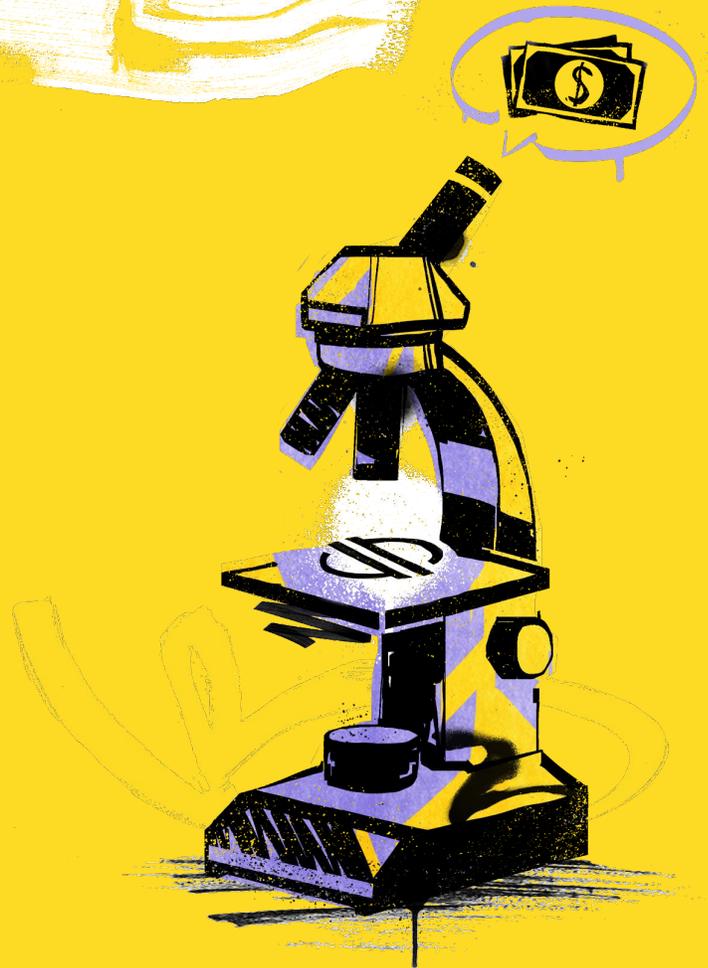


Whitepaper

BLOCKCHAIN AS A MEANS TO BROADEN DIGITAL FINANCIAL INCLUSION?

Exploring the role of blockchain-based solutions in promoting greater financial access and usage



Blockchain for Financial Inclusion

WHAT IS THE VALUE OF DIGITAL FINANCIAL INCLUSION?

Financial inclusion plays a significant role in driving social empowerment, fostering economic growth, and achieving sustainable development.

Financial inclusion means that individuals and Micro, Small, and Medium Enterprises (MSMEs) have access to useful and affordable financial products and services that meet their needs, and those products and services are delivered in a responsible and sustainable way.¹ Data shows that access to the formal financial system supports productivity, growth, job creation, and most importantly, reduced inequality and improved livelihoods.²

Access to formal financial services is the first step towards financial inclusion but access alone is insufficient to achieve inclusion.

Account ownership is the first step for individuals and MSMEs to access formal financial services. Evidence shows that households and businesses that have access to financial services such as payments, savings accounts, and credit are better able to withstand financial shocks and smooth consumption than those that do not.³ Formal financial services provide security and privacy, and for recipients, can also be cheaper than receiving payments in cash. In Liberia, for example, by receiving their salaries as digital deposits rather than in cash, teachers saw the cost of collecting their money fall by 92 percent, from \$25 per paycheck to \$2, and they were able to spend more time in the classroom because they no longer had to take time off to travel into town to collect their wages.⁴ Financial access alone, however, is insufficient to achieve inclusion. In order to achieve broader financial inclusion, individuals and MSMEs must not only have access to accounts, but also the ability to regularly use a broad range of financial products and services that are offered responsibly and meet their daily needs. For instance, if an individual has access to a bank account but withdraws the funds into cash for day-to-day needs, inclusion goals are still not being met. The goal of financial inclusion is for account owners to benefit from the use of accounts for digital payments, savings, and appropriate credit because such uses provide a range of positive benefits, which extend far beyond convenience. For this reason, access to formal financial services provides an important starting point for the financially excluded but achieving inclusion requires individuals to also incorporate formal financial products and services into their daily lives.

Digital technology and widespread access to mobile phones and the Internet is driving improved access to and usage of financial services.⁵

Although account ownership at a financial institution or mobile money provider globally increased by 50 percent in the 10 years spanning 2011 to 2021, approximately 1.7 billion adults worldwide still do not

1. World Bank Group, [Financial Inclusion Portal](#)

2. Marvalle, A., Pandiella, A., Expanding access to finance to boost growth and reduce inequalities in Mexico (2022); Adan Guyo Shibia. (2023) Firms' use of formal and informal finance in coping with droughts and floods: experiences from Kenya. *Climate and Development* 0:0, pages 1-16.

