees are presented (Table 2). In the case of small transfers or cash withdrawals, indicating the fees in absolute Ugandan schillings increases the willingness to pay. In contrast, for medium-sized or large transfers or cash withdrawals, the willingness to pay is higher when the fees are presented as a percentage and not in absolute Ugandan schillings. This indicates that many respondents have issues properly understanding percentages in this context.[16] Individuals with more financial literacy show a higher willingness to pay—five percentage points on average—for almost all transactions. However, an individual's current level of financial literacy does not seem to fully address the comprehension issues described above, as the differences in willingness to pay depending on how the fees are presented remain.

Figure 2

Frequency of transactions according to transaction type and overall transaction amount
In percent of all transfers made



Note: One euro is equal to 4,090.05 Ugandan schillings (as of May 15, 2020).

Source: Authors' own calculations.

Mobile money is most commonly used for transactions of over 10,000 Ugandan schillings compared to other amounts.

Economic improvements due to mobile money

Mobile money makes two major contributions to economic welfare: it fosters financial development and, in particular, it helps buffer major negative shocks.[17]

Concerning financial development, two aspects must be highlighted. First, it has already been documented how mobile money contributes to financial inclusion; even low-income households profit from regulated, secure financial services. The second aspect is increased competition. Mobile money is typically provided by "new" providers on the financial market, specifically by telephone companies. These new competitors force the established credit institutions to act. In Kenya, for example, credit institutions have responded to this increased competition by commissioning local agents to provide similar services as the numerous small telephone provider sales outlets (which handle cash transactions for the mobile money providers). Their network of contact points has thus become much more dense,[18] which contributes to competition. It is also advantageous in this respect if there are several providers of mobile money and not just one monopoly.

Mobile money also has positive effects beyond the financial sector. This is best documented in the literature by payments to areas affected by natural disasters, thus allowing a reliable attribution of causation.[19] In addition, there is further concrete evidence of positive effects, such as general risk sharing and consumption smoothing,[20] remittances from family members working far away from their family,[21] and additional

13 Cf. Uganda Bureau of Statistics, *Uganda National Household Survey 2016/2017* (Kampala, Uganda: 2018) (available online).

14 The difference between the transfers is eight percentage points between the individuals with the highest and lowest level of financial literacy.

15 One euro is equivalent to around 4,000 Ugandan schillings.

16 See also Marianne Bertrand and Adair Morse, "Information Disclosure, Cognitive Biases, and Payday Borrowing," *The Journal of Finance* 66, no. 6 (2011): 1865–1893. In their study, the authors show that individuals less frequently take out payday loans when the costs are presented to them not only in percentage terms, but also in absolute amounts of money.

17 The financial consequences of the introduction of cell phones is only one part of its positive effects. Cf. Jenny C. Aker and Isaac M. Mbiti, "Mobile Phones and Ecnomic Development in Africa," *Journal of Economic Perspecives* 24, no. 3 (2010): 207–232.

18 Cf. Suri, "Mobile Money," pg. 507.

19 Cf. for example Joshua E. Blumenstock, Nathan Eagle, and Marcel Fafchamps, "Airtime Transfer and Mobile Communications: Evidence in the Aftermath of Natural Disasters," *Journal of Development Economics* 120 (2016): 157–181.

20 William Jack and Tavneet Suri, "Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution," *American Economic Review* 104, no. 1 (20˙4): 183–223.

21 Cf. for example Ggombe Kasim Munyegera and Tomoya Matsumoto, "Mobile Money, Remittances, and Household Welfare: Panel Evidence from Rural Uganda," *World Development* 79 (2016): 127–137.

Table 2

Willingness to pay for mobile money services
Share of respondents who would be willing to carry out a transaction at the actual fees charged (depending on how the fees are presented)

	Transfer to an account with the same provider		Transfer to an account with another provider		Withdraw cash	
Transfer amount	Costs in percent	Costs in percent and Ugandan schillings	Costs in percent	Costs in percent and Ugandan schillings	Costs in percent	Costs in percent and Ugandan schillings
10,000 Ugandan schillings	58	67	34	36	61	78
50,000 Ugandan schillings	80	75	71	65	79	71
150,000 Ugandan schillings	85	89	79	73	79	68

Source: Authors' own calculations.

savings.[22] Overall, there are estimates for Kenya that indicate the poverty rate has reduced by two percentage points.[23]

In addition to these successes, there are sometimes worries that mobile money could disturb monetary policy, as it creates additional money. However, this is not actually true, as a customer acquires credit by depositing cash with a provider's agent, i.e., they exchange assets. This means that there is more money in circulation for the time being (if mobile money is included), but it is not relevant for money supply definitions that aim at the overall economic demand. It is similar to someone depositing cash into their checking account in Germany; that does not mean more money is in circulation. There is also no evidence that mobile financial services will destabilize the monetary system because they are offered via telephone providers and thus outside the regulated sector. Rather, two new studies show that mobile money contributes to an expansion of the observed and regulated sector.[24]

However, mobile money can actually influence monetary policy via two other mechanisms. One the one hand, it is argued that using cash for monetary transactions increases the speed of circulation. On the other hand, now that mobile money providers offer loans, money is generated.