3. Moore, Danielle, Zahra Niazi, Rebecca Rouse, and Berber Kramer. "Building Resilience through Financial Inclusion: A Review of Existing Evidence and Knowledge Gaps." Financial Inclusion Program, Innovations for Poverty Action, Washington, DC. 2019

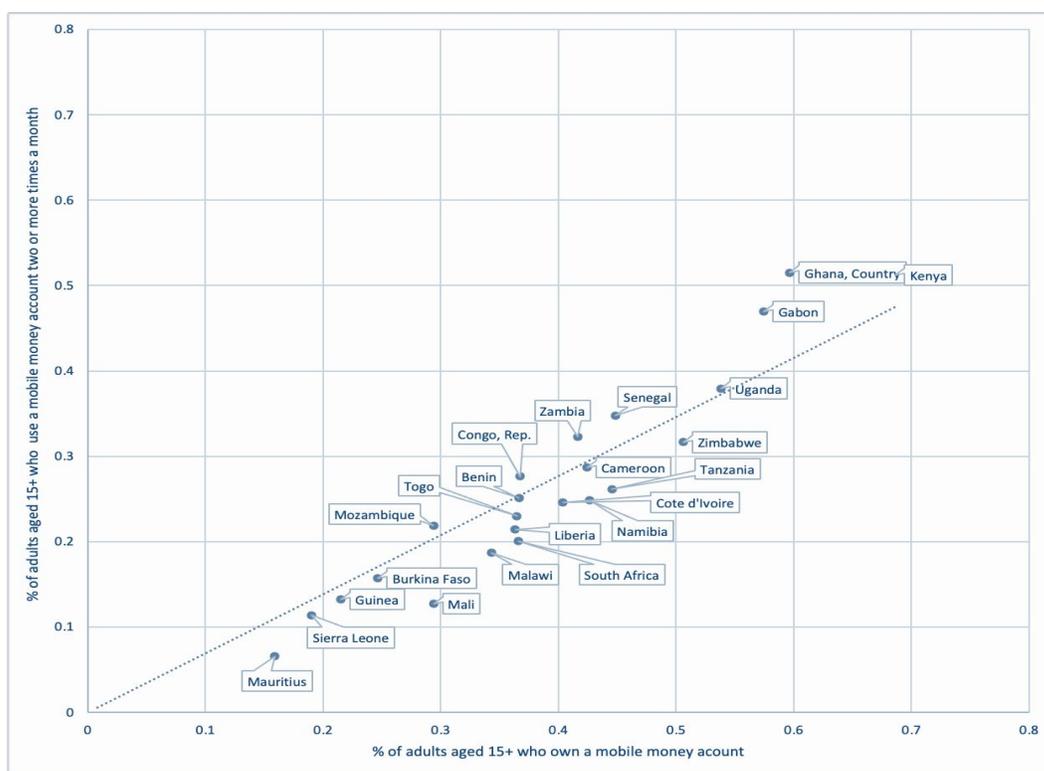
4. Cost decrease includes externalities such as transportation and opportunity costs (and others) of collecting cash instead of receiving a digital deposit. Teachers were also able to avoid traveling with cash in their pockets, a safety benefit confirmed by research that associates digital payments with reductions in crime ([The Global Findex Database 2021](#)).

5. Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. (2022). The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19. Washington DC: The World Bank Group; [The Global Findex Database 2021](#)

have a basic account.⁶ Access needs to be complemented with usage of financial services to achieve financial inclusion. Data shows that 64.1 percent of adults have made or received digital payments.⁷ Digital technology and connectivity has helped facilitate financial inclusion, both for accessing a deposit account and using it through digital payments which is deemed as the entry point of the formal financial system. Mobile money services offered by non-bank financial entities like telecommunications companies or fintechs that partner with mobile network operators have become an important enabler of financial inclusion in Sub-Saharan Africa, especially for women, both as a driver of account ownership and usage through mobile payments, savings, and borrowing.⁸ Data from 2021 shows that 79% of adults in emerging economies have a mobile phone, and 1.1 billion unbanked adults have a mobile phone.⁹ In addition, COVID-19 boosted the adoption of digital financial services: about 40 percent of adults in developing economies, excluding China, who made a digital merchant payment using a card, phone, or the Internet did so for the first time after the start of the pandemic.¹⁰

Figure 2: Correlation between access to and use of a mobile money account in Sub-Saharan Africa in 2021

Source: Global Findex Database (2021)



Further progress is needed to achieve broader financial inclusion, especially in emerging economies in which a significant share of economic activity is informal.

While many factors contribute to financial exclusion, informality can be a key barrier.¹¹ The informal economy is broadly defined to encompass “all economic activities by workers and economic units that are in law or in practice not covered or insufficiently covered by formal arrangements”.¹²

6. Ibid

7. Ibid

8. Brookings Institute, Technology impact on financial inclusion is not what you think, 2022

9. Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. (2022). The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19. Washington DC: The World Bank Group; [The Global Findex Database 2021](#)

10. Ibid

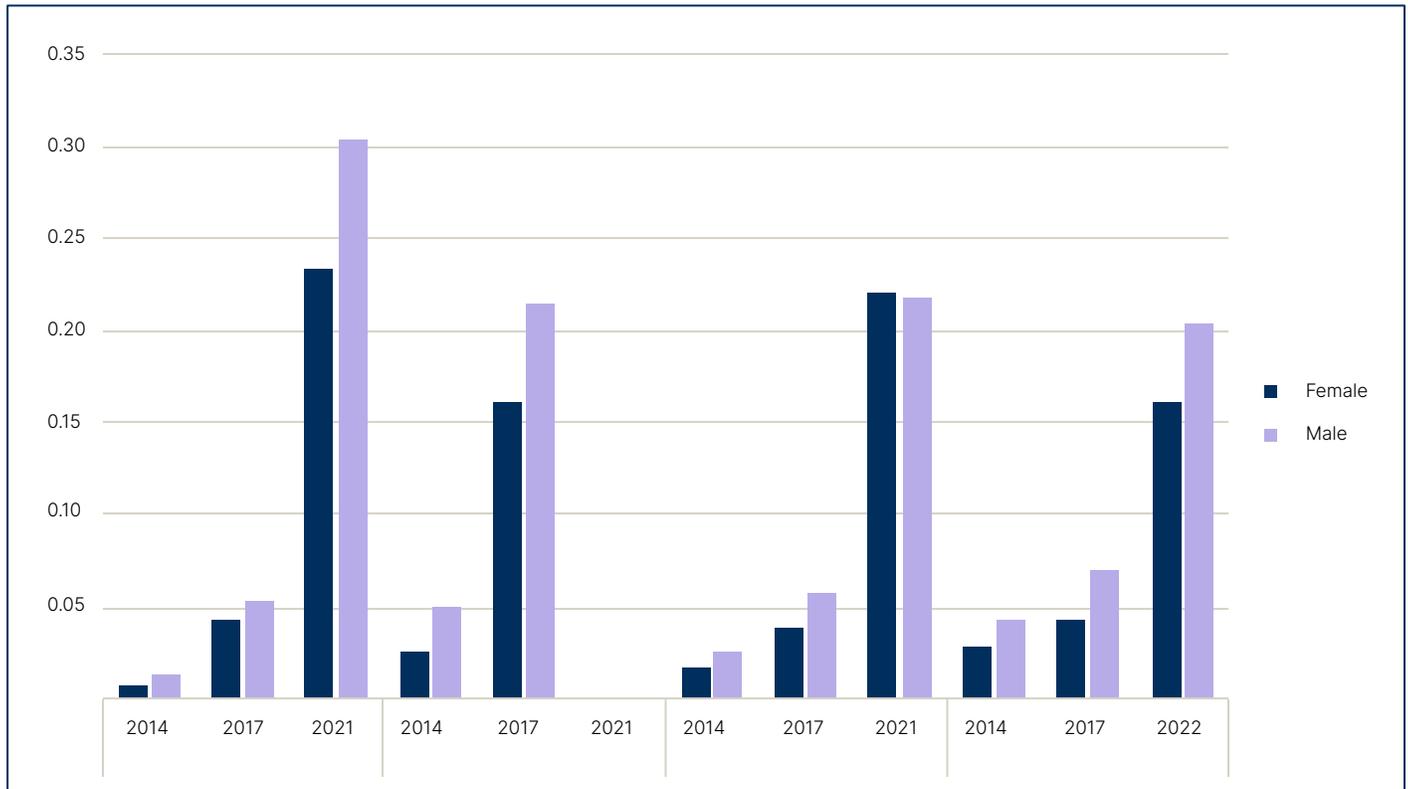
11. [G20 Policy Guide: Digitisation and informality: Harnessing digital financial inclusion for individuals and MSMEs in the informal economy](#)

12. International Labor Organisation (2013). Decent Work and the Informal Economy. Geneva: United Nations.

Entities such as banks and mobile money providers create formal relationships with their users. However, around 80 percent of total MSMEs are informal.¹³ Individuals and MSMEs operating in the informal economy find it particularly difficult to access and use formal financial services. Those in the informal sector –such as seasonal agricultural workers, street vendors, farmers, and domestic workers– face difficulties accessing formal lending and expanding their businesses due to a lack of collateral, credit history, and strict onboarding requirements, among others. Financial exclusion of both individuals and MSMEs is more widespread in countries where the size of the informal economy is greater.¹⁴ Additionally, women make up a disproportionate share of workers in the informal sector. Although the gender gap in account ownership across developing economies has fallen, it remains at 6 percentage points.¹⁵ As a result, women often have less access to financial services than men.¹⁶ Women in emerging economies also see lower levels of savings, and lower use of formal lending channels.¹⁷

Figure 2: Percentage of adults aged 15+ who own a mobile money account

Source: Global Findex Database (2021)



13. MSME Finance Gap Database. Washington DC: The World Bank Group.

14. Medina and Schneider (2017); G20 Global Financial Inclusion Indicators; World Bank Global Payment Systems Survey

15. Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. (2022). The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19. Washington DC: The World Bank Group; [The Global Findex Database 2021](#)

16. Klugman, Jeni and Yvonne Quek (2018). Women's Financial Inclusion and Economic Opportunities in Fragile and Conflict-Affected States An overview of challenges and prospects. Georgetown University's Institute for Women, Peace and Security

17. The World Bank Group, [Gender Data Portal](#)

Figure 3: Percentage of informal employment in male and female workers in emerging economies in 2021

Source: International Labour Organization Database (2021)