What still needs to change?

For every success mobile money has brought the respective societies, there is still room for improvement. In particular, four areas must be focused on:

(1) A topic not often discussed is the concern about possible "bank runs," or the widespread and unexpected desire to exchange mobile money into cash. Of course, the sale outlets do not keep all deposits made in cash; there would be too high a risk of theft and loss on interest. Consequently, they manage their cash holdings and may run into liquidity problems in the event of a mass withdrawal. Here, supervisory authorities should operate with some form of deposit insurance to minimize the probability of a run and mitigate the resulting consequences if necessary.[25]

(2) A somewhat surprising finding is the relatively low use of mobile money relative to its possibilities, as almost everyone has a mobile money account. In the target group from western Uganda analyzed in this study, over a fourth of the population surveyed was unbanked, i.e., had no access to the formal financial sector. Currently, it is not entirely clear what is preventing more widespread use. It is possible the fees are acting as a deterrent, especially for small customers. Fees range up to ten percent of the transaction, which would be considered prohibitively high in Germany. To combat this issue, policymakers could either try to increase competition or set targets related to distribution policy.[26] An interesting development can be observed over the course of the 2020 corona pandemic: In order to encourage cashless payments, especially for everyday purchases, many mobile money providers have reduced or completely suspended fees for smaller transactions that were previously particularly expensive relative to the transaction volume. The situation is similar in Uganda: MTN, the largest telephone and mobile money provider in the country, charges no fees for transactions of less than 30,000 Ugandan schillings (around seven euros).[27] It remains to be seen whether this will lead to permanently lower costs.

(3) Related to this, consumer protection is another issue. There are concerns that the actual fees are not clear to many customers.[28] This study has shown, in line with a study from the United States, that the willingness to pay is higher when costs are expressed as a percentage rather than as absolute sums of money. A higher level of financial literacy would certainly help address this issue.

(4) Many countries, such as Uganda and almost all OECD countries, invest systematically in financial literacy training for their populations. However, mobile money is barely mentioned in the standard curriculum; in the future, there must be a stronger focus on mobile money in financial literacy

22 Cf. the overview in Jana Hamdan, "The Impact of Mobile Money in Developing Countries," *DIW Roundup* 131 (available online).

23 Cf. Tavneet Suri and William Jack, "The Long-run Poverty and Gender Impacts of Mobile Money," *Science* vol. 354, no. 6317 (2016): 1288–1292.

24 Cf. GSM Association, *The impact of mobile money on monetary and financial stability in Sub-Saharan Africa* (2019) (available online) and Joseph Mawejje and Paul Lakuma, "Macroeconomic Effects of Mobile Money: Evidence from Uganda," *Financial Innovation* 5, no. 23 (2019) (available online).

25 Like banks, mobile money providers are subject to state regulation, but to a lesser extent so far.

26 At the end of 2019, after data collection for this study ended, both main providers for mobile money actually lowered their costs due to the increased competition. The costs for small transaction amounts, which are particularly high in percentage terms, were reduced by up to 50 percent.

27 GSM Association, *Mobile money recommendations to central banks in response to COVID-19* (available online).

28 *The Economist* also warns that mobile money users can get into debt very quickly due to the loans offered. The Economist, "Not so fast. Borrowing by mobile phone gets some poor people into trouble," (2018) (available online).

training.[29] As a result, more people would presumably use mobile money and users would be able to assess the various offers correctly and use them appropriately.

29 A US study on young users of mobile money also points this out, see Annamaria Lusardi, Carlo des Bassa Schersberg, and Melissa Avery, "Millennial Mobile Payment Users: A Look into their Personal Finances and Financial Behaviors," *GFLEC Insights Report* (Washington, DC: 2018). See also this OECD policy brief: OECD, *G20/OECD INFE Policy Guidance on Digitalisation and Financial Literacy* (2018) (available online).

Katharina Lehmann-Uschner is a research associate in the Macroeconomics Department at DIW Berlin | klehmann@diw.de

Lukas Menkhoff is head of the Macroeconomics Department at DIW Berlin | lmenkhoff@diw.de

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LEGAL AND EDITORIAL DETAILS

DIW Berlin — Deutsches Institut für Wirtschaftsforschung e. V.
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www.diw.de
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