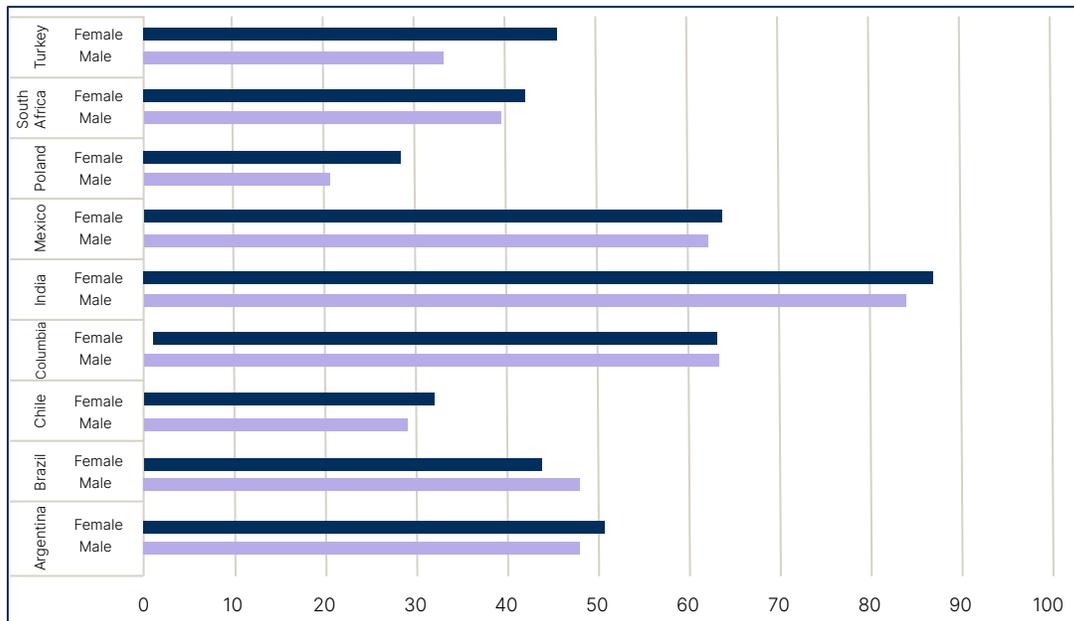
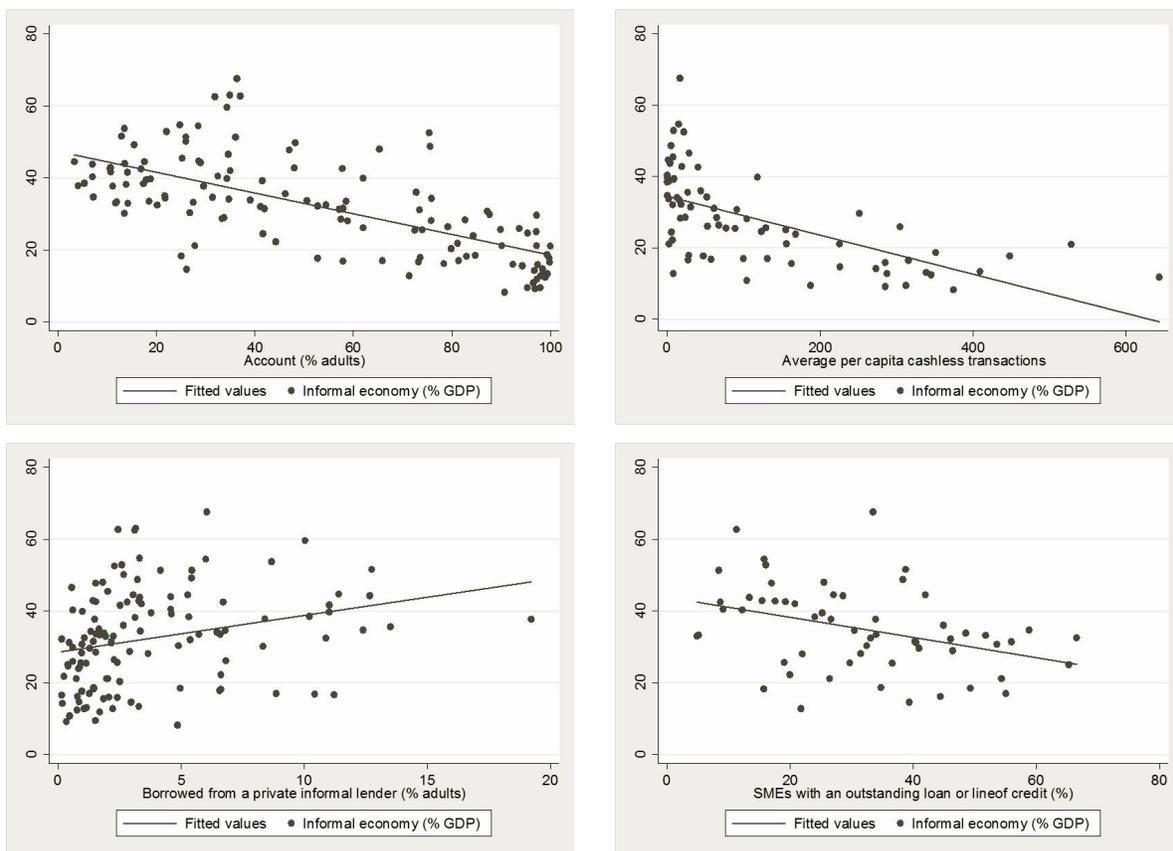


Figure 4:¹⁸ Correlation between financial exclusion indicators and level of informality

Source: G20 Global Financial Inclusion Indicators; World Bank Global Payment Systems Survey



18. Medina and Schneider (2017)

Access to formal financial services is the first step towards financial inclusion.



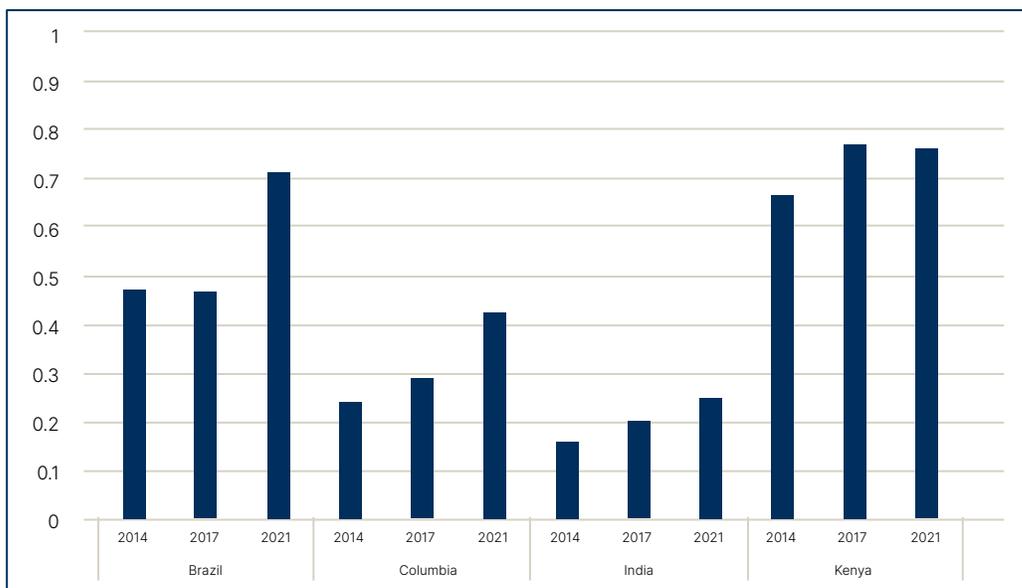
Affordable payment solutions are the entry point to the formal economy for the unbanked and underbanked, and can build the foundation from which individuals and MSMEs not only have access to financial services, but also appropriately and consistently use those services. Digital payments are deemed as the entry point to the formal financial system, particularly for MSMEs in emerging economies. Mobile money and innovative payments products have typically proven to be more affordable than traditional solutions for merchants. QR payments and mobile point of sale terminals have become a common means of payments and acceptance for consumers and retailers. These solutions have helped reduce the cost of acceptance below 1% in emerging economies¹⁹ and allowed informal workers such as street vendors to start transacting in the formal economy. By accepting digital payments, merchants can build a credit history through their payments behaviors that can lead to the access to further financial services such as lending, savings, and insurance. Technology is helping to reduce the cost of usage and acceptance of digital domestic and cross-border payments, to increase account ownership, to promote the access to consumer and MSMEs lending, to develop inclusive insurance, specifically for health and climate risk, and overall, to foster innovative product design and development.

Although cash remains the main means of payments in emerging economies, digital payments are supporting broader financial inclusion. About 100 million unbanked adults still receive a government payment in cash and about 230 million unbanked adults in the private sector are paid in cash.²⁰ A billion adults who have an account still pay utility bills in cash.²¹ The prevalence of cash for wage payments, government transfers, and domestic remittances has positive effects on financial inclusion as data suggests that receiving this type of payment digitally –rather than in physical cash– can catalyze the use of other financial services, such as storing, saving, and borrowing money.²²



Figure 5: Percentage of adults aged 15+ who made a digital payment

Source: Global Findex Database (2021)



19. The cost of accepting digital payments in Latin America has decreased from 3% to 0.6% through mobile money solutions such QR codes payments, peer-to-peer transactions, mobile point of sale terminals, among others.

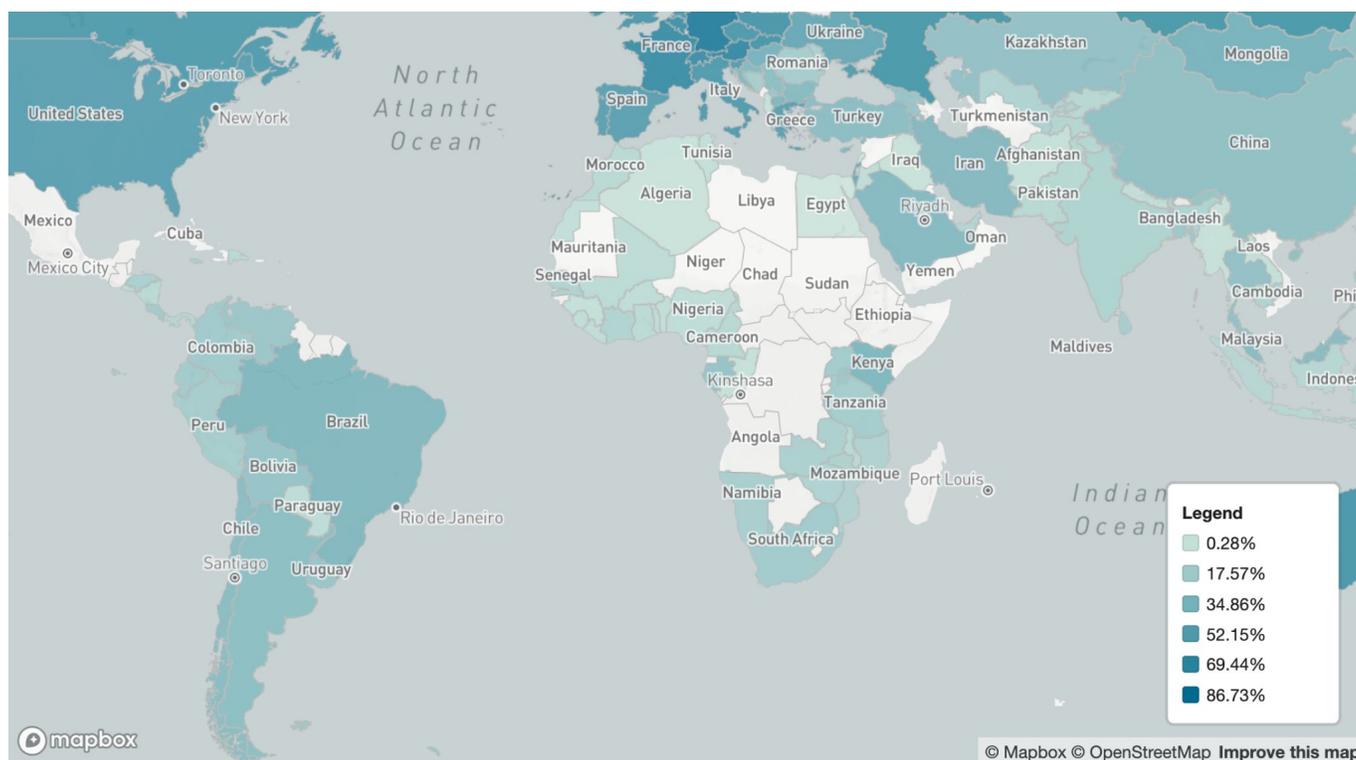
20. In countries like India that are rapidly becoming cashless societies, many digital payment initiatives are focused on capturing traditionally cash-intensive economies. For example, many rickshaw drivers now accept UPI payments via QR codes. Drivers can then withdraw cash from their digital wallet or refill their wallet through cash deposits as well.

21. Medina and Schneider (2017); G20 Global Financial Inclusion Indicators; World Bank Global Payment Systems Survey

22. Ibid

Figure 7: Percentage of individuals who made a utility payment using an account in 2021

Source: Global Findex Database (2021)



The cost for cross-border payments remains high. Despite the efforts of the international community to reduce the cost of payments, fees for accepting digital payments for merchants and to send funds across borders remain high. The global average cost of cross-border payments in Q4 2022 amounted to 6.24% of the total amount sent.²³ This is more than double the Sustainable Development Goal target of 3% by 2030.²⁴ And while the cost of cross-border payments varies by country and region, emerging markets tend to face higher costs than developed markets. Banks remain the most expensive type of service provider, with an average cost of 11.84%. Mobile money remained the least costly instrument to originate remittances and was also the least costly instrument to receive remittances.²⁵

HOW CAN BLOCKCHAIN-BASED SOLUTIONS ADDRESS FINANCIAL INCLUSION CHALLENGES?

Technology-enabled solutions, including those offered by blockchain technology, can promote access to and usage of financial services.

Technology has helped reduce the cost of usage and acceptance of digital domestic and cross-border payments, increase account ownership, promote access to consumer and MSMEs lending, develop inclusive insurance, and foster innovative product design and development.

23. The World Bank Group, [Remittances Prices Worldwide Quarterly](#), December 2022.

24. United Nations, [Sustainable Development Goals](#)

25. The World Bank Group, [Remittances Prices Worldwide Quarterly](#), December 2022. Researchers in Uganda found that adopting mobile money services increased the total value of remittances by 36 percent and was associated with a 13 percent increase in per capita consumption ([The Global Findex Database 2021](#)).



THE COST FOR CROSS-BORDER PAYMENTS REMAINS HIGH.

Blockchain-based solutions in particular can play an important role in enabling financial transactions that are more secure, cheaper, and more efficient than traditional alternatives, while providing new avenues into the global financial system. Solutions built on blockchain can also help job creation and business growth by expanding to new markets through payments solutions.²⁶

Box 1. Balancing innovation with consumer protection and privacy

While innovative technological solutions can promote financial inclusion, they can also invite risk for vulnerable consumers if adequate financial education and customer protections are not in place. Transparency and disclosure of terms and conditions are essential to ensure that users understand the cost²⁷, how their information is managed and their rights to terminate the contractual relationship with the financial entity, and protections to avoid overindebtedness and fraudulent transactions. Cooperation between industry and government stakeholders is needed to develop guiding principles that address consumer protection challenges regarding security, privacy, and disclosures and liability.

Blockchain-based digital wallets offer new avenues to access deposit accounts. One of the main challenges to advance financial inclusion is the onboarding process required by traditional financial institutions to verify and identify new users. This process tends to be burdensome for individuals and MSMEs, and is one of the drivers of financial exclusion. Innovative products like digital wallets have proven to be a simple-to-use tool for both consumers and merchants because they can reduce customer onboarding time and ease the cumbersome identity verification process. Further, digital wallets can be used not only to access a deposit account but also to store value, make both domestic and cross-border digital payments, build savings and income protection, and convert cash to digital assets and vice versa.

Box 2. Cash-to-digital asset conversions and income protection

Cash-to-crypto on-ramps

MoneyGram International and the Stellar Development Foundation in 2022 launched a first-of-its-kind global on-ramp service for digital wallets to create a bridge between cash and cryptocurrencies. The service utilizes the Stellar blockchain to enable seamless conversion between cash and digital assets, allowing cash funding and payout in different currencies of the consumer's choice, using a stablecoin for settlement purposes. This service represents an important innovation in bridging the gap between the physical and digital world, giving cash-dependent people a way into the digital economy.

26. World Economic Forum, Blog Series, [How blockchain accelerates small business growth and development](#), 2022

27. Lab experiments in Mexico and Peru found that presenting participants with simplified statements of key facts about credit and savings products was strongly correlated with choosing a financial product that best fit their needs. By contrast, financial literacy had a much weaker impact on good financial decisions ([Global Findex Database 2021](#))

Box 2. Cash-to-digital asset conversions and income protection

Income protection

Argentina has faced high rates of inflation over the past 10 years. To protect themselves from local currency devaluation, Argentines typically preserve their wealth by exchanging the Argentine peso for the U.S. dollar. This process usually involves holding onto the physical bills at home. This leaves them with no safe way to store or use their money. **Vibrant**, a digital wallet developed on the Stellar network by Sunship, Inc., a subsidiary of SDF, saw an opportunity to give Argentines an alternative means of protecting themselves from devaluation. Vibrant is designed to expand access to U.S. dollar-based stablecoins. Vibrant makes it possible for Argentines experiencing inflation to purchase and hold digital dollars quickly, cheaply, and easily.

Airtm is a blockchain-based digital wallet and peer-to-peer exchange platform that provides access to digital U.S. dollars to consumers and businesses throughout Latin America and other emerging markets. It enables consumers and businesses in emerging economies to exchange potentially devaluing currencies for other forms of money, such as U.S. dollars or cryptocurrencies, at the market rate.



Blockchain provides more affordable and efficient cross-border payments.

The cost of cross-border payments remains high for individuals sending personal remittances and for businesses exporting and importing goods or making inter-company payments and settlements. Financial entities using blockchain infrastructure have built products that facilitate more affordable and efficient cross-border transactions. Solutions built on blockchain can provide low-cost and faster payments than those products using traditional rails due to the reduction of intermediation. This allows for transactional cost savings for the sender and faster receipt of funds by the receivers. Lack of liquidity is still a challenge in the most expensive payments corridors. However, new products coming to market are designed to address these liquidity issues and lower the costs of remittances and business-to-business payments (see text box 3).

Box 3. Easing cross-border payments and liquidity challenges

Cross-border payments

In Spring 2023, two fintech companies, **FinClusive** and **Anclap**, announced the results of a limited-scope pilot focused on the US-Colombia remittance corridor, utilizing the Stellar blockchain.²⁸

28. [Blockchain remittances: A game changer for cross-border transfers](#), Stellar Development Foundation, SDF blog series, April 2023.

Box 3. Easing cross-border payments and liquidity challenges

For this particular corridor, the average cost of sending remittances via traditional methods is over 5% of the amount sent, according to the World Bank.²⁹ During this pilot, which utilized blockchain technology and stablecoins to send remittances between individuals in the US and Columbia, the average cost for a remittance was roughly half that figure. The participating companies believe that these costs could be further reduced as transaction volumes increase.

BOSS Money is a digital wallet built on the Stellar blockchain that enables customers in ten countries in Africa to store savings, send and receive money in the form of digital assets across borders, make payments, and manage money from a mobile device without the need for a smartphone. BOSS Money's wallet is designed for refugees, cross-border traders, and other migrant populations. Users can save money, send and receive it between families and friends, exchange in different currencies, and cash out in local payment systems.

Airtm is also facilitating international payments for payroll. This solution is focused on micro-work in emerging markets. Beneficiaries are paid with Circle's fully reserved digital dollar USDC, which they can convert to local currency. The Airtm wallet is able to receive international payments as well as make local payments and add funds.

Liquidity provision

Arf serves as a regulated liquidity and settlement platform for licensed financial institutions in cross-border payments. In 2022, Arf introduced a short-term liquidity solution using USDC for cross-border payments. Within eight months of its launch, the company has extended over \$270 million in loans to financial institutions, resulting in a cumulative on-chain USDC volume of \$370 million. This solution demonstrates how blockchain and stablecoins can address financial inclusion challenges arising from liquidity constraints while making settlements more transparent, traceable, and real-time.

Real-time payments settlement on blockchain technology. In the last twenty years, central banks and financial regulators have focused on modernizing the current payments infrastructure to develop real-time or instant payments systems. Blockchain technology can also be used for processing and settling payment transactions. Generally, payments settlements are not automated and can take more than one business day to settle. This brings delays on the availability of funds for consumers and retailers. Blockchain technology can be used as a settlement layer processing real-time payments both in the back-end and front-end for the benefits of payment services providers and, more importantly, for consumers and MSMEs.

29. World Bank Group, Remittances Prices Worldwide, Payment corridor: United States to Colombia.

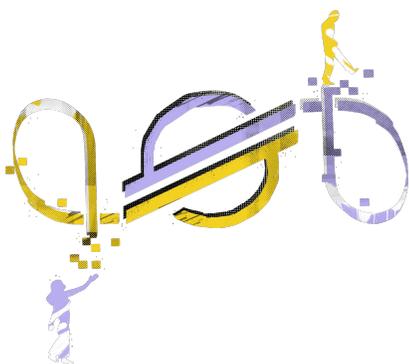
Box 4. Real-time payments using tokenized deposits in Ukraine

In December 2021, a large commercial bank in Ukraine conducted a pilot to issue electronic money denominated in Hryvnia – Ukraine’s local currency – on the Stellar blockchain. In early 2023, [the results of that pilot project](#) were published. The report highlights the advantages of using blockchain technology for the issuance of a digital Hryvnia:

- It creates Ukraine’s first real-time payment system;
- It provides transparency, traceability, and improved auditability of funds, and allows for real-time visibility into how funds move;
- It supports more efficient distribution of aid and recovery funds to Ukraine, giving confidence to governments and donors that reconstruction funds are used as intended;
- It supports financial inclusion objectives by making financial services available to the unbanked; and
- It was developed by and for Ukrainians – reflecting what the country needs at this pivotal moment.

Currently, **DCM** has developed a platform to issue tokenized deposits of Hryvnia which would allow for consumer and merchant adoption of blockchain bank accounts. Local commercial banks in Ukraine are integrating with this system. Blockchain will also enable more efficient distribution of donor support to Ukraine. The digital Hryvnia can be used for cash-transfers of humanitarian aid to internally displaced persons and to facilitate reconstruction and recovery in Ukraine following Russia’s invasion.

Transparency and traceability in cash-based transfers and portability of funds.



In times of distress, vulnerable groups need to receive relief funds immediately in a form that is both secure and portable. Portability allows beneficiaries to transact worldwide if they are forced to relocate due to a conflict or natural disaster. Humanitarian aid organizations and governments can implement cash-transfer programs that are dispersed using blockchain-based solutions. Blockchain technology provides further transparency and traceability to the financial system. Transactional data (and not private data) on the ledger is public and can be used for monitoring the life-cycle of a cash-transfer operation aimed for relief, aid, or welfare assistance. Blockchain technology can also contribute to reducing fraud because it relies on a transparent, immutable and traceable ledger that cannot be altered, deleted or manipulated.³⁰

30. Government payments are one category of digital payments known to produce benefits for both the sender and the recipient. In India, internal fraud and leakage from pension payments dropped by 47 percent when the country transitioned from cash to sending payments to biometric smart cards. Recipients also spent less time collecting payments, and they received more money because of reductions in fraud. The government saved millions of dollars annually in administrative costs—more than enough to cover the cost of the new system ([The Global Findex Database 2021](#))

Box 5. Humanitarian Aid Disbursement via the Stellar Network

In collaboration with leading humanitarian organizations, SDF supported the launch of Stellar Aid Assist (SAA) in December 2022. SAA is a disbursement system built on the Stellar blockchain to help humanitarian aid organizations deliver urgently-needed cash assistance to vulnerable populations quickly and transparently. SAA enhances aid organizations' existing cash assistance efforts by leveraging digital wallets and a digital asset, such as USDC.

The use of a digital dollar provides a stable store of value and gives individuals the ability to exchange digital dollars for local currency anywhere in the world through the MoneyGram network or other available off-ramps. Individuals remotely receive the digital dollars and hold them over time in a digital wallet or cash them out, giving aid organizations an alternative to physical cash or traditional financial payment rails. It does not require a bank account, debit card, or credit card and provides recipients with a more secure place to hold and transport funds until cash is needed, and can be used in additional geographies beyond Ukraine.

With 1.4 billion people unbanked worldwide and more than 103 million people forcibly displaced, SAA presents a critical new option for individuals who have historically been limited by the accessibility and portability challenges of traditional payment methods, like cash and local currency bank transfers. Aid recipients can manage their funds entirely on their phone, wherever they go, and are not bound to a specific geographic location. Additionally, the use of the Stellar public blockchain provides greater transparency for aid organizations and their donors through the traceability and auditability of funds.

UNHCR was one of the humanitarian organizations that used the SAA for aid disbursement and has begun to expand its use of SAA in Ukraine and beyond. In March 2023, **UNHCR** won the award for "Best Impact Project Award" for their SAA pilot project to

disburse cash on Stellar to people impacted by the war in Ukraine. This award recognizes projects delivering significant social impact using blockchain technology and acknowledges UNHCR's commitment to exploring innovative solutions to assist refugees and forcibly displaced people.

In late December of 2022, the **International Rescue Committee (IRC)** piloted the use of SAA and digital dollars to disburse cash assistance to refugees and internally displaced persons in Ukraine. The pilot proved to be successful in providing a free, fast, and innovative approach to cash distribution. The IRC is currently exploring the viability of launching blockchain-based cash transfers in additional geographies using SAA.



31. Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. (2022). The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19. Washington DC: The World Bank Group; [The Global Findex Database 2021](#)

32. The United Nations Refugee Agency, [Refugee Data Finder](#)

Blockchain for Financial Inclusion

CONCLUSION

Financial inclusion plays a significant role in driving social empowerment, and advancing economic growth and sustainable development.

Digitalization is helping to expand access to and usage of formal financial services, specifically in emerging economies and for individuals and MSMEs in the informal sector. Digital payments can be a key entry point to the formal economy, and can help ensure individuals and MSMEs not only have access to financial services, but to a broad range of financial services, including lending, savings, and insurance products.

Technology-enabled solutions, including those offered by blockchain technology, can play a critical role in addressing access and usage issues by enabling financial transactions that are more affordable, more secure, and more efficient than traditional alternatives and by creating new inroads to the global financial system. Blockchain-based digital wallets provide new avenues to access deposit accounts and more affordable and faster cross-border payments. Blockchain can also contribute to achieving real-time payment settlements, and traceable and transparent cash-transfers to vulnerable people.

Cooperation between industry and government stakeholders is needed to develop guiding principles for innovative financial technologies, especially blockchain, that foster innovation, competition, and transparency. Blockchain-based financial services have the potential to be transformative for the unbanked and underbanked, and a collaborative public-private approach would help build a meaningful framework that both protects vulnerable consumers and supports those companies bringing innovative products and services to market.

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